City Council
Regular Meeting
AGENDA

Civic Center Council Chamber ♦ 300 Seminary Avenue ♦ Ukiah, CA 95482
Register for Ukiah City Council Regular Meeting at:

https://attendee.gotowebinar.com/rt/3875223642797335563

After registering, you will receive a confirmation email containing information about joining the webinar. Alternatively, you may view the meeting (without participating) by clicking on the name of the meeting at www.cityofukiah.com/meetings.

August 5, 2020 - 6:00 PM

1. ROLL CALL

2. PLEDGE OF ALLEGIANCE

3. PROCLAMATIONS/INTRODUCTIONS/PRESENTATIONS

4. PETITIONS AND COMMUNICATIONS

5. APPROVAL OF MINUTES

5.a. Approval of the Minutes for the July 15, 2020, Regular Meeting.

Recommended Action: Approve the Minutes of July 15, 2020, Regular Meeting, as submitted.

Attachments:

1. 2020-07-15 Draft Minutes

6. RIGHT TO APPEAL DECISION

Persons who are dissatisfied with a decision of the City Council may have the right to a review of that decision by a court. The City has adopted Section 1094.6 of the California Code of Civil Procedure, which generally limits to ninety days (90) the time within which the decision of the City Boards and Agencies may be judicially challenged.

7. CONSENT CALENDAR

The following items listed are considered routine and will be enacted by a single motion and roll call vote by the City Council. Items may be removed from the Consent Calendar upon request of a Councilmember or a citizen in which event the item will be considered at the completion of all other items on the agenda. The motion by the City Council on the Consent Calendar will approve and make findings in accordance with Administrative Staff and/or Planning Commission recommendations.

7.a. Report of Disbursements for the Month of May 2020.

Recommended Action: Approve the Report of Disbursements for the Month of May 2020.

Attachments:

1. May 2020 Summary of Disbursements
2. Account Codes for Reference
3. Object codes for Reference
4. May 2020 Disbursement Detail

7.b. Notification of Grant Funds Received and Disbursed Related to the Proposition 84 Integrated Regional Water Management Program Funding Source for the Construction of Water Wells 4 and 9 and the Recycled Water Project.

Recommended Action: Receive notification of grant funds received and disbursed related to the Proposition 84 Integrated Regional Water Management Plan funding source for the Construction of Wells 4 and 9 and the Recycled Water Proejct

Attachments: None

7.c. Adoption of Resolution Establishing Fee for Mailing the Agenda or Agenda Packet, Per the Ralph M. Brown Act, Section 54954.1.

Recommended Action: Adopt resolution establishing fee for mailing the agenda or agenda packet, per the Ralph M. Brown Act, Section 54954.1.

Attachments:

1. Proposed Resolution

7.d. Approval of Amendment No. 2 with SHN Consulting Engineers and Geologists in the Amount of $10,000 for Additional Design Services for Pressure Zone 2 South Reservoir and Approval of Corresponding Budget Amendment.

Recommended Action: Approve Amendment No. 2 with SHN Consulting Engineers and Geologists in the Amount of $10,000 for Additional Design Services for Pressure Zone 2 South Reservoir.

Attachments:

1. Agreement w SHN
2. Amendment 1- Signed
3. SHN Amendment 2

7.e. Approve Change Order to Purchase Order #46701 for the installation SCADA Server UPS Replacement Batteries to JM Integration in the Amount of $7,603.19, to Bring the New Total Purchase Order to $26,823.46.

Recommended Action: Approve change order to Purchase Order #46701 to JM Integration in the amount of $7,603.19, to bring the new total Purchase Order to $26,823.46, to install SCADA Server UPS Replacement Batteries.

Attachments:

1. Proposal Jun 23 2020
2. Proposal Jul 22 2020 (002)

7.f. Authorize City Manager to Negotiate and Execute a Subrecipient Agreement with North Coast Opportunities, for Implementing the City's Tenant Based Rental Assistance Program; and Approve a Corresponding Budget Amendment.

Recommended Action: Authorize the City Manager to negotiate and execute a subrecipient agreement with North Coast Opportunities, for implementing the City's Tenant Based Rental Assistance Program; and approve corresponding budget amendment.

Attachments:

1. Draft Subrecipient Agreement- COVID TBRA Program

7.g. Approval of Conditional Award of Contract to Center for Economic Development for Implementation of Community Development Block Grant (CDBG) Microenterprise Technical Assistance Services in the Amount of up to $140,000, and Authorize the City Manager to Negotiate and Execute Agreement.

Recommended Action: Approve award of contract to the Center for Economic Development for implementation of CDBG Microenterprise Technical Assistance Services in the Amount of up to $140,000, conditioned upon the City's CDBG Microenterprise Technical Assistance Services application receiving an award of funding under the 2019-2020 CDBG Notice of Funding Availability, and authorize the City Manager to negotiate and execute agreement.

Attachments:

1. RFP - CDBG META Program Op - Final
2. Center for Economic Development_City of Ukiah_Microenterprise Proposal
3. Proposal Evaluation Summary - MEA Operator

7.h. Approval of Notice of Completion for Golf Course Storm Drain Project, Specification 19-07, Change Orders and Budget Amendment in the Amount of $35,955.26.

Recommended Action: 1. Accept the work as complete. 2. Direct the City Clerk to file the Notice of Completion with the County Recorder for Golf Course Storm Drain Replacement, Specification No.19-07. 3. Approval of Change Orders. 4. Approval of Budget Amendment in the Amount of $35,955.26

Attachments:

1. Contract Change Order #1-4
2. Notice of Completion-Spec 19-07
3. Invoices- Valley Paving, Tayman Park Golf Group
4. Contract_1920255

7.i. Approval of Contract with Stone Creek Environmental Consulting in the Amount of $39,600 for Engineering Services Related to the Municipal Separate Storm Sewer Systems Permit Issued by the North Coast Regional Water Quality Control Board.

Recommended Action: Approve contract with Stone Creek Environmental Consulting in the amount of $39,600 for Engineering Services related to the City's Stormwater Permit.

Attachments:

1. 200715 Ukiah Storm Water Support LP

7.j. Approval of Plans and Specifications for the Museum Roof Replacement Project, Specification No. 20-10, and Authorize Staff to Issue the Request for Bid.

Recommended Action: Approve the plans and specifications for the Museum Roof Replacement Project, Specification No. 20-10, and authorize staff to issue the Request for Bid.

Attachments:

1. Spec 20-10 Museum Roof Replacement

7.k. Approve Amendment to the Original Agreement with Coastland Civil Engineering for Professional Services Related to Clara Avenue Phase 2 Improvement Project to be Competitive for CDBG Funding and Corresponding Budget Transfer.

Recommended Action: Approve contract amendment to agreement with Coastland Civil Engineering in the amount not to exceed $4,615 for additional engineering design services for the Clara Avenue Phase 2 Project, and approve corresponding budget transfer.

Attachments:

1. 1920231_Coastland Contract
2. Clara Ave Phase 2 - Amendment No. 1 Proposal

7.l. Adopt Plans and Specifications for the Electric Service Center Site Improvements (Spec No. 16-07) to Provide Access Modifications, Roof Replacement and Other Site Improvements ($2.7M).

Recommended Action: Adopt Plans and Specifications for the Electric Service Center Site Improvements (Spec No. 16-07) to Provide Access Modifications, Roof Replacement and Other Site Improvements ($2.7M).

Attachments:

1. Spec 16-07 Hastings
2. Hasting Drawings

8. AUDIENCE COMMENTS ON NON-AGENDA ITEMS

The City Council welcomes input from the audience. If there is a matter of business on the agenda that you are interested in, you may address the Council when this matter is considered. If you wish to speak on a matter that is not on this agenda, you may do so at this time. In order for everyone to be heard, please limit your comments to three (3) minutes per person and not more than ten (10) minutes per subject. The Brown Act regulations do not allow action to be taken on audience comments in which the subject is not listed on the agenda.

9. COUNCIL REPORTS

10. CITY MANAGER/CITY CLERK REPORTS

11. PUBLIC HEARINGS (6:15 PM)

11.a. Consideration and Possible Approval of Final Environmental Impact Report for Closure and Post-Closure Maintenance Plan for City of Ukiah Landfill, and Approval of the Closure and Post-Closure Maintenance Plan.

Recommended Action: Take two actions in the following order: (1) adopt the Resolution attached as Attachment 9, adopting the Statement of Facts (Attachment 8), which makes findings of fact and certifies as complete the final EIR for the Closure and Post-Closure Maintenance Plan; and (2) approve the Closure and Post-Closure Maintenance Plan.(Attachment 1).

Attachments:

1. City of Ukiah Landfill - Final Closure & Post Closure Maintenance Plan (April 2019)
2. Ukiah Landfill Closure Project - Complete Public Draft EIR - With Appendicies
3. Complete Final EIR- 4.22.20 (1)
4. 11a EIR Objection
5. Memo Recommending Continuance
6. 2020-07-17 Ukiah Landfill Response Memo
7. Attachments to ESA Memo
8. Ukiah Landfill Closure Project- Findings of Fact
9. Resolution Adopting Findings EIR & MMRP
10. Pioneer Law Group Opinion Letter 7.30.20

11.b. Conduct a Public Hearing to Consider Adoption of a Resolution Authorizing Submittal of an Application in Response to the 2020 State Community Development Block Grant Program - Coronavirus Response Round 1 Notice of Funding Availability; and Approve Corresponding Budget Amendments if Awarded the Grant.

Recommended Action: 1) Conduct a public hearing to consider approval of application submittal to the State Department of Housing and Community Development; and 2) adopt a resolution authorizing the submittal of a 2020 State Community Development Block Grant application and authorizing the City Manager to execute all related documents; and 3) approve corresponding budget amendments if awarded.

Attachments:

1. CDBG-CV1 NOFA
2. CARES-Programs-for-CDBG-Grantees-Enterprise
3. CDBG-CV1 Jurisdiction Allocations
4. Resolution- 2020 CDBG-CV1 application

11.c. Public Hearing on Financing Documentation for Facilities Acquisition, Enhancement, and Repair of Recently Acquired Property at 501 South State Street and Other Facilities (Recommended to be continued to a date certain of August 19, 2020).

Recommended Action: Continue the agenda item to a time/date certain on August 19, 2020, at 6:15 PM to conduct a public hearing on financing documentation for facility acquisition and improvements.

Attachments: None

12. UNFINISHED BUSINESS

12.a. Receive Report and Consider Directing Staff to Gather the Necessary Information and Conduct the Necessary Analyses to Develop an Application for Potential Annexation of Certain Unincorporated Lands, Including and Surrounding those Areas Commonly Known as the Brush Street Triangle, the Masonite Area Properties, and the City's Water Treatment Plant; and Bring that Application and Pertinent Information and Analyses to the City Council for its Consideration.

Recommended Action: Receive report and direct staff to gather the necessary information and conduct the necessary analyses to develop an application for potential annexation of certain unincorporated lands, including and surrounding those areas commonly known as the Brush Street Triangle, the Masonite Area Properties, and the City's Water Treatment Plant; and bring that application and pertinent information and analyses to the City Council for its consideration.

Attachments:

1. Past Staff Reports- 1-16-20 and 8-27-19 workshops
2. CC Reso 2020-06 - Adopting Annexation Policy
3. Map of Potential Annexation Area

12.b. Receive Status Report and Consider Any Action or Direction Related to the Novel Coronavirus (COVID-19) Emergency Including Operational Preparedness and Response; Continuity of City Operations and Services; Community and Business Impacts; and Any Other Related Matters.

Recommended Action: Receive status report and consider any action or direction related to the Novel Coronavirus (COVID-19) Emergency including operational preparedness and response; continuity of City operations and services; community and business impacts; and any other related matters.

Attachments: None

12.c. Consideration of Adoption of Amended Resolution Authorizing Applications for Funding and the Execution of Grant Agreements and any Amendments thereto from the 2019-2020 Funding Year of the State Community Development Block Grant Program.

Recommended Action: Adopt amended resolution authorizing applications for funding and the execution of grant agreements and any amendments thereto from the 2019-2020 funding year of the State CDBG program.

Attachments:

1. CC Reso 2020-20 - Approving Application for Funding from CDBG
2. 2020-CDBG-OTC-Applications-Received-Final
3. Resolution (Amended)- 2020 State CDBG application

12.d. Consider Adoption of the Ordinance Amending City Code Provisions Regulating Development of Accessory Dwelling Units.

Recommended Action: Adopt the Ordinance Amending City Code Provisions Regulating Development of Accessory Dwelling Units.

Attachments:

1. ADU Ordinance Amendment REDLINE
2. ADU Ordinance Amendment CLEAN

13. NEW BUSINESS

13.a. Consideration of Restructuring Proposal for the Community Development Department and Corresponding Budget Amendment.

Recommended Action: Approve Community Development Department restructuring proposal and corresponding budget amendment.

Attachments:

1. CDD Housing Division Revenue 2020-2022
2. Planning Manager Job Description (revised 7-28-20)

13.b. Consideration of 1) Approval of Community Development Director Determination that the Identified Project for Homekey Funding Qualifies for a CEQA Exemption; and 2) Adoption of Resolution Authorizing an Application for Funding to the Homekey Program.

Recommended Action: Approve Community Development Director determination that the identified project for Homekey Program funding qualifies for a CEQA exemption; and adopt resolution authorizing an application for funding to the Homekey Program.

Attachments:

1. 2020_HCD_HomeKey-NOFA_07-15-2020
2. Resolution- 2020 CDBG-CV1 application

13.c. Consider Adoption of Resolution for Authorization to Submit an Application to Join the Upper Russian River Water Agency (URRWA).

Recommended Action: Approve resolution for authorization to submit an application to join the Upper Russian River Water Agency (URRWA)

Attachments:

1. URRWA.Resolution

13.d. Discussion and Possible Adoption of Resolution Amending Procedures for Annual Appointment and Rotation of Mayor, Vice Mayor, and City Councilmembers.

Recommended Action: 1) Conduct a discussion per staff recommendations; and 2) If Council decides to go with the proposed method of rotation, then adopt Resolution A or B, depending on which option Council chooses; or 3) If Council decides not to go with the proposed method, then give direction to the ad hoc and staff.

Attachments:

1. Dais Seating
2. Mayor Rotation Scenarios
3. Resolution - Redline
4. Resolution A
5. Resolution B

13.e. Receive Updates on City Council Committee and Ad Hoc Assignments, and, if Necessary, Consider Modifications to Assignments and/or the Creation/Elimination of Ad Hoc(s).

Recommended Action: Receive report(s). The Council will consider modifications to committee and ad hoc assignments along with the creation/elimination ad hoc(s).

Attachments:

1. 2020 City Council Special Assignments - 07-06-20

14. CLOSED SESSION - CLOSED SESSION MAY BE HELD AT ANY TIME DURING THE MEETING

14.a. **Conference with Legal Counsel—Anticipated Litigation**
(Government Code Section 54956.9(d))
A. Initiation of litigation pursuant to paragraph (4) of subdivision (d) of Government Code Section 54956.9: (Number of potential cases: 1.)
B. Significant exposure to litigation pursuant to paragraph (2) or (3) of subdivision (d) of Section 54956.9: (Number of potential cases: 1)
Recommended Action: Confer in Closed Session

Attachments: None

14.b. **Conference with Legal Counsel—Anticipated Litigation**
(Government Code Section 54956.9(d))Significant exposure to litigation pursuant to Government Code Section 54956.9(d)(1) (Number of potential case: 1)
Recommended Action: Confer in Closed Session

Attachments: None

14.c. **Conference with Legal Counsel – Existing Litigation**
(Government Code Section 54956.9(d)(1))
Name of case: Vichy Springs Resort v. City of Ukiah, Et Al; Case No. SCUK-CVPT-2018-70200
Recommended Action: Confer in Closed Session

Attachments: None

14.d. **Conference with Legal Counsel – Existing Litigation**
(Cal. Gov't Code Section 54956.9(d)(1))
Name of case: City of Ukiah v. Questex, LTD, et al, Mendocino County Superior Court, Case No. SCUK- CVPT-15-66036
Recommended Action: Confer in Closed Session

Attachments: None

14.e. **Conference with Real Property Negotiators**
(Cal. Gov't Code Section 54956.8)
Property: APN Nos: 157-050-03, 157-060-02, 157-050-04, 157-050-03, 157-030-02, 157-050-01, 157-050-02, 157-050-10, 157-050-09, 157-070-01, 157-070-02, 003-190-01
Negotiator: Sage Sangiacomo, City Manager;
Negotiating Parties: Dave Hull and Ric Piffero
Under Negotiation: Price & Terms of Payment
Recommended Action: Confer in Closed Session

Attachments: None

14.f. **Conference with Labor Negotiator (54957.6)**
Agency Representative: Sage Sangiacomo, City Manager
Employee Organizations: All Bargaining Units
Recommended Action: Confer in Closed Session

Attachments: None

15. ADJOURNMENT

Please be advised that the City needs to be notified 72 hours in advance of a meeting if any specific accommodations or interpreter services are needed in order for you to attend. The City complies with ADA requirements and will attempt to reasonably accommodate individuals with disabilities upon request. Materials related to an item on this Agenda submitted to the City Council after distribution of the agenda packet are available for public

inspection at the front counter at the Ukiah Civic Center, 300 Seminary Avenue, Ukiah, CA 95482, during normal business hours, Monday through Friday, 8:00 am to 5:00 pm.

I hereby certify under penalty of perjury under the laws of the State of California that the foregoing agenda was posted on the bulletin board at the main entrance of the City of Ukiah City Hall, located at 300 Seminary Avenue, Ukiah, California, not less than 72 hours prior to the meeting set forth on this agenda.

Kristine Lawler, City Clerk
Dated: July 31, 2020

CITY OF UKIAH
CITY COUNCIL MINUTES
Regular Meeting
CIVIC CENTER COUNCIL CHAMBERS
300 Seminary Avenue
Ukiah, CA 95482
July 15, 2020
6:00 p.m.

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1. ROLL CALL

Ukiah City Council met at a Regular Meeting on July 15, 2020, having been legally noticed on July 10, 2020. Mayor Crane called the meeting to order at 6:04p.m. Roll was taken with the following **Councilmembers Present:** Maureen Mulheren, Jim O. Brown, Stephen G. Scalmanini, Juan V. Orozco, and Douglas F. Crane. **Staff Present:** Sage Sangiacomo, City Manager; David Rapport, City Attorney; and Kristine Lawler, City Clerk.

MAYOR CRANE PRESIDING.

URGENCY ITEM: Introduction and Adoption of Urgency Ordinance Amending the Established Administrative Penalties For Violations of the County Health Officer's Orders Pertaining to the COVID-19 Pandemic.
Presenter: Sage Sangiacomo, City Manager.

Motion/Second: Scalmanini/Brown to accept the urgency item and place as agenda item 13b. Motion **carried** by the following roll call votes: AYES: Mulheren, Brown, Scalmanini, Orozco, and Crane. NOES: None. ABSENT: None. ABSTAIN: None.

2. PLEDGE OF ALLEGIANCE

The Pledge of Allegiance was led by Vice Mayor Orozco.

3. PROCLAMATIONS/INTRODUCTIONS/PRESENTATIONS

4. PETITIONS AND COMMUNICATIONS

5. APPROVAL OF MINUTES

a. Approval of the Minutes for the July 1, 2020, Regular Meeting.

Motion/Second: Mulheren/Orozco to approve Minutes of July 1, 2020, a regular meeting, as submitted. Motion **carried** by the following roll call votes: AYES: Mulheren, Brown, Scalmanini, Orozco, and Crane. NOES: None. ABSENT: None. ABSTAIN: None.

6. RIGHT TO APPEAL DECISION

7. CONSENT CALENDAR

a. Designation of Voting Delegates and Alternates for the League of California Cities Annual Conference – October 7 - 9, 2020 – *City Clerk.*

b. Council to Receive and File Adopted 2020-21 Fiscal Year City of Ukiah Budget Document – *Finance.*

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c. Award Contract *(COU No. 1920-284)* to Systems Integrated in the Amount of $245,461 to Replace Lake Mendocino Hydroelectric Plant's Control System, Authorize the City Manager to Negotiate and Execute an Agreement, and Approve Corresponding Budget Amendment – *Electric Utility.*

Motion/Second: Brown/Mulheren to approve Consent Calendar Items 7a-7c, as submitted. Motion **carried** by the following roll call votes: AYES: Mulheren, Brown, Scalmanini, Orozco, and Crane. NOES: None. ABSENT: None. ABSTAIN: None.

8. AUDIENCE COMMENTS ON NON-AGENDA ITEMS

No public comment was received.

9. COUNCIL REPORTS

No reports were received.

10. CITY MANAGER/CITY CLERK REPORTS

Presenters:

- Chamber Upgrade and Use Status – Sage Sangiacomo, City Manager.
- Elections Open Filing Period – Kristine Lawler, City Clerk.

11. PUBLIC HEARINGS (6:15 PM)

a. Consider Introduction by Title Only of the Ordinance Amending City Code Provisions Regulating Development of Accessory Dwelling Units.

Presenters: Darcy Vaughn, Assistant City Attorney and Craig Schlatter, Community Development Director.

PUBLIC HEARING OPENED AT 6:50 P.M.

No public comment was received.

PUBLIC HEARING CLOSED AT 6:50 P.M.

Motion/Second: Scalmanini/Orozco to Introduce the Ordinance by title only. Motion **carried** by the following roll call votes: AYES: Mulheren, Brown, Scalmanini, Orozco, and Crane. NOES: None. ABSENT: None. ABSTAIN: None.

City Clerk, Kristine Lawler, read the following title into the record:

ORDINANCE OF THE CITY COUNCIL OF THE CITY OF UKIAH ADDING AND AMENDING VARIOUS SECTIONS OF THE UKIAH CITY CODE TO COMPLY WITH CALIFORNIA GOVERNMENT CODE SECTION 65852.2 REGULATING ACCESSORY DWELLING UNITS

Motion/Second: Scalmanini/Orozco to Introduce the Ordinance Amending City Code Provisions Regulating Development of Accessory Dwelling Units. Motion **carried** by the following roll call votes: AYES: Mulheren, Brown, Scalmanini, Orozco, and Crane. NOES: None. ABSENT: None. ABSTAIN: None.

Council Consensus directs staff to make modifications per discussion.

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12. UNFINISHED BUSINESS

a. Receive Status Report and Consider Any Action or Direction Related to the Novel Coronavirus (COVID-19) Emergency Including Operational Preparedness and Response; Continuity of City Operations and Services; Community and Business Impacts; and Any Other Related Matters

Presenters: Tami Bartolomie, Office of Emergency Management Coordinator; Sage Sangiacomo, City Manager; Vice Mayor Orozco; Justin Wyatt, Police Chief;

Reports were received.

b. Discussion with Possible Direction to Staff Regarding Amendments to the City's HOME Tenant Based Rental Assistance Program Guidelines to Provide Rental and Utility Payment Assistance to Lower Income Households Impacted by the COVID-19 Pandemic

Presenter: Craig Schlatter, Community Development Director.

Report was received.

13. NEW BUSINESS

a. Receive Updates on City Council Committee and Ad Hoc Assignments and, if Necessary, Consider Modifications to Assignments and/or the Creation/Elimination of Ad hoc(s).

No reports were received.

b. Urgency Item: Introduction and Adoption of Urgency Ordinance Amending the Established Administrative Penalties For Violations of the County Health Officer's Orders Pertaining to the COVID-19 Pandemic.

Presenters: Sage Sangiacomo, City Manager and David Rapport, City Attorney.

Motion/Second: Brown/Scalmanini to introduce the Ordinance by title only. Motion **carried** by the following roll call votes: AYES: Mulheren, Brown, Scalmanini, Orozco, and Crane. NOES: None. ABSENT: None. ABSTAIN: None.

ORDINANCE NO. 1204

UNCODIFIED URGENCY ORDINANCE OF THE CITY COUNCIL OF THE CITY OF UKIAH AMENDING ORDINANCE NO. 1201 ADOPTING ADMINISTRATIVE PENALTIES FOR VIOLATION OF THE COUNTY HEALTH OFFICER'S ORDERS PERTAINING TO THE COVID-19 PANDEMIC

Motion/Second: Brown/Scalmanini to Introduce the Urgency Ordinance amending Ordinance No. 1201, establishing administrative penalties for violations of the County Health Officer's orders pertaining to the COVID-19 pandemic; and authorize Mayor to sign same. Motion **carried** by the following roll call votes: AYES: Mulheren, Brown, Scalmanini, Orozco, and Crane. NOES: None. ABSENT: None. ABSTAIN: None.

THE CITY COUNCIL ADJOURNED TO CLOSED SESSION AT 8:19 P.M.

14. CLOSED SESSION

a. Conference with Legal Counsel—Anticipated Litigation

(Government Code Section 54956.9(d))

A. Initiation of litigation pursuant to paragraph (4) of subdivision (d) of Government Code Section 54956.9: (Number of potential cases: 1.)

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B. Significant exposure to litigation pursuant to paragraph (2) or (3) of subdivision (d) of Section 54956.9: (Number of potential cases: 1)

b. Conference with Legal Counsel—Anticipated Litigation
Government Code Section 54956.9(d)(2)
Significant exposure to litigation pursuant to Government Code Section 54956.9(d)(1) (Number of potential case: 1)

c. Conference with Legal Counsel – Existing Litigation
(Government Code Section 54956.9(d)(1))
Name of case: *Vichy Springs Resort v. City of Ukiah, Et Al; Case No. SCUK-CVPT-2018-70200*

d. Conference with Legal Counsel – Existing Litigation
(Cal. Gov't Code Section 54956.9(d)(1))
Name of case: *City of Ukiah v. Questex, LTD, et al, Mendocino County Superior Court, Case No. SCUK- CVPT-15-66036*

e. Conference with Real Property Negotiators
(Cal. Gov't Code Section 54956.8)
Property: APN Nos: 002-192-14-00 (280 E. Standley)
Negotiator: Sage Sangiacomo, City Manager;
Negotiating Parties: Onetogether Solutions
Under Negotiation: Price & Terms of Payment

f. Conference with Labor Negotiator (54957.6)
Agency Representative: Sage Sangiacomo, City Manager
Employee Organizations: All Bargaining Units

Direction was given to staff.

15. ADJOURNMENT

There being no further business, the meeting adjourned at 8:28 p.m.

_____
Kristine Lawler, City Clerk

DRAFT

Agenda Item No: 7.a.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2019-82

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Report of Disbursements for the Month of May 2020.

DEPARTMENT: Finance **PREPARED BY:** Candice Rasmason, Accounts Payable
PRESENTER: Consent Item

ATTACHMENTS:
1. May 2020 Summary of Disbursements
2. Account Codes for Reference
3. Object codes for Reference
4. May 2020 Disbursement Detail

Summary: The Council will review and approve the Report of Disbursements for the month of May 2020.

Background: Payments made during the month of May 2020 are summarized on the Report of Disbursements. Further detail is supplied on the Schedule of Bills, representing the five (5) individual payment cycles within the month.

Accounts Payable Check Numbers (City & UVFA): 3037944-3038034; 3038035-3038113; 3038114-3038188; 3038189-3038326; 3038327-3038486

Accounts Payable Wire Transfers: 21, 22

Payroll Check Numbers: 507492-507495; 507496-507952

Payroll Manual Check Numbers: N/A

Direct Deposit Numbers: 98659-98870; 98872-99088

Manual Direct Deposit Numbers: 98871

Void Check Numbers: 3037714

Void Direct Deposit Numbers: 99037

Discussion: This report is submitted in accordance with Ukiah City Code Division 1, Chapter 7, Article 1.

Attachment #1: May 2020 Summary of Disbursements
Attachment #2: Account Codes for Reference
Attachment #3: Object Codes for Reference
Attachment #4: May 2020 Disbursement Detail

Recommended Action: Approve the Report of Disbursements for the Month of May 2020.

BUDGET AMENDMENT REQUIRED: N/A

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: N/A

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: N/A

Approved: 
Sage Sangiacomo, City Manager

CITY OF UKIAH
REPORT OF DISBURSEMENTS
REGISTER OF PAYROLL AND DEMAND PAYMENTS
FOR THE MONTH OF MAY

FUNDS:

100	General Fund	$223,718.12	700	Sanitary Disposal Site Fund	$38,364.35
105	Measure S General Fund		701	Landfill Corrective Fund	
110	Special General Fund		702	Disposal Closure Reserve Fund	
120	Streets Capital Improvement	$143,769.06	704	Post Closure Fund - Solid Waste	
201	Worker's Comp Fund		710	Ambulance Services Fund	
202	Liability Fund		720	Golf Fund	$5,806.30
203	Garage Fund	$8,821.14	730	Confernence Center Fund	$3,168.99
204	Purchasing Fund	$3,164.30	750	Visit Ukiah	
205	Billing & Collections Fund	$13,282.88	777	Airport Fund	$25,452.73
206	Public Safety Dispatch Fund	$4,333.18	778	Airport Capital Improvement Fund	$23,167.66
207	Payroll Posting Fund	$25,411.74	779	Special Aviation Fund	
208	Building Maintenance/Corp Yard Fund	$21,504.01	800	Electric Fund	$899,367.46
209	IT Fund	$27,884.64	801	Electric Capital Reserve Fund	$10,777.04
220	Equipment Reserve Fund		803	Lake Mendocino Bond Reserve	
249	City Housing Bond Proceeds	$0.00	805	Street Lighting Fund	$9,085.17
250	Special Revenue Fund		806	Public Benefits Fund	$13,554.57
251	Special Projects Reserve Fund		807	Electric Capital & Trade Fund	
253	CITY PROP 172	$7,248.38	820	Water Fund	$69,799.35
300	Park Development Fund		822	Water Capital Improvement Fund	$387,076.55
301	Anton Stadium Fund	$0.00	830	Recycled Water Fund	$21,776.53
302	Observatory Park Fund		840	City/District Sewer Fund	$237,023.67
304	Swimming Pool Fund	$0.00	841	Sewer Contruction Fund	
305	Riverside Park Fund	$0.00	843	Sewer Capital Fund	
306	Skate Park Fund	$0.00	900	Special Deposit Trust	$9,974.77
310	Museum Grants		901	General Service (Accts Recv)	$1,577.81
311	Alex Rorbaugh Recreation Center Fur	$1,281.27	902	U.S.W. Billing & Collection	$47,109.58
312	Downtown Business Improvement Fur	$11,139.74	903	Public Safety - AB 109	$0.00
313	LMIHF Housing Asset Fund		905	Federal Emergency Shelter Grant	
314	Winter Special Events		905	Mendocino Emergency Service Authority	
315	Advanced Planning Fund	$0.00	911	Russian River Watershed Association	$81,220.10
500	2106 Gas Tax Fund	$13,259.95	915	UVFD	$6,765.42
501	2107 Gas Tax Fund		916	UVFD PROP 172	$7,248.41
503	2105 Gas Tax Fund		917	UVFD Measure B	$3,079.06
505	Signalization Fund		918	UVFD Mitigation	$1,361.77
506	Bridge Fund		940	Sanitation District Special Fund	
507	1998 STIP Augmentation Fund		943	Sanitation District Capital Improvement Fur	
508	SB325 Reimbursement Fund	$8,029.79	952	REDIP Sewer Enterprise Fund	
509	S.T.P. Fund		960	Community Redevelopment Agency	
510	Trans-Traffic Congest Relief Fund		961	RDA Housing Pass-Through	
511	Rail Trail Fund		962	Redevelopment Housing Fund	
600	Community Development Block Grant	$812.50	963	Housing Debt	
601	EDBG 94-333 Revolving Loan		964	RDA Capital Pass-Through	
602	Community Development Fund		965	Redevelopment Capital Improvement Fund	
603	08-HOME-4688		966	Redevelopment Debt Service	
604	CDBG Grant 09-STBG-6417		967	Housing Bond Proceeds	
605	11-HOME-7654 Fund	$0.00	968	Non-Housing Bond Proceeds	
606	CDBG Grant 10-EDEF-7261		969	RDA Obligation Retirement Fund	$306.00
607	Prop 84 Grant Fund		844/944	Sewer Capital Projects Fund	$131,029.12
609	13-CDBG-8940				
610	City RDA Projects Fund				
613	Home Program Activities	$134,094.00			
630	Asset Seizure Fund	$3,075.00			
631	Asset Seizure Fund (Drug/Alcohol)				
633	H & S Education 11489(B)(2)(A1)			Retainage Withheld	$30,939.78
634	Federal Asset Seizure Grants		611	CDBG 16-CDBG-11147	
635	SUP Law Enforcement Service Fund	$470.40			
637	Local Law Enforcement Block Grant				
638	Asset Forfeiture 11470.2 H & S	$902.29			
639	Special Revenue - Police	$0.00			
640	Parking District Fund	$1,859.51			
691	Museum Fund				

PAYROLL CHECK NUMBERS: 507492-507495
DIRECT DEPOSIT NUMBERS: 98659-98871
PAYROLL PERIOD: 4/19/20-5/2/20

PAYROLL CHECK NUMBERS: 507496-507952
DIRECT DEPOSIT NUMBERS: 98872-99088
PAYROLL PERIOD: 5/3/20-5/16/20

PAYROLL CHECK NUMBERS:
DIRECT DEPOST NUMBERS:
PAYROLL PERIOD:

VOID CHECK NUMBERS:
3037714

MANUAL CHECK NUMBERS:
N/A

WIRE TRANSFER NUMBERS:
21, 22

TOTAL DEMAND PAYMENTS- A/P CHECKS	$2,719,094.09
TOTAL DEMAND PAYMENTS-WIRES* & EFT's	$322,818.98
TOTAL PAYROLL CHECKS & DIRECT DEPOSITS	$877,836.60
TOTAL PAYROLL EFT's (TAXES, PERS, VENDORS)	$556,868.12

* vendor name(if applicable)

TOTAL PAYMENTS $4,476,617.79

CERTIFICATION OF CITY CLERK

This register of Payroll and Demand Payments was duly approved by the City Council on _____.

_____
City Clerk

APPROVAL OF CITY MANAGER

I have examined this Register and approve same.

_____
City Manager

CERTIFICATION OF DIRECTOR OF FINANCE

I have audited this Register and approve for accuracy and available funds.

_____
Director of Finance

10000000	General Fund
10010000	City Council
10011100	City Clerk
10011300	Elections
10012100	City Manager
10012200	Administrative Support
10012400	Miscellaneous General Government
10013400	Finance Department
10014000	City Attorney
10015100	Treasury Management
10016100	Human Resources
10017100	Economic Development
10018000	Community Outreach
10020217	Animal Control
10022100	Parks
10022300	Aquatics
10022800	Recreation
10022810	Recreation Administration
10022821	Adult Basketball
10022822	Adult Softball
10022824	Co-Ed Volleyball
10022831	Youth Basketball
10022832	Youth Softball
10022840	Day Camp
10022850	Classes & Clinics
10022860	Special Activities
10023100	Community Planning
10023320	Building Inspection
10024210	Engineering
10024214	Traffic Signals
10024620	Streets
10024224	Storm Drains
10514000	Police - City Attorney
10520210	Patrol
10520214	Police Reserves
10520216	COPS Grant
10520218	Police - CSO
10520224	Police - Major Crimes Task Force
10521210	Fire Administration
10521312	Fire Volunteer Station
20112400	Worker's Compensation Fund
20212400	Liability Fund
20324100	Garage Fund
20413500	Purchasing Fund
20513300	Billing and Collections
20514000	Billing and Collections - City Attorney
20524412	Water Department - Meter Readers
20526430	Electric Department - Meter Readers
20620231	Ukiah Dispatch
20620232	Ft Bragg Dispatch
20700000	Payroll Posting Fund
20822500	Building Maintenance
20824300	Corporation Yard
20922900	IT Fund
22013300	FA Replace - Finance UB
22020200	FA Replace - Police Operations
22021210	FA Replace - Fire Administration
22022900	FA Replace - Information Technology
22024100	FA Replace - Garage
22024220	FA Replace - Streets
22024413	FA Replace - Water Distribution Cap
22024414	FA Replace - Water Distribution O&M
22024421	FA Replace - City Wastewater
25024210	Engineering Reserve
25024300	Corporation Yard Reserve
25122900	CIP - IT
25123100	CIP - Planning
25124210	CIP - Engineering
25124220	CIP - Streets
25124410	CIP - Water
25124421	CIP - City Wastewater
25126410	CIP - Electric
30022200	Park Development
30122210	Anton Stadium
30222220	Observatory Park
30522250	Riverside Park
30622260	Skate Park
30822280	Project Planning
31022700	Museum Grant
31122000	Alex Rorabaugh Recreation Center
31217100	Downtown Business Improvement District
50524210	Engineering - Signalization Fund
50624210	Capital Engineering
50824210	SB325 - Engineering
50824220	SB325 - Streets
50924210	STP - Engineering
50924220	STP - Streets
51024220	Trans - Traffic Slurry Seal
510X9999	Trans -Traffic Project
60217441	Grant - CDBG 602
60317442	Grant - HOME 603
60417441	Grant - CDBG 604
60517442	Grant - HOME 605
60517461	First Time Homebuyer Program

60517462	FTHB Activity Delivery
60517467	FTHB - PIR
60600000	CDBG Grant 10-EDEF-7261 Fund
60617441	Grant - CDBG 606
60617451	General Administration
60617452	AD ED Direct Financial Assistance
60617453	ED Direct Financial Assistance
60717443	Grant Prop 84
60724413	Prop 84 Water Distribution Cap
60900000	13-CDBG-8940
60917458	13-CDBG-8940
63020210	Asset Seizure Expenditure
63120210	Drug & Alcohol Education
63320210	H&S Asset Seizure Expenditure
63420250	Fed Asset Seizure Expenditure
63520210	SLESF
63820210	Asset Forfeiture 11470
64020213	Parking Enforcement
69122700	Museum
70024500	Landfill 700
70224500	Landfill Closure
70424500	Landfill Post closure
72022400	Golf
73022600	Conference Center
75017110	Visit Ukiah
77725200	Airport Operations
77817411	FAA Grant
80026100	Electric Administration
80026110	Electric Overhead
80026120	Electric Underground
80100000	Infrastructure
80026130	Electric Substation
80026140	Reimbursable Work for Others
80026200	Electric Metering
80026300	Electric Generation
80026312	Mendocino Hydro
80026330	Hydro Electric
80026400	Electric Administration
80026410	Electric General Administration
80026430	Interdepartmental Charges
80326330	Hydro Plant
80526610	Street Lighting
80626500	Public Benefit
82027110	Water
82027111	Water - Production O&M
82027113	Water - Distribution Capital
82027114	Water - Distribution O&M
82027115	Water - Production Capital
82227113	Water - Distribution Capital
84027220	Wastewater
84027221	Wastewater City - O&M
84027222	Wastewater City - Capital
84027225	Wastewater Treatment - O&M
84027226	Wastewater Treatment - Capital
84227220	Wastewater
84327222	Wastewater City - Capital
84427221	Wastewater City Capital - O&M
84427222	Wastewater City - Capital
90000000	Special Deposit Trust Fund
91190100	Russian River Watershed Assoc
96900000	Successor Agency

12102	INVENTORY OF SUPPLIES
12103	STORES PURCHASES
12104	INVENTORY - PURCHASES
12105	STORES ISSUES
51211	PERS UNFUNDED LIABILITY
51280	OVERTIME/CALLOUT MEALS
51285	CALLOUT MILEAGE REIMBURSEMENTS
52100	CONTRACTED SERVICES
52107	CONTRACTED SERVICES-EIR
52108	CONTRACT SERVICES-GPU
52110	AMBULANCE BILLING
52111	MAINT. CONTRCTS - DEFIBRULATOR
52112	M. S. OVERSIGHT
52113	PLANNING STUDIES
52114	COMPLIANCE STUDIES
52120	LABOR CHARGES FROM OTHER DEPAR
52130	EDUCATIONAL & MARKETING MATL'S
52131	ASSISTANCE TO SENIORS
52132	EMERGENCY ASSISTANCE
52133	MONTHLY DISCOUNT PROGRAM
52134	CONTRACT ADMINISTRATION
52135	ENERGY CONSERVATION PROGRAM
52136	PHOTOVOLTAIC RATES/INCENTIVE
52137	PUBLIC BENEFITS PROGRAM MGMT
52138	NCPA PUBLIC BENEFITS PROGRAM
52139	RESEARCH, DEVELOPMENT & DEMO
52140	LITIGATION EXPENSES
52145	DETACHMENT-SEWER-UVSD
52150	LEGAL SERVICES/EXPENSES
52151	AFLAC & PERS INSUR ADMIN FEES
52170	UKIAH WASTE SOLUTIONS
52171	RESIDENTIAL BILLING CHARGE
52172	COMMERCIAL OVERSIGHT FEE
52180	SECURITY SERVICES
52301	PROPERTY TAX ADMIN FEE
52302	AMBULANCE FEES
52303	REHIT SUPPORT
52304	LAFCO FEES AND PROP TAX EXP
52500	TRUSTEE FEES
52510	ADVERTISING & PROMOTION
52515	ADVERTISING & PUBLICATION
52521	LIABILITY INSURANCE PREMIUM
52522	LIABILITY INSURANCE DEDUCT
52523	BOILER/MACHINERY PREMIUMS
52524	PROPERTY INSURANCE
52525	WORKER'S COMP. EXPENSE
52526	FRAUD INVEST. ASSESSMENT
52527	A.D.P. PREMIUM & DEDUCTIBLE
52528	LIABILITY INSURANCE
52529	EARTHQUAKE & FLOOD PREMIUMS
52530	POLLUTION-ENVIRON INS PREMIUM
52531	UMEMPLOY. INS EXPENSE
52532	SAFETY & TRAINING SUPPORT
52600	RENT
52841	SUCCESSOR AGENCY ADMIN
54100	SUPPLIES
54101	POSTAGE
54102	SMALL TOOLS
54105	PHOTOGRAPHIC EXPENSE
54106	SPECIALTY SUPPLIES
54120	PW - SPECIAL SUPPLIES
54121	PW - ASPHALT CONCRETE
54122	PW - AGGREGATE BASE
54123	PW - CRACK SEALANT
54124	PW - CONCRETE/SUPPLIES
54125	PW - TRAFFIC PAINT
54126	PW-PREMARKS
54127	PW - SIGN POSTS/SHEETING
54128	PW - COLD PATCH MATERIAL
54129	PW - TACK OIL
54130	PW - SAFETY
54131	PW - BARRICADES & CONES
54160	HR - CITY LIABILITY & CONTRACT
54161	HR - BACKGROUND & PHYSICALS
54162	HR - ADVERTISING
54163	HR - INTERVIEW SUPPLIES
54164	HR - FORMS & OTHER DIV. EXP.
54165	HR - NEW EMPLOYEE FINGERPRINT
54166	HR - DOT TESTING PROGRAM
54167	HR - EMPLOYEE DEVELOPMENT
54168	HR - REMIF SAFETY TRNG & SUPPO
54201	PRISONER EXPENSE
54202	MAJOR CRIME INVETIGATIONS
54320	SOFTWARE
54330	COMPUTER AND TECHNOLOGY
54500	EQUIP RENTS AND LEASES
54700	FINES & PENALTIES
55100	TELEPHONE
55200	PG&E
55210	UTILITIES
56100	VEHICLE & EQUIPMENT MAINT. & R
56110	CITY GARAGE - PARTS

56121 R & M RADIO EQUIPMENT
56122 R & M NON-AUTO EMS EQUIPMENT
56123 R & M COMPUTERS
56124 MAINT CONTRACT DEFIBULATORS
56130 EXTERNAL SERVICES
56210 FUEL & FLUIDS
56300 BUILDING MAINT. & REPAIR
56410 EQUIPMENT RENTAL - PRIVATE
56504 FACILITY MAINTENANCE & REPAIR
56600 AIRFIELD MAINTENANCE & REPAIR
56700 LANDFILL CLOSURE EXPENSE
57100 CONFERENCE & TRAINING
57101 CONF & TRAINING-AQUATICS
57102 CONF & TRAINING-PARKS STAFF
57200 MEETINGS
57300 MEMBERSHIPS & SUBSCRIPTIONS
58101 NCPA PLANT GENERATION
58102 NCPA POWER PURCHASES
58103 NCPA TRANSMISSION
58104 NCPA MANAGEMENT SERVICES
58105 NCPA THIRD PARTY SALES
58106 NCPA PASS THROUGH COSTS
58107 NCPA COMMITMENTS ACTIVITY
58201 WATER PURCHASES
58202 WATER TREATMENT PLANT CHEMICAL
58401 AVIATION FUEL
58410 GARAGE LUBRICANTS & PARTS
58510 REIMBRSABLE JOBS
59100 PROPERTY TAXES PAID
59101 FEES
59102 FRANCHISE FEES
59350 PURCHASE DISCOUNTS TAKEN
59400 OTHER EXPENSES
70101 LOAN PAYMENTS MADE
70102 BOND INTEREST PAYMENTS
70110 BOND ISSUANCE COSTS
70201 LOAN PRINCIPAL PAYMENTS
70202 BOND PRINCIPAL PAYMENTS
80100 MACHINERY & EQUIPMENT
80200 BUILDINGS ACQUISITION
80210 LAND ACQUISITION
80220 BUILDING IMPROVEMENTS
80230 INFRASTRUCTURE
80231 RECYCLING STUDY 50% GRANT MATC
80232 LINE REPLACEMENTS
80233 MAIN REPLACEMENTS
80234 INFLOW/INFILTRATION
56111 CITY GARAGE - LABOR
56112 EQUIPMENT PARTS FOR RESALE
56120 EQUIPMENT MAINTENANCE & REPAIR
80235 SYSTEM MAINTENANCE
80236 EMERGENCY/CONTINGENCY
90100 LOAN PROCEEDS
90101 LOAN PAYMENT RECEIVED
90301 LOAN REPAYMENT
90410 BOND PROCEEDS

List of Checks Presented for Approval on 5/1/2020

The following list of bills payable was reviewed and approved for payment.

07/10/2020 DB CR

Signature

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ACT EQUIPMENT SALES	3124196	PNEUMERCATOR TANK MONITORING S	$4,516.52	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$4,516.52*
					Vendor Total:	*$4,516.52*
ADAMSON POLICE PRODUCTS	INV324683	M4 LED FLASHER WHITE	$643.06	*10021210-56130*	*EXTERNAL SERVICES*	*$321.53*
				91521400-56130	*EXTERNAL SERVICES*	*$321.53*
	INV325211	HAVIS #C-VS-3000-F150-1: VEHIC	$348.29	*10021210-80100*	*MACHINERY & EQUIPMENT*	*$174.11*
				91721400-80100	*MACHINERY & EQUIPMENT*	*$174.18*
					Vendor Total:	*$991.35*
AFLAC GROUP INSURANCE	A135054600	APR 20 AFLAC CRITICAL CARE INS	$364.60	*20700000-20538*	*AFLAC CRITICAL ILLNESS POLICY*	*$364.60*
					Vendor Total:	*$364.60*
AL SMATSKY	85	DESIGN, ENGINEERING & CONSULTA	$1,820.00	*80126100-80230*	*INFRASTRUCTURE*	*$539.70*
				80126100-80230	*INFRASTRUCTURE*	*$1,280.30*
					Vendor Total:	*$1,820.00*
ALL-GUARD ALARM SYSTEMS INC	A274963	MONTHLY MONITORING AT WWTP	$91.40	*84027225-52180*	*SECURITY SERVICES*	*$91.40*
					Vendor Total:	*$91.40*
ALTEC INDUSTRIES INC	11385637	COVER; EMS 5-9; TOOL COUPLER	$88.07	*80026110-56130*	*EXTERNAL SERVICES*	*$88.07*
	11383335	COVER; EMS 5-9; PLATFORM CONTROL CONSOLE	$458.10	*80026110-56130*	*EXTERNAL SERVICES*	*$458.10*
					Vendor Total:	*$546.17*
AMAZON CAPITAL SERVICES	16XJ-9T63-CJFH	AUDIO CABLE CONNECTOR	$21.75	*20324100-56112*	*EQUIPMENT PARTS FOR RESALE*	*$21.75*
	1DCC-PYTH-Q74T	DISINFECTANT WIPES	$76.00	*10012200-54100*	*SUPPLIES*	*$76.00*
	1GY6-JRGN-D3QH	DISPOSABLE FILTER MASKS	$288.50	*10012200-54100*	*SUPPLIES*	*$288.50*
	1L4V-9DD9-43PG	DISPOSABLE FILTER MASKS	$326.50	*10012200-54100*	*SUPPLIES*	*$326.50*
	1PJ7-Q1VR-FNTH	AMMEX X3 INDUSTRIAL NITRILE GLOVES	$375.85	*10012200-54100*	*SUPPLIES*	*$375.85*
	1L4V-9DD9-39T3	DISPOSABLE FILTER MASKS, DUSTPROOF MASKS	$749.80	*10012200-54100*	*SUPPLIES*	*$749.80*

List of Checks Presented for Approval on 5/1/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
AMAZON CAPITAL SERVICES	1MH3-6NQ6-KTYD	BLACK INK CARTRIDGE	$39.18	*10013400-54100*	*SUPPLIES*	*$39.18*
	13G4-4RY7-4RWG	ULTRASOURCE HIGH WALL DISINFECTANT BOOT DIP MAT	$588.80	*10020210-54100*	*SUPPLIES*	*$294.40*
				10021210-54100	*SUPPLIES*	*$147.20*
				91521400-54100	*SUPPLIES*	*$147.20*
	13KN-GVQV-4YHJ	MEGAPHONE SPEAKER PA	$95.68	*10022840-54100*	*SUPPLIES*	*$95.68*
	1VXL-MJ7G-67FD	ARROW FASTENER STAPLES; 5000PK	$16.43	*10023100-54100*	*SUPPLIES*	*$16.43*
	1QTD-7RXQ-DRJJ	BLACK INK CARTRIDGE	$33.45	*20413510-54100*	*SUPPLIES*	*$16.73*
				20413520-54100	*SUPPLIES*	*$16.72*
	163N-PWLR-6ML4	LINTHIUM BATTERY, TRIMLINE CLEAR SINGLE BASE	$84.37	*73022600-54100*	*SUPPLIES*	*$84.37*
	11WC-Q3VC-13DW	PURIFIER STEAM CLEANER	$113.58	*80026110-54100*	*SUPPLIES*	*$113.58*
	19C4-CHJJ-FMHV	LATEX MEDICAL HIGH RISK GLOVES	$129.66	*84027221-54100*	*SUPPLIES*	*$129.66*
					Vendor Total:	*$2,939.55*
AT&T	2463 APR 20	FAX SERVICES - S STATION	$38.74	*10021210-55100*	*TELEPHONE*	*$19.37*
				91521400-55100	*TELEPHONE*	*$19.37*
	000014581127	TELEPHONE SERVICES	$5,040.56	*20913900-55100*	*TELEPHONE*	*$5,040.56*
					Vendor Total:	*$5,079.30*
COMCAST	0472 MAY 20	INTERNET SERVICES	$162.30	*20913900-55100*	*TELEPHONE*	*$162.30*
					Vendor Total:	*$162.30*
COSTCO WHOLESALE CORPORATION	DV050120	SUPPLIES, COVID-19	$217.28	*10012200-54100*	*SUPPLIES*	*$217.28*
					Vendor Total:	*$217.28*
COUNTY OF SONOMA	20-044	SEXUAL ASSAULT EXAM, 2/23/2020	$1,800.00	*10020210-52100*	*CONTRACTUAL SERVICES*	*$1,800.00*
					Vendor Total:	*$1,800.00*
CUMMINS INC	Y7-97154	EMERGENCY ENGINE REPAIR	$11,959.93	*10021210-56130*	*EXTERNAL SERVICES*	*$11,959.93*
					Vendor Total:	*$11,959.93*
DARWIN DICK	DV042720	REIMBURSEMENT-CERTIFICATION RENEWAL	$110.00	*82027111-57100*	*LEARNING AND DEVELOPMENT*	*$110.00*
					Vendor Total:	*$110.00*
DAVID A WHITE JR	46525-00	LABOR AND MATERIALS TO PAINT	$4,998.90	*10021210-80100*	*MACHINERY & EQUIPMENT*	*$4,998.90*
					Vendor Total:	*$4,998.90*

List of Checks Presented for Approval on 5/1/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
DC ELECTRIC GROUP INC	414139	TRAFFIC SIGNAL REPAIRS, NOV 2019 - M1064	$1,413.53	*10024214-52100*	*CONTRACTUAL SERVICES*	*$1,413.53*
					Vendor Total:	*$1,413.53*
DONALD KEITH HEWETT	72785	TOWING SERVICES	$85.00	*10020210-56130*	*EXTERNAL SERVICES*	*$85.00*
					Vendor Total:	*$85.00*
E&M ELECTRIC & MACHINERY, INC	354079	ANNUAL RENEWAL - CF-PREMIUM-R-	$5,875.00	*82027111-52100*	*CONTRACTUAL SERVICES*	*$5,875.00*
					Vendor Total:	*$5,875.00*
ECS IMAGING INC	14842	LASERFICHE ANNUAL RENEWAL TERM	$6,686.00	*10012500-54320*	*SOFTWARE*	*$6,686.00*
					Vendor Total:	*$6,686.00*
EUREKA OXYGEN CO	466149	EQUIPMENT MAINTENANCE	$588.20	*10021210-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$294.10*
				91521400-56120	*EQUIPMENT MAINTENANCE & REPAIR*	*$294.10*
					Vendor Total:	*$588.20*
EVERGREEN JOB & SAFETY TRAINING INC	1138	JOB AND SAFETY TRAINING - APRIL 20	$2,109.12	*80026110-52100*	*CONTRACTUAL SERVICES*	*$2,109.12*
	1134	JOB AND SAFETY TRAINING - MARCH 20	$2,109.12	*80026110-52100*	*CONTRACTUAL SERVICES*	*$2,109.12*
					Vendor Total:	*$4,218.24*
FARWEST LINE SPECIALTIES LLC	303445	BENCHMARK FR NECK GAITER	$242.19	*80026110-54100*	*SUPPLIES*	*$242.19*
	303400	NOMEX BLEND HOOD - FACE COVER	$321.03	*80026110-54100*	*SUPPLIES*	*$321.03*
					Vendor Total:	*$563.22*
FASTENAL	CAUKA39001	MISC. SUPPLIES AS NEEDED	$31.51	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$31.51*
	CAUKA39040	MISC. SUPPLIES AS NEEDED	$3.23	*84027225-56130*	*EXTERNAL SERVICES*	*$3.23*
	CAUKA39056	MISC. SUPPLIES AS NEEDED	$7.75	*84027225-56130*	*EXTERNAL SERVICES*	*$7.75*
					Vendor Total:	*$42.49*
FIDELITY NATIONAL TITLE COMPANY OF CALIFORNIA	61873	FIRST TIME HOMEBUYER DEFERRED LOAN	$134,000.00	*61323400-59500*	*LOANS ISSUED*	*$134,000.00*
					Vendor Total:	*$134,000.00*
FISHER WIRELESS SVCS INC	231651	MISC. COMMUNICATION EQUIPMENT	$470.00	*10020210-52100*	*CONTRACTUAL SERVICES*	*$470.00*
					Vendor Total:	*$470.00*
GARTON TRACTOR INC	CU50869	HOSE, COUPLING, FITTING	$138.71	*10024620-56130*	*EXTERNAL SERVICES*	*$138.71*
					Vendor Total:	*$138.71*

List of Checks Presented for Approval on 5/1/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
GENERAL SERVICES AGENCY	MAY 20	SPANISH MTN SUBLEASE MO RENT-N	$50.00	*20620231-52100*	*CONTRACTUAL SERVICES*	*$50.00*
					Vendor Total:	*$50.00*
GOLDEN STATE EMERGENCY VEHICLE SERVICE INC	CI022118	LIGHT, WELDON LED SIDE TURN/MARKER	$131.27	*10021210-56130*	*EXTERNAL SERVICES*	*$131.27*
	CI021580	SENSOR & CRADLE ASSY, TPMS BENDIX	$205.70	*10021210-56130*	*EXTERNAL SERVICES*	*$102.85*
				10021210-56130	*EXTERNAL SERVICES*	*$102.85*
	CI021208	AIR CLEANER, 11.0X15.0, 7 IN-OUT	$255.54	*10021210-56130*	*EXTERNAL SERVICES*	*$255.54*
					Vendor Total:	*$592.51*
GRANITE CONSTRUCTION COMPANY	1775526	CONTRACT 1920110 RETAINAGE	$65,559.21	*12000000-20150*	*AP CONTRACT RETAINAGE*	*$1,920.36*
				12000000-20150	*AP CONTRACT RETAINAGE*	*$3,692.95*
				12000000-20150	*AP CONTRACT RETAINAGE*	*$46,685.95*
				50000000-20150	*AP CONTRACT RETAINAGE*	*$13,259.95*
					Vendor Total:	*$65,559.21*
HOME DEPOT CREDIT SERVICES	4512529	CONCRETE MIX	$3.43	*82027111-56300*	*BUILDING MAINT. & REPAIR*	*$3.43*
	5032169	LUMBER	$8.23	*82027111-56300*	*BUILDING MAINT. & REPAIR*	*$8.23*
	2523433	GARDNER FLEXX, WET PATCH	$39.10	*82027111-56300*	*BUILDING MAINT. & REPAIR*	*$39.10*
	3523388	FLAT BRUSH, PAINT, ROLLERS	$49.34	*82027111-56300*	*BUILDING MAINT. & REPAIR*	*$49.34*
	4032207	CONCRETE, RAZORBACK POWEREDGE WOOD	$73.71	*82027111-56300*	*BUILDING MAINT. & REPAIR*	*$73.71*
	4011609	STEEL DEMON 80G FLAP	$46.62	*82027111-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$46.62*
	3360836	PAINTCARE, BRUSHES, GAP FILLER	$89.72	*82027111-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$89.72*
	3032261	OUTDOOR LIGHT, SOCKET, BOTS	$223.76	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$223.76*
	6112628	BUCKETS, HOSES	$76.69	*10020210-54100*	*SUPPLIES*	*$25.57*
				10021210-54100	*SUPPLIES*	*$25.56*
				91521400-54100	*SUPPLIES*	*$25.56*
					Vendor Total:	*$610.60*
IDEXX DISTRIBUTION INC	3062611588	WP100I IRRADIATED COLILERT 100ML	$790.94	*84027225-54103*	*LAB SUPPLIES*	*$790.94*
					Vendor Total:	*$790.94*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
INDUSTRIAL LADDER & SCAFFOLDING INC	12582	#FG8212-L 12' ALL F/G SINGLE S	$4,993.52	80026110-54100	SUPPLIES	$4,993.52
					Vendor Total:	$4,993.52
INFOSEND INC	170002	UB PRINT & MAIL SERVICES	$4,441.23	20513300-52100	CONTRACTUAL SERVICES	$4,441.23
					Vendor Total:	$4,441.23
INTERWEST CONSULTING GROUP INC	58299	ON-CALL BUILDING & PLAN CHECK	$910.07	10023320-52100	CONTRACTUAL SERVICES	$910.07
					Vendor Total:	$910.07
JUDY CHAN	MAY 20	MAY 20 RENT - MASON ST	$1,435.00	10022100-52600	RENT	$1,435.00
					Vendor Total:	$1,435.00
JUSTIN WYATT	DV043020	REIMBURSEMENT-OFFICE CHAIR	$217.74	10020210-54100	SUPPLIES	$217.74
					Vendor Total:	$217.74
LACAL EQUIPMENT	0320083-IN	HEX ROLLER BEARING & HSG	$855.59	90000000-20231	COUNTY MENTAL HEALTH .5%	($3.15)
				90000000-23252	DISTRICT USE TAX-LIBRARIES	($0.79)
				90000000-23237	DISTRICT USE TAX-MEASURE S	($3.16)
				84027221-56130	EXTERNAL SERVICES	$56.03
				84027221-56130	EXTERNAL SERVICES	$855.59
				90000000-23028	MEASURE Y DISTRICT TAX	($3.16)
				90000000-23013	STATE USE TAX LIABILITY	($45.77)
					Vendor Total:	$855.59
LARRY WALKER ASSOCIATES INC	00564.07-1	APPLICATION PREPARATION (NPDES	$88,075.25	84027225-52100	CONTRACTUAL SERVICES	$88,075.25
					Vendor Total:	$88,075.25
LEHR AUTO ELECTRIC	SI44203	#52300A TIGER TOUCH SEAR COVER	$1,618.97	82027114-54100	SUPPLIES	$809.49
				84027221-54100	SUPPLIES	$809.48
					Vendor Total:	$1,618.97
LIFE ASSIST INC	955456	#AC8201: I-GEL SUPGRAGLOTTIC A	$1,212.83	10021210-54100	SUPPLIES	$606.37
				91721400-54100	SUPPLIES	$606.46
					Vendor Total:	$1,212.83
LINCOLN AQUATICS	D8677961	PULSAR 1 SYSTEM	$788.72	10022300-54106	SPECIALTY SUPPLIES	$788.72
					Vendor Total:	$788.72

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
LN CURTIS & SONS	INV372716	EAGLE BREATHING COMPRESSOR ANN	$1,908.36	*10021210-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$1,908.36*
					Vendor Total:	*$1,908.36*
MARK CLEMENTI PHD	03-16-20 UVFA	PRE-EMPLOYMENT PSYCHOLOGICAL E	$1,370.00	*10021210-54161*	*BACKGROUND & PHYSICALS*	*$685.00*
				91521400-54161	*BACKGROUND & PHYSICALS*	*$685.00*
					Vendor Total:	*$1,370.00*
MARY HORGER	DV043020	REIMBURSEMENT - COVID SUPPLIES, COSTCO MEMBERSHIP	$348.37	*20413500-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$120.00*
				10012200-54100	*SUPPLIES*	*$228.37*
					Vendor Total:	*$348.37*
MATHESON TRI-GAS INC	21562792	OXYGEN & MISC. SUPPLIES AS NEE	$64.43	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$64.43*
	21293532	OXYGEN & MISC. SUPPLIES AS NEE	$73.36	*80026210-54100*	*SUPPLIES*	*$73.36*
					Vendor Total:	*$137.79*
MICHAEL CANNON	123566-2	PHOTOVOLTAIC	$396.88	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$396.88*
					Vendor Total:	*$396.88*
MOTION INDUSTRIES INC	CA23-519949	BEARINGS, FITTINGS & MISC. SUP	$241.98	*82027111-56130*	*EXTERNAL SERVICES*	*$241.98*
					Vendor Total:	*$241.98*
MUNICIPAL MAINTENANCE EQUIPMENT	0147970-IN	DOOR SEAL 5-16 YD	$292.50	*84027221-56130*	*EXTERNAL SERVICES*	*$292.50*
	0147996-IN	FLANGE BEAING 1-3/8	$549.31	*84027225-56130*	*EXTERNAL SERVICES*	*$549.31*
	0147826-IN	BEARING KIT, WAS TF1022S	$623.65	*84027225-56130*	*EXTERNAL SERVICES*	*$623.65*
					Vendor Total:	*$1,465.46*
NORTH BAY PROFESSIONAL OFFICIALS INC	201	OFFICIALS FOR ADULT BASKETBALL	$5,551.00	*10022821-52100*	*CONTRACTUAL SERVICES*	*$5,551.00*
					Vendor Total:	*$5,551.00*
OLGA KEOUGH	DV031320	REIMBURSEMENT-LICENSE, EXAM FEE	$425.00	*10013400-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$175.00*
				10013400-57300	*MEMBERSHIPS & SUBSCRIPTIONS*	*$250.00*
					Vendor Total:	*$425.00*
ONE TIME PAY VENDOR	B 22365	PARK REFUND-UNDERWOOD, COVID-19	$100.00	*10022100-46360*	*PARKS RENTAL*	*$100.00*
	0016968	REC REFUND-VILLAVICENCIO - COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	0016763	REC REFUND- EVANS, COVID-19	$140.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$140.00*
	121508-6	UTILITY REFUND - EDAN WARSAME, OMAR ALBARGHOUTHI	$14.21	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$14.21*
	122420-3	UTILITY REFUND- RACHEL MITCHELL	$99.30	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$99.30*
	121371-9	UTILITY REFUND- ALMA RODRIQUES, EDUARDO BELTRAN	$318.01	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$318.01*
					Vendor Total:	*$756.52*
OWEN EQUIPMENT SALES	00049136	HOSE	$252.71	*84027221-56130*	*EXTERNAL SERVICES*	*$252.71*
	00049081	SEAL KIT	$426.52	*84027221-56130*	*EXTERNAL SERVICES*	*$426.52*
					Vendor Total:	*$679.23*
PACE SUPPLY CORPORATION	026010004	PVC UNIONS	$50.66	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$50.66*
	025997503	WEATHERED FLEX COUPLES	$97.30	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$97.30*
					Vendor Total:	*$147.96*
PF PETTIBONE & CO	178547	#PFR512-C: MAROON RED MINUTE B	$1,651.45	*10012500-54100*	*SUPPLIES*	*$1,651.45*
					Vendor Total:	*$1,651.45*
PG&E CO	3822-9 MAR 20	PACIFIC GAS & ELECTRIC	$7,788.22	*84027225-55200*	*PG&E*	*$4,424.46*
				10022100-55210	*UTILITIES*	*$13.35*
				10022300-55210	*UTILITIES*	*$7.84*
				10022700-55210	*UTILITIES*	*$159.29*
				20822500-55210	*UTILITIES*	*$2,231.38*
				70024500-55210	*UTILITIES*	*$600.04*
				73022600-55210	*UTILITIES*	*$8.12*
				73022600-55210	*UTILITIES*	*$50.53*
				77725200-55210	*UTILITIES*	*$16.43*
				82027111-55210	*UTILITIES*	*$159.95*
				84027221-55210	*UTILITIES*	*$116.83*
					Vendor Total:	*$7,788.22*
PITNEY BOWES INC	1015418223	POSTAGE MACHINE LEASE & SUPPLI	$163.31	*20513300-54101*	*POSTAGE*	*$163.31*
					Vendor Total:	*$163.31*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
POWER ENGINEERS INC	348255	TASK ORDER #5: DEVELOP AN ARC	$7,428.58	*80026400-52100*	*CONTRACTUAL SERVICES*	*$7,428.58*
	348254	TASK ORDER #4: DEVELOP A SYSTE	$16,537.02	*80026400-52100*	*CONTRACTUAL SERVICES*	*$16,537.02*
					Vendor Total:	*$23,965.60*
RAIN FOR RENT, WOODLAND	1469071	#811024 PUMP, TRASH 6" DV150C	$5,989.58	*80026220-52100*	*CONTRACTUAL SERVICES*	*$5,989.58*
					Vendor Total:	*$5,989.58*
REDWOOD COAST FUELS	2134747	CARDLOCK FUEL PURCHASES	$5,759.39	*10020210-56210*	*FUEL & FLUIDS*	*$1,704.13*
				10022100-56210	*FUEL & FLUIDS*	*$424.57*
				10023320-56210	*FUEL & FLUIDS*	*$85.65*
				20324100-56210	*FUEL & FLUIDS*	*$103.40*
				20822500-56210	*FUEL & FLUIDS*	*$68.09*
				80026400-56210	*FUEL & FLUIDS*	*$1,365.62*
				82027111-56210	*FUEL & FLUIDS*	*$385.20*
				82027111-56210	*FUEL & FLUIDS*	*$633.67*
				82027114-56210	*FUEL & FLUIDS*	*$170.87*
				82027114-56210	*FUEL & FLUIDS*	*$228.48*
				82027114-56210	*FUEL & FLUIDS*	*$268.22*
				84027221-56210	*FUEL & FLUIDS*	*$145.56*
				84027225-56210	*FUEL & FLUIDS*	*$175.93*
					Vendor Total:	*$5,759.39*
RESPECTECH	40186	PHONE SYSTEM SERVICE & LEAVE	$112.50	*10021210-55100*	*TELEPHONE*	*$56.25*
				91521400-55100	*TELEPHONE*	*$56.25*
					Vendor Total:	*$112.50*
RICHARD SEANOR	DV042720	REFUND- PAYROLL DEDUCTION	$2.50	*20700000-20513*	*EMPLOYEE ASSOCIATION DUES*	*$2.50*
					Vendor Total:	*$2.50*
RICHARD THORNTON	0000011183	MISC. TELEPHONE PRODUCTS & SER	$62.50	*20913900-52100*	*CONTRACTUAL SERVICES*	*$62.50*
					Vendor Total:	*$62.50*
RONALD ROYSUM	RS 2024	EARTHPAK DRY BAGS	$106.65	*25321210-54102*	*SMALL TOOLS*	*$53.32*
				91621400-54102	*SMALL TOOLS*	*$53.33*
					Vendor Total:	*$106.65*
RR DONNELLEY	910459307	DOOR HANGERS	$217.37	*80026120-54100*	*SUPPLIES*	*$217.37*
					Vendor Total:	*$217.37*

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SAFEWAY SIGN CO	16623	30"X6" COVERED BLANK, .080G AL	$754.50	*10024620-54127*	*PW - SIGN POSTS/SHEETING*	*$754.50*
	16611	30"X6" COVERED BLANK, .080G AL	$789.43	*10024620-54127*	*PW - SIGN POSTS/SHEETING*	*$789.43*
					Vendor Total:	*$1,543.93*
SAVINGS BANK OF MENDOCINO COUNTY	APR 20	LOVERS LANE LOAN PAYMENT	$1,945.41	*91500000-70103*	*LOAN INTEREST*	*$323.76*
				91800000-70103	*LOAN INTEREST*	*$755.41*
				91500000-70201	*LOAN PRINCIPAL PAYMENTS*	*$259.88*
				91800000-70201	*LOAN PRINCIPAL PAYMENTS*	*$606.36*
					Vendor Total:	*$1,945.41*
SNAP-ON INDUSTRIAL	ARV/43488932	GARAGE TOOLS	$592.94	*20324100-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$592.94*
	ARV/43482102	GARAGE TOOLS	$1,058.10	*20324100-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$1,058.10*
					Vendor Total:	*$1,651.04*
STAPLES CREDIT PLAN	37942	ADAPTERS	$76.19	*20620231-54330*	*COMPUTER AND TECHNOLOGY*	*$76.19*
	36887	ADAPTERS, USB CABLE	$166.85	*80026400-54330*	*COMPUTER AND TECHNOLOGY*	*$166.85*
	35317	SHREDDER	$119.75	*10020210-54201*	*PRISONER EXPENSE*	*$119.75*
	33193	MAGAZINE HOLDERS	$43.06	*10012200-54100*	*SUPPLIES*	*$43.06*
	34787	DUTY BOXES, USB, MANILA FOLDERS	$41.87	*10022700-54100*	*SUPPLIES*	*$41.87*
	34895	SHEET PROTECTORS	$43.53	*10022810-54100*	*SUPPLIES*	*$43.53*
	8436	HEADPHONES	$162.70	*77725200-54100*	*SUPPLIES*	*$162.70*
	36774	COLORED COPY PAPER, TONER	$551.36	*77725200-54100*	*SUPPLIES*	*$551.36*
	35062	USB	$20.40	*80026400-54100*	*SUPPLIES*	*$20.40*
	36688	COFFEEMATE, SUGARS, CREAMER	$66.71	*80026400-54100*	*SUPPLIES*	*$66.71*
	8383	BINDERS	$30.78	*82027111-54100*	*SUPPLIES*	*$30.78*
	35098	CARTRIDGE	$38.05	*82027111-54100*	*SUPPLIES*	*$38.05*
	34151	WALL SIGN, POST-ITS, PENS	$58.52	*84027225-54100*	*SUPPLIES*	*$58.52*
	34913	LEAD OP OFFICE SUPPLIES	$125.82	*84027225-54100*	*SUPPLIES*	*$125.82*
					Vendor Total:	*$1,545.59*
STEVE MICHAEL BROWN	UKIAH-010	EIR FOR LANDFILL CLOSURE PROJE	$2,960.00	*70024500-52100*	*CONTRACTUAL SERVICES*	*$2,960.00*
					Vendor Total:	*$2,960.00*

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TGIF REPAIRS INC	6078	PRINTER MAINTENANCE	$816.59	*20513300-59400*	*OTHER EXPENSES*	*$816.59*
					Vendor Total:	*$816.59*
THATCHER COMPANY OF CALIFORNIA INC	274343	CHLORINE PRODUCTS	$1,954.00	*82027111-58202*	*CHEMICALS*	*$1,954.00*
					Vendor Total:	*$1,954.00*
TIM ERIKSEN	DV043020	ACH PA CYCLE RETURN	$770.00	*10021210-51110*	*REGULAR SALARIES & WAGES*	*$770.00*
					Vendor Total:	*$770.00*
TIM SANTO	DV030620	REIMBURSEMENT-COVID-19 SUPPLIES	$54.57	*80026400-54100*	*SUPPLIES*	*$54.57*
					Vendor Total:	*$54.57*
TUFTS POLYGRAPH & INVESTIGATION	2020-554	POLYGRAPH INVESTIGATION & SERVICES	$550.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$550.00*
	2020-543(B)	POLYGRAPH & INVESTIGATION SERVICES	$650.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$650.00*
					Vendor Total:	*$1,200.00*
UKIAH MAIN STREET PROGRAM	1st QTR - 2020	1ST QTR 2020 DOWNTOWN IMPROVEMENT DISTRICT	$11,139.74	*31217100-52100*	*CONTRACTUAL SERVICES*	*$11,139.74*
					Vendor Total:	*$11,139.74*
UKIAH PAPER SUPPLY	I510310	MISC. JANITORIAL SUPPLIES AS N	$42.16	*73022600-54100*	*SUPPLIES*	*$42.16*
	509812	MISC. JANITORIAL SUPPLIES AS N	$307.01	*77725200-54100*	*SUPPLIES*	*$307.01*
	I510460	MISC. JANITORIAL SUPPLIES AS N	$84.23	*80026110-54100*	*SUPPLIES*	*$84.23*
	I510091	MISC. JANITORIAL SUPPLIES AS N	$102.77	*80026110-54100*	*SUPPLIES*	*$102.77*
	510099	MISC. JANITORIAL SUPPLIES AS N	$103.37	*80026120-54100*	*SUPPLIES*	*$103.37*
	509878	MISC. JANITORIAL SUPPLIES AS N	$105.39	*80026400-54100*	*SUPPLIES*	*$105.39*
	I510523	MISC. JANITORIAL SUPPLIES AS N	$7.06	*82027111-54100*	*SUPPLIES*	*$7.06*
	I510424	MISC. JANITORIAL SUPPLIES AS N	$102.77	*82027114-54100*	*SUPPLIES*	*$102.77*
	510525	MISC. JANITORIAL SUPPLIES AS N	$102.77	*84027225-54100*	*SUPPLIES*	*$102.77*
	509738	MISC. JANITORIAL SUPPLIES AS N	$174.57	*84027225-54100*	*SUPPLIES*	*$174.57*
	510551	MISC. JANITORIAL SUPPLIES AS N	$297.27	*84027225-54100*	*SUPPLIES*	*$297.27*
					Vendor Total:	*$1,429.37*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
UKIAH VALLEY ASSOCIATION FOR HABILITATION INC	IN22849	JANITORIAL SERVICES - WWTP FY	$360.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$360.00*
					Vendor Total:	*$360.00*
WAGNER & BONSIGNORE	03-20-723	ENG SVCS FOR WATER RIGHT PERMI	$43.75	*82027110-52100*	*CONTRACTUAL SERVICES*	*$43.75*
					Vendor Total:	*$43.75*
WAXIE SANITARY SUPPLY	79090305	DISINFECTANT WIPES	$272.48	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($1.25)*
				10012200-54100	*SUPPLIES*	*$1.25*
				10012200-54100	*SUPPLIES*	*$272.48*
	79120130	DISINFECTANT CLEANER	$44.02	*10020210-54100*	*SUPPLIES*	*$44.02*
					Vendor Total:	*$316.50*
WERLE ENTERPRISE LLC	0400745	NOTICE OF VIOLATION/ADMIN CITATION UPD	$193.56	*10023320-54100*	*SUPPLIES*	*$193.56*
					Vendor Total:	*$193.56*
WESCO DISTRIBUTION INC	775072	(U-B48-F) BOX, POLYMER CONC, 3	$1,011.01	*80000000-12104*	*INVENTORY - PURCHASES*	*$1,011.01*
	770760	(U-B48-F) BOX, POLYMER CONC, 3	$2,731.46	*80000000-12104*	*INVENTORY - PURCHASES*	*$2,731.46*
					Vendor Total:	*$3,742.47*
WEST YOST ASSOCIATED	2040768	RRWA EXECUTIVE SERVICES AGREEMENT	$35,718.88	*91190100-52100*	*CONTRACTUAL SERVICES*	*$8,444.00*
				91190100-52100	*CONTRACTUAL SERVICES*	*$11,397.92*
				91190100-52100	*CONTRACTUAL SERVICES*	*$15,876.96*
					Vendor Total:	*$35,718.88*
WRIGHT L'ESTRANGE & ERGASTOLO	30030	LEGAL SERVICES - CVEMSA EOA DI	$1,299.42	*10021210-52150*	*LEGAL SERVICES/ EXPENSES*	*$1,299.42*
					Vendor Total:	*$1,299.42*
XYLEM WATER SOLUTIONS USA INC	3556B16871	NOZZLE CAP	$679.29	*82027111-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$679.29*
					Vendor Total:	*$679.29*
ZUMAR INDUSTRIES INC	87823	R1-6 S/F, 12"X36" PLASTIC, FYG	$4,132.53	*10024620-54131*	*PW - BARRICADES & CONES*	*$1,767.36*
				10024620-54127	*PW - SIGN POSTS/SHEETING*	*$215.65*
				82027114-54100	*SUPPLIES*	*$1,074.76*

List of Checks Presented for Approval on 5/1/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ZUMAR INDUSTRIES INC	87823	R1-6 S/F. 12"X36" PLASTIC, FYG	$4,132.53	*84027221-54100*	*SUPPLIES*	*$1,074.76*
					Vendor Total:	*$4,132.53*
					INVOICE TOTAL:	***$494,574.13***

List of Checks Presented for Approval on 5/8/2020

The following list of bills payable was reviewed and approved for payment.



Signature

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ACME RIGGING & SUPPLY CO	309149	MISC. RENTAL & SUPPLIES AS NEE	$19.58	*82027111-56300*	*BUILDING MAINT. & REPAIR*	*$19.58*
	309003	MISC. RENTAL & SUPPLIES AS NEE	$27.75	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$27.75*
	309088	MISC. RENTAL & SUPPLIES AS NEE	$27.75	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$27.75*
	309086	MISC. RENTAL & SUPPLIES AS NEE	$87.46	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$87.46*
					Vendor Total:	*$162.54*
ADAMSON POLICE PRODUCTS	INV325219	VERTEX SUPER LED	$82.11	*82027114-56130*	*EXTERNAL SERVICES*	*$82.11*
					Vendor Total:	*$82.11*
ADVANCED SECURITY SYSTEMS	517305	MONTHLY ALARM SERVICES FOR 1301 TALMAGE RD	$24.75	*10021210-52180*	*SECURITY SERVICES*	*$12.38*
				91521400-52180	*SECURITY SERVICES*	*$12.37*
					Vendor Total:	*$24.75*
ALTEC INDUSTRIES INC	11390490	CAPSCREW KIT	$71.51	*20324100-56112*	*EQUIPMENT PARTS FOR RESALE*	*$71.51*
	1131242	CAP SCREWS, NUTS, HARWARE KITS	$187.73	*80026110-56130*	*EXTERNAL SERVICES*	*$187.73*
					Vendor Total:	*$259.24*
AMAZON CAPITAL SERVICES	1QTK-9VDJ-3TQL	HDMI CABLES	$18.16	*10020210-54330*	*COMPUTER AND TECHNOLOGY*	*$18.16*
	1QRY-9M3J-RLNW	SUNSCREEN	$104.64	*10024620-54120*	*PW - SPECIAL SUPPLIES*	*$104.64*
	1QN3-LGMV-1QJT	HAND SANITIZER	$62.72	*10012200-54100*	*SUPPLIES*	*$62.72*
	1HJJ-DWQV-HQ9K	REFUND - TEMPERATURE GUN	($244.96)	*10020210-54100*	*SUPPLIES*	*($244.96)*
	1YHL-VVDP-CN4M	WIRELESS KEYBOARD AND MOUSE	$181.35	*10020210-54100*	*SUPPLIES*	*$181.35*
	1DCC-PYTH-RMWP	FLUKE 568 DUEL INFRARED THERMOMETER	$459.37	*80026400-54100*	*SUPPLIES*	*$459.37*
	1MGV-6T7R-LXGX	SUNSCREEN	$201.78	*82027114-54100*	*SUPPLIES*	*$201.78*
					Vendor Total:	*$783.06*
AMERICAN WATER WORKS ASSOCIATION	7001773201	MEMBERSHIP- D TUBBS	$105.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$105.00*
					Vendor Total:	*$105.00*

List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
AT&T	2799 MAY 20	INTERNET	$87.65	*10022100-55100*	*TELEPHONE*	*$87.65*
	3138 APR 20	DSL FOR 911 REMOTE SUPPORT	$101.65	*20620231-55100*	*TELEPHONE*	*$101.65*
					Vendor Total:	*$189.30*
BOUND TREE MEDICAL LLC	83585593	AEROCHAMBER MV AEROSOL HOLDING	$179.83	*10021210-54100*	*SUPPLIES*	*$89.91*
				91521400-54100	*SUPPLIES*	*$89.92*
					Vendor Total:	*$179.83*
BT MANCINI CO INC	0128149-IN	PORTER #851 ECONOMY VOLLYBALL EQUIPMENT	$1,504.00	*90000000-23256*	*SPECIAL EVENTS TRUST*	*$1,504.00*
					Vendor Total:	*$1,504.00*
CALIFORNIA SOCIETY OF MUNICIPAL FINANCE OFFICERS	200004883	REGISTRATION - D BUFFALO	$425.00	*10013400-57100*	*LEARNING AND DEVELOPMENT*	*$425.00*
					Vendor Total:	*$425.00*
CAROLLO ENGINEERS INC	0186501	DESIGN PHASES I&II RECYCLED WATER	$15,086.75	*83027330-80230*	*INFRASTRUCTURE*	*$15,086.75*
					Vendor Total:	*$15,086.75*
CLARK PEST CONTROL	25715778	PEST CONTROL SVCS	$94.00	*80026210-52100*	*CONTRACTUAL SERVICES*	*$94.00*
	25704420	PEST CONTROL SVCS	$74.00	*80026220-52100*	*CONTRACTUAL SERVICES*	*$74.00*
	25704453	PEST CONTROL SVCS	$95.00	*80026400-52100*	*CONTRACTUAL SERVICES*	*$95.00*
					Vendor Total:	*$263.00*
COMCAST	5488 MAY 20	INTERNET SERVICES	$89.86	*10021210-55100*	*TELEPHONE*	*$44.93*
				91521400-55100	*TELEPHONE*	*$44.93*
					Vendor Total:	*$89.86*
COOPER COMPLIANCE CORPORATION	2090	COMPLIANCE & REPORTING SERVICE	$500.00	*80026400-52100*	*CONTRACTUAL SERVICES*	*$500.00*
					Vendor Total:	*$500.00*
DEEP VALLEY SECURITY	361168 6	SECURITY SYSTEM MONITORING AT	$39.95	*10022100-52180*	*SECURITY SERVICES*	*$39.95*
	361168	ALARM SERVICES PER ATTACHED CO	$278.65	*10022100-52180*	*SECURITY SERVICES*	*$26.95*
				10022100-52180	*SECURITY SERVICES*	*$29.95*
				10022700-52180	*SECURITY SERVICES*	*$42.95*
				20822500-52180	*SECURITY SERVICES*	*$42.95*
				20824300-52180	*SECURITY SERVICES*	*$49.00*
				73022600-52180	*SECURITY SERVICES*	*$19.95*
				73022600-52180	*SECURITY SERVICES*	*$21.95*

List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
DEEP VALLEY SECURITY	361168	ALARM SERVICES PER ATTACHED CO	$278.65	82027111-52180	SECURITY SERVICES	$20.00
				82027111-52180	SECURITY SERVICES	$24.95
	361168 5	SECURITY UPGRADE & MONITORING/	$42.95	10022700-52180	SECURITY SERVICES	$42.95
	361168 1	MONITORING - SOFTBALL COMPLEX	$32.95	10022822-52180	SECURITY SERVICES	$32.95
	361168 2	SECURITY MONITORING SVCS - STR	$34.95	20824300-52180	SECURITY SERVICES	$34.95
	361168 3	SECURITY MONITORING SVCS - GAR	$46.95	20824300-52180	SECURITY SERVICES	$46.95
	361168 4	PROVIDE AND INSTALL ELECTRONIC	$52.95	80026400-52180	SECURITY SERVICES	$52.95
					Vendor Total:	$529.35
DEPT OF FORESTRY & FIRE PROTECTION	1199487	FSTEP FIRE CONTROL REGISTRATION	$428.00	10021210-57100	LEARNING AND DEVELOPMENT	$214.00
				91721400-57100	LEARNING AND DEVELOPMENT	$214.00
					Vendor Total:	$428.00
DONALD KEITH HEWETT	69210	TOWING SERVICES	$560.00	10021210-56130	EXTERNAL SERVICES	$560.00
					Vendor Total:	$560.00
EUREKA OXYGEN CO	466253	EQUIPMENT MAINTENANCE	$32.36	84027225-52100	CONTRACTUAL SERVICES	$32.36
	466150	EQUIPMENT MAINTENANCE	$314.00	84027225-52100	CONTRACTUAL SERVICES	$314.00
	DM00811580	EQUIPMENT SERVICE	$20.81	10021210-56120	EQUIPMENT MAINTENANCE & REPAIR	$10.40
				91721400-56120	EQUIPMENT MAINTENANCE & REPAIR	$10.41
					Vendor Total:	$367.17
FASTENAL	CAUKA39078	U-BOLTS	$37.64	84027225-56120	EQUIPMENT MAINTENANCE & REPAIR	$37.64
	CAUKA39080	XL 6M/L BLACK GLOVES	$332.83	10012200-54100	SUPPLIES	$332.83
					Vendor Total:	$370.47
FISHER WIRELESS SVCS INC	231863	REMOTE CABLES, 17FT	$126.30	10020210-56130	EXTERNAL SERVICES	$126.30
					Vendor Total:	$126.30
GAYLENE BARTHOLF	DV050720	REIMBURSEMENT-SUPPLIES COVID-19	$29.25	10020210-54100	SUPPLIES	$29.25
					Vendor Total:	$29.25
GEXPRO	S127627130.001	SWANATE REELS	$611.78	80000000-12104	INVENTORY - PURCHASES	$611.78
					Vendor Total:	$611.78

List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
GRAINGER INC	9516464071	DISWASHING AND HAND SOAP	$68.27	*10021210-54100*	*SUPPLIES*	*$34.14*
				91521400-54100	*SUPPLIES*	*$34.13*
					Vendor Total:	*$68.27*
HILDEBRAND CONSULTING LLC	195	FINANCIAL ANALYSIS - SEWER RAT	$7,056.00	*84427222-52100*	*CONTRACTUAL SERVICES*	*$7,056.00*
					Vendor Total:	*$7,056.00*
IBEW, LOCAL 1245	20-4 IBEW	APR 20 ELECTRIC UNIT UNION DUE	$1,880.80	*20700000-20509*	*P/R DEDUCT.- UNION DUES*	*$1,880.80*
					Vendor Total:	*$1,880.80*
INTERSTATE BATTERIES	381609	BATTERIES	$123.98	*10021210-56130*	*EXTERNAL SERVICES*	*$123.98*
	380041698	BATTERIES	$128.67	*80026110-56130*	*EXTERNAL SERVICES*	*$128.67*
	380041654	BATTERIES	$263.20	*84027225-56130*	*EXTERNAL SERVICES*	*$263.20*
					Vendor Total:	*$515.85*
INTERWEST CONSULTING GROUP INC	57601	ON-CALL BUILDING & PLAN CHECK	$170.00	*10023320-52100*	*CONTRACTUAL SERVICES*	*$170.00*
	57064	ON-CALL BUILDING & PLAN CHECK	$265.00	*10023320-52100*	*CONTRACTUAL SERVICES*	*$265.00*
	56862	ON-CALL BUILDING & PLAN CHECK	$472.50	*10023320-52100*	*CONTRACTUAL SERVICES*	*$472.50*
	59087	ON-CALL BUILDING & PLAN CHECK	$1,710.65	*10023320-52100*	*CONTRACTUAL SERVICES*	*$1,710.65*
					Vendor Total:	*$2,618.15*
JACK MILLER	20024	LABOR FOR ANNUAL FLOW METER TE	$4,518.73	*82027111-52100*	*CONTRACTUAL SERVICES*	*$4,518.73*
					Vendor Total:	*$4,518.73*
KIMBALL MIDWEST	7901179	GARAGE SUPPLIES	$1,086.99	*20324100-56112*	*EQUIPMENT PARTS FOR RESALE*	*$1,086.99*
					Vendor Total:	*$1,086.99*
LN CURTIS & SONS	INV378067	SWIVEL GASKET, EXPANSION RING	$164.63	*10021210-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$82.31*
				91721400-56120	*EQUIPMENT MAINTENANCE & REPAIR*	*$82.32*
					Vendor Total:	*$164.63*
MAJOR CRIMES FORCE	042920	ANNUAL AGENCY CONTRIBUTION	$4,500.00	*10020224-52100*	*CONTRACTUAL SERVICES*	*$4,500.00*
					Vendor Total:	*$4,500.00*
MATHESON TRI-GAS INC	21611202	OXYGEN & MISC. SUPPLIES AS NEEDED	$75.65	*80026210-54100*	*SUPPLIES*	*$75.65*
					Vendor Total:	*$75.65*

List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
MENDOCINO COUNTY INFORMATION SERVICES DIVISION	DV042920	PARKING PERMIT REFUND- LIBRARY	$916.00	*64000000-42511*	*PARKING - OFF STREET PERMIT*	*$916.00*
					Vendor Total:	*$916.00*
MENDOCINO SOLID WASTE MANAGEMENT AUTHORITY	WWTP042320	FLUORESCENT TUBES	$25.00	*84027225-54100*	*SUPPLIES*	*$25.00*
					Vendor Total:	*$25.00*
MES - MUNICIPAL EMERGENCY SERVICES INC	IN1438551	SEEK REVEAL FIRE PRO 5+1 PACKA	$7,019.89	*25321210-54102*	*SMALL TOOLS*	*$3,509.94*
				91621400-54102	*SMALL TOOLS*	*$3,509.95*
					Vendor Total:	*$7,019.89*
NFP NATIONAL ACCOUNT SERVICES INC	20-05 NFP	MAY 20 NFP INSURANCE	$2,916.06	*20700000-20523*	*P/R DEDUCT-LTD*	*$2,681.46*
				20700000-20512	*REMIF LIFE*	*($89.40)*
				20700000-20512	*REMIF LIFE*	*$36.00*
				20700000-20512	*REMIF LIFE*	*$288.00*
	20-04 NFP	APR 20 NFP INSURANCE	$3,171.92	*20700000-20523*	*P/R DEDUCT-LTD*	*$2,841.17*
				20700000-20512	*REMIF LIFE*	*$36.75*
				20700000-20512	*REMIF LIFE*	*$294.00*
					Vendor Total:	*$6,087.98*
OLIN CORPORATION	2817185	LIQUID SODIUM HYPOCHLORITE	$4,166.87	*84027225-58202*	*CHEMICALS*	*$4,166.87*
					Vendor Total:	*$4,166.87*
ONE TIME PAY VENDOR	DV042820	REC REFUND- WOODHOUSE, COVID-19	$300.00	*10022824-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	040209 2	REC REFUND- WEAVER, COVID-19	$10.50	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$10.50*
	DV043020	REC REFUND- GONZALEZ, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016538	REC REFUND- MUNOZ, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0017094	REC REFUND- WAGNAR, COVID-19	$80.00	*10022850-44915*	*RECREATION PROGRAM INCOME*	*$80.00*
	115404-6	UTILITY REFUND - BRIAN WAIBEL	$34.77	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$34.77*
	121395-8	UTILITY REFUND - JUSTINO MOLINA, LUISANA ROBLEDO	$107.50	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$107.50*

List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	106496-3	UTILITY REFUND - MARIA ISABEL MEZA, LEOPALDO ROLON	$136.00	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$136.00*
	114162-1	UTILITY REFUND - WINDERMERE PLATINUM	$156.48	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$156.48*
					Vendor Total:	*$965.25*
OPERATING ENGINEERS UNION	2004-1	APR 20 PW UNION DUES	$1,040.00	*20700000-20509*	*P/R DEDUCT.- UNION DUES*	*$1,040.00*
	2004	APR 20 MISC UNION DUES	$1,740.00	*20700000-20509*	*P/R DEDUCT.- UNION DUES*	*$1,740.00*
					Vendor Total:	*$2,780.00*
OPPERMAN & SON INC	01P32045	CLAMPS	$56.82	*20324100-56112*	*EQUIPMENT PARTS FOR RESALE*	*$56.82*
	01P32067	LAMP	$57.62	*20324100-56112*	*EQUIPMENT PARTS FOR RESALE*	*$57.62*
	01P30707	FUSE BLOCK CIRCUIT	$148.70	*10020210-56130*	*EXTERNAL SERVICES*	*$148.70*
	01P31349	LOW BEAM LED	$778.42	*10021210-56130*	*EXTERNAL SERVICES*	*$265.71*
				10021210-56130	*EXTERNAL SERVICES*	*$265.71*
				91521400-56130	*EXTERNAL SERVICES*	*$247.00*
	01P30767	MOTOR	$389.94	*10024620-56130*	*EXTERNAL SERVICES*	*$389.94*
	01P31930	COVER- SHIFT LEVER	$220.87	*82027114-56130*	*EXTERNAL SERVICES*	*$220.87*
	01P31388	PIGTAIL SOCKET	$49.44	*84027221-56130*	*EXTERNAL SERVICES*	*$49.44*
	01P31295	HOOD LATCH KIT	$94.22	*84027221-56130*	*EXTERNAL SERVICES*	*$94.22*
	01P30978	KIT FILTER	$131.67	*84027221-56130*	*EXTERNAL SERVICES*	*$131.67*
	01P31389	LAMP, LIGHTS	$244.58	*84027221-56130*	*EXTERNAL SERVICES*	*$244.58*
	01P31043	VALVE, PIPE	$516.11	*20324100-58510*	*REIMBURSABLE JOBS*	*$516.11*
					Vendor Total:	*$2,688.39*
OWEN EQUIPMENT SALES	00049134	DEBRIS HOSE	$779.54	*84027221-56130*	*EXTERNAL SERVICES*	*$779.54*
					Vendor Total:	*$779.54*
PACE SUPPLY CORPORATION	026044516	PIPE WRENCH, ADAPTER	$418.65	*82027111-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$65.13*
				20324100-54102	*SMALL TOOLS*	*$353.52*
	025973944	BALL VALVE BRANCH	$311.56	*82000000-12104*	*INVENTORY - PURCHASES*	*$311.56*
					Vendor Total:	*$730.21*

List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
PFM ASSET MANAGEMENT LLC	SMA-M0320-16316	FINANCIAL ADVISORY SERVICES	$2,758.94	*10015100-52100*	*CONTRACTUAL SERVICES*	*$2,758.94*
					Vendor Total:	*$2,758.94*
RAINBOW AGRICULTURAL SERVICES	32474/1	STROKE FUEL	$97.98	*82027111-56300*	*BUILDING MAINT. & REPAIR*	*$97.98*
	32817/1	CIRCUIT BREAKER	$7.61	*82027111-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$7.61*
	32207/1	NOZZLE ASSEMBLY, MIX OIL	$97.95	*10022100-56210*	*FUEL & FLUIDS*	*$10.88*
				10022100-54100	*SUPPLIES*	*$87.07*
	83099/1	TRIMMER, HEARING PROTECTOR	$250.35	*82027111-54102*	*SMALL TOOLS*	*$250.35*
	32208/1	PRE-MIX FUEL, CHAIN LOOP OIL	$262.41	*82027111-54102*	*SMALL TOOLS*	*$262.41*
	32183/1	K-9 FOOD	$65.31	*10020210-54100*	*SUPPLIES*	*$65.31*
					Vendor Total:	*$781.61*
RAY C STARKEY	P-2001293	HATS - WATER DEPT.	$418.06	*82027114-54100*	*SUPPLIES*	*$418.06*
	P-2001292	HATS - WATER DEPT.	$627.09	*82027114-54100*	*SUPPLIES*	*$627.09*
					Vendor Total:	*$1,045.15*
RD OFFUTT COMPANY	1223905	LEICA GEOSYSTEMS GG04 SMART AN	$10,710.00	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($53.56)*
				90000000-23257	*COURT COST TRUST*	*($13.38)*
				90000000-23237	*DISTRICT USE TAX-MEASURE S*	*($53.55)*
				10024620-80100	*MACHINERY & EQUIPMENT*	*$237.62*
				10024620-80100	*MACHINERY & EQUIPMENT*	*$1,710.00*
				82027110-80100	*MACHINERY & EQUIPMENT*	*$237.63*
				82027110-80100	*MACHINERY & EQUIPMENT*	*$3,000.00*
				83027330-80100	*MACHINERY & EQUIPMENT*	*$237.63*
				83027330-80100	*MACHINERY & EQUIPMENT*	*$3,000.00*
				84027220-80100	*MACHINERY & EQUIPMENT*	*$237.63*
				84027220-80100	*MACHINERY & EQUIPMENT*	*$3,000.00*
				90000000-23028	*MEASURE Y DISTRICT TAX*	*($53.55)*
				90000000-23013	*STATE USE TAX LIABILITY*	*($776.47)*
					Vendor Total:	*$10,710.00*

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Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
REDWOOD COAST FUELS	2140413	CARDLOCK FUEL PURCHASES	$921.09	*20324100-58410*	*GARAGE LUBRICANTS & PARTS*	*$921.09*
					Vendor Total:	*$921.09*
REDWOOD EMPIRE MUNICIPAL INSURANCE FUND	20-05 EAP	REMIF EAP INRUANCE	$545.28	*20700000-20520*	*P/R DEDUCT.-MEDICAL INS*	*$545.28*
					Vendor Total:	*$545.28*
RELIABLE MILL SUPPLY CO	144564	PLATES CUT	$477.89	*82027114-54100*	*SUPPLIES*	*$477.89*
					Vendor Total:	*$477.89*
REXEL USA INC	0H63055	CABLE CONNECTOR	$312.32	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$312.32*
	0H9439	BASE LAMP	$146.41	*84027225-54100*	*SUPPLIES*	*$146.41*
					Vendor Total:	*$458.73*
RINO PACIFIC	CL30779	FUEL CARD CHARGES AS NEEDED	$1,259.79	*10021210-56210*	*FUEL & FLUIDS*	*$629.90*
				91521400-56210	*FUEL & FLUIDS*	*$629.89*
					Vendor Total:	*$1,259.79*
ROGINA WATER COMPANY	0380 APR 20	WATER SERVICES - 1301 TALMAGE RD	$23.84	*10021210-55210*	*UTILITIES*	*$11.92*
				91521400-55210	*UTILITIES*	*$11.92*
					Vendor Total:	*$23.84*
SHI INTERNATIONAL CORP	B11632190	CISCO #C9300-48P-E: CATALYST 9	$605.71	*20913900-80100*	*MACHINERY & EQUIPMENT*	*$605.71*
	B11626689	CISCO #C9300-48P-E: CATALYST 9	$3,537.88	*20913900-80100*	*MACHINERY & EQUIPMENT*	*$3,537.88*
					Vendor Total:	*$4,143.59*
STATE WATER RESOURCES CONTROL BOARD	DV042420	CERTIFICATION RENEWAL - A HODGE	$60.00	*84027225-57100*	*LEARNING AND DEVELOPMENT*	*$60.00*
					Vendor Total:	*$60.00*
STEVE MICHAEL BROWN	UKIAH-011	EIR FOR LANDFILL CLOSURE PROJECT	$9,990.00	*70024500-52100*	*CONTRACTUAL SERVICES*	*$9,990.00*
					Vendor Total:	*$9,990.00*
SUBURBAN PROPANE	1426-201343	PROPANE	$194.43	*10021210-55210*	*UTILITIES*	*$97.22*
				91521400-55210	*UTILITIES*	*$97.21*
					Vendor Total:	*$194.43*
TIM ERIKSEN	DV050620	ACH PA CYCLE RETURN	$770.00	*10024210-51110*	*REGULAR SALARIES & WAGES*	*$770.00*
					Vendor Total:	*$770.00*

List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
TUFTS POLYGRAPH & INVESTIGATION	2020-550(A)	POLYGRAPH & INVESTIGATION SERVICES	$550.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$550.00*
	2020-559(A)	POLYGRAPH & INVESTIGATION SERVICES	$550.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$550.00*
	2020-560(A)	POLYGRAPH & INVESTIGATION SERVICES	$550.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$550.00*
	2020-561(A)	POLYGRAPH & INVESTIGATION SERVICES	$550.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$550.00*
	2020-557(A)	POLYGRAPH INVESTIGATION SERVICES	$550.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$550.00*
					Vendor Total:	*$2,750.00*
UKIAH AUTO PARTS	STMT050620	DISCOUNT	($21.89)	*20324100-56112*	*EQUIPMENT PARTS FOR RESALE*	*($21.89)*
	154987	LAMPS	$59.34	*20324100-56112*	*EQUIPMENT PARTS FOR RESALE*	*$59.34*
	155318	BATTERY	$1,055.18	*10024620-56130*	*EXTERNAL SERVICES*	*$1,055.18*
	156560	OIL FILTER	$22.06	*20822500-56130*	*EXTERNAL SERVICES*	*$22.06*
	156156	CYCLE OIL	$2.17	*20822500-56210*	*FUEL & FLUIDS*	*$2.17*
	158027	VALVE CAP	$5.90	*20324100-54100*	*SUPPLIES*	*$5.90*
	156088	ADAPTER, COUPLER	$52.97	*20324100-54100*	*SUPPLIES*	*$52.97*
					Vendor Total:	*$1,175.73*
UKIAH DAILY JOURNAL	0006433531	LEGAL LINER PUBLICATION	$39.00	*10020210-52515*	*ADVERTISING & PUBLICATION*	*$39.00*
	0006468094	PUBLIC HEARING	$123.42	*10023411-52515*	*ADVERTISING & PUBLICATION*	*$123.42*
	0006472784	PUBLIC HEARING	$150.43	*10023411-52515*	*ADVERTISING & PUBLICATION*	*$150.43*
	0006468151	PUBLISHING SERVICES FOR FY 19/	$69.40	*10012500-52150*	*LEGAL SERVICES/ EXPENSES*	*$69.40*
					Vendor Total:	*$382.25*
UNITED SITE SERVICES	114-10238086	PORTABLE TOILET RENTAL	$166.86	*10022100-52100*	*CONTRACTUAL SERVICES*	*$166.86*
	114-10238090	PORTABLE TOILET RENTAL	$166.86	*10022100-52100*	*CONTRACTUAL SERVICES*	*$166.86*
					Vendor Total:	*$333.72*
US BANK CORPORATE PAYMENT SERVICES	APR 20	CAL CARD PURCHASES	$2,272.42	*10021210-56300*	*BUILDING MAINT. & REPAIR*	*$18.60*
				91721400-56300	*BUILDING MAINT. & REPAIR*	*$18.60*
				10021210-56120	*EQUIPMENT MAINTENANCE & REPAIR*	*$102.34*

List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
US BANK CORPORATE PAYMENT SERVICES	APR 20	CAL CARD PURCHASES	$2,272.42	*91721400-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$102.34*
				10021210-57100	*LEARNING AND DEVELOPMENT*	*($24.01)*
				91521400-57100	*LEARNING AND DEVELOPMENT*	*($25.00)*
				25321210-54102	*SMALL TOOLS*	*$322.71*
				91621400-54102	*SMALL TOOLS*	*$322.71*
				10021210-54100	*SUPPLIES*	*$32.58*
				91521400-54100	*SUPPLIES*	*$32.59*
				91521400-54100	*SUPPLIES*	*$444.11*
				91521400-54100	*SUPPLIES*	*$480.74*
				91721400-54100	*SUPPLIES*	*$444.11*
					Vendor Total:	*$2,272.42*
VERIZON WIRELESS	9852914018	DATA & EMERGENCY LOANER PHONES	$1,832.85	*80126100-80100*	*MACHINERY & EQUIPMENT*	*$152.04*
				10012100-55100	*TELEPHONE*	*$38.01*
				10020210-55100	*TELEPHONE*	*$76.02*
				10022100-55100	*TELEPHONE*	*$38.01*
				10022300-55100	*TELEPHONE*	*$38.01*
				10022810-55100	*TELEPHONE*	*$38.00*
				10022840-55100	*TELEPHONE*	*$38.01*
				10023100-55100	*TELEPHONE*	*$38.01*
				10024210-55100	*TELEPHONE*	*$69.69*
				10024620-55100	*TELEPHONE*	*$53.96*
				20913900-55100	*TELEPHONE*	*$430.98*
				70024500-55100	*TELEPHONE*	*$28.51*
				77725200-55100	*TELEPHONE*	*$38.01*
				80026210-55100	*TELEPHONE*	*$38.01*
				80026400-55100	*TELEPHONE*	*$232.06*
				82027110-55100	*TELEPHONE*	*$117.20*

List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
VERIZON WIRELESS	9852914018	DATA & EMERGENCY LOANER PHONES	$1,832.85	*82027111-55100*	*TELEPHONE*	*$76.02*
				82027114-55100	*TELEPHONE*	*$40.04*
				84027220-55100	*TELEPHONE*	*$98.19*
				84027221-55100	*TELEPHONE*	*$154.07*
					Vendor Total:	*$1,832.85*
VWR INTERNATIONAL INC	8089807611	TURBIDITY STANDARD HACH	$74.04	*90000000-23237*	*DISTRICT USE TAX-MEASURE S*	*($0.28)*
				84027225-54103	*LAB SUPPLIES*	*$0.56*
				84027225-54103	*LAB SUPPLIES*	*$74.04*
				90000000-23028	*MEASURE Y DISTRICT TAX*	*($0.28)*
	8089815268	GLASS FILTER, EC ,EC MEDIUM	$179.58	*90000000-23237*	*DISTRICT USE TAX-MEASURE S*	*($0.77)*
				84027225-54103	*LAB SUPPLIES*	*$1.54*
				84027225-54103	*LAB SUPPLIES*	*$179.58*
				90000000-23028	*MEASURE Y DISTRICT TAX*	*($0.77)*
					Vendor Total:	*$253.62*
WATSON-MARLOW INC	S1125337	HYPO-TUBING	$896.01	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$896.01*
					Vendor Total:	*$896.01*
WAXIE SANITARY SUPPLY	79067157	DISINFECTANT CLEANER	$137.40	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.64)*
				10020210-54100	*SUPPLIES*	*$0.22*
				10020210-54100	*SUPPLIES*	*$45.80*
				10021210-54100	*SUPPLIES*	*$0.21*
				10021210-54100	*SUPPLIES*	*$45.80*
				91521400-54100	*SUPPLIES*	*$0.21*
				91521400-54100	*SUPPLIES*	*$45.80*
					Vendor Total:	*$137.40*
WEST YOST ASSOCIATED	2041036	RRWA EXECUTIVE SERVICES AGREEMENT	$45,501.22	*91190100-52100*	*CONTRACTUAL SERVICES*	*$6,610.75*
				91190100-52100	*CONTRACTUAL SERVICES*	*$12,178.65*

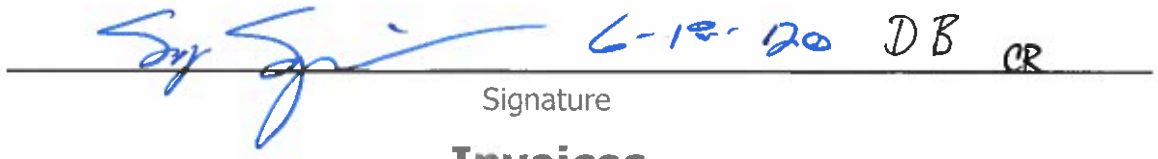
List of Checks Presented for Approval on 5/8/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
WEST YOST ASSOCIATED	2041036	RRWA EXECUTIVE SERVICES AGREEMENT	$45,501.22	*91190100-52100*	*CONTRACTUAL SERVICES*	*$26,711.82*
					Vendor Total:	*$45,501.22*
WILLOW COUNTY WATER DIST	10010 APR 20	WATER SERVICES - 1500 S STATE ST	$48.37	*10021210-55210*	*UTILITIES*	*$24.19*
				91521400-55210	*UTILITIES*	*$24.18*
	40353 APR 20	WATER SERVICES - 1640 S STATE ST	$20.18	*31122000-55210*	*UTILITIES*	*$20.18*
	40353 MAR 20	WATER SERVICES - 1640 S STATE ST	$31.91	*31122000-55210*	*UTILITIES*	*$31.91*
	81154 APR 20	WATER SERVICES - SEWER TREATMENT PLANT	$21.81	*84027225-55210*	*UTILITIES*	*$21.81*
	81154 MAR 20	WATER SERVICES - SEWER TREATMENT PLANT	$21.81	*84027225-55210*	*UTILITIES*	*$21.81*
					Vendor Total:	*$144.08*
WITMER PUBLIC SAFETY GROUP	E1958551	FIRE CLOTHING	$37.55	*91521400-54100*	*SUPPLIES*	*$18.78*
				91721400-54100	*SUPPLIES*	*$18.77*
					Vendor Total:	*$37.55*
WYATT IRRIGATION CO	269722 00	ADJUSTABLE VALVE	$234.91	*10022300-54106*	*SPECIALTY SUPPLIES*	*$234.91*
	269910 00	PVC ADAPTER	$22.38	*10022100-54100*	*SUPPLIES*	*$22.38*
	270992 00	ADJUSTABLE VALVE	$852.90	*10022100-54100*	*SUPPLIES*	*$852.90*
					Vendor Total:	*$1,110.19*
					INVOICE TOTAL:	***$162,288.34***

List of Checks Presented for Approval on 5/15/2020

The following list of bills payable was reviewed and approved for payment.



Signature

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ADAMSON POLICE PRODUCTS	INV325261	LABELS CENCOM	$258.51	*10020210-56130*	*EXTERNAL SERVICES*	*$258.51*
	INV324984	BUMPBER PAD	$461.37	*10020210-56130*	*EXTERNAL SERVICES*	*$461.37*
	INV325409	SPEAKER	$180.10	*10021210-56130*	*EXTERNAL SERVICES*	*$90.05*
				91521400-56130	*EXTERNAL SERVICES*	*$90.05*
					Vendor Total:	*$899.98*
AFLAC	662841	CANCER/LIFE/ACC INSURANCE	$7,719.16	*20700000-20527*	*SECTION 125 (CANCER & LIFE)*	*$7,719.16*
					Vendor Total:	*$7,719.16*
ALHAMBRA NATIONAL WATER	5109554 050620	DRINKING WATER SERVICES	$23.59	*10022700-52100*	*CONTRACTUAL SERVICES*	*$8.99*
				84027225-54100	*SUPPLIES*	*$14.60*
					Vendor Total:	*$23.59*
AMAZON CAPITAL SERVICES	1LRV-NNH6-1XN1	LENORO DOCK	$224.28	*10012500-54330*	*COMPUTER AND TECHNOLOGY*	*$224.28*
	1Q49-YD9H-PNPJ	LENORO DOCK	$225.37	*10021210-54330*	*COMPUTER AND TECHNOLOGY*	*$112.68*
				91721400-54330	*COMPUTER AND TECHNOLOGY*	*$112.69*
					Vendor Total:	*$449.65*
ANIXTER	4566778-02	TRANSFORMER BOX	$2,847.82	*80000000-12104*	*INVENTORY - PURCHASES*	*$2,847.82*
					Vendor Total:	*$2,847.82*
BRIDGES RESTORATION LLC	2211	ON-CALL EMERGENCY CLEAN-UP SER	$350.00	*10020210-52100*	*CONTRACTUAL SERVICES*	*$350.00*
					Vendor Total:	*$350.00*
CA POLICE CHIEFS ASSOC	15656	MEMBERSHIP- J WYATT	$440.00	*10020210-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$440.00*
					Vendor Total:	*$440.00*
COMCAST	1067 MAY 20	INTERNET SERVICES	$124.81	*10021210-55100*	*TELEPHONE*	*$62.41*
				91521400-55100	*TELEPHONE*	*$62.40*
					Vendor Total:	*$124.81*

List of Checks Presented for Approval on 5/15/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
DARLENE R SIMPSON	9822	DORA STREET ADA IMPROVEMENT PROJECT	$96,284.00	*12024200-80230*	*INFRASTRUCTURE*	*$96,284.00*
					Vendor Total:	*$96,284.00*
DAVID RAPPORT	050120 COVID-19	LEGAL SERVICES FOR FY 19/20	$8,912.40	*10014000-52150*	*LEGAL SERVICES/ EXPENSES*	*$8,757.24*
				20414000-52150	*LEGAL SERVICES/ EXPENSES*	*$155.16*
	7164	LEGAL SERVICES FOR FY 19/20	$34,788.63	*10014000-52150*	*LEGAL SERVICES/ EXPENSES*	*$4,498.86*
				10014000-52150	*LEGAL SERVICES/ EXPENSES*	*$9,516.22*
				20414000-52150	*LEGAL SERVICES/ EXPENSES*	*$778.69*
				77714000-52150	*LEGAL SERVICES/ EXPENSES*	*$254.03*
				80014000-52150	*LEGAL SERVICES/ EXPENSES*	*$912.59*
				82014000-52150	*LEGAL SERVICES/ EXPENSES*	*$8,027.66*
				83027330-52150	*LEGAL SERVICES/ EXPENSES*	*$709.85*
				84014000-52150	*LEGAL SERVICES/ EXPENSES*	*$1,911.12*
				90214000-52150	*LEGAL SERVICES/ EXPENSES*	*$8,179.61*
					Vendor Total:	*$43,701.03*
DETROIT INDUSTRIAL TOOL	577764	MASKS	$664.20	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($3.10)*
				90000000-23252	*DISTRICT USE TAX-LIBRARIES*	*($0.76)*
				90000000-23237	*DISTRICT USE TAX-MEASURE S*	*($3.10)*
				90000000-23028	*MEASURE Y DISTRICT TAX*	*($3.10)*
				10024620-54120	*PW - SPECIAL SUPPLIES*	*$5.03*
				10024620-54120	*PW - SPECIAL SUPPLIES*	*$332.10*
				84027221-54100	*SUPPLIES*	*$5.03*
				84027221-54100	*SUPPLIES*	*$332.10*
					Vendor Total:	*$664.20*

List of Checks Presented for Approval on 5/15/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
DLT SOLUTIONS INC	4798790A	DLT #9701-1004940, AUTOCAD - I	$1,641.41	*80026400-54320*	*SOFTWARE*	*$1,641.41*
					Vendor Total:	*$1,641.41*
DON W CHASE FAMILY TRUST	DV050820	SEWER LATERAL REIMBURSEMENT	$2,000.00	*84427222-52100*	*CONTRACTUAL SERVICES*	*$2,000.00*
					Vendor Total:	*$2,000.00*
EFAX CORPORATE	1418341	EFAX SERVICES	$149.86	*10012200-52100*	*CONTRACTUAL SERVICES*	*$149.86*
					Vendor Total:	*$149.86*
ENGLAND ENTERPRISES TRAINING DIVISION, LLC	20-138	REGISTRATION- S OROPEZA	$595.00	*10023320-57100*	*LEARNING AND DEVELOPMENT*	*$595.00*
					Vendor Total:	*$595.00*
EPIC AVIATION LLC	7315830	JET-A FUEL	$9,006.86	*77725200-58401*	*AVIATION FUEL*	*$9,006.86*
					Vendor Total:	*$9,006.86*
FARWEST LINE SPECIALTIES LLC	300859	REPLACEMENT BLADES	$554.70	*80026120-54102*	*SMALL TOOLS*	*$554.70*
					Vendor Total:	*$554.70*
FASTENAL	CAUKA38981	GLOVES	$52.59	*10012200-54100*	*SUPPLIES*	*$52.59*
					Vendor Total:	*$52.59*
GGK ENTERPRISES INC	25882	AIR FILTER	$264.91	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$264.91*
					Vendor Total:	*$264.91*
GHD INC	141352	DOWNTOWN STREETSCAPE - UNDERGR	$10,663.75	*82227113-80230*	*INFRASTRUCTURE*	*$5,331.88*
				84427221-80230	*INFRASTRUCTURE*	*$5,331.87*
					Vendor Total:	*$10,663.75*
GLOBAL KNOWLEDGE TRAINING, LLC	22118397	COURSE #5846L: PALO ALTO NETWORK	$3,000.00	*20913900-57100*	*LEARNING AND DEVELOPMENT*	*$3,000.00*
					Vendor Total:	*$3,000.00*
GRANITE CONSTRUCTION COMPANY	1788955	MISC. ROCK & ROAD PATCH MATERIAL	$299.06	*10024620-54121*	*PW - ASPHALT CONCRETE*	*$299.06*
					Vendor Total:	*$299.06*
HENRY INDUSTRIES INC	19222	FREIGHT CHARGES TO SHIP 2 PUMPS	$1,050.00	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$1,050.00*
					Vendor Total:	*$1,050.00*
IBEW, LOCAL 1245	20-5 IBEW	MAY 20 ELECTRIC UNIT UNION DUE	$1,736.72	*20700000-20509*	*P/R DEDUCT.- UNION DUES*	*$1,736.72*
					Vendor Total:	*$1,736.72*

List of Checks Presented for Approval on 5/15/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
INFOSEND INC	170805	SNIPE PRINT ON UTILITY BILLING	$1,200.00	*10012200-52100*	*CONTRACTUAL SERVICES*	*$1,200.00*
					Vendor Total:	*$1,200.00*
INTEGRITY SHRED LLC	105656	DOCUMENT SHREDDING	$57.00	*10020210-54100*	*SUPPLIES*	*$28.50*
				20620231-54100	*SUPPLIES*	*$28.50*
					Vendor Total:	*$57.00*
KONOCTI RIDGE CORPORATION	640462	EXTERMINATION SERVICES	$98.00	*10021210-56300*	*BUILDING MAINT. & REPAIR*	*$49.00*
				91721400-56300	*BUILDING MAINT. & REPAIR*	*$49.00*
					Vendor Total:	*$98.00*
LEGAL SHIELD	38295 MAY 20	MAY 20 PRE-PAID LEGAL SERVICE	$77.70	*20700000-20526*	*PREPAID LEGAL - AFLAC*	*$77.70*
					Vendor Total:	*$77.70*
LEXISNEXIS RISK DATA MANAGEMENT INC	1410964-20200430	LEXIS NEXIS LE PLUS SEARCHING	$81.50	*10020210-54202*	*MAJOR CRIME INVESTIGATIONS*	*$81.50*
					Vendor Total:	*$81.50*
MARC CARSON WEB DESIGN	22 APRIL 2020	UPD WEBSITE DESIGN	$3,075.00	*63020210-52100*	*CONTRACTUAL SERVICES*	*$3,075.00*
					Vendor Total:	*$3,075.00*
MARK CLEMENTI PHD	04-16-20	PRE-EMPLOYMENT PSYCHOLOGICAL EVALUATION	$734.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$734.00*
					Vendor Total:	*$734.00*
MATHESON TRI-GAS INC	21662952	OXYGEN & MISC. SUPPLIES AS NEEDED	$99.25	*80026220-54100*	*SUPPLIES*	*$99.25*
					Vendor Total:	*$99.25*
MEAD & HUNT INC	301741	CONSTRUCTION ADMIN SVCS RUNWAY	$7,108.72	*77825200-80230*	*INFRASTRUCTURE*	*$7,108.72*
	300512	CONSTRUCTION ADMIN SVCS RUNWAY	$16,058.94	*77825200-80230*	*INFRASTRUCTURE*	*$16,058.94*
					Vendor Total:	*$23,167.66*
MENDO MILL & LUMBER CO	156215/1	HOSE COUPLE AND FLUSH LEVER	$5.69	*10021210-56300*	*BUILDING MAINT. & REPAIR*	*$2.85*
				91721400-56300	*BUILDING MAINT. & REPAIR*	*$2.84*
	154916/1	TV MOUNT	$35.88	*10021210-56300*	*BUILDING MAINT. & REPAIR*	*$17.94*
				91721400-56300	*BUILDING MAINT. & REPAIR*	*$17.94*
	155606/1	RAID SPRAY, GARDEN SPRAYER, KILLZALL SPRAY	$42.04	*10021210-56300*	*BUILDING MAINT. & REPAIR*	*$21.02*
				91721400-56300	*BUILDING MAINT. & REPAIR*	*$21.02*
	155886/1	PLASTIC ADHESIVE	$6.87	*10021210-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$3.43*

List of Checks Presented for Approval on 5/15/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
MENDO MILL & LUMBER CO	155886/1	PLASTIC ADHESIVE	$6.87	*91721400-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$3.44*
	155849/1	MARK PAINT AND WAND	$39.41	*10021210-57100*	*LEARNING AND DEVELOPMENT*	*$19.70*
				91721400-57100	*LEARNING AND DEVELOPMENT*	*$19.71*
	156792/1	SCREWS, WASHERS, SPRAY PAINT	$293.69	*10021210-57100*	*LEARNING AND DEVELOPMENT*	*$146.84*
				91721400-57100	*LEARNING AND DEVELOPMENT*	*$146.85*
	156869/1	ROUGHNECK TOTE, DRILL BITS	$50.66	*25321210-54102*	*SMALL TOOLS*	*$25.33*
				91621400-54102	*SMALL TOOLS*	*$25.33*
	156903/1	AIR PLUG, HEX NIPPLE, RAKE	$9.97	*10021210-54100*	*SUPPLIES*	*$4.98*
				91521400-54100	*SUPPLIES*	*$4.99*
	154718/1	TRASH BAGS	$11.01	*10021210-54100*	*SUPPLIES*	*$5.51*
				91521400-54100	*SUPPLIES*	*$5.50*
					Vendor Total:	*$495.22*
MENDOCINO COUNTY INFORMATION SERVICES DIVISION	20201-4	SLA/MAINTENANCE AGREEMENT FY19/20	$525.00	*20620231-52100*	*CONTRACTUAL SERVICES*	*$525.00*
	20203-4	SLA/MAINTENANCE AGREEMENT FY19/20	$565.40	*20620231-52100*	*CONTRACTUAL SERVICES*	*$565.40*
	20202-4	SLA/MAINTENANCE AGREEMENT FY19	$1,335.20	*20620231-52100*	*CONTRACTUAL SERVICES*	*$1,335.20*
					Vendor Total:	*$2,425.60*
MICROBIOLOGICS INC	866738	E-COLI KWIKSTIK	$224.25	*84027225-54103*	*LAB SUPPLIES*	*$224.25*
					Vendor Total:	*$224.25*
MINTIER HARNISH LP	UKIAHSB2-02	GPU, EIR & ADVANCED PLANNING S	$4,626.25	*31523100-52100*	*CONTRACTUAL SERVICES*	*$4,626.25*
					Vendor Total:	*$4,626.25*
MUNICIPAL MAINTENANCE EQUIPMENT	0148055-IN	FILTER ELEMENT	$114.13	*10024620-56130*	*EXTERNAL SERVICES*	*$114.13*
	0148330-IN	MOTOR CONT SHFT, V-BELT	$1,922.06	*10024620-56130*	*EXTERNAL SERVICES*	*$1,922.06*
					Vendor Total:	*$2,036.19*
NCPA	006102-0520027	MAY 20 NCPA	$752,444.00	*80026440-58104*	*NCPA MANAGEMENT SERVICES*	*$41,353.00*
				80026440-58101	*NCPA PLANT GENERATION*	*$223,682.00*
				80026440-58102	*NCPA POWER PURCHASES*	*$247,957.00*

List of Checks Presented for Approval on 5/15/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
NCPA	006102-0520027	MAY 20 NCPA	$752,444.00	*80026440-58105*	*NCPA THIRD PARTY SALES*	*($15,029.00)*
				80026440-58103	*NCPA TRANSMISSION*	*$254,481.00*
					Vendor Total:	*$752,444.00*
ONE TIME PAY VENDOR	B 21298	PARKS REFUND-MEDINA, COVID-19	$100.00	*10022100-46360*	*PARKS RENTAL*	*$100.00*
	0016957	REC REFUND- HOWE, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV050520	REC REFUND-LINDSTEADT, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV050720	REC REFUND-BAROZA, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	17022	REC REFUND- HAKE, COVID-19	$40.00	*10022850-44915*	*RECREATION PROGRAM INCOME*	*$40.00*
	B 22364	UVCC REFUND-ROSALES	$525.00	*73000000-46701*	*TENANT RENTALS*	*$525.00*
	121425-3 1	UTILITY REFUND-JUDITH MOLONEY	$150.00	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$150.00*
	116232-0	UTILITY REFUND - SCOTT HANSEN	$164.66	*90100000-10421*	*UTILITY RECEIVABLES CLEARING*	*$164.66*
					Vendor Total:	*$1,204.66*
ONESOURCE DISTRIBUTORS LLC	S6443207.001	HIGH VOLTAGE SIGN	$651.07	*80000000-12104*	*INVENTORY - PURCHASES*	*$651.07*
					Vendor Total:	*$651.07*
OPERATING ENGINEER PUBLIC& MISC EMPLOYEES	86138 APR 20	APR 20 HEALTH INSURANCE	$1,497.00	*20700000-20524*	*NON-EMPLOYEE HEALTH INS PREM*	*$1,497.00*
					Vendor Total:	*$1,497.00*
OPERATING ENGINEERS UNION	2005-1	MAY 20 PW UNION DUES	$1,040.00	*20700000-20509*	*P/R DEDUCT.-UNION DUES*	*$1,040.00*
	2005	MAY 20 MISC UNION DUES	$1,680.00	*20700000-20509*	*P/R DEDUCT.-UNION DUES*	*$1,680.00*
					Vendor Total:	*$2,720.00*
OREILLY AUTO PARTS	2707-229083	DISC PAD SET	$369.22	*10020210-56130*	*EXTERNAL SERVICES*	*$369.22*
	2707-227774	TIE ROD END	$53.81	*80026110-56130*	*EXTERNAL SERVICES*	*$53.81*
					Vendor Total:	*$423.03*
OWEN EQUIPMENT SALES	00049274	NOZZLE, CONNECTORS	$77.40	*84027221-56130*	*EXTERNAL SERVICES*	*$77.40*
					Vendor Total:	*$77.40*

List of Checks Presented for Approval on 5/15/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
PACE SUPPLY CORPORATION	026055749	PRESSURE REDUCING VALVE FOR PLAZA	$848.70	*10022100-54100*	*SUPPLIES*	*$848.70*
					Vendor Total:	*$848.70*
PETERSON TRUCKS INC	224762R	WINDSHIELD WASHER	$25.92	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.14)*
				20324100-54100	*SUPPLIES*	*$0.14*
				20324100-54100	*SUPPLIES*	*$25.92*
	224879R	BRAKLEEN	$46.63	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.27)*
				20324100-56112	*EQUIPMENT PARTS FOR RESALE*	*$0.27*
				20324100-56112	*EQUIPMENT PARTS FOR RESALE*	*$46.63*
	226748S	FILTER ASSEMBLY, FUEL KIT	$187.81	*10021210-56130*	*EXTERNAL SERVICES*	*$187.81*
	222425S	GASKET	$44.85	*84027221-56130*	*EXTERNAL SERVICES*	*$44.85*
	CM223826R	CORE RETURN	($103.92)	*20324100-58510*	*REIMBURSABLE JOBS*	*($103.92)*
					Vendor Total:	*$201.29*
PG&E CO	7075-1 APR 1	PACIFIC GAS & ELECTRIC	$22.65	*10022100-55210*	*UTILITIES*	*$22.65*
	0853-6 APR 20	PACIFIC GAS & ELECTRIC	$1,159.18	*31122000-55210*	*UTILITIES*	*$1,159.18*
					Vendor Total:	*$1,181.83*
PITNEY BOWES INC	1015203613	POSTAGE MACHINE LEASE & SUPPLI	$146.98	*73022600-54101*	*POSTAGE*	*$146.98*
					Vendor Total:	*$146.98*
PMI	10033944	BOOMERANG IV METER - STANDARD	$1,559.55	*80026200-54102*	*SMALL TOOLS*	*$1,559.55*
					Vendor Total:	*$1,559.55*
POLYDYNE INC	1452411	LIQUID POLYMER ALKYLAMINE	($4,732.80)	*84027225-58202*	*CHEMICALS*	*($4,732.80)*
	1448270	LIQUID POLYMER ALKYLAMINE	$4,732.80	*84027225-58202*	*CHEMICALS*	*$4,732.80*
	1449537	LIQUID POLYMER ALKYLAMINE	$9,465.59	*84027225-58202*	*CHEMICALS*	*$9,465.59*
					Vendor Total:	*$9,465.59*
PUBLIC SERVICE DEPARTMENT	81411-1 MAR 20	SEWER - 1500 S STATE ST	$87.21	*10021210-55210*	*UTILITIES*	*$43.61*
				91521400-55210	*UTILITIES*	*$43.60*
	90558-8 MAR 20	SEWER - 141 LOVERS LN	$112.87	*10021210-55210*	*UTILITIES*	*$56.43*
				91521400-55210	*UTILITIES*	*$56.44*
	CITY MAR 20	CITY UTILITIES	$83,045.90	*10022100-55210*	*UTILITIES*	*$8,413.39*

List of Checks Presented for Approval on 5/15/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
PUBLIC SERVICE DEPARTMENT	CITY MAR 20	CITY UTILITIES	$83,045.90	*10022300-55210*	*UTILITIES*	*$2,720.07*
				10022700-55210	*UTILITIES*	*$1,501.49*
				10024214-55210	*UTILITIES*	*$689.99*
				10024620-55210	*UTILITIES*	*$408.93*
				20620231-55210	*UTILITIES*	*$57.18*
				20822500-55210	*UTILITIES*	*$6,266.59*
				20824300-55210	*UTILITIES*	*$1,606.68*
				64020213-55210	*UTILITIES*	*$528.11*
				72022400-55210	*UTILITIES*	*$5,806.30*
				73022600-55210	*UTILITIES*	*$1,512.91*
				77725200-55210	*UTILITIES*	*$2,895.15*
				80026400-55210	*UTILITIES*	*$1,881.15*
				80526150-55210	*UTILITIES*	*$9,085.17*
				82027111-55210	*UTILITIES*	*$13,067.12*
				83027330-55210	*UTILITIES*	*$4,637.30*
				84027221-55210	*UTILITIES*	*$60.37*
				84027225-55210	*UTILITIES*	*$21,908.00*
					Vendor Total:	*$83,245.98*
RAY C STARKEY	P-2000144	EMBROIDER HAT FRONT - ELECT, DEPT	$192.00	*80026110-54100*	*SUPPLIES*	*$192.00*
	P-2001265	EMBROIDER 140 FR SHIRTS WITH C	$112.00	*80026120-54100*	*SUPPLIES*	*$112.00*
	P-2000185	EMBROIDER 140 FR SHIRTS WITH C	$1,120.00	*80026120-54100*	*SUPPLIES*	*$1,120.00*
					Vendor Total:	*$1,424.00*
REDWOOD COAST FUELS	2142781	GST OIL	$101.59	*82027111-56300*	*BUILDING MAINT. & REPAIR*	*$101.59*
	2137912	CARDLOCK FUEL PURCHASES	$4,263.33	*10020210-56210*	*FUEL & FLUIDS*	*$1,578.07*
				10022100-56210	*FUEL & FLUIDS*	*$428.22*
				10023320-56210	*FUEL & FLUIDS*	*$34.59*
				10024620-56210	*FUEL & FLUIDS*	*$287.21*
				20324100-56210	*FUEL & FLUIDS*	*$153.96*
				80026400-56210	*FUEL & FLUIDS*	*$931.88*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
REDWOOD COAST FUELS	2137912	CARDLOCK FUEL PURCHASES	$4,263.33	*82027110-56210*	*FUEL & FLUIDS*	*$43.53*
				82027111-56210	*FUEL & FLUIDS*	*$167.45*
				82027114-56210	*FUEL & FLUIDS*	*$261.84*
				84027221-56210	*FUEL & FLUIDS*	*$223.04*
				84027225-56210	*FUEL & FLUIDS*	*$153.54*
	2142620	CARDLOCK FUEL PURCHASES	$25.39	*84027225-56210*	*FUEL & FLUIDS*	*$25.39*
					Vendor Total:	*$4,390.31*
REDWOOD FORD	331169	ELEMENT ASSEMBLY	$19.12	*10020210-56130*	*EXTERNAL SERVICES*	*$19.12*
	331217	ANTI-FREEZE	$45.62	*10020210-56130*	*EXTERNAL SERVICES*	*$45.62*
	331172	WHEEL ASSEMBLY	$192.51	*10020210-56130*	*EXTERNAL SERVICES*	*$192.51*
	331173	SHAFTS, BOLT, STUD, BRACKET, TUBE ASSEMBLY	$721.67	*10020210-56130*	*EXTERNAL SERVICES*	*$721.67*
	331219	SENSOR ASSEMBLY	$101.98	*20324100-56130*	*EXTERNAL SERVICES*	*$101.98*
	FOCS152433	AIR COOLER TUBE INSPECTION	$158.00	*20324100-56130*	*EXTERNAL SERVICES*	*$158.00*
	331337	FILTER & ELEMENT ASSEMBLY	$24.76	*82027114-56130*	*EXTERNAL SERVICES*	*$24.76*
					Vendor Total:	*$1,263.66*
SAFEWAY INC	STMT APR 20	MISC. PURCHASES AS NEEDED	$16.28	*10012200-54100*	*SUPPLIES*	*$16.28*
					Vendor Total:	*$16.28*
SOLID WASTES SYSTEMS INC	APR 20	RESIDENTIAL GARBAGE FEES	$38,929.97	*90200000-52170*	*UKIAH WASTE SOLUTIONS*	*$38,929.97*
					Vendor Total:	*$38,929.97*
SYDNEY DEARBORN	Q6428284	REIMBURSEMENT FOR MEDICAL INSURANCE	$188.03	*91500000-52152*	*POST-EMPLOYMENT BENEFITS*	*$188.03*
					Vendor Total:	*$188.03*
THURSTON CHEVROLET TOYOTA SCION	224037	PUMP ASSEMBLY	$137.42	*80026110-56130*	*EXTERNAL SERVICES*	*$137.42*
					Vendor Total:	*$137.42*
TIM SANTO	DV051220	ELECTRIC LUNCH MEETING REIMBUREMENT	$68.46	*80026110-54100*	*SUPPLIES*	*$68.46*
					Vendor Total:	*$68.46*
TRANSENE COMPANY INC	180736	ACETATE BUFFER SOLUTION	$903.26	*84027225-54103*	*LAB SUPPLIES*	*$903.26*
					Vendor Total:	*$903.26*
TUFTS POLYGRAPH & INVESTIGATION	2020-560(B)	POLYGRAPH & INVESTIGATION SERVICES	$250.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$250.00*

List of Checks Presented for Approval on 5/15/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
TUFTS POLYGRAPH & INVESTIGATION	2020-548(B)	POLYGRAPH & INVESTIGATION SERVICES	$300.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$300.00*
					Vendor Total:	*$550.00*
VWR INTERNATIONAL INC	8089850289	LABORATORY SUPPLIES WWTP	$41.56	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.14)*
				84027225-54103	*LAB SUPPLIES*	*$0.27*
				84027225-54103	*LAB SUPPLIES*	*$41.56*
				90000000-23028	*MEASURE Y DISTRICT TAX*	*($0.13)*
	8089855638	LABORATORY SUPPLIES WWTP	$180.99	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.78)*
				90000000-23028	*MEASURE Y DISTRICT TAX*	*($0.77)*
				84027225-54102	*SMALL TOOLS*	*$1.55*
				84027225-54102	*SMALL TOOLS*	*$180.99*
					Vendor Total:	*$222.55*
WAHLUND CONSTRUCTION INC	043020	DOWNTOWN UTILITY UPGRADE & ELE	$522,511.50	*82227113-80230*	*INFRASTRUCTURE*	*$401,836.50*
				84427221-80230	*INFRASTRUCTURE*	*$120,675.00*
					Vendor Total:	*$522,511.50*
WAXIE SANITARY SUPPLY	79155382	CITRUS MIST MICRO	$102.05	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.47)*
				10012200-54100	*SUPPLIES*	*$0.47*
				10012200-54100	*SUPPLIES*	*$102.05*
					Vendor Total:	*$102.05*
WINE COUNTRY WATERWORKS ASSOC	03314	MEMBERSHIP- A HODGE	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
	03320	MEMBERSHIP- A VARGAS	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
	03316	MEMBERSHIP- D TUBBS	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
	03322	MEMBERSHIP- K JUDD	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
	03319	MEMBERSHIP- M ANLIKER	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
	03326	MEMBERSHIP- M MICHAEL	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
	03318	MEMBERSHIP- R BARTON	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*

List of Checks Presented for Approval on 5/15/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
WINE COUNTRY WATERWORKS ASSOC	03317	MEMBERSHIP- R KRIKEN	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
	03321	MEMBERSHIP- T ANDERSON	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
	03323	MEMBERSHIP- T SHEFFER	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
	03315	MEMEBERSHIP- C GOWAN	$30.00	*84027225-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$30.00*
					Vendor Total:	*$330.00*
WORLD OIL ENVIRONMENTAL SERVICES	I500-00551692	DISPOSAL OF MISC. PRODUCTS AS	$110.00	*77725200-56300*	*BUILDING MAINT. & REPAIR*	*$110.00*
					Vendor Total:	*$110.00*
ZERO WASTE USA	326420	DOG WASTE BAGS	$865.40	*10022100-54100*	*SUPPLIES*	*$865.40*
					Vendor Total:	*$865.40*
					INVOICE TOTAL:	***$1,650,596.69***

List of Checks Presented for Approval on 5/22/2020

The following list of bills payable was reviewed and approved for payment.



7-9-2020 DB CR

Signature

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
AIMEE SHIELDS	APRIL 2020	TRANSCRIPTION SERVICES FOR POLICE	$470.40	*63520210-52100*	*CONTRACTUAL SERVICES*	*$470.40*
					Vendor Total:	*$470.40*
AL SMATSKY	87	DESIGN, ENGINEERING & CONSULTA	$8,805.00	*80126100-80230*	*INFRASTRUCTURE*	*$8,805.00*
					Vendor Total:	*$8,805.00*
ALEJANDRO VARGAS	BA FY 19/20	BOOT ALLOWANCE	$150.00	*84027225-54100*	*SUPPLIES*	*$150.00*
					Vendor Total:	*$150.00*
AMAZON CAPITAL SERVICES	1THX-M9HQ-9GXV	PRINTER INK	$218.82	*84027225-54100*	*SUPPLIES*	*$218.82*
					Vendor Total:	*$218.82*
AT&T	000014677511	T1 TO INTERNET FOR DOJ/CLETS	$299.15	*10020210-55100*	*TELEPHONE*	*$149.58*
				20620231-55100	*TELEPHONE*	*$149.57*
	000014676032	FIBER INTERNET GATEWAY	$153.82	*20913900-55100*	*TELEPHONE*	*$153.82*
	1718 MAY 20	CC TERMINAL	$221.74	*77725200-55100*	*TELEPHONE*	*$221.74*
					Vendor Total:	*$674.71*
BOUND TREE MEDICAL LLC	33005997	EMS SUPPLIES	$796.15	*91521400-54100*	*SUPPLIES*	*$398.08*
				91721400-54100	*SUPPLIES*	*$398.07*
	83569234	EMS SUPPLIES	$845.52	*91521400-54100*	*SUPPLIES*	*$422.76*
				91721400-54100	*SUPPLIES*	*$422.76*
					Vendor Total:	*$1,641.67*
BUSINESS CARD	RWACES6EW2	FACEBOOK ADVERTISING	$20.00	*10012300-52510*	*ADVERTISING & PROMOTION*	*$20.00*
	BJPXPRS6W2	FACEBOOK ADVERTISING	$70.00	*10012300-52510*	*ADVERTISING & PROMOTION*	*$70.00*
	040920	REGISTRATION - HR DEPT	$75.00	*10016100-57100*	*LEARNING AND DEVELOPMENT*	*$75.00*
	10633	REGISTRATION - HR DEPT	$75.00	*10016100-57100*	*LEARNING AND DEVELOPMENT*	*$75.00*
	050120	REGISTRATION - IT DEPT	$75.00	*10016100-57100*	*LEARNING AND DEVELOPMENT*	*$75.00*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
BUSINESS CARD	24566	REGISTRATION - S SCHOFIELD	$149.00	*10020210-57100*	*LEARNING AND DEVELOPMENT*	*$149.00*
	G0733916	COURSE #EECR 4010: PROJECT MAN	$845.75	*20413500-57100*	*LEARNING AND DEVELOPMENT*	*$845.75*
	040620	LODGING - V MARTINEZ	$93.48	*82027114-57100*	*LEARNING AND DEVELOPMENT*	*$93.48*
	300007481	MEMBERSHIP RENEWAL - M HORGER	$130.00	*20413500-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$130.00*
	300007512	MEMBERSHIP RENEWAL - M WILLIAMSON	$130.00	*20413500-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$130.00*
	D36472 1	REGISTRATION REFUND - J BENSON	($700.00)	*83027330-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*($700.00)*
	D36470 1	REGISTRATION REFUND - J THIELE	($700.00)	*83027330-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*($700.00)*
	D36471 1	REGISTRATION REFUND - S WHITE	($495.00)	*83027330-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*($495.00)*
	00524324	PRISONER SUPPLIES	$38.64	*10020210-54201*	*PRISONER EXPENSE*	*$38.64*
	373298	ABS SHEET HAIRCELL FINISH	$484.06	*10024620-54120*	*PW - SPECIAL SUPPLIES*	*$484.06*
	SF-D 23232 1	DISPOSIBLE GLOVES RETURN	($4,998.00)	*10012200-54100*	*SUPPLIES*	*($4,998.00)*
	420414948	3 LAYER MASKS	$500.50	*10012200-54100*	*SUPPLIES*	*$500.50*
	103359	IHEALTH CONTACTLESS THERMOMETE	$1,736.52	*10012200-54100*	*SUPPLIES*	*$1,736.52*
	SJ316650	CHEMICAL SPRAYER KIT	$237.35	*10020210-54100*	*SUPPLIES*	*$237.35*
	050620	PD APPRECIATION WEEK LUNCH	$424.60	*10020210-54100*	*SUPPLIES*	*$424.60*
	29217	DISINFECTANT LIGHT	$549.99	*10020210-54100*	*SUPPLIES*	*$549.99*
	06235J	STAFF APPRECIATION FLOWERS	$66.41	*10020214-54100*	*SUPPLIES*	*$66.41*
	9000050	GREEDING CARDS W/ ENVELOPES	$200.06	*10020214-54100*	*SUPPLIES*	*$200.06*
	042220	DISPATCH APPRECIATION WEEK	$204.68	*10020214-54100*	*SUPPLIES*	*$204.68*
	50757	ID CARDS	$47.15	*10023320-54100*	*SUPPLIES*	*$47.15*
	42344	SYMPATHY FLOWERS - IT DEPT.	$96.90	*20913900-54100*	*SUPPLIES*	*$96.90*
	1519 3	PANEL CANVAS REFUND	($71.96)	*63820210-54100*	*SUPPLIES*	*($71.96)*
	1519 4	INTERNATIONAL FEE REFUND	($2.16)	*63820210-54100*	*SUPPLIES*	*($2.16)*
	WEB1025737 34	PODIUM	$629.67	*63820210-54100*	*SUPPLIES*	*$629.67*
	024	ADMIN PROFFESIONALS DAY LUNCH	$53.78	*64020213-54100*	*SUPPLIES*	*$53.78*
	2504875396	VOLTAGE SENSING SOCKET	$186.46	*80026210-54100*	*SUPPLIES*	*$186.46*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
BUSINESS CARD	146267	FLEXIBLE ROGOWSKI	$666.25	*84027225-54100*	*SUPPLIES*	*$666.25*
					Vendor Total:	*$819.13*
CALIFORNIA RIVER WATCH	DV052120	CRW SETTLEMENT	$30,000.00	*84027221-53000*	*LAWSUIT SETTLEMENT*	*$30,000.00*
					Vendor Total:	*$30,000.00*
CANTEEN SERVICE	5975:007531	WATER FILTRATION SERVICE POLICE	$45.00	*10020210-54100*	*SUPPLIES*	*$22.50*
				20620231-54100	*SUPPLIES*	*$22.50*
					Vendor Total:	*$45.00*
CINTAS CORPORATION	404620323	RUG/MAT & UNIFORM SERVICES	$85.39	*20822500-56300*	*BUILDING MAINT. & REPAIR*	*$85.39*
	4048744653	RUG/MAT & UNIFORM SERVICES	$85.39	*20822500-56300*	*BUILDING MAINT. & REPAIR*	*$85.39*
	4048744634	RUG/MAT & UNIFORM SERVICES	$49.83	*20324100-52100*	*CONTRACTUAL SERVICES*	*$49.83*
	4048190354	RUG/MAT & UNIFORM SERVICES	$49.84	*20324100-52100*	*CONTRACTUAL SERVICES*	*$49.84*
	4049361227	RUG/MAT & UNIFORM SERVICES	$79.32	*20324100-52100*	*CONTRACTUAL SERVICES*	*$79.32*
	4047620256	RUG/MAT & UNIFORM SERVICES	$106.88	*20324100-52100*	*CONTRACTUAL SERVICES*	*$106.88*
	4047620239	RUG/MAT & UNIFORM SERVICES	$35.00	*31122000-52100*	*CONTRACTUAL SERVICES*	*$35.00*
	4048744551	RUG/MAT & UNIFORM SERVICES	$35.00	*31122000-52100*	*CONTRACTUAL SERVICES*	*$35.00*
	4047620251	RUG/MAT & UNIFORM SERVICES	$35.00	*73022600-52100*	*CONTRACTUAL SERVICES*	*$35.00*
	4048744646	RUG/MAT & UNIFORM SERVICES	$35.00	*73022600-52100*	*CONTRACTUAL SERVICES*	*$35.00*
	4047156503	RUG/MAT & UNIFORM SERVICES	$40.60	*77725200-54100*	*SUPPLIES*	*$40.60*
	4047746494	RUG/MAT & UNIFORM SERVICES	$40.60	*77725200-54100*	*SUPPLIES*	*$40.60*
	4048305056	RUG/MAT & UNIFORM SERVICES	$40.60	*77725200-54100*	*SUPPLIES*	*$40.60*
	4048862367	RUG/MAT & UNIFORM SERVICES	$40.60	*77725200-54100*	*SUPPLIES*	*$40.60*
					Vendor Total:	*$759.05*
CLERK-RECORDER, MENDOCINO COUNTY	DV052020	RECORDING FEES - FIRST TIME HOME BUYER	$94.00	*61323421-52134*	*GENERAL ADMIN*	*$94.00*
					Vendor Total:	*$94.00*
COFFEE CRITIC INC, THE	R23654	MISC. COFFEE SUPPLIES AS NEEDED	$180.00	*91521400-54100*	*SUPPLIES*	*$90.00*
				91721400-54100	*SUPPLIES*	*$90.00*
					Vendor Total:	*$180.00*
COMCAST	4635 MAY 20	INTERNET SERVICES	$247.00	*20913900-55100*	*TELEPHONE*	*$247.00*
					Vendor Total:	*$247.00*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
DEFATTE EQUIPMENT INC	21875	EQUIPMENT MAINTENANCE & REPAIR	$32.36	84027225-56120	EQUIPMENT MAINTENANCE & REPAIR	$32.36
					Vendor Total:	$32.36
DEPARTMENT OF JUSTICE	448815	FINGERPRINTS	$230.00	10020210-54169	LIVESCAN	$230.00
	448863	FINGERPRINTS	$32.00	10016100-54165	NEW EMPLOYEE FINGERPRINT	$32.00
	450925	FY1920 CLETS SERVICE	$1,200.48	20620231-55100	TELEPHONE	$1,200.48
					Vendor Total:	$1,462.48
FEDERAL EXPRESS	6-964-07924.1	SHIPPING SERVICES	$66.22	20513382-54101	POSTAGE	$66.22
					Vendor Total:	$66.22
FRANK ROMANO	UPD4-62020	ANNUAL K9 TRAINING	$675.00	10020210-57100	LEARNING AND DEVELOPMENT	$675.00
					Vendor Total:	$675.00
FRIEDMANS HOME IMPROVEMENT	INV10647746	MISC. SUPPLIES AS NEEDED	$134.68	20822500-56300	BUILDING MAINT. & REPAIR	$134.68
	INV10743481	MISC. SUPPLIES AS NEEDED	$163.32	20822500-56300	BUILDING MAINT. & REPAIR	$163.32
	10713110	MISC. SUPPLIES AS NEEDED	$170.70	20822500-56300	BUILDING MAINT. & REPAIR	$170.70
	INV10654954	MISC. SUPPLIES AS NEEDED	$385.22	77725200-56300	BUILDING MAINT. & REPAIR	$385.22
	INV10675502	MISC. SUPPLIES AS NEEDED	$7.62	82027111-56300	BUILDING MAINT. & REPAIR	$7.62
	INV10749572	MISC. SUPPLIES AS NEEDED	$18.60	82027111-56300	BUILDING MAINT. & REPAIR	$18.60
	INV10632106	MISC. SUPPLIES AS NEEDED	$31.39	82027111-56300	BUILDING MAINT. & REPAIR	$31.39
	INV10627585	MISC. SUPPLIES AS NEEDED	$31.33	84027225-56120	EQUIPMENT MAINTENANCE & REPAIR	$31.33
	INV10658290	MISC. SUPPLIES AS NEEDED	$65.03	84027225-56504	FACILITY MAINTENANCE & REPAIR	$65.03
	INV10742458	MISC. SUPPLIES AS NEEDED	$35.18	10024620-54120	PW - SPECIAL SUPPLIES	$35.18
	INV10738368	MISC. SUPPLIES AS NEEDED	$40.23	10024620-54120	PW - SPECIAL SUPPLIES	$40.23
	INV10710749	MISC. SUPPLIES AS NEEDED	$66.54	10024620-54125	PW - TRAFFIC PAINT	$66.54
	INV10749829	MISC. SUPPLIES AS NEEDED	$42.87	10022100-54100	SUPPLIES	$42.87
	INV10712192	MISC. SUPPLIES AS NEEDED	$80.52	10022100-54100	SUPPLIES	$80.52
	INV10659072	MISC. SUPPLIES AS NEEDED	$88.96	20822500-54100	SUPPLIES	$88.96
	INV10750061	MISC. SUPPLIES AS NEEDED	$13.13	63820210-54100	SUPPLIES	$13.13
	INV10738346	MISC. SUPPLIES AS NEEDED	$11.71	80026120-54100	SUPPLIES	$11.71

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
FRIEDMANS HOME IMPROVEMENT	INV10627809	MISC. SUPPLIES AS NEEDED	$35.52	80026120-54100	SUPPLIES	$35.52
	INV10665251	MISC. SUPPLIES AS NEEDED	$37.29	80026210-54100	SUPPLIES	$37.29
	INV10658448	MISC. SUPPLIES AS NEEDED	$92.85	80026210-54100	SUPPLIES	$92.85
	INV10619025	MISC. SUPPLIES AS NEEDED	$32.65	80026220-54100	SUPPLIES	$32.65
	INV10744509	MISC. SUPPLIES AS NEEDED	$67.88	80026220-54100	SUPPLIES	$67.88
	INV10711157	MISC. SUPPLIES AS NEEDED	$99.30	82027111-54100	SUPPLIES	$99.30
	INV10693728	MISC. SUPPLIES AS NEEDED	$176.20	82027111-54100	SUPPLIES	$176.20
	INV10608820	MISC. SUPPLIES AS NEEDED	$227.04	82027111-54100	SUPPLIES	$227.04
	INV10685412	MISC. SUPPLIES AS NEEDED	$26.13	82027114-54100	SUPPLIES	$26.13
	INV10627041	MISC. SUPPLIES AS NEEDED	$27.89	82027114-54100	SUPPLIES	$27.89
	10711407	MISC. SUPPLIES AS NEEDED	$47.71	84027221-54100	SUPPLIES	$47.71
					Vendor Total:	$2,257.49
GINA GRECO	DV030220	INSTRUCTOR	$1,547.00	10022850-52100	CONTRACTUAL SERVICES	$1,547.00
					Vendor Total:	$1,547.00
GRAINGER INC	9516427433	CLEANER	$22.94	91521400-54100	SUPPLIES	$11.47
				91721400-54100	SUPPLIES	$11.47
	9516464089	ALL PURPOSE CLEANER	$53.96	91521400-54100	SUPPLIES	$26.98
				91721400-54100	SUPPLIES	$26.98
	9516877991	BATTERIES, SOAP, PAPER TOWELS	$106.98	91521400-54100	SUPPLIES	$53.49
				91721400-54100	SUPPLIES	$53.49
					Vendor Total:	$183.88
HANSEL FORD	1198129	GEAR ASY AND CORE DEPOSIT	$1,506.42	10020210-56130	EXTERNAL SERVICES	$1,506.42
					Vendor Total:	$1,506.42
INTERNATIONAL CODE COUNCIL INC	1001180440	FIRE INSPECTOR	$69.00	10023320-57100	LEARNING AND DEVELOPMENT	$69.00
					Vendor Total:	$69.00
KEN FOWLER MOTORS INC	24539	FILTER AND FILTER KIT	$72.91	80026110-56130	EXTERNAL SERVICES	$72.91
					Vendor Total:	$72.91
LARRY E DESJARDINS	DV051420	SEWER LATERAL REIMBURSEMENT	$2,000.00	84427222-52100	CONTRACTUAL SERVICES	$2,000.00
					Vendor Total:	$2,000.00
LYMAN GROUP INC	5244540	SULFATE CRYSTALS AND BURLAP BAGS	$829.56	82027111-58202	CHEMICALS	$829.56

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
LYMAN GROUP INC	5243793	PROPANE	$16.83	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$16.83*
					Vendor Total:	*$846.39*
MATHESON TRI-GAS INC	21662958	OXYGEN & MISC. SUPPLIES AS NEEDED	$64.43	*20324100-54100*	*SUPPLIES*	*$64.43*
					Vendor Total:	*$64.43*
MENDO MILL & LUMBER CO	157281	RAGS, BALL VALVES, ELBOWS, NIPPLES	$116.35	*80026220-54100*	*SUPPLIES*	*$116.35*
					Vendor Total:	*$116.35*
MOIRS	157768	CHLORINE	$331.39	*82027111-58202*	*CHEMICALS*	*$331.39*
	158103	CHLORINE	$441.86	*82027111-58202*	*CHEMICALS*	*$441.86*
	157822	CHLORINE	$552.32	*82027111-58202*	*CHEMICALS*	*$552.32*
	157974	CHLORINE	$607.56	*82027111-58202*	*CHEMICALS*	*$607.56*
	157919	CHLORINE	$71.51	*10022300-54106*	*SPECIALTY SUPPLIES*	*$71.51*
					Vendor Total:	*$2,004.64*
MUNICIPAL MAINTENANCE EQUIPMENT	0148471-IN	BOOM LOCK LATCH	$99.51	*84027221-56130*	*EXTERNAL SERVICES*	*$99.51*
					Vendor Total:	*$99.51*
OFFICE DEPOT INC	470080123001	HEWLETT	$105.40	*82027110-57100*	*LEARNING AND DEVELOPMENT*	*$105.40*
	484162646001	ADDRESS LABELS, STICKY NOTES	$29.29	*10012200-54100*	*SUPPLIES*	*$12.22*
				20413500-54100	*SUPPLIES*	*$8.53*
				20513300-54100	*SUPPLIES*	*$8.54*
	473624583001	MAILBOX WALL MOUNT	$71.30	*10012200-54100*	*SUPPLIES*	*$71.30*
	474778050001	TONERS	$248.34	*10013210-54100*	*SUPPLIES*	*$186.25*
				20413500-54100	*SUPPLIES*	*$62.09*
	473624393001	PRINTER INK	$523.16	*10013210-54100*	*SUPPLIES*	*$392.37*
				20413500-54100	*SUPPLIES*	*$130.79*
	485200639001	EARBUDS	$54.43	*10013400-54100*	*SUPPLIES*	*$54.43*
	468995716001	ADJUSTABLE DESK	$195.89	*10013400-54100*	*SUPPLIES*	*$195.89*
	484148156001	SIGN HERE TAPE	$6.34	*10020210-54100*	*SUPPLIES*	*$6.34*
	472497335001	LOTION	$10.33	*10020210-54100*	*SUPPLIES*	*$10.33*
	484148157001	ENVELOPES	$10.87	*10020210-54100*	*SUPPLIES*	*$10.87*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
OFFICE DEPOT INC	484145975001	BLUE PEN	$12.27	*10020210-54100*	*SUPPLIES*	*$12.27*
	478340763001	HDMI ADAPTER	$14.03	*10020210-54100*	*SUPPLIES*	*$14.03*
	478340762001	TONER	$90.21	*10020210-54100*	*SUPPLIES*	*$90.21*
	474182237001	LIQUID SOAP	$94.85	*10020210-54100*	*SUPPLIES*	*$31.62*
				10021210-54100	*SUPPLIES*	*$31.62*
				91721400-54100	*SUPPLIES*	*$31.61*
	472817393001	USB	$139.99	*10020210-54100*	*SUPPLIES*	*$139.99*
	482044060001	STICKY NOTES, GEL PENS, PAD, FOLDERS	$165.53	*10020210-54100*	*SUPPLIES*	*$165.53*
	472497334001	BATTERY BACKUP	$195.96	*10020210-54100*	*SUPPLIES*	*$195.96*
	470074906001	CARTRIDGES	$435.48	*10024210-54100*	*SUPPLIES*	*$145.16*
				82027110-54100	*SUPPLIES*	*$145.16*
				84027220-54100	*SUPPLIES*	*$145.16*
	470080549001	CARTRIDGES	$435.48	*10024210-54100*	*SUPPLIES*	*$145.16*
				82027110-54100	*SUPPLIES*	*$145.16*
				84027220-54100	*SUPPLIES*	*$145.16*
	478626977001	TONERS	$541.54	*20324100-54100*	*SUPPLIES*	*$541.54*
	470697984001	HP INK	$36.58	*20413500-54100*	*SUPPLIES*	*$36.58*
	473361878001	HP Special Inkjet Paper Roll,	$461.59	*80026400-54100*	*SUPPLIES*	*$461.59*
	473391412001	HP Special Inkjet Paper Roll,	$1,032.03	*80026400-54100*	*SUPPLIES*	*$37.63*
				80026400-54100	*SUPPLIES*	*$994.40*
					Vendor Total:	*$4,910.89*
ONE TIME PAY VENDOR	2020 SPONSOR 2	REC REFUND-CROSSFIT, COVID-19	$1,000.00	*90000000-23226*	*CONCERT SERIES*	*$1,000.00*
	DV051420 4	REC REFUND - WOW SMILES, COVID-19	$1,000.00	*90000000-23226*	*CONCERT SERIES*	*$1,000.00*
	2020 SPONSOR 1	REC REFUND- CARPET ONE, COVID-19	$2,500.00	*90000000-23226*	*CONCERT SERIES*	*$2,500.00*
	2020 SPONSOR	REC REFUND-FRIEDMANS, COVID-19	$2,500.00	*90000000-23226*	*CONCERT SERIES*	*$2,500.00*
	60974-3 2	ENERGY REBATE - ELDREDGE, COVID-19	$100.00	*80626450-52135*	*ENERGY CONSERVATION PROGRAM*	*$100.00*
	DV051320 2	REC REFUND - BYINGTON, COVID-19	$20.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$20.00*
	DV051320 7	REC REFUND-BOTTLESON, COVID-19	$20.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$20.00*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	DV051420 20	REC REFUND- FORD, COVID-19	$20.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$20.00*
	DV051420 8	REC REFUND- HERRERA, COVID-19	$20.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$20.00*
	DV051420 9	REC REFUND- KELSAY, COVID-19	$20.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$20.00*
	DV051420 5	REC REFUND- POLOYNIS, COVID-19	$35.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$35.00*
	DV051320 1	REC REFUND - EMM, COVID-19	$40.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$40.00*
	DV051420 19	REC REFUND- WELLINGTON, COVID-19	$40.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$40.00*
	0016717	REC REFUNC - SOUTHARD, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016545	REC REFUND - AMADOR, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051320 3	REC REFUND - BURRELL, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 3	REC REFUND - CAICO, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016813	REC REFUND - ELLER, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 2	REC REFUND - MARQUEZ, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016606	REC REFUND - MCBURNEY, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016909	REC REFUND - PLAZA, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016628	REC REFUND - POTURICA, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016542	REC REFUND - VANDAGRIFF, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420	REC REFUND - WICKLIFFE, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016704	REC REFUND - FLAMER, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 29	REC REFUND- ALLENBAUGH, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051320 5	REC REFUND- ARRINGTON,COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016945	REC REFUND- ATHERTON, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	DV051420 17	REC REFUND- BURNETT, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 16	REC REFUND- CHAPMAN, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016833	REC REFUND- CHRISTOPHER, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016753	REC REFUND- DAIVS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016745	REC REFUND- DAKIN, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016840	REC REFUND- EPPERSON, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 11	REC REFUND- GEIMER, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 7	REC REFUND- GIBBS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016911	REC REFUND- GURLEY, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016821	REC REFUND- JACKSON, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016904	REC REFUND- KEFFELER, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 25	REC REFUND- MADUENO, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016960	REC REFUND- MAYNARD, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016939	REC REFUND- MILES, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016953	REC REFUND- MORRIS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 12	REC REFUND- MUCHO, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016947	REC REFUND- ODNEAL, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016952	REC REFUND- PEDROTTI, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016692	REC REFUND- POWIS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016910	REC REFUND- RASMASON, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051320 6	REC REFUND- SCATENA, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*

List of Checks Presented for Approval on 5/22/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	DV051320 12	REC REFUND-SMILGYS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016792	REC REFUND-TAYLOR, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016681	REC REFUND-THOMAS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 26	REC REFUND-WALKER, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016810	REC REFUND- WEISS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016881	REC REFUND- WEISS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 24	REC REFUND-WILSON, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051420 27	REC REFUND-WOLLITZ, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016884	REC REFUND-WRIGHT, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016954	REC RERUND - WELSH, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051320	REC REFUND - KING, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016985	REC REFUND - MAISAK, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051520 5	REC REFUND - MCNERLIN, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016986	REC REFUND-ARMSTRONG, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016967	REC REFUND-BETTENCOURT, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016997	REC REFUND- DAVIS, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016995	REC REFUND-FONTANA, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051420 21	REC REFUND-FRAZER, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0017061	REC REFUND-GITCHEL, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051320 9	REC REFUND-HIGGINS, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0017056	REC REFUND- KENT, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*

List of Checks Presented for Approval on 5/22/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	0017039	REC REFUND- LUGO, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051420 28	REC REFUND- RAMIREZ, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051420 18	REC REFUND- RAYA, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051420 14	REC REFUND- RINEHART, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051420 22	REC REFUND- RODRIGUEZ, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016992	REC REFUND- ROSARIO, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051420 15	REC REFUND- SHANNON, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016961	REC REFUND- WALLACE, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016990	REC REFUND- WYSOCKI, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051320 8	REC REFUND- DILL, COVID-19	$130.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$130.00*
	DV051320 4	REC REFUND- ARTEAGA, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	DV051320 13	REC REFUND- CLARKE, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	DV051320 10	REC REFUND- FREEMAN, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	DV051320 11	REC REFUND- GIUNTINI, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	DV051420 13	REC REFUND- JAMES, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	DV051420 23	REC REFUND- STROM, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	0016765	REC REFUND- TLELO, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	0016841	REC REFUND- CORBETT, COVID-19	$140.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$140.00*
	0016942	REC REFUND- POZZI, COVID-19	$140.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$140.00*
	0016964	REC REFUND- MOYNAHAN, COVID-19	$170.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$170.00*
	DV051520 1	REC REFUND - AUTHORITY, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*

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Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	DV051520 4	REC REFUND - LONDON, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	DV051520	REC REFUND - LOPEZ AUTO GLASS, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	DV051520 7	REC REFUND - MUFFLER, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	DV051520 2	REC REFUND - NIKKI SOUTHARD REALTOR	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	DV051520 3	REC REFUND - SELZER, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	DV051520 6	REC REFUND - UKIAH VETERINARY HOSPITAL, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
					Vendor Total:	*$15,860.00*
PAYMENTUS GROUP INC	INV-15-102202	CREDIT CARD PROCESSING SERVICE	$3,796.50	*20513300-52100*	*CONTRACTUAL SERVICES*	*$3,796.50*
					Vendor Total:	*$3,796.50*
REDWOOD COAST FUELS	2140609	CARDLOCK FUEL PURCHASES	$149.92	*84027221-56130*	*EXTERNAL SERVICES*	*$149.92*
	2140548	CARDLOCK FUEL PURCHASES	$834.83	*20324100-58410*	*GARAGE LUBRICANTS & PARTS*	*$834.83*
					Vendor Total:	*$984.75*
RICHARD THORNTON	0000011356	MISC. TELEPHONE PRODUCTS & SER	$62.50	*10020210-52100*	*CONTRACTUAL SERVICES*	*$62.50*
	0000011276	MISC. TELEPHONE PRODUCTS & SER	$62.50	*20913900-52100*	*CONTRACTUAL SERVICES*	*$62.50*
	0000011261	MISC. TELEPHONE PRODUCTS & SER	$474.35	*82027111-52100*	*CONTRACTUAL SERVICES*	*$474.35*
	000011168	MISC. TELEPHONE PRODUCTS & SER	$495.38	*20413510-54100*	*SUPPLIES*	*$247.69*
				20413520-54100	*SUPPLIES*	*$247.69*
					Vendor Total:	*$1,094.73*
ROY THOMAS HISE	040420	ARCH SVCS - GLU-LAM BEAM REPAI	$5,281.00	*10022700-80220*	*BUILDING IMPROVEMENTS*	*$5,281.00*
					Vendor Total:	*$5,281.00*
SAGE SANGIACOMO	DV051220	MEMBERSHIP RENEWAL	$495.00	*10012100-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$495.00*
					Vendor Total:	*$495.00*
STAPLES CREDIT PLAN	7306802655-0	USB	$14.14	*10013400-54330*	*COMPUTER AND TECHNOLOGY*	*$14.14*
	7306802655-0	USB CABLE	$23.40	*10013400-54330*	*COMPUTER AND TECHNOLOGY*	*$23.40*
	7306688248	HAND SANITIZER REFUND	($282.20)	*10012200-54100*	*SUPPLIES*	*($282.20)*
	182676261-1-	HAND SOAP REFUND	($45.80)	*10012200-54100*	*SUPPLIES*	*($45.80)*
	182676261-2-	HAND SOAP	$24.04	*10012200-54100*	*SUPPLIES*	*$24.04*

List of Checks Presented for Approval on 5/22/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
STAPLES CREDIT PLAN	182676261-0-	SEAT COVER	$243.73	*10012200-54100*	*SUPPLIES*	*$243.73*
	7306688248-0	HAND SANTITIZER	$376.27	*10012200-54100*	*SUPPLIES*	*$376.27*
	182919870-0-	PAPER TOWEL	$70.45	*10020210-54100*	*SUPPLIES*	*$23.47*
				10021210-54100	*SUPPLIES*	*$23.49*
				91521400-54100	*SUPPLIES*	*$23.49*
	7306841076-0	CARTRIDGES	$104.87	*10020210-54100*	*SUPPLIES*	*$104.87*
	182919870-0-	PAPER TOWEL DISPENSER	$114.29	*10020210-54100*	*SUPPLIES*	*$38.09*
				10021210-54100	*SUPPLIES*	*$38.10*
				91521400-54100	*SUPPLIES*	*$38.10*
	7306741348-0	MONITOR	$174.19	*10020210-54100*	*SUPPLIES*	*$174.19*
	7306867963-0	COPY PAPER	$86.28	*10021210-54100*	*SUPPLIES*	*$43.14*
				91521400-54100	*SUPPLIES*	*$43.14*
	7306430904-0	AVERY LABELS	$77.61	*10023320-54100*	*SUPPLIES*	*$77.61*
	7307121087-0	BLACK CHAIR	$237.88	*20413500-54100*	*SUPPLIES*	*$237.88*
	7306650212-0	WIRELESS HEADSET	$183.55	*20513300-54100*	*SUPPLIES*	*$183.55*
	7306741348-0	WIRELESS KEYBOAR, PENS	$60.92	*20620231-54100*	*SUPPLIES*	*$60.92*
	7306577287-0	TONERS	$939.61	*80026400-54100*	*SUPPLIES*	*$939.61*
					Vendor Total:	*$2,403.23*
THATCHER COMPANY OF CALIFORNIA INC	274894	LIQUID FERRIC CHLORIDE	$7,902.21	*84027225-58202*	*CHEMICALS*	*$7,902.21*
					Vendor Total:	*$7,902.21*
VWR INTERNATIONAL INC	8089732905	LABORATORY SUPPLIES WWTP	$158.50	*84027225-52100*	*CONTRACTUAL SERVICES*	*$1.32*
				84027225-52100	*CONTRACTUAL SERVICES*	*$158.50*
				90000000-20231	*COUNTY MENTAL HEALTH .5%*	*($0.66)*
				90000000-23028	*MEASURE Y DISTRICT TAX*	*($0.66)*
					Vendor Total:	*$158.50*
WESTERN RENEWABLE ENERGY GENERATION	WR18580	WREGIS CERTIFICATE FEES	$2.73	*80026400-52100*	*CONTRACTUAL SERVICES*	*$2.73*
	WR18110	WREGIS CERTIFICATE FEES	$4.75	*80026400-52100*	*CONTRACTUAL SERVICES*	*$4.75*

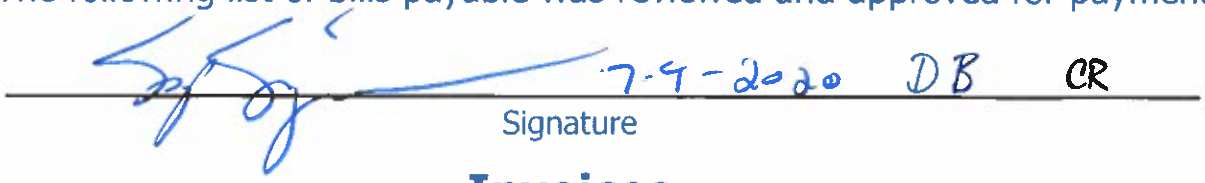
List of Checks Presented for Approval on 5/22/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
WESTERN RENEWABLE ENERGY GENERATION	WR19442	WREGIS CERTIFICATE FEES	$127.33	*80026400-52100*	*CONTRACTUAL SERVICES*	*$127.33*
					Vendor Total:	*$134.81*
					INVOICE TOTAL:	***$100,130.48***

List of Checks Presented for Approval on 5/29/2020

The following list of bills payable was reviewed and approved for payment.



Signature

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
AACTION RENTS	470128-2	EQUIPMENT & MACHINE RENTAL AS	$80.75	*10022100-54100*	*SUPPLIES*	*$80.75*
					Vendor Total:	*$80.75*
AARON OBENYAH	1225903	ENERGY REBATE	$741.00	*80626450-52135*	*ENERGY CONSERVATION PROGRAM*	*$741.00*
					Vendor Total:	*$741.00*
ABD ENGINEERING & DESIGN, INC.	20200230	COUNCIL CHAMBER A/V UPGRADE -	$777.50	*20822500-80220*	*BUILDING IMPROVEMENTS*	*$777.50*
	20200115	COUNCIL CHAMBER A/V UPGRADE -	$9,415.00	*20822500-80220*	*BUILDING IMPROVEMENTS*	*$9,415.00*
					Vendor Total:	*$10,192.50*
ACME RIGGING & SUPPLY CO	309565	MISC. RENTAL & SUPPLIES AS NEE	$186.37	*82027111-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$186.37*
	309554	MISC. RENTAL & SUPPLIES AS NEE	$218.80	*82027111-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$218.80*
	309547	MISC. RENTAL & SUPPLIES AS NEE	$230.21	*20324100-54100*	*SUPPLIES*	*$230.21*
	309553	MISC. RENTAL & SUPPLIES AS NEE	$457.23	*20324100-54100*	*SUPPLIES*	*$457.23*
					Vendor Total:	*$1,092.61*
ADAMSON POLICE PRODUCTS	INV325895	MAGNETIC MIC SINGLE UNIT	$217.81	*20324100-56112*	*EQUIPMENT PARTS FOR RESALE*	*$217.81*
	INV325798	HAVIS #K-9-F18-PT-B: 2013-2019	$4,327.83	*10020210-56130*	*EXTERNAL SERVICES*	*$4,327.83*
					Vendor Total:	*$4,545.64*
AIRGAS INC	9100550524	SNSR REPL H2S MICROCLIP/MAX	$271.30	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$271.30*
					Vendor Total:	*$271.30*
ALLEN J ROGINA	123198-4	ENERGY REBATE	$1,540.81	*80626450-52135*	*ENERGY CONSERVATION PROGRAM*	*$1,540.81*
					Vendor Total:	*$1,540.81*
ALPHA ANALYTICAL LABORATORIES INC	0044902-UKIAHLF	ANNUAL SURFACE WATER MONITORING	$570.00	*70024500-52100*	*CONTRACTUAL SERVICES*	*$570.00*
	0044893-UKIAHLF	ANNUAL SURFACE WATER MONITORING	$582.00	*70024500-52100*	*CONTRACTUAL SERVICES*	*$582.00*
	0042204-UKIAHLF	ANNUAL SURFACE WATER MONITORING	$819.00	*70024500-52100*	*CONTRACTUAL SERVICES*	*$819.00*

List of Checks Presented for Approval on 5/29/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ALPHA ANALYTICAL LABORATORIES INC	0042306-UKIAHLF	ANNUAL SURFACE WATER MONITORING	$1,615.95	*70024500-52100*	*CONTRACTUAL SERVICES*	*$1,615.95*
	0044901-UKIAHLF	ANNUAL SURFACE WATER MONITORIN	$3,457.95	*70024500-52100*	*CONTRACTUAL SERVICES*	*$3,457.95*
	0044736-UKIAHLF	ANNUAL SURFACE WATER MONITORIN	$5,369.95	*70024500-52100*	*CONTRACTUAL SERVICES*	*$5,369.95*
	0044735-UKIAHLF	ANNUAL SURFACE WATER MONITORIN	$5,485.95	*70024500-52100*	*CONTRACTUAL SERVICES*	*$5,485.95*
	0041688-UKIAH	MISC. LABORATORY WORK AS NEEDE	$110.00	*82027111-52100*	*CONTRACTUAL SERVICES*	*$110.00*
	0043889-UKIAH	MISC. LABORATORY WORK AS NEEDE	$110.00	*82027111-52100*	*CONTRACTUAL SERVICES*	*$110.00*
	0044742-UKIAH	MISC. LABORATORY WORK AS NEEDE	$110.00	*82027111-52100*	*CONTRACTUAL SERVICES*	*$110.00*
	0044612-UKIAH	ANALYZE WATER SAMPLES OR TTHM'	$320.00	*82027111-52100*	*CONTRACTUAL SERVICES*	*$320.00*
	0043420-UKIAH	MISC. LABORATORY WORK AS NEEDE	$350.00	*82027111-52100*	*CONTRACTUAL SERVICES*	*$350.00*
	0044012-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$18.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$18.00*
	0044014-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$18.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$18.00*
	0043114-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$58.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$58.00*
	0043509-UKIAHSPT	MISC. LABORATORY WORK AS NEEDE	$59.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$59.00*
	0043195-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$80.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$80.00*
	0043210-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$80.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$80.00*
	0043215-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$80.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$80.00*
	0043216-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$80.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$80.00*
	0042988-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$108.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$108.00*
	0043508-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$118.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$118.00*
	0041427-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$177.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$177.00*
	0041949-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$177.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$177.00*
	0044337-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$177.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$177.00*
	0044697-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$177.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$177.00*
	0044791-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$281.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$281.00*
	0041496-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$381.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$381.00*
	0042987-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$381.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$381.00*
	0044806-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$390.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$390.00*
	0043093-UKIAHSTP	MISC. LABORATORY WORK AS NEEDE	$748.00	*84027225-52100*	*CONTRACTUAL SERVICES*	*$748.00*
	0042107-	ANNUAL PRIORITY	$2,090.00	*84027225-52100*	*CONTRACTUAL*	*$2,090.00*

List of Checks Presented for Approval on 5/29/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
					Vendor Total:	*$24,578.80*
AMAZON CAPITAL SERVICES	1MW1-XGGY-MDGH	THINKPAD THUNDERBOLT DOCK	$223.16	*82027110-54330*	*COMPUTER AND TECHNOLOGY*	*$111.58*
				84027220-54330	*COMPUTER AND TECHNOLOGY*	*$111.58*
	1NVJ-NJRM-DYCD	POWER INVERTERS	$831.78	*10024620-54120*	*PW - SPECIAL SUPPLIES*	*$831.78*
	1LRJ-4Y7L-9FMK	RETURN PO#46464	($1,964.09)	*10012200-54100*	*SUPPLIES*	*($1,964.09)*
	1MPD-Q741-CGVG	NORTHLIGHT 15' PRE-LIT CHRISTM	$1,964.09	*10012200-54100*	*SUPPLIES*	*$1,964.09*
	1MGV-6T7R-CYWJ	FOREHEAD THERMOMETER	$173.11	*10020210-54100*	*SUPPLIES*	*$173.11*
	1NVJ-NJRM-CVKY	INSULATED BATTERY POWER JUNCTION	$175.02	*20324100-54100*	*SUPPLIES*	*$175.02*
	1G7K-HVVN-G7PK	MEGAPHONE SPEAKER W/ALARM SIREN	$61.51	*63820210-54100*	*SUPPLIES*	*$61.51*
	16VT-7JW9-M7M1	PD LICENSE PLATE FRAMES	$272.10	*63820210-54100*	*SUPPLIES*	*$272.10*
	16Q6-PCVM-3T6C	DIRECTIONAL FLOOR SIGN	$119.55	*73022600-54100*	*SUPPLIES*	*$119.55*
					Vendor Total:	*$1,856.23*
ANSELL USA INC	20863787	MICROGLEX GLOVES	$248.24	*10020210-54100*	*SUPPLIES*	*$248.24*
					Vendor Total:	*$248.24*
ANTHONY MANDON	BA FY19/20	BOOT ALLOWANCE	$150.00	*10024620-54120*	*PW - SPECIAL SUPPLIES*	*$150.00*
					Vendor Total:	*$150.00*
ARROW FENCING	80570	INSTALL 380' OF 6' OPEN CHAIN	$10,708.48	*77725200-56600*	*AIRFIELD MAINTENANCE & REPAIR*	*$10,708.48*
					Vendor Total:	*$10,708.48*
AT&T	00001458073	T1 TO INTERNET	$573.75	*20913900-55100*	*TELEPHONE*	*$573.75*
	00001472295	T1 TO INTERNET	$573.75	*20913900-55100*	*TELEPHONE*	*$573.75*
	00001472335	TELEPHONE SERVICES	$4,991.65	*20913900-55100*	*TELEPHONE*	*$4,991.65*
					Vendor Total:	*$6,139.15*
AT&T MOBILITY	832118877X05142020	DATA & VOICE CELL PHONES	$353.56	*10020210-55100*	*TELEPHONE*	*$129.69*
				20620231-55100	*TELEPHONE*	*$14.45*
				77725200-55100	*TELEPHONE*	*$37.20*
				80026400-55100	*TELEPHONE*	*$86.46*
				82027110-55100	*TELEPHONE*	*$14.45*
				82027111-55100	*TELEPHONE*	*$42.41*
				84027221-55100	*TELEPHONE*	*$28.90*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
AT&T MOBILITY	832056361X05142020	POLICE MODEMS	$473.04	*10020210-55100*	*TELEPHONE*	*$473.04*
	875108535X05142020	VOICE & DATA	$108.69	*84027221-55100*	*TELEPHONE*	*$108.69*
					Vendor Total:	*$935.29*
AVENGER FIBERGLASS MFG INC	99986138	HONDA 2020 BF40D4LHA MARINE MO	$6,674.17	*25321210-54102*	*SMALL TOOLS*	*$3,337.08*
				91621400-54102	*SMALL TOOLS*	*$3,337.09*
					Vendor Total:	*$6,674.17*
B & B INDUSTRIAL SUPPLY INC	215867	MISC. MATERIALS AS NEEDED	$26.75	*82027111-56300*	*BUILDING MAINT. & REPAIR*	*$26.75*
	216382	MISC. MATERIALS AS NEEDED	$89.77	*10021210-56130*	*EXTERNAL SERVICES*	*$89.77*
	216444	MISC. MATERIALS AS NEEDED	$104.61	*82027114-54102*	*SMALL TOOLS*	*$104.61*
	216464	MISC. MATERIALS AS NEEDED	$94.56	*80026220-54100*	*SUPPLIES*	*$94.56*
	216412	MISC. MATERIALS AS NEEDED	$102.26	*82027114-54100*	*SUPPLIES*	*$102.26*
					Vendor Total:	*$417.95*
BADGER METER INC	1362976	#101-0278, 3" TURBO METER, CU	$2,202.54	*82027114-54100*	*SUPPLIES*	*$2,202.54*
					Vendor Total:	*$2,202.54*
BORIS PROKOP	UKIAH-2020-2	ASSIST EUD WITH REGULATORY & M	$15,500.00	*80026400-52100*	*CONTRACTUAL SERVICES*	*$15,500.00*
					Vendor Total:	*$15,500.00*
BOX INC	INV07876857	BUSINESS PLUS ACCOUNT LICENSES	$3,600.00	*20913900-54320*	*SOFTWARE*	*$3,600.00*
					Vendor Total:	*$3,600.00*
BRIDGES RESTORATION LLC	2389	ON-CALL EMERGENCY CLEAN-UP SERVICE	$350.00	*10020210-52100*	*CONTRACTUAL SERVICES*	*$350.00*
					Vendor Total:	*$350.00*
CHROMAGRAPHICS	69574	BUSINESS CARDS - K MURRAY	$68.86	*10020210-54100*	*SUPPLIES*	*$68.86*
					Vendor Total:	*$68.86*
CLARK PEST CONTROL	25863670	PEST CONTROL SVCS	$95.00	*80026400-52100*	*CONTRACTUAL SERVICES*	*$95.00*
					Vendor Total:	*$95.00*
COMCAST	1296 MAY 20	INTERNET SERVICES	$170.34	*20913900-55100*	*TELEPHONE*	*$170.34*
	9780 MAY 20	INTERNET SERVICES	$130.88	*73022600-55100*	*TELEPHONE*	*$130.88*
					Vendor Total:	*$301.22*
COSTCO WHOLESALE CORPORATION	DV052720	COVID SUPPLIES	$821.27	*10012200-54100*	*SUPPLIES*	*$821.27*
					Vendor Total:	*$821.27*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
CYME INTERNATIONAL T & D INC	939707226	CYMDIST - DISTRIBUTION SYSTEM	$16,000.00	*80026400-54320*	*SOFTWARE*	*$16,000.00*
					Vendor Total:	*$16,000.00*
DANIEL F MEAD	50285	DUPLICATE KEYS, REPAIRS & MISC	$93.50	*20822500-56300*	*BUILDING MAINT. & REPAIR*	*$93.50*
	50284	DUPLICATE KEYS, REPAIRS & MISC	$118.75	*20822500-56300*	*BUILDING MAINT. & REPAIR*	*$118.75*
					Vendor Total:	*$212.25*
DANIEL STEEL & MACHINE INC	15247	CRANE SERVICES AS NEEDED AT WWTP	$229.31	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$229.31*
	041420-C	CRANE SERVICES AS NEEDED AT WWTP	$550.00	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$550.00*
	15219	CRANE SERVICES AS NEEDED AT WWTP	$968.06	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$968.06*
					Vendor Total:	*$1,747.37*
DEFATTE EQUIPMENT INC	22012	LP HOSE TANK CONNECTION	$102.45	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$102.45*
					Vendor Total:	*$102.45*
DELL MARKETING LP	10391893589	DELL LATITUDE 7400	$2,728.92	*10012500-54330*	*COMPUTER AND TECHNOLOGY*	*$2,728.92*
	10394469463	LATITUDE 7400 LAPTOP	$3,735.05	*20513300-54330*	*COMPUTER AND TECHNOLOGY*	*$3,735.05*
	10391893597	DELL OPTIPLEX 7070 MICRO	$1,411.92	*80026200-54330*	*COMPUTER AND TECHNOLOGY*	*$1,411.92*
	10390321191	DELL PRECISION 7740 LAPTOP	$9,095.94	*80026400-54330*	*COMPUTER AND TECHNOLOGY*	*$9,095.94*
					Vendor Total:	*$16,971.83*
DETROIT INDUSTRIAL TOOL	577319	CAUTION TAP 3'WX1000'L X48	$764.81	*10024620-54100*	*SUPPLIES*	*$382.41*
				82027114-54100	*SUPPLIES*	*$191.20*
				84027221-54100	*SUPPLIES*	*$191.20*
					Vendor Total:	*$764.81*
EBA ENGINEERING	50778	TASK 2B - FIRST QUARTER 2020 D	$6,885.00	*70024500-52100*	*CONTRACTUAL SERVICES*	*$6,885.00*
					Vendor Total:	*$6,885.00*
EFFICIENCY SERVICES GROUP LLC	2735	ADMIN OF EUD PUBLIC BENEFITS P	$3,500.00	*80626450-52137*	*PUBLIC BENEFITS PROGRAM MGMT*	*$3,500.00*
	2706	ADMIN OF EUD PUBLIC BENEFITS P	$3,672.76	*80626450-52137*	*PUBLIC BENEFITS PROGRAM MGMT*	*$3,672.76*
					Vendor Total:	*$7,172.76*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
EUREKA OXYGEN CO	U 171981	CUP, RETAINING	$50.49	*20324100-54100*	*SUPPLIES*	*$50.49*
					Vendor Total:	*$50.49*
EVERGREEN JOB & SAFETY TRAINING INC	1149	JOB AND SAFETY TRAINING - JULY	$2,109.12	*80026110-52100*	*CONTRACTUAL SERVICES*	*$2,109.12*
					Vendor Total:	*$2,109.12*
FAMILY TREE RESOURCE INC	202217	TREE TRIMMING PER CONTRACT 192	$16,132.50	*80026110-52100*	*CONTRACTUAL SERVICES*	*$16,132.50*
	202218	TREE TRIMMING PER CONTRACT 192	$17,208.00	*80026110-52100*	*CONTRACTUAL SERVICES*	*$17,208.00*
					Vendor Total:	*$33,340.50*
FASTENAL	CAUKA39132	MISC. SUPPLIES AS NEEDED	$21.03	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$21.03*
					Vendor Total:	*$21.03*
FEDERAL EXPRESS	7-012-36551	SHIPPING SERVICES	$596.17	*10020210-54101*	*POSTAGE*	*$26.26*
				10020210-54101	*POSTAGE*	*$26.58*
				10020210-54101	*POSTAGE*	*$528.44*
				20513382-54101	*POSTAGE*	*$14.89*
					Vendor Total:	*$596.17*
GCR TIRES & SERVICES	851-49376	TIRES, TUBES, REPAIRS & LABOR	$190.15	*10020210-56130*	*EXTERNAL SERVICES*	*$190.15*
	851-49471	TIRES, TUBES, REPAIRS & LABOR	$190.55	*10020210-56130*	*EXTERNAL SERVICES*	*$190.55*
	851-49563	TIRES, TUBES, REPAIRS & LABOR	$191.55	*10020210-56130*	*EXTERNAL SERVICES*	*$191.55*
	851-49562	TIRES, TUBES, REPAIRS & LABOR	$383.10	*10020210-56130*	*EXTERNAL SERVICES*	*$383.10*
	851-49409	TIRES, TUBES, REPAIRS & LABOR	$782.59	*10020210-56130*	*EXTERNAL SERVICES*	*$782.59*
	851-49516	TIRES, TUBES, REPAIRS & LABOR	$711.59	*10022100-56130*	*EXTERNAL SERVICES*	*$711.59*
	851-49536	TIRES, TUBES, REPAIRS & LABOR	$596.14	*77725200-56130*	*EXTERNAL SERVICES*	*$596.14*
	851-49401	TIRES, TUBES, REPAIRS & LABOR	$321.45	*80026110-56130*	*EXTERNAL SERVICES*	*$321.45*
	851-49574	TIRES, TUBES, REPAIRS & LABOR	$883.78	*80026110-56130*	*EXTERNAL SERVICES*	*$883.78*
	851-49561	FS 225/70R19.5/14 F561	$2,285.23	*82027114-56130*	*EXTERNAL SERVICES*	*$1,142.59*
				84027221-56130	*EXTERNAL SERVICES*	*$1,142.64*
	851-49513	TIRES, TUBES, REPAIRS & LABOR	$123.15	*84027225-56130*	*EXTERNAL SERVICES*	*$123.15*
					Vendor Total:	*$6,659.28*
GGK ENTERPRISES INC	25936	#300EBE1095X GARDNER DENVER RE	$4,768.01	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$4,768.01*
					Vendor Total:	*$4,768.01*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
GOLDEN STATE EMERGENCY VEHICLE SERVICE INC	CI022334	CLIP, TOOL HOLDING IVZ, LIGHT LED	$150.01	*10021210-56130*	*EXTERNAL SERVICES*	*$7.00*
				10021210-56130	*EXTERNAL SERVICES*	*$143.01*
	CI022578	SENSOR	$249.91	*10021210-56130*	*EXTERNAL SERVICES*	*$249.91*
					Vendor Total:	*$399.92*
GOVERNMENT FINANCE OFFICERS ASSOCIATION	0246754	MEMBERSHIP- G FETH-MICHEL	$150.00	*10013400-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$150.00*
					Vendor Total:	*$150.00*
HACH COMPANY	11944926	NITRITE	$91.78	*84027225-54103*	*LAB SUPPLIES*	*$91.78*
	11928076	AMMONIA	$132.29	*84027225-54103*	*LAB SUPPLIES*	*$132.29*
	11923091	AMMONIA, NITRATE, BUFFER SOLN	$377.48	*84027225-54103*	*LAB SUPPLIES*	*$377.48*
					Vendor Total:	*$601.55*
HOME DEPOT CREDIT SERVICES	6020046	M18 FUEL 5" GRINDGER	$194.89	*82027114-54100*	*SUPPLIES*	*$194.89*
					Vendor Total:	*$194.89*
HOME DEPOT USA, INC	63632-4	ENERGY REBATE	$4,000.00	*80626450-52135*	*ENERGY CONSERVATION PROGRAM*	*$4,000.00*
					Vendor Total:	*$4,000.00*
INTEGRITY SHRED LLC	106268	DOCUMENT SHREDDING	$57.00	*20513300-52100*	*CONTRACTUAL SERVICES*	*$57.00*
	106113	DOCUMENT SHREDDING	$28.50	*10020210-54100*	*SUPPLIES*	*$14.25*
				20620231-54100	*SUPPLIES*	*$14.25*
					Vendor Total:	*$85.50*
JAMES NOVAK	BA FY19/20	BOOT ALLOWANCE	$150.00	*82027114-54100*	*SUPPLIES*	*$75.00*
				84027221-54100	*SUPPLIES*	*$75.00*
					Vendor Total:	*$150.00*
JOHN'S LOCK & SAFE	10123	MISC. LOCK & KEY SERVICES AS N	$13.07	*84027221-54100*	*SUPPLIES*	*$13.07*
					Vendor Total:	*$13.07*
KERRY RANDALL	DV051420	REIMBURSEMENT-CATERING ORDER	$137.62	*10012800-54100*	*SUPPLIES*	*$137.62*
	024145	REIMBURSEMENT - SANITIZATION KITS - COVID	$97.44	*73022600-54100*	*SUPPLIES*	*$97.44*
					Vendor Total:	*$235.06*
LACAL EQUIPMENT	0321378-IN	TOE GUARD, SKID SHOE	$381.14	*84027225-56130*	*EXTERNAL SERVICES*	*$381.14*
					Vendor Total:	*$381.14*

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LINCOLN AQUATICS	NX246502	@AWC-50-6501 PULSAR PLUS BRIQU	$5,370.59	*10022300-54106*	*SPECIALTY SUPPLIES*	*$5,370.59*
					Vendor Total:	*$5,370.59*
MEL GRANDI	DV010820	REIMBURSEMENT-MEETING LUNCHEON	$590.13	*80026400-54100*	*SUPPLIES*	*$590.13*
					Vendor Total:	*$590.13*
MENDOCINO COUNTY AUDITOR-CONTROLLER	2004	PROPERTY TAX ADMINISTRATIVE SERVICES	$10,204.01	*10012200-52301*	*PROPERTY TAX ADMIN FEE*	*$10,204.01*
	2008	PROPERTY TAX ADMINISTRATIVE SERVICES	$213.73	*64020213-52301*	*PROPERTY TAX ADMIN FEE*	*$213.73*
					Vendor Total:	*$10,417.74*
OCCU-MED LTD	0520511	PRE-EMPLOYMENT PHYSICAL	$92.00	*10016100-54161*	*BACKGROUND & PHYSICALS*	*$92.00*
					Vendor Total:	*$92.00*
OLIN CORPORATION	2828549	LIQUID SODIUM HYPOCHLORITE	$4,173.78	*84027225-58202*	*CHEMICALS*	*$4,173.78*
					Vendor Total:	*$4,173.78*
ONE TIME PAY VENDOR	2020 SPONSOR 14	SUNDAYS IN THE PARK REFUND-COVID-19	$1,000.00	*90000000-23226*	*CONCERT SERIES*	*$1,000.00*
	2020 SPONSOR 6	SUNDAYS IN THE PARK REFUND-COVID-19	$1,000.00	*90000000-23226*	*CONCERT SERIES*	*$1,000.00*
	B 22289	FUN IN THE SUN REFUND- BLUE RIBBON PETS, COVID-19	$500.00	*90000000-23243*	*FAMILY FUN IN THE SUN*	*$500.00*
	DV051920 1	REC REFUND- DAVID, COVID-19	$20.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$20.00*
	DV051920 6	REC REFUND- DIAZ, COVID-19	$20.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$20.00*
	DV051820 8	REC REFUND-SHEPARD, COVID-19	$20.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$20.00*
	DV051920 3	REC REFUND-WESTBROOK, COVID-19	$20.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$20.00*
	DV051920 4	REC REFUND-LABARBERA, COVID-19	$40.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$40.00*
	dv051820 11	REC REFUND-MCMULLEN, COVID-19	$65.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$65.00*
	DV051920 10	REC REFUND-AGUILAR, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051820 10	REC REFUND-ANDRUS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016854	REC REFUND- BABB, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	DV051920 7	REC REFUND- CALVERT, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016912	REC REFUND- CHARPENTIER, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016831	REC REFUND- EBERT, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV052020	REC REFUND- GACHES, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016880	REC REFUND- GIACOMINI, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV052020 2	REC REFUND- GOMEZ, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016782	REC REFUND- GUTIERREZ, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016908	REC REFUND- HERNANDEZ, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051820	REC REFUND- LANE, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016737	REC REFUND- LICEA, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051820 5	REC REFUND- LINCOLN, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016665	REC REFUND- LONG, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016950	REC REFUND- LOWERY, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051820 1	REC REFUND- LYNELL, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051520 9	REC REFUND- MCMULLEN, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016941	REC REFUND- MUNOZ, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016733	REC REFUND- PARISI, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV052020 1	REC REFUND- PEREZ, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051920 5	REC REFUND- ROTBERGS, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051520 8	REC REFUND- RUBIE, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016760	REC REFUND- SANDOVAL, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	DV051920 11	REC REFUND- SILVA, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016901	REC REFUND- SNEDIKER, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV052020 3	REC REFUND- STANLEY, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016956	REC REFUND- STEINMANN, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051820 12	REC REFUND- WEER, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	0016936	REC REFUND- WILSON, COVID-19	$70.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$70.00*
	DV051920 2	REC REFUND- AVILA, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051820 4	REC REFUND- DELACRUZ, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051820 9	REC REFUND- GROFF, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051820 3	REC REFUND- HOLLEY, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0017058	REC REFUND- HUNT, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0017029	REC REFUND- JAMES, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV052020 4	REC REFUND- MORENO, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016979	REC REFUND- PARSONS, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051920 9	REC REFUND- PEREA, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051820 7	REC REFUND- UNDERWOOD, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	0016918	REC REFUND- VITORELO, COVID-19	$85.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$85.00*
	DV051920	REC REFUND- BROWN, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	DV051920 8	REC REFUND- LOPEZ, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	0016646	REC REFUND- PALMER, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*
	DV051820 2	REC REFUND-HELMS, COVID-19	$135.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$135.00*

List of Checks Presented for Approval on 5/29/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
ONE TIME PAY VENDOR	0016935	REC REFUND- WELLS, COVID-19	$140.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$140.00*
	DV051820 6	REC REFUND- JACOBS, COVID-19	$165.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$165.00*
	DV052020 5	REC REFUND- NUNEZ, COVID-19	$165.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$165.00*
	2020 SPONSOR 8	REC REFUND- BRANDON BUILDERS, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	2020 SPONSOR 5	REC REFUND- CANTEEN, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	2020 SPONSOR 9	REC REFUND- FORKS CAFE, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	2020 SPONSOR 11	REC REFUND- FRIEDMANS, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	2020 SPONSOR 10	REC REFUND- GARTON, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	2020 SPONSOR 3	REC REFUND- JAMES, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	2020 SPONSOR 13	REC REFUND- MALDANADO, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	2020 SPONSOR 12	REC REFUND- MCCARTYS, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	2020 SPONSOR 7	REC REFUND- SHERIFF ASSOC, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
	2020 SPONSOR 4	REC REFUND-BT'S TREE, COVID-19	$300.00	*10022832-44915*	*RECREATION PROGRAM INCOME*	*$300.00*
					Vendor Total:	*$9,730.00*
OWEN EQUIPMENT SALES	00049235	HEAVY DUTY COTTER KEY & PIN	$52.25	*10024620-56130*	*EXTERNAL SERVICES*	*$52.25*
	00049268	HEAVY DUTY CHAIN LINK & T-HEAD COTTER KEY	$368.44	*10024620-56130*	*EXTERNAL SERVICES*	*$368.44*
	00049105	RODDER PUPM SENSOR, PIN ROLL,	$390.46	*84027221-56130*	*EXTERNAL SERVICES*	*$390.46*
	00049202	VAC 29698 SEAL KEEPER	$3,607.68	*84027221-56130*	*EXTERNAL SERVICES*	*$3,607.68*
					Vendor Total:	*$4,418.83*
PACIFIC ECORISK INC	16478	ACUTE TOXICITY TESTING	$3,100.71	*84027225-52100*	*CONTRACTUAL SERVICES*	*$3,100.71*
					Vendor Total:	*$3,100.71*
PACIFIC REDWOOD MEDICAL GROUP INC	2728	PRE-EMPLOYMENT PHYSICALS	$330.40	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$196.00*

List of Checks Presented for Approval on 5/29/2020

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Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
PACIFIC REDWOOD MEDICAL GROUP INC	2728	PRE-EMPLOYMENT PHYSICALS	$330.40	*20324100-54161*	*BACKGROUND & PHYSICALS*	*$134.40*
					Vendor Total:	*$330.40*
PARKER, LUCAS AND ASSOCIATES	13	UNDERWRITING SERVICES FOR BUSI	$812.50	*60012612-52155*	*ACTIVITY DELIVERY*	*$812.50*
					Vendor Total:	*$812.50*
PETERSON POWER SYSTEMS INC	PC060159839	ELEMENT ASSEMBLY, FUEL ELEMENT	$193.88	*84027225-56130*	*EXTERNAL SERVICES*	*$193.88*
					Vendor Total:	*$193.88*
PETERSON TRUCKS INC	225561R	FILTER ASSEMBLY, FILTER LUBE OIL	$15.52	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.08)*
				90000000-23252	*DISTRICT USE TAX-LIBRARIES*	*($0.02)*
				20324100-56112	*EQUIPMENT PARTS FOR RESALE*	*$0.10*
				20324100-56112	*EQUIPMENT PARTS FOR RESALE*	*$15.52*
	225114R	FILTERS	$21.61	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.10)*
				90000000-23252	*DISTRICT USE TAX-LIBRARIES*	*($0.03)*
				20324100-56112	*EQUIPMENT PARTS FOR RESALE*	*$0.13*
				20324100-56112	*EQUIPMENT PARTS FOR RESALE*	*$21.61*
	225418R	FILTER SYSTEM BREATHER ELEMENT, FILTERS	$423.25	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($1.96)*
				90000000-23252	*DISTRICT USE TAX-LIBRARIES*	*($0.49)*
				10021210-56130	*EXTERNAL SERVICES*	*$2.45*
				10021210-56130	*EXTERNAL SERVICES*	*$423.25*
	226657S	FUEL FILTERS	$111.14	*82027111-56130*	*EXTERNAL SERVICES*	*$111.14*
					Vendor Total:	*$571.52*
PG&E CO	8716-1 MAY 20	PACIFC GAS & ELECTRIC	$3,840.80	*82027111-55210*	*UTILITIES*	*$3,840.80*
					Vendor Total:	*$3,840.80*
PHENOVA	160405	PROFICIENCY TESTING SAMPLES	$332.07	*84027225-52114*	*COMPLIANCE STUDIES*	*$332.07*
	160579	PROFICIENCY TESTING SAMPLES	$566.53	*84027225-52114*	*COMPLIANCE STUDIES*	*$566.53*
					Vendor Total:	*$898.60*

List of Checks Presented for Approval on 5/29/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
RAIN FOR RENT, WOODLAND	1462269	#811024 PUMP, TRASH 6" DV150C	$1,469.46	*80026220-52100*	*CONTRACTUAL SERVICES*	*$1,469.46*
					Vendor Total:	*$1,469.46*
REDWOOD COAST FUELS	2144431	CARDLOCK FUEL PURCHASES	$75.07	*20324100-58410*	*GARAGE LUBRICANTS & PARTS*	*$75.07*
	2129724	CARDLOCK FUEL PURCHASES	$85.80	*20324100-58410*	*GARAGE LUBRICANTS & PARTS*	*$85.80*
	2140547	CARDLOCK FUEL PURCHASES	$311.93	*20324100-58410*	*GARAGE LUBRICANTS & PARTS*	*$311.93*
					Vendor Total:	*$472.80*
REXEL USA INC	0J39342	GENERATOR FUEL TANK SUPPLIES	$177.59	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$177.59*
	0J37177	INSTALLED FUEL TANK MONITOR	$210.90	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$210.90*
					Vendor Total:	*$388.49*
RICHARD ANDERSON	2020-0503-2	AGREEMENT FOR PROF.SVC'S FOR W	$250.00	*20913900-52100*	*CONTRACTUAL SERVICES*	*$250.00*
	2020-0503-1	AGREEMENT FOR PROF.SVC'S FOR W	$4,325.00	*20913900-52100*	*CONTRACTUAL SERVICES*	*$4,325.00*
					Vendor Total:	*$4,575.00*
RINO PACIFIC	CL30919	FUEL CARD CHARGES AS NEEDED	$1,398.87	*10021210-56210*	*FUEL & FLUIDS*	*$699.44*
				91521400-56210	*FUEL & FLUIDS*	*$699.43*
	CL30932	FUEL CARD CHARGES AS NEEDED	$22.92	*82027114-56210*	*FUEL & FLUIDS*	*$12.38*
				84027221-56210	*FUEL & FLUIDS*	*$10.54*
					Vendor Total:	*$1,421.79*
ROUND TABLE PIZZA	14-116	OUTAGE MEAL-SOUTH STATE ST ELECT DEPT	$145.50	*80026110-54100*	*SUPPLIES*	*$145.50*
					Vendor Total:	*$145.50*
SAFEWAY INC	STMT MAY 20	MISC. PURCHASES AS NEEDED	$160.04	*10012800-54100*	*SUPPLIES*	*$42.64*
				64020213-54100	*SUPPLIES*	*$25.48*
				64020213-54100	*SUPPLIES*	*$56.48*
				73022600-54100	*SUPPLIES*	*$35.44*
					Vendor Total:	*$160.04*
SALLY SWANSON ARCHITECTS INC	0245575	ADA RIGHT OF WAY ACCESS PLAN	$8,029.79	*50824210-52100*	*CONTRACTUAL SERVICES*	*$8,029.79*
					Vendor Total:	*$8,029.79*
SONOMA COUNTY SHERIFF'S DEPT	9002	19/20 COUNTY WIDE BOMB SQAUD SERVICES	$11,073.00	*10020210-52100*	*CONTRACTUAL SERVICES*	*$11,073.00*
					Vendor Total:	*$11,073.00*

List of Checks Presented for Approval on 5/29/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
STATE WATER RESOURCES CONTROL BOARD	DV051320	ELAP CERTIFICATION RENEWAL FEE #2463	$5,331.00	*84027225-59101*	*FEES*	*$5,331.00*
					Vendor Total:	*$5,331.00*
THOMSON REUTERS BARCLAYS	842181008	MONTHLY SUBSCRIPTION RENEWAL	$494.84	*80026400-57300*	*MEMBERSHIPS & SUBSCRIPTIONS*	*$494.84*
					Vendor Total:	*$494.84*
TIM SANTO	DV051820	REIMBURSEMENT-BEVERAGES, OUTAGE	$10.68	*80026110-54100*	*SUPPLIES*	*$10.68*
					Vendor Total:	*$10.68*
TRACTOR SUPPLY CREDIT PLAN	100397938	BOLTS	$7.61	*84027225-56120*	*EQUIPMENT MAINTENANCE & REPAIR*	*$7.61*
	200333425	BOLTS	$4.30	*84027225-56130*	*EXTERNAL SERVICES*	*$4.30*
	100398342	FEED SPAY GUNS, PORTABLE CABLE GAUGE	$245.98	*10021210-54100*	*SUPPLIES*	*$122.99*
				91521400-54100	*SUPPLIES*	*$122.99*
					Vendor Total:	*$257.89*
TRAINING INNOVATIONS INC	20-153	ANNUAL TRAINING SOFTWARE - PD	$750.00	*10020210-57100*	*LEARNING AND DEVELOPMENT*	*$750.00*
					Vendor Total:	*$750.00*
TUFTS POLYGRAPH & INVESTIGATION	2020-562(A)	POLYGRAPH & INVESTIGATION SERVICES	$800.00	*10020210-54161*	*BACKGROUND & PHYSICALS*	*$800.00*
					Vendor Total:	*$800.00*
TYLER MAGNAN	1581820	PD - F250 TINT	$250.00	*10021210-56130*	*EXTERNAL SERVICES*	*$250.00*
					Vendor Total:	*$250.00*
UKIAH DAILY JOURNAL	0006471056	EMPLOYMENT ADVERTISING	$574.08	*10016100-54162*	*ADVERTISING*	*$574.08*
	0006474052	LEGAL LINER	$289.00	*10020210-52515*	*ADVERTISING & PUBLICATION*	*$289.00*
	0006480343	NOTICE OF PUBLIC HEARING	$120.91	*10023411-52515*	*ADVERTISING & PUBLICATION*	*$120.91*
	0006474685	NOTICE OF PUBLIC HEARING	$139.31	*10023411-52515*	*ADVERTISING & PUBLICATION*	*$139.31*
	0006480277	NOTICE OF HEARING - CDBG	$167.63	*10023411-52515*	*ADVERTISING & PUBLICATION*	*$167.63*
	0006432144	LEGAL NOTICE - BOARD MTG	$63.05	*91521400-52150*	*LEGAL SERVICES/ EXPENSES*	*$63.05*
					Vendor Total:	*$1,353.98*
UKIAH WASTE SOLUTIONS INC	428181	BIOSOLID REMOVAL	$9,862.02	*84027225-52100*	*CONTRACTUAL SERVICES*	*$9,862.02*
					Vendor Total:	*$9,862.02*

List of Checks Presented for Approval on 5/29/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
UNION BANK OF CALIFORNIA	1208425	TRUSTEE FEES 2/1-4/30/20	$1,280.00	*10015100-52100*	*CONTRACTUAL SERVICES*	*$974.00*
				96995601-52100	*CONTRACTUAL SERVICES*	*$153.00*
				96995669-52100	*CONTRACTUAL SERVICES*	*$153.00*
					Vendor Total:	*$1,280.00*
UNITED SITE SERVICES	114-10238099	PORTABLE TOILET RENTAL	$136.37	*80026220-52100*	*CONTRACTUAL SERVICES*	*$136.37*
					Vendor Total:	*$136.37*
US CELLULAR	0371857836	CELL PHONES	$354.22	*10024620-55100*	*TELEPHONE*	*$30.06*
				80026400-55100	*TELEPHONE*	*$42.04*
				80026400-55100	*TELEPHONE*	*$68.70*
				82027110-55100	*TELEPHONE*	*$13.53*
				82027111-55100	*TELEPHONE*	*$153.44*
				84027221-55100	*TELEPHONE*	*$13.53*
				84027225-55100	*TELEPHONE*	*$32.92*
					Vendor Total:	*$354.22*
WELTY, WEAVER & CURRIE	961	LEGAL SERVICES - WATER RESOURC	$9,643.00	*82027110-52150*	*LEGAL SERVICES/ EXPENSES*	*$9,643.00*
					Vendor Total:	*$9,643.00*
WERLE ENTERPRISE LLC	0401131	SOCIAL DISTANCING STICKET SIGNS	$425.07	*10012200-54100*	*SUPPLIES*	*$425.07*
					Vendor Total:	*$425.07*
WIPF CONSTRUCTION LLC	4468	DELIVERY OF MISC MATERIALS AS	$176.79	*82027114-54100*	*SUPPLIES*	*$176.79*
					Vendor Total:	*$176.79*
WYATT IRRIGATION CO	271422 00	IRRIGATION PARTS FOR PLAZA	$32.72	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.03)*
				90000000-23252	*DISTRICT USE TAX-LIBRARIES*	*($0.04)*
				90000000-23237	*DISTRICT USE TAX-MEASURE S*	*($0.16)*
				90000000-23028	*MEASURE Y DISTRICT TAX*	*($0.08)*
				10022100-54100	*SUPPLIES*	*$0.31*
				10022100-54100	*SUPPLIES*	*$32.72*
	271352 00	ANGLE VALVE, SOLENOID PARTS	$174.82	*90000000-20231*	*COUNTY MENTAL HEALTH .5%*	*($0.20)*

List of Checks Presented for Approval on 5/29/2020

Invoices

Vendor Name	Invoice #	Invoice Description	Invoice Amt	Account Detail and Allocation Detail		
WYATT IRRIGATION CO	271352 00	ANGLE VALVE, SOLENOID PARTS	$174.82	*90000000-23252*	*DISTRICT USE TAX-LIBRARIES*	*($0.21)*
				90000000-23237	*DISTRICT USE TAX-MEASURE S*	*($0.81)*
				90000000-23028	*MEASURE Y DISTRICT TAX*	*($0.41)*
				10022100-54100	*SUPPLIES*	*$1.63*
				10022100-54100	*SUPPLIES*	*$174.82*
					Vendor Total:	*$207.54*
XEROX CORP	010228914	COPIER LEASE-SEE ADD'L DESCRIP	$160.44	*10022700-52100*	*CONTRACTUAL SERVICES*	*$160.44*
	010228913	COPIER LEASE-SEE ADD'L DESCRIP	$303.71	*73022600-52100*	*CONTRACTUAL SERVICES*	*$303.71*
	010228910	XEROX CB070H COPIER LEASE	$486.47	*10012200-54500*	*EQUIP RENTS AND LEASES*	*$486.47*
	010228909	COPIER LEASE-SEE ADD'L DESCRIP	$647.31	*10012200-54500*	*EQUIP RENTS AND LEASES*	*$647.31*
	010228912	COPIER LEASE-SEE ADD'L DESCRIP	$212.34	*10020210-54500*	*EQUIP RENTS AND LEASES*	*$148.64*
				20620231-54500	*EQUIP RENTS AND LEASES*	*$42.47*
				64020213-54500	*EQUIP RENTS AND LEASES*	*$21.23*
	010228911	COPIER LEASE-SEE ADD'L DESCRIP	$447.08	*10020210-54500*	*EQUIP RENTS AND LEASES*	*$312.96*
				20620231-54500	*EQUIP RENTS AND LEASES*	*$89.42*
				64020213-54500	*EQUIP RENTS AND LEASES*	*$44.70*
					Vendor Total:	*$2,257.35*
ZUMAR INDUSTRIES INC	88159	#M75-BDL34-0000: BDL3-Y BULLDO	$609.70	*10024620-54127*	*PW - SIGN POSTS/SHEETING*	*$609.70*
	88358	#230-1369 SPECIAL 24"X24" GREA	$1,213.93	*10024620-54127*	*PW - SIGN POSTS/SHEETING*	*$1,213.93*
	88362	#M75-BDL34-0000: BDL3-Y BULLDO	$11,714.96	*10024620-54127*	*PW - SIGN POSTS/SHEETING*	*$11,714.96*
					Vendor Total:	*$13,538.59*
					INVOICE TOTAL:	***$316,130.70***

Agenda Item No: 7.b.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-480

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Notification of Grant Funds Received and Disbursed Related to the Proposition 84 Integrated Regional Water Management Program Funding Source for the Construction of Water Wells 4 and 9 and the Recycled Water Project.

DEPARTMENT: Water Resources **PREPARED BY:** Jarod Thiele, Public Works Management Analyst
PRESENTER: Consent Calendar

ATTACHMENTS:
None

Summary: Council will receive notification of grant funds received and disbursed related to the Proposition 84 Integrated Regional Water Management Program funding source for the Construction of Water Wells 4 and 9 and the Recycled Water Project.

Background: On June 1, 2019, City Council authorized the City Manager to negotiate and execute agreements with Humboldt County and the California Land Stewardship Institute (CLSI) for grant funds awarded through the Integrated Regional Water Management Program funded through Proposition 84.

Discussion: In 2016, Staff was successful in preparing and submitting grant applications for two separate projects. The first project was for partial construction of Phases 1-3 of the Recycled Water System and the construction of offsite storage ponds in collaboration with the CLSI. The second project was for the replacement of Water Well 4 and the installation of Water Well 9. This project included collaboration with Humboldt County as the grant administrator and Redwood Valley, and Millview County Water Districts as sub-grantee partners for the construction of new interties in each district.

The City was awarded $2,062,570.85 for the first project and $1,554,450 for the second project.

Construction was complete on the Recycled Water System and the offsite storage ponds in the fall of 2019, and the well and intertie project was complete in the spring of 2019.

Staff submitted disbursement requests in order to receive the grant funds from CLSI and Humboldt County. Once the funds were received, they were disbursed to the partners as follows and by project:

Recycled Water Project:
City- $2,020,026.20
Milovina Brothers- $22,917.44
K2 Farming Co, LLC- $19,627.21

Well and Intertie Project:
City- $1,317,212.56
Redwood Valley County Water District- $123,870.99
Millview County Water District- $113,366.45

Recommended Action: Receive notification of grant funds received and disbursed related to the Proposition 84 Integrated Regional Water Management Plan funding source for the Construction of Wells 4 and 9 and the Recycled Water Proejct

BUDGET AMENDMENT REQUIRED: Yes

CURRENT BUDGET AMOUNT: $0

PROPOSED BUDGET AMOUNT: 82227113.52100- $237,237.44

FINANCING SOURCE: Proposition 84 Grant Funds

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Sean White, Water Resources Director; Mary Horger, Financial Services Manager

Approved: 
Sage Sangiacomo, City Manager

Agenda Item No: 7.c.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-483

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Adoption of Resolution Establishing Fee for Mailing the Agenda or Agenda Packet, Per the Ralph M. Brown Act, Section 54954.1.

DEPARTMENT: City Clerk **PREPARED BY:** Kristine Lawler, City Clerk
PRESENTER: Consent Calendar

ATTACHMENTS:

1. Proposed Resolution

Summary: The City Council will consider adopting a resolution establishing a fee for mailing the agenda or agenda packet, per the Ralph M. Brown Act, Section 54954.1.

Background: Government Code Section 54954.1 for the Ralph M. Brown Act reads as follows:

Any person may request that a copy of the agenda, or a copy of all the documents constituting the agenda packet, of any meeting of a legislative body be mailed to that person. If requested, the agenda and documents in the agenda packet shall be made available in appropriate alternative formats to persons with a disability, as required by Section 202 of the Americans with Disabilities Act of 1990 (42 U.S.C. Sec. 12132), and the federal rules and regulations adopted in implementation thereof. Upon receipt of the written request, the legislative body or its designee shall cause the requested materials to be mailed at the time the agenda is posted pursuant to Section 54954.2 and 54956 or upon distribution to all, or a majority of all, of the members of a legislative body, whichever occurs first. Any request for mailed copies of agendas or agenda packets shall be valid for the calendar year in which it is filed, and must be renewed following January 1 of each year. The legislative body may establish a fee for mailing the agenda or agenda packet, which fee shall not exceed the cost of providing the service. Failure of the requesting person to receive the agenda or agenda packet pursuant to this section shall not constitute grounds for invalidation of the actions of the legislative body taken at the meeting for which the agenda or agenda packet was not received.

Whenever an agenda is posted, an electronic email goes out to all those who have signed up for the distribution list – made free and easily available on the Agendas & Minutes page of the City's website (www.cityofukiah.com/meetings). However, the Brown Act provides that an individual may obtain a mailed copy of the agenda or agenda packet upon request. For clarification, the request per the Brown Act to receive a copy of the agenda or agenda packet is different from a Public Records Act request.

Discussion: Staff is recommending that Council consider adopting the resolution (Attachment 1) establishing a fee of .10 cents per page plus postage, to compensate for the cost of providing the service.

Recommended Action: Adopt resolution establishing fee for mailing the agenda or agenda packet, per the Ralph M. Brown Act, Section 54954.1.

BUDGET AMENDMENT REQUIRED: N/A

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: N/A

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: David Rapport, City Attorney

Approved: Sage Sangiacomo, City Manager

RESOLUTION NO. 2020 –

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH ESTABLISHING A FEE UNDER CALIFORNIA GOVERNMENT CODE SECTION 54954.1 - RALPH M. BROWN ACT - FOR MAILING AN AGENDA OR AGENDA PACKET.

WHEREAS,

1. An electronic agenda or agenda packet may be obtained free by signing up on the distribution list made available on the Agendas & Minutes page of the City's website at: www.cityofukiah.com/meetings; and

2. Government Code Section 54954.1 under the Ralph M. Brown Act reads, "The legislative body may establish a fee for mailing the agenda or agenda packet, which fee shall not exceed the cost of providing the service;" and

3. The City Council has never established a fee for mailing the agenda or agenda packet under Government Code Section 54954.1.

NOW, THEREFORE, BE IT RESOLVED:

1. That requests to mail an agenda or agenda packet for the City Council, all City Boards & Commissions, and all legislative entitles within the City of Ukiah, will be subject to the following established fee:

   $ .10 cents per page plus cost of postage.

2. Fee shall be payable prior to receiving documents.

PASSED AND ADOPTED on August 5, 2020, by the following Roll Call Vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

_____
Douglas F. Crane, Mayor

ATTEST:

_____
Kristine Lawler, City Clerk

Agenda Item No: 7.d.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-381

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Approval of Amendment No. 2 with SHN Consulting Engineers and Geologists in the Amount of $10,000 for Additional Design Services for Pressure Zone 2 South Reservoir and Approval of Corresponding Budget Amendment.

DEPARTMENT: Water Resources **PREPARED BY:** Jarod Thiele, Public Works Management Analyst
PRESENTER: Consent Calendar

ATTACHMENTS:
1. Agreement w SHN
2. Amendment 1- Signed
3. SHN Amendment 2

Summary: Council will consider approval of an amendment with SHN Consulting Engineers and Geologists (SHN) in the amount of $10,000 for additional design services for Pressure Zone 2 South Water Reservoir and approval of corresponding Budget Amendment.

Background: On October 5, 2016, Council awarded a contract to SHN Consulting Engineers and Geologist for the design of replacement Pressure Zone 2 South Reservoir in the amount of $84,472 (Attachment 1). Staff recommended this Water Reservoir be replaced due to its age and poor condition.

On May 6, 2020, Council approved Amendment No.1 (Attachment 2) in the amount of $21,680 for additional services related to lead and asbestos testing of the existing reservoir.

Discussion: Upon testing of the existing reservoir it was determined that the external coating did contain lead based materials. Additional resources were required by SHN Consulting Engineers and Geologists to develop a Lead Compliance Plan in order to ensure the tank demolition is in compliance with regulations involving lead based substances. Staff has requested assistance in reviewing submittals for the project.

Staff is requesting approval of Amendment No. 2 (Attachment 3) in the amount of $10,000 for a total contract amount of $116,152 and approval of corresponding Budget Amendment

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Recommended Action: Approve Amendment No. 2 with SHN Consulting Engineers and Geologists in the Amount of $10,000 for Additional Design Services for Pressure Zone 2 South Reservoir.

BUDGET AMENDMENT REQUIRED: Yes

CURRENT BUDGET AMOUNT: 82227113.80230.15071- $0

PROPOSED BUDGET AMOUNT: 82227113.80230.15071- $10,000

FINANCING SOURCE: Water Fund

PREVIOUS CONTRACT/PURCHASE ORDER NO.: 1617-133-A1

COORDINATED WITH: Sean White, Director of Water Resources

Approved: _____
Sage Sangiacomo, City Manager

Con # 1617-133

Attachment 1

AGREEMENT FOR
PROFESSIONAL CONSULTING SERVICES
[Design Professional]

This Agreement, made and entered into this 31st day of October, 2016 ("Effective Date"), by and between the CITY OF UKIAH, CALIFORNIA, hereinafter referred to as "City" and SHN Consulting Engineers and Geologists, Inc., a Corporation 0rganized and in good standing under the laws of the state of California, hereinafter referred to as "Consultant".

RECITALS

This Agreement is predicated on the following facts:

a. City requires consulting services related to Engineering Design, Geotechnical and Construction Oversight Services for the rehabilitation/replacement of the Pressure Zone 2 South Reservoir.

b. Consultant represents that it has the qualifications, skills, experience and properly licensed to provide these services, and is willing to provide them according to the terms of this Agreement.

c. City and Consultant agree upon the Scope-of-Work and Work Schedule attached hereto as Attachment "A", describing contract provisions for the project and setting forth the completion dates for the various services to be provided pursuant to this Agreement.

TERMS OF AGREEMENT

1.0 DESCRIPTION OF PROJECT

1.1 The Project is described in detail in the attached Scope-of-Work (Attachment "A").

2.0 SCOPE OF SERVICES

2.1 As set forth in Attachment "A".

2.2. Additional Services. Additional services, if any, shall only proceed upon written agreement between City and Consultant. The written Agreement shall be in the form of an Amendment to this Agreement.

3.0 CONDUCT OF WORK

3.1 Time of Completion. Consultant shall commence performance of services as required by the Scope-of-Work upon receipt of a Notice to Proceed from City and shall complete such services within a reasonable time from receipt of the Notice to Proceed. Consultant shall complete the work to the City's reasonable satisfaction, even if contract disputes arise or Consultant contends it is entitled to further compensation.

4.0 COMPENSATION FOR SERVICES

4.1 Basis for Compensation. For the performance of the professional services of this Agreement, Consultant shall be compensated on a time and expense basis not to exceed a guaranteed maximum dollar amount of $84,472. Labor charges shall be based upon hourly billing rates

for the various classifications of personnel employed by Consultant to perform the Scope of Work as set forth in the attached Attachment B, which shall include all indirect costs and expenses of every kind or nature, except direct expenses. The direct expenses and the fees to be charged for same shall be as set forth in Attachment B. Consultant shall complete the Scope of Work for the not-to-exceed guaranteed maximum, even if actual time and expenses exceed that amount.

4.2 Changes. Should changes in compensation be required because of changes to the Scope-of-Work of this Agreement, the parties shall agree in writing to any changes in compensation. "Changes to the Scope-of-Work" means different activities than those described in Attachment "A" and not additional time to complete those activities than the parties anticipated on the date they entered this Agreement.

4.3 Sub-contractor Payment. The use of sub-consultants or other services to perform a portion of the work of this Agreement shall be approved by City prior to commencement of work. The cost of sub-consultants shall be included within guaranteed not-to-exceed amount set forth in Section 4.1.

4.4 Terms of Payment. Payment to Consultant for services rendered in accordance with this contract shall be based upon submission of monthly invoices for the work satisfactorily performed prior to the date of invoice less any amount already paid to Consultant, which amounts shall be due and payable thirty (30) days after receipt by City. The invoices shall provide a description of each item of work performed, the time expended to perform each task, the fees charged for that task, and the direct expenses incurred and billed for. Invoices shall be accompanied by documentation sufficient to enable City to determine progress made and the expenses claimed.

5.0 ASSURANCES OF CONSULTANT

5.1 Independent Contractor. Consultant is an independent contractor and is solely responsible for its acts or omissions. Consultant (including its agents, servants, and employees) is not City's agent, employee, or representative for any purpose.

It is the express intention of the parties hereto that Consultant is an independent contractor and not an employee, joint venturer, or partner of City for any purpose whatsoever. City shall have no right to, and shall not control the manner or prescribe the method of accomplishing those services contracted to and performed by Consultant under this Agreement, and the general public and all governmental agencies regulating such activity shall be so informed.

Those provisions of this Agreement that reserve ultimate authority in City have been inserted solely to achieve compliance with federal and state laws, rules, regulations, and interpretations thereof. No such provisions and no other provisions of this Agreement shall be interpreted or construed as creating or establishing the relationship of employer and employee between Consultant and City.

Consultant shall pay all estimated and actual federal and state income and self-employment taxes that are due the state and federal government and shall furnish and pay worker's compensation insurance, unemployment insurance and any other benefits required by law for himself and his employees, if any. Consultant agrees to indemnify and hold City and its officers, agents and employees harmless from and against any claims or demands by federal, state or local government agencies for any such taxes or benefits due but not paid by Consultant, including the legal costs associated with defending against any audit, claim, demand or law suit.

Consultant warrants and represents that it is a properly licensed professional or professional organization with a substantial investment in its business and that it maintains its own offices and staff which it will use in performing under this Agreement.

5.2 Conflict of Interest. Consultant understands that its professional responsibility is solely to City. Consultant has no interest and will not acquire any direct or indirect interest that would conflict with its performance of the Agreement. Consultant shall not in the performance of this Agreement employ a person having such an interest. If the City Manager determines that the Consultant has a disclosure obligation under the City's local conflict of interest code, the Consultant shall file the required disclosure form with the City Clerk within 10 days of being notified of the City Manager's determination.

6.0 INDEMNIFICATION

6.1 Insurance Liability. Without limiting Consultant's obligations arising under Paragraph 6.2 Consultant shall not begin work under this Agreement until it procures and maintains for the full period of time allowed by law, surviving the termination of this Agreement insurance against claims for injuries to persons or damages to property, which may arise from or in connection with its performance under this Agreement.

A. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office ("ISO) Commercial General Liability Coverage Form No. CG 20 10 10 01 and Commercial General Liability Coverage – Completed Operations Form No. CG 20 37 10 01.

2. ISO Form No. CA 0001 (Ed. 1/87) covering Automobile Liability, Code 1 "any auto" or Code 8, 9 if no owned autos and endorsement CA 0025.

3. Worker's Compensation Insurance as required by the Labor Code of the State of California and Employers Liability Insurance.

4. Errors and Omissions liability insurance appropriate to the consultant's profession. Architects' and engineers' coverage is to be endorsed to include contractual liability.

B. Minimum Limits of Insurance

Consultant shall maintain limits no less than:

1. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage including operations, products and completed operations. If Commercial General Liability Insurance or other form with a general aggregate limit is used, the general aggregate limit shall apply separately to the work performed under this Agreement, or the aggregate limit shall be twice the prescribed per occurrence limit.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

3. Worker's Compensation and Employers Liability: Worker's compensation limits as required by the Labor Code of the State of California and Employers Liability limits of $1,000,000 per accident.

4. Errors and Omissions liability: $1,000,000 per occurrence.

C. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects to the City, its officers, officials, employees and volunteers; or the Consultant shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

D. Other Insurance Provisions

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages

a. The City, it officers, officials, employees and volunteers are to be covered as additional insureds as respects; liability arising out of activities performed by or on behalf of the Consultant, products and completed operations of the Consultant, premises owned, occupied or used by the Consultant, or automobiles owned, hired or borrowed by the Consultant for the full period of time allowed by law, surviving the termination of this Agreement. The coverage shall contain no special limitations on the scope-of-protection afforded to the City, its officers, officials, employees or volunteers.

b. The Consultant's insurance coverage shall be primary insurance as respects to the City, its officers, officials, employees and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be in excess of the Consultant's insurance and shall not contribute with it.

c. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

d. The Consultant's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Worker's Compensation and Employers Liability Coverage

The insurer shall agree to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses arising from Consultant's performance of the work, pursuant to this Agreement.

3. Professional Liability Coverage

If written on a claims-made basis, the retroactivity date shall be the effective date of this Agreement. The policy period shall extend for the duration of the project.

4. All Coverages

Each Insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the City.

E. Acceptability of Insurers

Insurance is to be placed with admitted California insurers with an A.M. Best's rating of no less than A- for financial strength, AA for long-term credit rating and AMB-1 for short-term credit rating.

F. Verification of Coverage

Consultant shall furnish the City with Certificates of Insurance and with original Endorsements effecting coverage required by this Agreement. The Certificates and Endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates and Endorsements are to be on forms provided or approved by the City. All Certificates and Endorsements are to be received and approved by the City before Consultant begins the work of this Agreement. The City reserves the right to require complete, certified copies of all required insurance policies, at any time. If Consultant fails to provide the coverages required herein, the City shall have the right, but not the obligation, to purchase any or all of them. In that event, after notice to Consultant that City has paid the premium, the cost of insurance may be deducted from the compensation otherwise due the contractor under the terms of this Contract.

G. Subcontractors

Consultant shall include all sub-contractors or sub-consultants as insured under its policies or shall furnish separate certificates and endorsements for each sub-contractor or sub-consultant. All coverage for sub-contractors or sub-consultants shall be subject to all insurance requirements set forth in this Paragraph 6.1.

6.2 Indemnification. Notwithstanding the foregoing insurance requirements, and in addition thereto, Consultant agrees, for the full period of time allowed by law, surviving the termination of this Agreement, to indemnify the City for any claim, cost or liability that arises out of, or pertains to, or relates to any negligent act or omission or the willful misconduct of Consultant and its agents in the performance of services under this contract, but this indemnity does not apply to liability for damages for death or bodily injury to persons, injury to property, or other loss, arising from the sole negligence, willful misconduct or defects in design by the City, or arising from the active negligence of the City.

"Indemnify," as used herein includes the expenses of defending against a claim and the payment of any settlement or judgment arising out of the claim. Defense costs include all

costs associated with defending the claim, including, but not limited to, the fees of attorneys, investigators, consultants, experts and expert witnesses, and litigation expenses.

References in this paragraph to City or Consultant, include their officers, employees, agents, and subcontractors.

7.0 CONTRACT PROVISIONS

7.1 Documents and Ownership of Work. All documents furnished to Consultant by City and all documents or reports and supportive data prepared by Consultant under this Agreement are owned and become the property of the City upon their creation and shall be given to City immediately upon demand and at the completion of Consultant's services at no additional cost to City. Deliverables are identified in the Scope-of-Work, Attachment "A". All documents produced by Consultant shall be furnished to City in digital format and hardcopy. Consultant shall produce the digital format, using software and media approved by City.

7.2 Governing Law. Consultant shall comply with the laws and regulations of the United States, the State of California, and all local governments having jurisdiction over this Agreement. The interpretation and enforcement of this Agreement shall be governed by California law and any action arising under or in connection with this Agreement must be filed in a Court of competent jurisdiction in Mendocino County.

7.3 Entire Agreement. This Agreement plus its Attachment(s) and executed Amendments set forth the entire understanding between the parties.

7.4 Severability. If any term of this Agreement is held invalid by a court of competent jurisdiction, the remainder of this Agreement shall remain in effect.

7.5 Modification. No modification of this Agreement is valid unless made with the agreement of both parties in writing.

7.6 Assignment. Consultant's services are considered unique and personal. Consultant shall not assign, transfer, or sub-contract its interest or obligation under all or any portion of this Agreement without City's prior written consent.

7.7 Waiver. No waiver of a breach of any covenant, term, or condition of this Agreement shall be a waiver of any other or subsequent breach of the same or any other covenant, term or condition or a waiver of the covenant, term or condition itself.

7.8 Termination. This Agreement may only be terminated by either party: 1) for breach of the Agreement; 2) because funds are no longer available to pay Consultant for services provided under this Agreement; or 3) City has abandoned and does not wish to complete the project for which Consultant was retained. A party shall notify the other party of any alleged breach of the Agreement and of the action required to cure the breach. If the breaching party fails to cure the breach within the time specified in the notice, the contract shall be terminated as of that time. If terminated for lack of funds or abandonment of the project, the contract shall terminate on the date notice of termination is given to Consultant. City shall pay the Consultant only for services performed and expenses incurred as of the effective termination date. In such event, as a condition to payment, Consultant shall provide to City all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs and reports prepared by the Consultant under this Agreement. Consultant shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder,

subject to off-set for any direct or consequential damages City may incur as a result of Consultant's breach of contract.

7.9 Duplicate Originals. This Agreement may be executed in duplicate originals, each bearing the original signature of the parties. When so signed, each such document shall be admissible in administrative or judicial proceedings as proof of the terms of the Agreement between the parties.

8.0 NOTICES

Any notice given under this Agreement shall be in writing and deemed given when personally delivered or deposited in the mail (certified or registered) addressed to the parties as follows:

CITY OF UKIAH DEPT. OF PUBLIC WORKS 300 SEMINARY AVENUE UKIAH, CALIFORNIA 95482-5400	SHN CONSULTING ENGINEERS & GEOLIGISOTS, INC. ATTN: THOMAS M. HERMAN 335 SOUTH MAIN STREET WILLITS, CA 95490-3977

9.0 SIGNATURES

IN WITNESS WHEREOF, the parties have executed this Agreement the Effective Date:

CONSULTANT

BY: _____ 10/19/16
Date

PRINT NAME: Thomas M. Herman

94-2571944
IRS IDN Number

CITY OF UKIAH

BY: _____ 10-31-16
Date

CITY MANAGER

ATTEST

_____ 10-31-16
CITY CLERK Date

Project Understanding and Approach

The City of Ukiah is requesting Engineering Services to assist with the assessment of the condition of an existing 150,000 gallon welded steel water which is located in pressure zone 2 of the City's water system. The subject water tank is situated on a pad above the municipal golf course with a bolted steel water tank that serves the same pressure zone. These tanks are two of the four major water tanks that provide gravity flow in the water distribution system that serves a daytime population exceeding 35,000 people. The welded steel tank currently has two major leaks that have necessitated the inspection of the tank to analyze the condition of the interior protective coatings, and the degree of metal corrosion that has occurred to date. The initial goal will be to perform an exterior visual inspection of the tank and foundation and a detailed interior inspection of the water tank to determine the feasibility of performing rehabilitation repairs on the existing tank or the need for replacement. Upon formalizing the findings of the inspections the next phase of work will be to prepare contract specifications and plans as needed for the repair or replacement of the tank. Upon award of a construction contract, construction management and inspection services for quality control and contract management during the performance of repairs or new construction will be required.

This proposal identifies how SHN will approach performing the necessary tasks to assist the City with the successful rehabilitation or replacement of the existing 150,000 gallon welded steel water tank. The critical elements of our project approach will be to perform an initial on-site visual inspection of the water tank and foundation and coordinate the timely inspection of the interior of the water tank. SHN staff would also anticipate meeting with City staff and reviewing existing plans and documentation about the tanks and distribution piping in the vicinity of the pad. We have included a highly experienced sub-consultant that specializes in the inspection of the interior and exterior of water tanks, performing video documentation, and measurements of metal thickness, pitting depths, joint weld integrity, and sampling of metal coating.

The following is the Project Approach and Scope of Services. A more detailed description of services by Potable Divers, Inc. can be found in Attachment A.

Exceptions

SHN has extensive experience contracting with the City of Ukiah and has no exceptions to the terms and conditions described in the Scope of Services.

Scope of Services

Phase One - Tank Assessment

SHN and Potable Divers Inc. will perform the following services relative to the inspection of the existing PZ2S welded steel water tank and foundation, together with the preparation of a Technical Memorandum with comments and recommendations as to the condition of the existing tank. (See Attachment A for a complete description of the services and procedures of Potable Divers, Inc.)

- Conduct initial site visit and coordination meeting with City staff.
- Conduct surficial geotechnical investigation to determine if the existing tank foundation is acceptable for reuse or will require replacement.
- Conduct an exterior visual inspection of the welded steel water tank to determine if a more in depth inspection of the tank's interior is warranted.
- Coordinate an extensive tank inspection to be performed by diving and conducting under water video documentation, thickness measurements, and sampling of coatings.
- Potable Divers Inc. will perform an in-depth inspection of the interior and exterior of the welded steel tank and prepare a report with photographs and video documentation.
- Prepare a Technical Memorandum summarizing the geotechnical investigation and tank inspection, with recommendations for rehabilitation or replacement of the existing foundation and water tank.
- Meet with City staff to review our recommendations submitted in the technical memorandum.

Phase Two - Preparation of Construction Documents

SHN will perform engineering services for the preparation of plans for rehabilitation or replacement of the existing welded steel water tank, new tank foundation, and associated yard piping, and technical specifications for the bidding of work to be performed as follows:

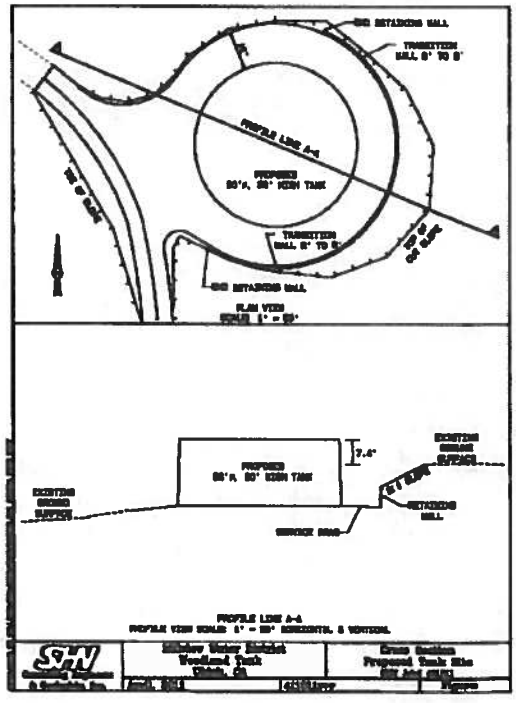
- Perform a field survey of the water tank pad, the existing water tanks and the existing inflow piping; drain piping, and any water system telemetry.
- Perform a subsurface geotechnical investigation consisting of two test holes for the analysis of soils under the tank pad to facilitate the design of a new tank foundation per the latest building and seismic design codes and American Water Works Association (AWWA) standards.
- Prepare plans and technical specifications based on the recommended alternative noted in the Technical Memorandum.
- Prepare and submit 75 percent plans and technical specifications to the City staff for review and comment.
- Incorporate City comments; prepare and submit 95 percent plans and technical specifications for review and comment.
- Prepare a finalized set of plans and technical specifications for final approval and advertising for bids.
- Prepare a detailed bid schedule with

quantities for incorporation into the contract documents.
- Prepare a detailed engineer's opinion of cost of the water tank improvements.
- Provide one set of reproducible Mylar plans and one copy-ready set of contract documents and technical specifications.
- Provide one copy of contract documents, and plans and specifications in digital format.

Phase Three - Bidding Assistance, Inspection, and Construction Management

SHN will provide the City with assistance during bidding of the construction project, perform construction inspection, materials testing, and construction management during construction of water tank improvements as follows:

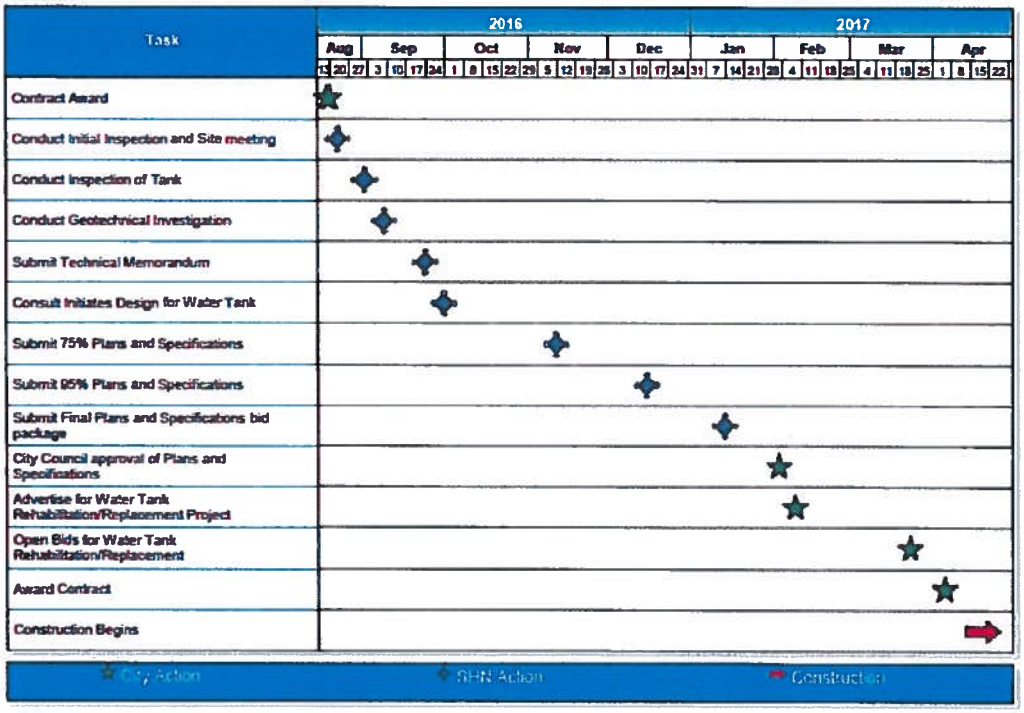
- SHN will provide services during bidding to answer technical questions and requests for information, as directed by the City.
- Prepare a draft addenda as required for the City for distribution to bidders
- Review bids received and provide recommendations to the City
- Conduct a pre-construction conference with the Contractor awarded the project.
- Review submittals provided by the Contractor.
- Provide daily inspections during the course of the project and coordinate with the City and the Contractor.
- Maintain a field record of any modifications to the contract drawings.
- Review certified payroll documentation provided by the Contractor to assure that they are in compliance with State and Federal labor laws and provide to the City at close of project.
- Review progress payment invoices submitted by the Contractor and make recommendations for payment.
- Provide materials testing as needed during construction of the water tank and foundation.
- Provide copies of inspection and testing reports to the City for their records.
- Provide one set of reproducible Mylar "AS-BUILT" drawings after the completion of the construction project.



SHN provided geotechnical investigation and topographic mapping to Millview County Water District for the Woodland water tank replacement site.

Schedule

Schedule
City of Ukiah Water Tank Project



Fee Proposal

SHN proposes to complete the work on an hourly rate with a "not to exceed maximum" cost for each Phase.

Phase 1	• Perform an inspection of the existing PZ2S welded steel water tank and foundation. • Prepare a Technical Memorandum with comments and recommendations as to the condition of the existing tank.	$ 8,614
Phase 2	• Prepare plans for rehabilitation or replacement of the existing welded steel water tank, new tank foundation, and associated yard piping • Prepare technical specifications for the bidding of work to be performed.	$ 37,008
Phase 3	• Provide assistance during bidding of the construction project. • Perform construction inspection, materials testing. • Construction management during construction of water tank improvements.	$ 30,850

See Attachment B for a full breakdown of costs and man-hours budgeted for each team member. An itemized hourly rate schedule can be found in Attachment D.

City of Ukiah Water Tank Project - Cost Proposal
SHN Consulting Engineers & Geologists

Attachment "B"

		PRINCIPAL	SR. CIVIL ENGINEER PROJECT MANAGER	GEOTECHNICAL ENGINEER	PROJECT SURVEYOR	SURVEY CREW PW	ENGINEERING & SURVEYING TECHNICIAN	CLERICAL	CONSTRUCTION INSPECTOR (PW)	MATERIAL TESTING /LABORATORY EXPENSES /MILEAGE	OUTSIDE SERVICES	FEE TOTAL FOR INITIAL SCOPE
	BILLING RATE	$ 150	$ 145	$ 145	$ 135	$ 170	$ 85	$ 60	$ 110	LUMP		Task
	DESCRIPTION	HOURS	HOURS	HOURS	HOURS	HOURS	HOURS	HOURS	HOURS	SUM FEE		TOTAL
Phase 1	Technical Memorandum- Water Tank Inspection											
Task 1	PERFORM FIELD RECONNAISSANCE & CLIENT MEETING		4							$ 28		$ 608
Task2	PRELIMINARY GEOTECHNICAL INVESTIGATION	2		4						$ 28		$ 908
Task 3	CONDUCT EXTERIOR VISUAL TANK INSPECTION		4									$ 580
Task 4	COORDINATE INSPECTION BY POTABLE DIVERS		4									$ 580
Task 5	POTABLE DIVERS INSPECTION		2							$ 28	$ 2,000	$ 2,318
Task 6	PREPARE TECHNICAL MEMORANDUM	2	10	2			4	4				$ 2,620
Task 7	REVIEW MEMORANDUM WITH CITY OF UKIAH STAFF	2	4					2				$ 1,000
	MAN HOURS BY DISCIPLINE	6	28	6	0	0	4	6	0			
	SUBTOTAL BY DISCIPLINE/PHASE TOTAL	$ 900	$ 4,060	$ 870	$ -	$ -	$ 340	$ 360	$ -	$ 84	$ 2,000	$ 8,614
Phase 2	Plans & Specifications											
Task 1	PERFORM FIELD SURVEY OF SITE	2	2		4	8	8			$ 28		$ 3,198
Task 2	PERFORM GEOTECHNICAL SUBSURFACE INVESTIGATION		2	18			4	4		$ 700	$ 2,000	$ 6,180
Task 3	PREPARE PLANS AND TECHNICAL SPECIFICATIONS	4	36				32	8				$ 9,020
Task 4	SUBMIT 75% PLANS AND TECHNICAL SPECIFICATIONS	2	16				16	8				$ 4,460
Task 5	PERFORM UPDATING AND SUBMIT 95% PLANS AND SPECIFICATIONS	2	16				16	6				$ 4,340
Task 6	PREPARE FINALIZED SET OF PLANS AND TECHNICAL SPECIFICATION S	2	12				16	8				$ 3,880
Task 7	PREPARE A BID SCHEDULE WITH QUANTITIES		8				4					$ 1,500
Task 8	PREPARE AN ENGINEER'S OPINION OF COST	2	10				2					$ 1,920
Task 9	PROVIDE A SET OF MYLAR PLANS AND CONTRACT DOCUMENTS		4				4					$ 920
Task 10	PROVIDE DIGITAL PLANS AND TECHNICAL SPECIFICATIONS		2					4				$ 530
Task 11	PROVIDE 20 SETS OF PLANS & TECHNICAL SPECIFICATIONS		4					8				$ 1,060
												$ -
	MAN HOURS BY DISCIPLINE/TOTAL HOURS	14	112	18	4	8	102	46	0			
	SUBTOTAL BY DISCIPLINE/PHASE TOTAL	$ 2,100	$ 16,240	$ 2,610	$ 540	$ 1,360	$ 8,670	$ 2,760	$ -	$ 728	$ 2,000	$ 37,008
Phase 3	Construction Management											
Task 1	BIDDING ASSISTANCE	2	16					6				$ 2,980
Task 2	PREPARE DRAFT AGENDA FOR PRE-BID MEETING		2					2				$ 410
Task 3	REVIEW BIDS AND PROVIDE RECOMMENDATIONS TO CITY		8									$ 1,160
Task 4	CONDUCT PRE-CONSTRUCTION MEETING		4						2			$ 800
Task 5	REVIEW SUBMITTALS FROM CONTRACTOR		16									$ 2,320
Task 6	PROVIDE DAILY INSPECTIONS DURING CONSTRUCTION		24						44			$ 8,320
Task 7	MAINTAIN A RECORD OF PROJECT MODIFICATIONS		12				8					$ 2,420
Task 8	REVIEW CERTIFIED PAYROLL		8					2				$ 1,280
Task 9	REVIEW CONTRACTOR PROGRESS PAYMENT INVOICE		12				4					$ 2,080
Task 10	PROVIDE MATERIALS TESTING AS NEEDED		4							$ 1,500		$ 2,080
Task 11	PROVIDE MATERIALS TESTING REPORTS	2	12				12	4		$ 500		$ 3,800
Task 12	PREPARE AND PROVIDE RECORD DRAWINGS AFTER COMPLETION		8				24					$ 3,200
	MAN HOURS BY DISCIPLINE/TOTAL HOURS	4	126	0	0	0	48	14	46			
	SUBTOTAL BY DISCIPLINE/PHASE TOTAL	$ 600	$ 18,270	$ -	$ -	$ -	$ 4,080	$ 840	$ 5,060	$ 2,000	$ -	$ 30,850
Total Outside Services											$ 4,000	
Total Project Cost - Inspection, Engineering, Geotechnical, Surveying, & Construction Management												$ 84,472

Consulting Engineers & Geologists, Inc.

Fee Schedule
January 1, 2016

When accurate definition of the proposed work is not possible, an hourly charge out rate for determining compensation shall be used. Hourly charge rates include payroll costs, overhead, and profit. Hourly services are billed portal to portal and are subject to a 2-hour minimum. Current rates are as follows:

Hourly Charge Rates			
Position[1]	**Hourly Rates**		
Principal Engineer	$ 135.00	-	$180.00
Principal Engineering Geologist	$ 125.00	-	$155.00
Principal Surveyor	$ 125.00	-	$155.00
Project Manager	$ 85.00	-	$155.00
Senior Planner	$ 100.00	-	$140.00
Senior Engineer	$ 115.00	-	$150.00
Senior Geotechnical Engineer	$ 125.00	-	$155.00
Senior Geologist	$ 115.00	-	$145.00
Senior Surveyor	$ 105.00	-	$135.00
Engineer	$ 85.00	-	$120.00
Traffic Engineer	$ 85.00	-	$140.00
Geologist	$ 85.00	-	$115.00
Certified Industrial Hygienist	$ 95.00	-	$140.00
Environmental Specialist	$ 75.00	-	$130.00
Environmental Planner	$ 75.00	-	$115.00
Staff Surveyor[3]	$ 75.00	-	$105.00
Assistant Engineer	$ 75.00	-	$120.00
Survey Party Chief[3]	$ 75.00	-	$105.00
Junior Engineer	$ 65.00	-	$ 90.00
Engineering Technician/Draftsperson[3]	$ 65.00	-	$ 90.00
Lab/Field Technician[3]	$ 65.00	-	$ 100.00
Survey Technician[3]	$ 65.00	-	$ 90.00
Technical Writer	$ 55.00	-	$ 70.00
Clerical	$ 50.00	-	$ 70.00
Expert Witness[2,4]	$155.00	-	$255.00

1 Incidental expenses, i.e., lodging, meals, airplane tickets, etc., are billed at cost plus 15%.
2 Minimum daily charge is four hours.
3 Rates depend on the specific personnel assigned and if prevailing wage rates are required in the area of work.
4 Rates for Expert Witness are charged for preparation and testimony for both deposition(s) and trial(s).

Reimbursables The following direct charges are charged in addition to the hourly charge rates set forth above.	
Direct Charges:	
CADD plots (black & white)	$ 4.00/ea.
CADD plots (color)	$ 20.00/ea.
Copies	$ .15/ea.
Equipment and other expenditures (required for projects)	Cost + 15%
FAX	$ 2.00/sheet
Field office	Cost + 15%
Filing fees, telephone expense, etc.	Cost + 15%
Iron pipe, monuments, flagging, etc.	Cost + 15%
Mylars	$ 2.50/sq. ft.
Services of other consultants	Cost + 15%
Stakes, hubs, lath, etc.	Cost + 15%
Subsistence, air travel, etc.	Cost + 15%
Vehicles	$ 50.00/day
Field Testing and Equipment:	
Anchor bolt tension testing	$ 80.00/day plus operator
CO_2 Meter	$ 10.00/day
Concrete Compression Impact Hammer	$ 25.00/day*+
Core Drilling Machine	$ 75.00/day + $3.00/inch cored
Dissolved Oxygen Meter	$ 53.00/day*+
Expendable Supplies	$ 40.00/day*+
Fyrite Meter	$ 33.00/day*+
Generator	$ 53.00/day*+
Geophysical Equipment	By Quotation
Grundfos Controller & Pump	$275.00/day
Hand Auger	$ 33.00/day
Health & Safety Level D	$ 35.00/day*+
Health & Safety Level C	$ 60.00/day*+
High Pressure Controller	$ 60.00/day*+
Inclinometer	$200.00/day*
LEL Meter	$ 66.00/day*+
Nuclear Density Testing	$ 25.00/hour plus operator
Other equipment including drill rigs, backhoes, etc.	Cost + 15%
ORP Meter	$ 15.00/day
OVA	$132.00/day*+
Ozone Sparge Trailer	$2,000.00/day
Peristaltic Pump	$ 50.00/day*+
pH/Conductivity Meter	$ 53.00/day*+
Power Auger	$100.00/day*+
Pumps	$ 45.00/day*+
Quad (ATV)	$150.00/day
Rebar Locating Device	$ 40.00/day plus operator

* 1/2 Day Minimum Charge.
\+ 25% Weekly Discount, 40% Monthly Discount.
(1) If concrete is sampled and delivered to SHN lab by outside contractor, add $5.00/ea. for processing and curing per ASTM C-31.

Reimbursables, Continued	
Field Testing and Equipment, Continued:	
Roto-hammer	$ 50.00/day*+
Skidmore-Wilhelm Bolt Tension Calibration	$ 50.00/day
Soil/Gas Purge Pumps	$ 30.00/day*+
Soil Gas Probes	$200.00/day*+
Torque Wrench (0 to 250 ft lbs)	$ 25.00/day
Torque Wrench (250 to 1,000 ft lbs)	$ 50.00/day
Turbidity Meter	$ 26.00/day*+
Ultrasonic Test Device	$ 20.00/hour plus operator
Vapor Extraction System	$500.00/day*+
Water Level Data Logger	$ 60.00/day*+
Water Level Meter	$ 33.00/day*+
Well Point	$ 50.00/day
Well Wizard	$100.00/day*+
Survey Equipment:	
GPS Station	$300.00/day*
Level	$ 25.00/day*
Robotic Total Station	$ 200.00/day
Total Station	$ 7.50/hour
Total Station w/Data Collector	$ 100.00/day
Laboratory Tests:	
Asphalt Briquette Compaction	$ 50.00/ea.(1)
Asphalt Bulk Specific Gravity	$ 30.00/ea.
Asphalt Content by Nuclear Method	$ 75.00/test
Asphalt Content Gauge Calibration	$190.00/ea.
Asphalt Extraction (% Bitumen)	On Request
Asphalt (Hveem) Mix Design	On Request
Brass Tube (Liner)	$ 5.00/ea.
Cleanness Value (CT 227)	$ 75.00/ea.
Compaction Curves (ASTM D 1557 or Caltrans CT216):	
4-inch Mold	$150.00/ea.
6-inch Mold	$150.00/ea.
Check Point	$ 50.00/ea.
Concrete Compressive Strength (CT 521 or ASTM C39)	$ 25.00/ea.(2)
Concrete Linear Shrinkage (3 Bars)	$200.00
Concrete Moisture	$ 25.00/test (floor test)
Consolidation Test	$300.00/ea.
Direct Shear, per point: (ASTM D3080)	
Consolidated-Drained (CD)	$130.00/point
Unconsolidated-Undrained (UU) (Modified ASTM)	$100.00/point
Consolidated-Undrained (CU) (Modified ASTM)	$115.00/point
Additional cycles (each)	$ 50.00/ea.
Disposable Concrete Molds	$ 2.00/ea.

* 1/2 Day Minimum Charge.
\+ 25% Weekly Discount, 40% Monthly Discount.
(1) If asphalt is delivered to SHN lab unmixed, add $75.00/ea. for processing and mixing per Caltrans CT304.
(2) If concrete is sampled and delivered to SHN lab by outside contractor, add $5.00/ea. for processing and curing per ASTM C-31.

Reimbursables, Continued	
Laboratory Tests, Continued:	
Durability Index	$ 75.00/ea.
Expansion Index	$150.00/test
Fireproofing Density	$ 50.00/ea.
Grout Compressive Strength	$ 40.00/ea.
LA Rattler (abrasion resistance)	$150.00/test
Liquid Limit	$ 75.00/ea.
Masonry Block Compressive Strength	$ 65.00/ea.
Masonry Block Linear Shrinkage	$ 85.00/ea.
Masonry Block Prism Compressive Strength	$125.00/ea.
Masonry Core Shear Test	$ 50.00/core
Moisture Content	$ 15.00/ea.
Moisture-Density Test	$ 25.00/ea.
Particle Size Analysis (ASTM 422)	$100.00/ea.
Percent Crushed Particles	$125.00/ea.
Percent Entrained Air In Concrete	$ 10.00/ea.
Percent Organics	$ 50.00/ea.
Plastic Limit	$ 50.00/ea.
Plasticity Index	$125.00/ea.
R-Value	$250.00/ea.
Rice Specific Gravity of Asphalt (ASTM D2041)	$ 70.00/ea.
Sand Equivalent	$ 50.00/ea.
Sawing Rocks and Concrete Cores	$ 30.00/unit
Sieve Analysis--Coarse	$ 45.00/ea.
Sieve Analysis--Fine	$ 55.00/ea
Sieve Analysis--Passing 200	$ 45.00/ea.
Specific Gravity, Rock	$ 45.00/ea.
Stabilometer of Premixed AC	$ 75.00/ea.
Sulfate Soundness	$ 80.00/cycle
Swell Test	$ 55.00/point
Triaxial Compression	
Unconsolidated Undrained (TXUU) (ASTM D2850)	$115.00/point
Consolidated Undrained (TXCU) (ASTM D4767)	$385.00/point
Consolidated Drained (TXCD) (ACOE)	$500.00/point
Consolidated Undrained (TXCU–3 stage) (ASTM D4767)	$810.00/test
Consolidated Drained (TXCD–3 stage) (ACOE)	$860.00/test
USDA Bulk Density Test	$ 30.00/ea.
USDA Textural Suitability Test	$ 50.00/ea.
Unconfined Compression	$ 50.00/ea.
Unit Weight of Lightweight Concrete	$ 50.00/unit

Notes:

All samples of soil or rock from physical testing are discarded 30 days after submission of final report unless prior arrangements are made. Samples of soil or rock submitted for testing for hazardous substances will be returned to the Client, who is responsible for proper disposal.

This fee schedule is subject to review and adjustment, as required.

Certain services may require prevailing wages or overtime at premium pay to SHN employees. In such circumstances, fees will be adjusted to reflect increased labor costs.

CITY OF UKIAH
AMENDMENT NO. 1
TO AGREEMENT FOR PROFESSIONAL CONSULTING SERVICES
DATED OCTOBER 31, 2016

TERMS AND CONDITIONS

All terms and conditions of the Agreement for Professional Consulting Services dated October 31, 2016 shall remain in force and effect except as modified by this first amendment.

AUTHORIZATION

Upon execution of this amendment, service provider is authorized to provide the service described under the Scope of Additional Work identified in this Amendment No. 1.

SCOPE OF ADDITIONAL WORK

Work authorized by this amendment shall include that work described in the June 13, 2019 and April 16, 2020 Project Modification Agreement from SHN Consulting Engineers & Geologists, Inc. A copy of said letter is included in this first amendment.

COMPENSATION

Compensation for the performance of the additional work shall be made on a time and expense basis at Consultant's customary fees. Expenses shall not exceed a maximum total cost of $21,680 for a total contract amount of $106,152.

SHN CONSULTING ENGINEERS AND GEOLOGISTS, INC.

BY: _____
THOMAS M. HERMAN
PRINCIPAL

5/7/2020
DATE

CITY OF UKIAH

BY: _____
SAGE SANGIACOMO
CITY MANAGER

05/29/2020
DATE

Project Modification Agreement

Project Title:	PZ2S Water Tank Replacement
Client:	City of Ukiah
Job Number:	416086
Project Manager:	Tom Herman
Change No.:	1

Project requirements or conditions encountered indicate that the Scope of Services included in this Project must be revised. CLIENT and SHN hereby agree that the Project Scope of Services, Schedule, and/or Budget shall be revised as described below.

Scope of Services Change:

Asbestos/lead testing of existing PZ2S tank materials in advance of demolition. Contract assumes all laboratory testing to be paid for by direct billing agreement between the City of Ukiah and Alpha Labs. SHN will provide a summary report of results.

Impact To:

Initial Budget:	$84,472	
Current Budget:	$84,472	(Reflecting Prior Changes)
Budget Change:	$6,680	(Addition or Reduction +/-)
Revised Budget:	$91,152	
Initial Schedule:		(Wks)
Current Schedule:	TBD	(Reflecting Prior Changes)
Schedule Change:	NA	(Addition or Reduction +/- Wks)
Revised Schedule:	TBD	(Wks)
Other:		

Individuals Endorsing Change:

Thomas Herman
SHN Project Manager

X _____ (signature)

Jason Island
SHN Project QA/QC

X _____ (signature)

Authorization to Proceed with Change:

SHN Consulting Engineers & Geologists, Inc.

Date: _____

X _____
Client

Date: 6/13/19

Project Modification Agreement

Project Title:	PZ2S Water Tank Replacement
Client:	City of Ukiah
Job Number:	416086
Project Manager:	Jason Island
Change No.:	2

Project requirements or conditions encountered indicate that the Scope of Services included in this Project must be revised. CLIENT and SHN hereby agree that the Project Scope of Services, Schedule, and/or Budget shall be revised as described below.

Scope of Services Change:

Modify plans, specifications, and engineer's opinion of probable cost to include a glass fused to steel bolted water tank in lieu of the epoxy coated tank that is currently specified in previously developed bid documents. Remaining funds not expended in this effort will be applied to construction management budget.

Impact To:

Initial Budget:	**$84,472**	
Current Budget:	**$91,152**	(Reflecting Prior Changes)
Budget Change:	**$15,000**	(Addition or Reduction +/-)
Revised Budget:	**$106,152**	
Initial Schedule:		(Wks)
Current Schedule:	**TBD**	(Reflecting Prior Changes)
Schedule Change:	**NA**	(Addition or Reduction +/- Wks)
Revised Schedule:	**TBD**	(Wks)
Other:		

Individuals Endorsing Change:

Jason Island
SHN Project Manager

X Jason Island
(signature)

Lory Widmer
SHN Project QA/QC

X Lory B. Widmer
(signature)

Authorization to Proceed with Change:

SHN Consulting Engineers & Geologists, Inc.

Date: 4/17/2020

X Jarod Thiele Electronically
City of Ukiah

Date: 4/16/20

Attachment 3

COU NO. 1617-133-A2

CITY OF UKIAH
AMENDMENT NO. 2
TO AGREEMENT FOR PROFESSIONAL CONSULTING SERVICES
DATED OCTOBER 31, 2016

TERMS AND CONDITIONS

All terms and conditions of the Agreement for Professional Consulting Services dated October 31, 2016 shall remain in force and effect except as modified by this second amendment.

AUTHORIZATION

Upon execution of this amendment, service provider is authorized to provide the service described under the Scope of Additional Work identified in this Amendment No. 2.

SCOPE OF ADDITIONAL WORK

Work authorized by this amendment shall include that work described in Project Modification Agreements 1, 2 and 3 from SHN Consulting Engineers & Geologists, Inc. A copy of said letter is included in this first amendment.

COMPENSATION

Compensation for the performance of the additional work shall be made on a time and expense basis at Consultant's customary fees. Expenses shall not exceed a maximum total cost of $10,000 for a total contract amount of $116,152.

SHN CONSULTING ENGINEERS AND GEOLOGISTS, INC.

BY: _____
THOMAS M. HERMAN
PRINCIPAL

_____
DATE

CITY OF UKIAH

BY: _____
SAGE SANGIACOMO
CITY MANAGER

_____
DATE

Project Modification Agreement

Project Title:	PZ2S Water Tank Replacement
Client:	City of Ukiah
Job Number:	416086
Project Manager:	Jason Island
Change No.:	3

Project requirements or conditions encountered indicate that the Scope of Services included in this Project must be revised. CLIENT and SHN hereby agree that the Project Scope of Services, Schedule, and/or Budget shall be revised as described below.

Scope of Services Change:

Additional funds are needed to cover costs associated with providing Tasks 4-12 of Phase 3 as described in SHN's original proposal dated 6/27/2016. Because over four years have passed since the proposal was originally submitted, costs of providing services have increased. In addition, the submittal review process is anticipated to require more time than originally projected to review tank submittals as well as a lead compliance plan for tank demolition.

Impact To:

Initial Budget:	**$84,472**	
Current Budget:	**$106,152**	(Reflecting Prior Changes)
Budget Change:	**$10,000**	(Addition or Reduction +/-)
Revised Budget:	**$116,152**	
Initial Schedule:		(Wks)
Current Schedule:	**TBD**	(Reflecting Prior Changes)
Schedule Change:	**NA**	(Addition or Reduction +/- Wks)
Revised Schedule:	**TBD**	(Wks)
Other:		

Individuals Endorsing Change:

Jason Island
SHN Project Manager

X
(signature)

Lory Widmer
SHN Project QA/QC

X
(signature)

Authorization to Proceed with Change:

X
SHN Consulting Engineers & Geologists, Inc.
Date:

X
City of Ukiah
Date:

Agenda Item No: 7.e.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-484

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Approve Change Order to Purchase Order #46701 for the installation SCADA Server UPS Replacement Batteries to JM Integration in the Amount of $7,603.19, to Bring the New Total Purchase Order to $26,823.46.

DEPARTMENT: Water Resources
PREPARED BY: Mary Williams, Buyer II
PRESENTER: Consent Calendar

ATTACHMENTS:

1. Proposal Jun 23 2020
2. Proposal Jul 22 2020 (002)

Summary: Council will consider approving a change order to Purchase Order #46701 to JM Integration in the amount of $7,603.19, to bring the new total purchase order to $26,823.46.

Background: The Water Resources Department has been in the process of procuring a contract for a complete overhaul of the SCADA system at the Water Treatment Plant. However, some critical components failed before the completion of the purchasing process.

Discussion: On June 24, 2020, Purchase Order #46701 (Attachment 1) was issued to JM Integration in the amount of $19,220.27 for emergency work to repair and update the SCADA Servers based on proposal received June 17, 2020.

During the repairs authorized in the original proposal, it was discovered that some of the backup batteries for the SCADA system had also failed.

On July 13, 2020, another proposal (Attachment 2) in the amount of $7,603.19 including tax was received for change order to do the additional work found to be needed.

Recommended Action: Approve change order to Purchase Order #46701 to JM Integration in the amount of $7,603.19, to bring the new total Purchase Order to $26,823.46, to install SCADA Server UPS Replacement Batteries.

BUDGET AMENDMENT REQUIRED: No.

CURRENT BUDGET AMOUNT: 82027111.52100: $211,000

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: N/A

PREVIOUS CONTRACT/PURCHASE ORDER NO.: 46701

COORDINATED WITH:

Approved: 
Sage Sangiacomo, City Manager

City of Ukiah

JMIntegration
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License # 1040899

RFP:
Repair/Update SCADA Servers

PROPOSAL
Rev09JUN2020

Attn: Shelly Whyburn
City of Ukiah
Water Treatment Plant
935 River Street
Ukiah, CA 95482

June 17, 2020

JM Integration LLC is pleased to submit this proposal for services to support City of Ukiah in achieving its goals for improving customer satisfaction by providing the following scope of work listed below.

Scope of Work

- Furnish and install total of 128GB of RAM for each server of: four (4) each of Crucial 32GB Kit (16GBx2) DDR3/DDR3L-1600 MT/s (PC3-12800) DR x4 RDIMM
- Furnish and install total of 1.6TB for each server of: two (2) each of 400-ALXT Dell 800-GB 12G 2.5 MU SAS SSD w/G176J
- Furnish and install total of two (2): Dell E Series 23-Inch Screen LED-lit Monitor (Dell E2318Hx),Black and peripherals (mouse and keyboard).
- Furnish, install and configure Windows Server 2016 Standard (includes Windows Defender) on SCADA servers using best practices and industry standards
- Update Wonderware Intouch and Historian software with any related patches or revisions. Test existing applications on updated versions to verify operations. Customer will provide licensing required for use.

Pricing

The following table details the pricing for delivery of the services outlined in this proposal. This pricing is valid for 30 days from the date of this proposal:

Description		**Price**	
Labor		$	8,126.00
Travel		$	1,926.00
Materials		$	8,420.91
Tools & Equipment			Included
	Total	$	18,472.91

RFP:
Repair/Update SCADA Servers

The prices listed in the preceding table are an estimate for the services discussed. This summary is not a guarantee of final price. Estimates are subject to change if project specifications are changed or costs for outsourced services change before a contract is executed.

Exclusions

None

Conclusion

We look forward to working with City of Ukiah and supporting your efforts to improve and maintain your system. If you have questions on this proposal, please contact me at your convenience.

Thank you for your time and consideration,

Jack Miller | Owner | JM Integration LLC

City of Ukiah

JMIntegration
Listen. Plan. Exceed.
License # 1040899

RFP:
Repair/Update SCADA Servers

PROPOSAL
Rev09JUN2020

TERMS AND CONDITIONS

Base Terms: Quotation is valid for 30 days from above date. Our terms are due and payable 30 days from date of invoice. Payments must be made on a minimum of a monthly basis. If payment is not received by the 30th day, a 1.5% monthly service charge (18% annually) will be charged on all accounts past due. Attorney's fees, court costs and costs of collection will be paid to prevailing party. Permits and bonding are excluded unless otherwise noted herein. Our standard insurance applies unless agreed to in writing by JM Integration LLC. We accept no responsibility for consequential damages and our standard warranty applies. Please reference the above stated quote in all correspondence and purchase orders. Unless otherwise noted, this quote is based on standard straight time hours and does not include any prevailing wage rates unless agreed in writing by JM Integration LLC. The price quoted herein is for the labor and materials specifically listed within the body of this quote. Service calls carry a 4-hour minimum per person. Cancellation charges apply including engineering, labor, materials, quote and estimating time, markup, % of profit, return goods fees, etc. at the time of written cancellation notice to JM Integration LLC.

Limitation of Liability: (a) In no event shall JM Integration LLC, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, whether in contract, warranty, tort, negligence, strict liability or otherwise, including, but not limited to, loss of profits or revenue, loss of use of the Equipment or any associated equipment, cost of capital, cost of substitute equipment, facilities or services, downtime costs, delays, and claims of customers of the Purchaser or other third parties for any damages. JM Integration LLC liability for any claim whether in contract, warranty, tort, negligence, strict liability, or otherwise for any loss or damage arising out of, connected with, or resulting from this Agreement or the performance or breach thereof, or from the design, manufacture, sale, delivery, resale, repair, replacement, installation, technical direction of installation, inspection, operation or use of any equipment covered by or furnished under this Agreement, or from any services rendered in connection therewith, shall in no case exceed one-fourth (1/4) of the purchase price allocable to the Equipment or part thereof or Services which gives rise to the claim. (b) All causes of action against JM Integration LLC arising out of or relating to this Agreement or the performance or breach hereof shall expire unless brought within one year of the time of accrual thereof. (c) In no event, regardless of cause, shall JM Integration LLC be liable for penalties or penalty clauses of any description or for indemnification of Purchaser or others for costs, damages, or expenses arising out of or related to the Equipment and/Services.

Force Majeure: JM Integration LLC shall neither be liable for loss, damage, detention or delay nor be deemed to be in default for failure to perform when prevented from doing so by causes beyond its reasonable control including but not limited to acts of war (declared or undeclared), Acts of God, fire, strike, labor difficulties, acts or omissions of any governmental authority or of Purchaser, compliance with government regulations, insurrection or riot, embargo, delays or shortages in transportation or inability to obtain necessary labor, materials, or manufacturing facilities from usual sources or from defects or delays in the performance of its suppliers or subcontractors due to any of the foregoing enumerated causes. In the event of delay due to any such cause, the date of delivery will be extended by period equal to the delay plus a reasonable time to resume production, and the price will be adjusted to compensate JM Integration LLC for such delay.

Cancellation: Any order may be cancelled by Purchaser only upon prior written notice and payment of termination charges, including but not limited to, all costs identified to the order incurred prior to the effective date of notice of termination and all expenses incurred by JM Integration LLC attributable to the termination, plus a fixed sum of ten
(10) percent of the final total price to compensate for disruption in scheduling, planned production and other indirect costs.

Entire Agreement: This Agreement constitutes the entire agreement between JM Integration LLC and Purchaser. There are no agreements, understandings, restrictions, warranties, or representations between JM Integration LLC and Purchaser other than those set forth herein or herein provided

Bonding: Cost of Bonding is not included. Contact JM Integration LLC for a quote if bonding is required.

Signature		Print Name	Date
Jack Miller	Digitally signed by Jack Miller Date: 2020.06.17 10:20:34 -07'00'	Jack Miller	17JUN2020
Signature		Print Name	Date

City of Ukiah

JMIntegration
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License # 1040899

PROPOSAL
Rev09JUN2020

RFP:
SCADA UPS Installation

Attn: Shelly Whyburn
City of Ukiah
Water Treatment Plant
935 River Street
Ukiah, CA 95482

July 13, 2020

JM Integration LLC is pleased to submit this proposal for services to support City of Ukiah in achieving its goals for improving customer satisfaction by providing the following scope of work listed below.

Scope of Work

Furnish and install SCADA server cabinet UPS replacement batteries per manufacturer specifications and recommendations:

- One (1) APC Replacement Battery Cartridge #43
- One (1) APC Replacement Battery Cartridge #105

Install two (2) SCADA UPS (customer provided) inside server cabinet. Installation includes wiring and:

- One (1) 120VAC 30 Amp NEMA L5-30R locking receptacle for APC SMT2200RM2U
- One (1) 120VAC 20 Amp NEMA L5-20R single receptacle for APC SUA3000RMXL3U

Circuit breakers are provided inside existing lighting panel and will be used per customer approval.

Pricing

The following table details the pricing for delivery of the services outlined in this proposal. This pricing is valid for 30 days from the date of this proposal:

Description		Price	
Labor		$	5,270.00
Travel		$	1,241.52
Materials		$	1,002.68
Tools & Equipment			Included
	Total	$	7,514.20

RFP:
SCADA UPS Installation

The prices listed in the preceding table are an estimate for the services discussed. This summary is not a guarantee of final price. Estimates are subject to change if project specifications are changed or costs for outsourced services change before a contract is executed.

Conclusion

We look forward to working with City of Ukiah and supporting your efforts to improve and maintain your system. If you have questions on this proposal, please contact me at your convenience.

Thank you for your time and consideration,

Jack Miller | Owner | JM Integration LLC

Agenda Item No: 7.f.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-486

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Authorize City Manager to Negotiate and Execute a Subrecipient Agreement with North Coast Opportunities, for Implementing the City's Tenant Based Rental Assistance Program; and Approve a Corresponding Budget Amendment.

DEPARTMENT: Community Development

PREPARED BY: Craig Schlatter, Community Development Director

PRESENTER: Consent Calendar

ATTACHMENTS:

1. Draft Subrecipient Agreement- COVID TBRA Program

Summary: Council will consider authorizing the City Manager to negotiate and execute a subrecipient agreement with North Coast Opportunities for implementing the City's Tenant Based Rental Assistance (TBRA) program; and approve a corresponding budget amendment.

Background: On July 15, 2020, Council provided input and direction to Staff regarding amending the City's Tenant Based Rental Assistance (TBRA) program guidelines to provide rental and utility payment assistance to lower income households impacted by the COVID-19 pandemic. The City's TBRA program is funded by the California Department of Housing and Community Development (HCD) Home Investment Partnerships Program (HOME), under 16-HOME-11376. Given the coordination and implementation effort needed to quickly set up and deploy COVID TBRA financial resources and lack of adaptive capacity (staffing) within the City, Staff has been exploring alternative options for COVID TBRA implementation.

One of the options available to the City through HCD HOME is designation of a subrecipient nonprofit organization to implement the activity. By designating a nonprofit organization, the City can avoid the lengthy federal and state-required procurement process and more quickly implement and deploy the program activity.

Discussion: Staff was made aware that North Coast Opportunities (NCO), in partnership with The Community Foundation of Mendocino County, had been operating a program similar to the City's COVID TBRA program. Staff met with and discussed the City's program with NCO staff, who were interested in further partnering on implementation efforts. Given the synergies between NCO's program and the City's TBRA program, there should be good economies of scale in having one organization, NCO, implement both programs. NCO's Executive Director Patty Bruder confirmed on July 28, 2020, that NCO would be interested in being the City's designated subrecipient for the COVID TBRA program.

Although a budget amendment is required, the revenue from the City's existing 16-HOME-11376 contract and other HOME administrative funds will be adequate to fully reimburse the implementation costs incurred by NCO for delivery of the COVID TBRA program. There will thus be no net cost to the City for this service. Staff and NCO have tentatively agreed to a not-to-exceed direct delivery fee of 7.5% per client/household assisted.

Staff recommends that Council authorize the City Manager to negotiate and execute a subrecipient agreement (Attachment 1) with North Coast Opportunities for implementing the City's TBRA program; and approve a

corresponding budget amendment.

Recommended Action: Authorize the City Manager to negotiate and execute a subrecipient agreement with North Coast Opportunities, for implementing the City's Tenant Based Rental Assistance Program; and approve corresponding budget amendment.

BUDGET AMENDMENT REQUIRED: Yes

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: 61223400.52100.TBRA: $17,750

FINANCING SOURCE: 16-HOME-11376; other City HOME funds

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Mary Horger, Financial Services Manager

Approved: 
Sage Sangiacomo, City Manager

COU No. _____

SUBRECIPIENT AGREEMENT
16-HOME-11376 TENANT BASED RENTAL ASSISTANCE

This Agreement, made and entered into this _____ day of _____, 2020 ("Effective Date"), by and between CITY OF UKIAH, CALIFORNIA, hereinafter referred to as "City" and North Coast Opportunities, a nonprofit corporation [sole proprietorship, corporation, partnership, limited partnership, limited liability company, etc.] organized and in good standing under the laws of the state of California, hereinafter referred to as "Consultant".

RECITALS

This Agreement is predicated on the following facts:

a. City requires consulting services related to implementation of the City's Tenant Based Rental Assistance program, funded through 16-HOME-11376.

b. Consultant represents that it has the qualifications, skills, experience and properly licensed to provide these services, and is willing to provide them according to the terms of this Agreement.

c. City and Consultant agree upon the Scope-of-Work and Work Schedule attached hereto as Attachment "A", describing contract provisions for the project and setting forth the completion dates for the various services to be provided pursuant to this Agreement.

TERMS OF AGREEMENT

1.0 DESCRIPTION OF PROJECT

1.1 The Project is described in detail in the attached Scope-of-Work (Attachment "A").

2.0 SCOPE OF SERVICES

2.1 As set forth in Attachment "A".

2.2. Additional Services. Additional services, if any, shall only proceed upon written agreement between City and Consultant. The written Agreement shall be in the form of an Amendment to this Agreement.

3.0 CONDUCT OF WORK

3.1 Time of Completion. Consultant shall commence performance of services as required by the Scope-of-Work upon receipt of a Notice to Proceed from City and shall complete such services within _____ from receipt of the Notice to Proceed. Consultant shall complete the work to the City's reasonable satisfaction, even if contract disputes arise or Consultant contends it is entitled to further compensation.

4.0 COMPENSATION FOR SERVICES

4.1 Basis for Compensation. For the performance of the professional services of this Agreement, Consultant shall be compensated on a time and expense basis not to exceed a guaranteed maximum dollar amount of $18,000. Labor charges shall be based upon hourly billing rates for the various classifications of personnel employed by Consultant to perform the Scope of Work as set forth in the attached Attachment B,

which shall include all indirect costs and expenses of every kind or nature, except direct expenses. The direct expenses and the fees to be charged for same shall be as set forth in Attachment B. Consultant shall complete the Scope of Work for the not-to-exceed guaranteed maximum, even if actual time and expenses exceed that amount.

4.2 Changes. Should changes in compensation be required because of changes to the Scope-of-Work of this Agreement, the parties shall agree in writing to any changes in compensation. "Changes to the Scope-of-Work" means different activities than those described in Attachment "A" and not additional time to complete those activities than the parties anticipated on the date they entered this Agreement.

4.3 Sub-contractor Payment. The use of sub-consultants or other services to perform a portion of the work of this Agreement shall be approved by City prior to commencement of work. The cost of sub-consultants shall be included within guaranteed not-to-exceed amount set forth in Section 4.1.

4.4 Terms of Payment. Payment to Consultant for services rendered in accordance with this contract shall be based upon submission of monthly invoices for the work satisfactorily performed prior to the date of the invoice less any amount already paid to Consultant, which amounts shall be due and payable thirty (30) days after receipt by City. The invoices shall provide a description of each item of work performed, the time expended to perform each task, the fees charged for that task, and the direct expenses incurred and billed for. Invoices shall be accompanied by documentation sufficient to enable City to determine progress made and to support the expenses claimed.

5.0 ASSURANCES OF CONSULTANT

5.1 Independent Contractor. Consultant is an independent contractor and is solely responsible for its acts or omissions. Consultant (including its agents, servants, and employees) is not the City's agent, employee, or representative for any purpose.

It is the express intention of the parties hereto that Consultant is an independent contractor and not an employee, joint venturer, or partner of City for any purpose whatsoever. City shall have no right to, and shall not control the manner or prescribe the method of accomplishing those services contracted to and performed by Consultant under this Agreement, and the general public and all governmental agencies regulating such activity shall be so informed.

Those provisions of this Agreement that reserve ultimate authority in City have been inserted solely to achieve compliance with federal and state laws, rules, regulations, and interpretations thereof. No such provisions and no other provisions of this Agreement shall be interpreted or construed as creating or establishing the relationship of employer and employee between Consultant and City.

Consultant shall pay all estimated and actual federal and state income and self-employment taxes that are due the state and federal government and shall furnish and pay worker's compensation insurance, unemployment insurance and any other benefits required by law for himself and his employees, if any. Consultant agrees to indemnify and hold City and its officers, agents and employees harmless from and against any claims or demands by federal, state or local government agencies for any such taxes or benefits due but not paid by Consultant, including the legal costs associated with defending against any audit, claim, demand or law suit.

Consultant warrants and represents that it is a properly licensed professional or professional organization with a substantial investment in its business and that it maintains its own offices and staff which it will use in performing under this Agreement.

5.2 Conflict of Interest. Consultant understands that its professional responsibility is solely to City. Consultant has no interest and will not acquire any direct or indirect interest that would conflict with its performance of the Agreement. Consultant shall not in the performance of this Agreement employ a person having such an interest. If the City Manager determines that the Consultant has a disclosure obligation under the City's local conflict of interest code, the Consultant shall file the required disclosure form with the City Clerk within 10 days of being notified of the City Manager's determination.

6.0 INDEMNIFICATION

6.1 Insurance Liability. Without limiting Consultant's obligations arising under Paragraph 6.2 Consultant shall not begin work under this Agreement until it procures and maintains for the full period of time allowed by law, surviving the termination of this Agreement insurance against claims for injuries to persons or damages to property, which may arise from or in connection with its performance under this Agreement.

A. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office ("ISO) Commercial General Liability Coverage Form No. CG 20 10 10 01 and Commercial General Liability Coverage – Completed Operations Form No. CG 20 37 10 01.

2. ISO Form No. CA 0001 (Ed. 1/87) covering Automobile Liability, Code 1 "any auto" or Code 8, 9 if no owned autos and endorsement CA 0025.

3. Worker's Compensation Insurance as required by the Labor Code of the State of California and Employers Liability Insurance.

4. Errors and Omissions liability insurance appropriate to the consultant's profession. Architects' and engineers' coverage is to be endorsed to include contractual liability.

B. Minimum Limits of Insurance

Consultant shall maintain limits no less than:

1. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage including operations, products and completed operations. If Commercial General Liability Insurance or other form with a general aggregate limit is used, the general aggregate limit shall apply separately to the work performed under this Agreement, or the aggregate limit shall be twice the prescribed per occurrence limit.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

3. Worker's Compensation and Employers Liability: Worker's compensation limits as required by the Labor Code of the State of California and Employers Liability limits of $1,000,000 per accident.

4. Errors and Omissions liability: $1,000,000 per occurrence.

C. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects to the City, its officers, officials, employees and volunteers; or the Consultant shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

D. Other Insurance Provisions

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages

a. The City, it officers, officials, employees and volunteers are to be covered as additional insureds as respects; liability arising out of activities performed by or on behalf of the Consultant, products and completed operations of the Consultant, premises owned, occupied or used by the Consultant, or automobiles owned, hired or borrowed by the Consultant for the full period of time allowed by law, surviving the termination of this Agreement. The coverage shall contain no special limitations on the scope-of-protection afforded to the City, its officers, officials, employees or volunteers.

b. The Consultant's insurance coverage shall be primary insurance as respects to the City, its officers, officials, employees and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be in excess of the Consultant's insurance and shall not contribute with it.

c. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

d. The Consultant's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Worker's Compensation and Employers Liability Coverage

The insurer shall agree to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses arising from Consultant's performance of the work, pursuant to this Agreement.

3. Professional Liability Coverage

If written on a claims-made basis, the retroactivity date shall be the effective date of this Agreement. The policy period shall extend from ------ to ----------.

4. All Coverages

Each Insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the City.

E. Acceptability of Insurers

Insurance is to be placed with admitted California insurers with an A.M. Best's rating of no less than A- for financial strength, AA for long-term credit rating and AMB-1 for short-term credit rating.

F. Verification of Coverage

Consultant shall furnish the City with Certificates of Insurance and with original Endorsements effecting coverage required by this Agreement. The Certificates and Endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates and Endorsements are to be on forms provided or approved by the City. Where by statute, the City's Workers' Compensation - related forms cannot be used, equivalent forms approved by the Insurance Commissioner are to be substituted. All Certificates and Endorsements are to be received and approved by the City before Consultant begins the work of this Agreement. The City reserves the right to require complete, certified copies of all required insurance policies, at any time. If Consultant fails to provide the coverages required herein, the City shall have the right, but not the obligation, to purchase any or all of them. In that event, the cost of insurance becomes part of the compensation due the contractor after notice to Consultant that City has paid the premium.

G. Subcontractors

Consultant shall include all subcontractors or sub-consultants as insured under its policies or shall furnish separate certificates and endorsements for each sub-contractor or sub-consultant. All coverage for sub-contractors or sub-consultants shall be subject to all insurance requirements set forth in this Paragraph 6.1.

6.2 Indemnification. Notwithstanding the foregoing insurance requirements, and in addition thereto, Consultant agrees, for the full period of time allowed by law, surviving the termination of this Agreement, to indemnify the City for any claim, cost or liability that arises out of, or pertains to, or relates to any negligent act or omission or the willful misconduct of Consultant in the performance of services under this contract by Consultant, but this indemnity does not apply to liability for damages for death or bodily injury to persons, injury to property, or other loss, arising from the sole negligence, willful misconduct or defects in design by the City, or arising from the active negligence of the City.

"Indemnify," as used herein includes the expenses of defending against a claim and the payment of any settlement or judgment arising out of the claim. Defense costs include all costs associated with defending the claim, including, but not limited to, the fees of attorneys, investigators, consultants, experts and expert witnesses, and litigation expenses.

References in this paragraph to City or Consultant, include their officers, employees, agents, and subcontractors.

7.0 CONTRACT PROVISIONS

7.1 Ownership of Work. All documents furnished to Consultant by City and all documents or reports and supportive data prepared by Consultant under this Agreement are owned and become the property of the City upon their creation and shall be given to City immediately upon demand and at the completion of Consultant's services at no additional cost to City. Deliverables are identified in the Scope-of-Work, Attachment "A". All documents produced by Consultant shall be furnished to City in digital format and hardcopy. Consultant shall produce the digital format, using software and media approved by City.

7.2 Governing Law. Consultant shall comply with the laws and regulations of the United States, the State of California, and all local governments having jurisdiction over this Agreement. The interpretation and enforcement of this Agreement shall be governed by California law and any action arising under or in connection with this Agreement must be filed in a Court of competent jurisdiction in Mendocino County.

7.3 Entire Agreement. This Agreement plus its Attachment(s) and executed Amendments set forth the entire understanding between the parties.

7.4 Severability. If any term of this Agreement is held invalid by a court of competent jurisdiction, the remainder of this Agreement shall remain in effect.

7.5 Modification. No modification of this Agreement is valid unless made with the agreement of both parties in writing.

7.6 Assignment. Consultant's services are considered unique and personal. Consultant shall not assign, transfer, or sub-contract its interest or obligation under all or any portion of this Agreement without City's prior written consent.

7.7 Waiver. No waiver of a breach of any covenant, term, or condition of this Agreement shall be a waiver of any other or subsequent breach of the same or any other covenant, term or condition or a waiver of the covenant, term or condition itself.

7.8 Termination. This Agreement may only be terminated by either party: 1) for breach of the Agreement; 2) because funds are no longer available to pay Consultant for services provided under this Agreement; or 3) City has abandoned and does not wish to complete the project for which Consultant was retained. A party shall notify the other party of any alleged breach of the Agreement and of the action required to cure the breach. If the breaching party fails to cure the breach within the time specified in the notice, the contract shall be terminated as of that time. If terminated for lack of funds or abandonment of the project, the contract shall terminate on the date notice of termination is given to Consultant. City shall pay the Consultant only for services

performed and expenses incurred as of the effective termination date. In such event, as a condition to payment, Consultant shall provide to City all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs and reports prepared by the Consultant under this Agreement. Consultant shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder, subject to off-set for any direct or consequential damages City may incur as a result of Consultant's breach of contract.

7.9 Execution of Agreement. This Agreement may be executed in duplicate originals, each bearing the original signature of the parties. Alternatively, this Agreement may be executed and delivered by facsimile or other electronic transmission, and in more than one counterpart, each of which shall be deemed an original, and all of which together shall constitute one and the same instrument. When executed using either alternative, the executed agreement shall be deemed an original admissible as evidence in any administrative or judicial proceeding to prove the terms and content of this Agreement.

8.0 NOTICES

Any notice given under this Agreement shall be in writing and deemed given when personally delivered or deposited in the mail (certified or registered) addressed to the parties as follows:

CITY OF UKIAH ----------
DEPT. OF_____ ----------
300 SEMINARY AVENUE ----------
UKIAH, CALIFORNIA 95482-5400

9.0 SIGNATURES

IN WITNESS WHEREOF, the parties have executed this Agreement the Effective Date:

CONSULTANT

BY: _____ _____
Date

PRINT NAME: _____

_____
IRS IDN Number

CITY OF UKIAH

BY: _____ _____
Date

CITY MANAGER

ATTEST

_____ _____
CITY CLERK Date

DRAFT

ATTACHMENT A
SCOPE OF WORK

Consultant will implement the City's TBRA program in a manner consistent with the City's approved Tenant Based Rental Assistance program guidelines, funded by 16-HOME-11376. Work shall be completed by the deadline for expenditure of funds within this contract, or by July 31, 2021.

DRAFT

Agenda Item No: 7.g.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-487

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Approval of Conditional Award of Contract to Center for Economic Development for Implementation of Community Development Block Grant (CDBG) Microenterprise Technical Assistance Services in the Amount of up to $140,000, and Authorize the City Manager to Negotiate and Execute Agreement.

DEPARTMENT: Community Development

PREPARED BY: Craig Schlatter, Community Development Director

PRESENTER: Consent Calendar

ATTACHMENTS:

1. RFP - CDBG META Program Op - Final
2. Center for Economic Development_City of Ukiah_Microenterprise Proposal
3. Proposal Evaluation Summary - MEA Operator

Summary: Council will consider conditionally awarding a contract to the Center for Economic Development for implementation of CDBG Microenterprise Technical Assistance services in the amount of up to $140,000.

Background: The Ukiah City Council approved Resolution No. 2020-20 on May 6, 2020, authorizing the submittal of applications for funding under the 2019-2020 funding year of the State Community Development Block Grant (CDBG) program. One of these applications was for a City of Ukiah Microenterprise Technical Assistance Program for up to $150,500, consisting of $140,000 for the microenterprise technical assistance activity and $10,500 for general administration. CDBG microenterprise technical assistance and business assistance applications are due to the Department of Housing and Community Development (HCD) by August 31, 2020.

During discussions with HCD representatives regarding the City's forthcoming applications, HCD representatives indicated that if the City would be procuring a consultant for implementation, the City would need to have this procurement completed and contract conditionally awarded prior to submitting the CDBG application.

CDBG microenterprise technical assistance services consist of such items as assisting a future microenterprise business owner on management development, preparation of business plans, cash flow, and preparation for financing. Such services also include connecting potential and existing microentrepreneurs to financing and other resources such that they can start up and/or expand their business. Defined by the CDBG program as "a commercial enterprise that has five or fewer employees, one or more of whom owns the enterprise," microenterprises range in type and capacity and represent a range of service providers and retail businesses. Because of the prevalence of existing and prospective new microenterprises in the Ukiah area, there is a need for a microenterprise technical assistance program that provides the services and expertise enabling these businesses to be successful- and that ultimately leads to job creation and retention.

Discussion: Staff revisited the Microenterprise program model that had been deployed in 2018-2019 through a 2016 CDBG Microenterprise grant and found a potential area of weakness to be that there was no direct connection of the microentrepreneur with financial and other resources, including the City's CDBG Business

Assistance program. A Request for Proposals (RFP) that was developed for a Microenterprise Technical Assistance services provider thus requested respondents incorporate this aspect into their program design. The RFP (Attachment 1) was issued on June 22, 2020, with proposals due July 23, 2020.

Two proposals were received in response to the City's RFP, and the proposal receiving a recommendation from the City's evaluation committee (Attachment 2) for conditional contract award was the Center for Economic Development (CED), in partnership with Morrison and the Economic Development and Financing Corporation (EDFC). Please see Attachment 3 for the Evaluation Summary for both proposals.

Because the City has not yet been awarded funding through CDBG for the new microenterprise technical assistance services program, Staff recommends Council approve an award to the Center for Economic Development, conditional upon the City receiving a CDBG grant for this activity, and authorize the City Manager to negotiate and execute an agreement for the work.

Recommended Action: Approve award of contract to the Center for Economic Development for implementation of CDBG Microenterprise Technical Assistance Services in the Amount of up to $140,000, conditioned upon the City's CDBG Microenterprise Technical Assistance Services application receiving an award of funding under the 2019-2020 CDBG Notice of Funding Availability, and authorize the City Manager to negotiate and execute agreement.

BUDGET AMENDMENT REQUIRED: No

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: CDBG

PREVIOUS CONTRACT/PURCHASE ORDER NO.:

COORDINATED WITH: Mary Horger, Financial Services Manager

Approved: Sage Sangiacomo, City Manager



Request for Proposals

Program Operator Services for
Community Development Block Grant
Microenterprise Technical Assistance Services Program

Request Date:	June 22, 2020
Deadline for Responses:	July 23, 2020 5:00 P.M. (PST)

CITY OF UKIAH

Request for Proposals (RFP) to provide Program Operator Services for
Community Development Block Grant Microenterprise Technical Assistance Services Program

1.0 INTRODUCTION

The City of Ukiah is applying for a Community Development Block Grant (CDBG) through the 2019-20 CDBG Notice of Funding Availability (NOFA) for the funding of a Microenterprise Technical Assistance Program. The City is seeking proposals from qualified operators interested in contracting for the provision of Microenterprise Technical Assistance services to micro-businesses and micro-business start-ups located in the City of Ukiah, participants of whom are members of the Low and Moderate Income population. The City is pursuing such procurement of services through the CDBG "Small Purchases Method," outlined in 2 CFR 200.320 (b).

If awarded, the CDBG grant will provide $140,000 for Program services including operation. Grant general administration activities will be performed by City of Ukiah staff. To obtain more clarity regarding the overall program design and use of funds, it is recommended that potential proposers review attachments to this document. In addition, potential proposers should review the City's current Microenterprise Technical Assistance Program Guidelines. The CDBG grant application and current Program Guidelines can be obtained by contacting the designated contact person for this RFP.

The microenterprise Program activities must be completed, and all funds expended, by the expenditure date listed in the Standard Agreement between the City and State. Although the term of the agreement between the City and the selected firm will conclude on this date, potential proposers should be advised that monitoring and file retention responsibilities will continue for up to an additional five years after the expenditure deadline.

2.0 SCHEDULE OF EVENTS AND DELIVERY

The schedule for this procurement is as follows:

Distribute Request for Proposals:	June 23, 2020
Deadline for Responses:	**July 23, 2020, 5:00 P.M. (Pacific Time)**
City Evaluation of Proposals:	By July 28, 2020
City Council approval requested for recommended firm:	August 5, 2020

The City must receive proposals no later than the time and date specified above. Those proposals received after this date and time will not be considered. Proposals will only be accepted electronically. Send your proposals to the following:

Mary Horger
Financial Services Manager
City of Ukiah
Email: mhorger@cityofukiah.com

3.0 SCOPE OF SERVICES

The scope of services shall include tasks described below. All services shall be provided in accordance with the following Attachments: Attachment A - City of Ukiah Insurance Requirements; Attachment B - City of Ukiah Professional Services Agreement; Attachment C - City of Ukiah Microenterprise Technical Assistance Program Task Matrix; Attachment D - City of Ukiah Microenterprise Technical Assistance Program Guidelines; and Attachment E - the Federally

required contract provisions for Community Development Block Grant (CDBG)-Aided Consultant Contracts. Attachment F is reserved for the future Standard Agreement between the City of Ukiah and State, if awarded. The City reserves the right to add attachments upon award of the CDBG grant for this activity.

1. Review, monitor, and recommend refinements to the City's most recent Microenterprise Technical Assistance Services Program Guidelines. Adhere to adopted Microenterprise Technical Assistance Services Program Guidelines.
2. Provide program outreach, networking and marketing as needed to identify, contact and attract prospective eligible microenterprises and micro-entrepreneurs.
3. Perform income screening and collection of demographic and other required data of applicants to determine eligibility and to comply with grant reporting requirements, utilizing appropriate income certification methods per CDBG regulations depending upon services to be utilized by clients.
4. Perform CDBG-compliant program eligibility reviews per City Program Guidelines and CDBG regulations.
5. Provide needs assessment and identify strategies for provision of service; provide referrals for business support and technical assistance when appropriate, and provide direct business support and technical assistance to eligible microenterprises and micro-entrepreneurs.
6. Utilize a program-tracking/evaluation system to provide client demographic statistics and evaluation data about services provided (number of clients served, number of business plans developed, etc.) as well as outcomes (number of jobs created, number of businesses formed, etc.) and provide reports to City as necessary for grant reporting and program monitoring.
7. Assist clients in accessing or arranging financing for their businesses.
8. Coordinate with City staff to ensure timely submittal of all data, reports and cash requests associated with the program.
9. Prepare for and attend grant monitoring visits as necessary.
10. Provide other needed support and technical assistance to ensure accomplishment of the City's microenterprise program. This may include, but is not limited to, hosting workshops and community events or organizing other training and networking opportunities for clients.
11. Indicate the location where services will be provided. With the exception of web-based remote trainings, all services should be provided in a location accessible to persons with disabilities. Services should also be provided in a location easily accessible to Ukiah-based low- and moderate-income participants, so that the cost of transportation is minimized.

4.0 REQUIRED PROPOSAL CONTENT

Firms interested in providing the services described in the section above must submit a proposal responding to all the questions below and providing all information requested in a format that mirrors the RFP by section and order listed. Proposals shall include the following:

1. Brief description of firm, contact person, address and telephone number.

2. A list of key personnel, as assigned their respective roles, and a resume or synopsis of their relevant experience.

3. Description of experience in the provision of microenterprise technical assistance services;; and experience in complying with CDBG grants or similar grant requirements.

4. Description of how the City's Microenterprise Technical Assistance program would be implemented by consultant such that microenterprises are connected with financing and/or other resources, leading to business start-ups and job retention. The City is seeking a consultant that can deliver results, similar to formats established by business acceleration and incubation programs throughout the U.S.

5. List of public agencies or clients for whom CDBG-funded Microenterprise Technical Assistance Services tasks have been performed, with the name, title and phone number of a contact person.

6. Proposed schedule of work and phased milestones for completion.

7. The individual or firm receiving the contract shall procure and maintain for the duration of the contract, insurance against claims for injuries to persons or damages to property that may arise from or in connection with the performance of the work hereunder by the Consultant, his agents, representatives, employees or subcontracts as set forth in the Professional Services Agreement which is attached hereto and incorporated by reference herein. The cost of such insurance shall be included in the consultant's proposal.

8. Identification of firm's ownership as a minority or women-owned business and/or identification of Section 3 hiring practices.

9. Submission of a list describing any lawsuits filed against the firm during the preceding three (3) years, and any litigation currently pending or threatened in conjunction with the types of services described in the RFP.

10. Specify a rate or dollar amount to be charged for each proposed Task, and including estimated hourly rates and time to be expended on each task. Please see the *City of Ukiah Microenterprise Task Matrix* (Attachment C) for assistance with allocation of tasks and costs.

11. The City's professional services agreement for CDBG contracts is attached as Attachment B. Please identify if your firm would have any issues with the provisions of the City's standard professional services agreement.

12. Federally required contract provisions for Community Development Block Grant (CDBG)-Aided Consultant Contracts are attached as Attachment E.

13. Proposals must be signed by an authorized employee in order to receive consideration.

5.0 PROPOSAL EVALUATION

The City of Ukiah is using the competitive proposal process, wherein the experience of each submitted proposal is evaluated as it relates to the Scope of Work. The City intends to select one firm to provide microenterprise technical assistance program services. The City will make its selection using the following criteria and rating schedule:

1.	Capabilities, resources, and applicable experience of the firm, especially as relates to performance on CDBG-funded activities.	15 Points, Maximum
2.	Responsiveness- how firm addresses the Scope of Work.	35 Points, Maximum

3.	Qualifications and experience of key individuals, especially as related to CDBG Microenterprise Technical Assistance Programs.	10 Points, Maximum
4.	Schedule for completion of the work.	5 Points, Maximum
5.	Budget and schedule of charges.	35 Points, Maximum
		100 Points, Total

The City reserves the right to reject any and all proposals. The City reserves the right to award a contract to the firm that presents the proposal, which in the sole judgment of the City best serves the City's interest. The City reserves the right to reject any or all proposals, to waive minor irregularities in said proposals, and/or negotiate minor deviations with the successful firm.

6.0 CONTACT PERSON

Please contact Mary Horger, Procurement Manager, if you have questions or require additional information. Questions must be submitted in writing via email. Contact information can be found below.

Mary Horger, Financial Services Manager
City of Ukiah
mhorger@cityofukiah.com

Communication between a proposing company and a member of the City staff, other than the Procurement Manager, or between a proposing company and a non-designated City representative regarding the selection of a proposing company or award of this contract is explicitly prohibited from the time the RFP is advertised until the selection of a proposing company or award of the contract. Questions pertaining to this RFP shall be addressed to the party specified above. Failure of a proposing company, or any of its representatives, to comply with this paragraph will result in their proposal being rejected.

7.0 ADDENDA

If it becomes necessary to revise any part of this RFP, an addendum will be provided to all proposing companies in written or electronic (i.e., facsimile or email) form.

8.0 INSURANCE REQUIREMENTS

Provided as Attachment "A" are the City's complete insurance requirements. Awarded firm, prior to performing any work, shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property, which may arise from or in connection with its performance under the Agreement, certificates of insurance covering full liability under Worker's Compensation laws of the State of California, Comprehensive General Liability and Business Auto Insurance with policy limits of not less than $1,000,000 naming the City as an additional insured party.

9.0 CITY BUSINESS LICENSE

Awarded firm will be required to maintain a City business license for the duration of the contract. Information regarding the City business license can be found on the City website, at www.cityofukiah.com/businesses.

10.0 PUBLIC RECORDS

All materials submitted in response to this RFP are property of the City and will not be returned. The

materials will be a public record subject to the disclosure provisions of the California Public Records Act and any other related public law or provision of such laws.

11.0 FINANCIAL RESPONSIBLITY

The City accepts no financial responsibility for any costs incurred by a firm in responding to this RFP. Submissions will become the property of the City and may be used by the City in any way deemed appropriate.

ATTACHMENT A

INSURANCE REQUIREMENTS FOR CONSULTANTS

Consultant(s) shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Consultant(s), his agents, representatives, or employees.

I. Minimum Scope of Insurance

Coverage shall be at least as broad as:

A. Insurance Services Office **Commercial General Liability** coverage (Form No. CG 20 10 10 01 and Commercial General Liability – Completed Operations Form No. CG 20 37 10 01).

B. Insurance Services Office form number CA 0001 (Ed. 1/87) covering **Automobile Liability**, code 1 (any auto).

C. **Workers' Compensation** insurance as required by the State of California and Employer's Liability Insurance.

D. **Errors and Omissions liability** insurance appropriate to the consultant's profession. Architects' and engineers' coverage is to be endorsed to include contractual liability.

II. Minimum Limits of Insurance

Consultant shall maintain limits no less than:

A. General Liability**:** $1,000,000 per occurrence for bodily injury, personal injury and property damage including **operations, products and completed operations**, as applicable. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit. Insurance must be written on an occurrence basis.

B. Automobile Liability: $1,000,000 per accident for bodily injury and property damage. Insurance must be written on an occurrence basis.

C. Workman's Compensation Employer's Liability: $1,000,000 per accident for bodily injury or disease.

D. Errors and Omissions liability: $1,000,000 per occurrence. If written on a claims-made basis, insurance coverage must cover claims filed within 3 years after contract work completed.

III. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. The City may require the insurer to reduce or eliminate such deductibles or self-insured retentions with respect to the City, its officers, officials, employees and volunteers; or the Consultant to provide a financial guarantee satisfactory to the City guaranteeing payment of losses and related investigations, claim administration and defense expenses; or to approve the deductible without a guarantee.

IV. REQUIRED Insurance Provisions

Proof of **general liability and automobile liability** policies are to contain, or **be endorsed** to contain, the following provisions:

A. The City, its officers, officials, employees, and volunteers are to be covered as **ADDITIONAL INSURED** with respect to liability arising out of automobiles owned, leased, hired or borrowed by or on behalf of the contractor; and with respect to liability arising out of work or operations performed by or on behalf of the Consultant including materials, parts or equipment, furnished in connection with such work or operations. General liability coverage can be provided in the form of an endorsement to the Consultant's insurance, or as a separate owner's policy.

B. **The workers' compensation policy is to be endorsed with a waiver of subrogation**. The insurance company, in its endorsement, agrees to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses paid under the terms of this policy which arises from the work performed by the named insured for the City. NOTE: You cannot be added as an additional insured on a workers' compensation policy.

C. For any claims related to this project, the Consultant's insurance coverage shall be **primary insurance** with respect to the City, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees, or volunteers shall be in excess of the Consultant's insurance and shall not contribute with it.

D. Each insurance policy required by this clause shall be endorsed to state that coverage shall **not be canceled** by either party, except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City.

V. RATING - Acceptability of Insurers

Insurance is to be placed with admitted California insurers with a current A.M. Best's rating of no less than A- for financial strength, AA for long-term credit rating and AMB-1 for short-term credit rating.

VI. Verification of Coverage

Consultant shall furnish the City with original certificates and amendatory endorsements effecting coverage required by this clause. The endorsements should be **on forms provided by the City**. If endorsements are on forms other than the City's forms, those endorsements must provide coverage that is equivalent to or better than the forms requested by the City. All certificates and endorsements are to be received and approved by the City before work commences. The City reserves the right to require complete, certified copies of all required insurance policies, including endorsements affecting the coverage required by these specifications at any time.

If you have questions regarding our insurance requirements contact:
Risk Manager
(707) 463-6287 or FAX (707) 463-6204

Revised: 11/20/08

ATTACHMENT B - AGREEMENT FOR
PROFESSIONAL CONSULTING SERVICES

This Agreement, made and entered into this _____ day of _____, 2020 ("Effective Date"), by and between CITY OF UKIAH, CALIFORNIA, hereinafter referred to as "City" and _____, a corporation organized and in good standing under the laws of the state of California, hereinafter referred to as "Consultant".

RECITALS

This Agreement is predicated on the following facts:

a. City requires consulting services related to providing program operator services for its Microenterprise Technical Assistance Services Program, funded by Community Development Block Grant (CDBG) #20-CDBG-_____.

b. Consultant represents that it has the qualifications, skills, experience and properly licensed to provide these services, and is willing to provide them according to the terms of this Agreement.

c. City and Consultant agree upon the Scope-of-Work and Work Schedule attached hereto as Attachment "1", describing contract provisions for the project and setting forth the completion dates for the various services to be provided pursuant to this Agreement.

TERMS OF AGREEMENT

1.0 DESCRIPTION OF PROJECT

1.1 The Project is described in detail in the attached Scope-of-Work (Attachment "1").

2.0 SCOPE OF SERVICES

2.1 As set forth in Attachment "1".

2.2. Additional Services. Additional services, if any, shall only proceed upon written agreement between City and Consultant. The written Agreement shall be in the form of an Amendment to this Agreement.

3.0 CONDUCT OF WORK

3.1 Time of Completion. Consultant shall commence performance of services as required by the Scope-of-Work upon receipt of a Notice to Proceed from City and shall complete such services by _____. The term of this agreement may be extended up to an additional _____ days/years, for a total of five (5) years, upon written approval by the City of Ukiah. Consultant shall complete the work to the City's reasonable satisfaction, even if contract disputes arise or Consultant contends it is entitled to further compensation.

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4.0 COMPENSATION FOR SERVICES

4.1 Basis for Compensation. For the performance of the professional services of this Agreement, Consultant shall be compensated on a time and expense basis not to exceed a guaranteed maximum dollar amount of $140,000. Labor charges shall be based upon hourly billing rates for the various classifications of personnel employed by Consultant to perform the Scope of Work as set forth in the attached Attachment 1, which shall include all indirect costs and expenses of every kind or nature, except direct expenses. The direct expenses and the fees to be charged for same shall be as set forth in Attachment 2. Consultant shall complete the Scope of Work for the not-to-exceed guaranteed maximum, even if actual time and expenses exceed that amount.

4.2 Changes. Should changes in compensation be required because of changes to the Scope-of-Work of this Agreement, the parties shall agree in writing to any changes in compensation. "Changes to the Scope-of-Work" means different activities than those described in Attachment “1” and not additional time to complete those activities than the parties anticipated on the date they entered this Agreement.

4.3 Sub-contractor Payment. The use of sub-consultants or other services to perform a portion of the work of this Agreement shall be approved by City prior to commencement of work. The cost of sub-consultants shall be included within guaranteed not-to-exceed amount set forth in Section 4.1.

4.4 Terms of Payment. Payment to Consultant for services rendered in accordance with this contract shall be based upon submission of monthly invoices for the work satisfactorily performed prior to the date of the invoice less any amount already paid to Consultant, which amounts shall be due and payable thirty (30) days after receipt by City. The invoices shall provide a description of each item of work performed, the time expended to perform each task, the fees charged for that task, and the direct expenses incurred and billed for. Invoices shall be accompanied by documentation sufficient to enable City to determine progress made and to support the expenses claimed.

5.0 ASSURANCES OF CONSULTANT

5.1 Independent Contractor. Consultant is an independent contractor and is solely responsible for its acts or omissions. Consultant (including its agents, servants, and employees) is not the City's agent, employee, or representative for any purpose.

It is the express intention of the parties hereto that Consultant is an independent contractor and not an employee, joint venturer, or partner of City for any purpose whatsoever. City shall have no right to, and shall not control the manner or prescribe the method of accomplishing those services contracted to and performed by Consultant under this Agreement, and the general public and all governmental agencies regulating such activity shall be so informed.

Those provisions of this Agreement that reserve ultimate authority in City have been inserted solely to achieve compliance with federal and state laws, rules, regulations, and interpretations thereof. No such provisions and no other provisions of this Agreement shall be interpreted or construed as creating or establishing the relationship of employer and employee between Consultant and City.

Consultant shall pay all estimated and actual federal and state income and self-employment taxes that are due the state and federal government and shall furnish and pay worker's compensation insurance, unemployment insurance and any other benefits required by law for himself and his employees, if any. Consultant agrees to indemnify and hold City and its officers, agents and employees harmless from and against any claims or demands by federal, state or local government agencies for any such taxes or benefits due but not paid by Consultant, including the legal costs associated with defending against any audit, claim, demand or law suit.

Consultant warrants and represents that it is a properly licensed professional or professional organization with a substantial investment in its business and that it maintains its own offices and staff which it will use in performing under this Agreement.

5.2 Conflict of Interest. Consultant understands that its professional responsibility is solely to City. Consultant has no interest and will not acquire any direct or indirect interest that would conflict with its performance of the Agreement. Consultant shall not in the performance of this Agreement employ a person having such an interest. If the City Manager determines that the Consultant has a disclosure obligation under the City's local conflict of interest code, the Consultant shall file the required disclosure form with the City Clerk within 10 days of being notified of the City Manager's determination.

6.0 INDEMNIFICATION

6.1 Insurance Liability. Without limiting Consultant's obligations arising under Paragraph 6.2 Consultant shall not begin work under this Agreement until it procures and maintains for the full period of time allowed by law, surviving the termination of this Agreement insurance against claims for injuries to persons or damages to property, which may arise from or in connection with its performance under this Agreement.

A. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office ("ISO) Commercial General Liability Coverage Form No. CG 20 10 10 01 and Commercial General Liability Coverage – Completed Operations Form No. CG 20 37 10 01.

2. ISO Form No. CA 0001 (Ed. 1/87) covering Automobile Liability, Code 1 "any auto" or Code 8, 9 if no owned autos and endorsement CA 0025.

3. Worker's Compensation Insurance as required by the Labor Code of the State of California and Employers Liability Insurance.

4. Errors and Omissions liability insurance appropriate to the consultant's profession. Architects' and engineers' coverage is to be endorsed to include contractual liability.

B. Minimum Limits of Insurance

Consultant shall maintain limits no less than:

1. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage including operations, products and completed operations. If Commercial General Liability Insurance or other form with a general aggregate limit is used, the general aggregate limit shall apply separately to the work performed under this Agreement, or the aggregate limit shall be twice the prescribed per occurrence limit.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

3. Worker's Compensation and Employers Liability: Worker's compensation limits as required by the Labor Code of the State of California and Employers Liability limits of $1,000,000 per accident.

4. Errors and Omissions liability: $1,000,000 per occurrence.

C. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects to the City, its officers, officials, employees and volunteers; or the Consultant shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

D. Other Insurance Provisions

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages

a. The City, it officers, officials, employees and volunteers are to be covered as additional insureds as respects; liability arising out of activities performed by or on behalf of the Consultant, products and completed operations of the Consultant, premises owned, occupied or used by the Consultant, or automobiles owned, hired or borrowed by the Consultant for the full period of time allowed by law, surviving the termination of this Agreement. The coverage shall contain no special limitations on the scope-of-protection afforded to the City, its officers, officials, employees or volunteers.

b. The Consultant's insurance coverage shall be primary insurance as respects to the City, its officers, officials, employees and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be in excess of the Consultant's insurance and shall not contribute with it.

c. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

d. The Consultant's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Worker's Compensation and Employers Liability Coverage

The insurer shall agree to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses arising from Consultant's performance of the work, pursuant to this Agreement.

3. Professional Liability Coverage

If written on a claims-made basis, the retroactivity date shall be the effective date of this Agreement. The policy period shall extend through the duration of the project.

4. All Coverages

Each Insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the City.

E. Acceptability of Insurers

Insurance is to be placed with admitted California insurers with an A.M. Best's rating of no less than A- for financial strength, AA for long-term credit rating and AMB-1 for short-term credit rating.

F. Verification of Coverage

Consultant shall furnish the City with Certificates of Insurance and with original Endorsements effecting coverage required by this Agreement. The Certificates and Endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates and Endorsements are to be on forms provided or approved by the City. Where by statute, the City's Workers' Compensation - related forms cannot be used, equivalent forms approved by the Insurance Commissioner are to be substituted. All Certificates and Endorsements are to be received and approved by the City before Consultant begins the work of this Agreement. The City reserves the right to require complete, certified copies of all required insurance policies, at any time. If Consultant fails to provide the coverages required herein, the City shall have the right, but not the obligation, to purchase any or all of them. In that event, the cost of insurance becomes part of the compensation due the contractor after notice to Consultant that City has paid the premium.

G. Subcontractors

Consultant shall include all subcontractors or sub-consultants as insured under its policies or shall furnish separate certificates and endorsements for each sub-

contractor or sub-consultant. All coverage for sub-contractors or sub-consultants shall be subject to all insurance requirements set forth in this Paragraph 6.1.

6.2 Indemnification. Notwithstanding the foregoing insurance requirements, and in addition thereto, Consultant agrees, for the full period of time allowed by law, surviving the termination of this Agreement, to indemnify the City for any claim, cost or liability that arises out of, or pertains to, or relates to any negligent act or omission or the willful misconduct of Consultant in the performance of services under this contract by Consultant, but this indemnity does not apply to liability for damages for death or bodily injury to persons, injury to property, or other loss, arising from the sole negligence, willful misconduct or defects in design by the City, or arising from the active negligence of the City.

"Indemnify," as used herein includes the expenses of defending against a claim and the payment of any settlement or judgment arising out of the claim. Defense costs include all costs associated with defending the claim, including, but not limited to, the fees of attorneys, investigators, consultants, experts and expert witnesses, and litigation expenses.

References in this paragraph to City or Consultant, include their officers, employees, agents, and subcontractors.

7.0 APPLICABLE STATE/FEDERAL GRANT PROVISIONS

7.1 Equal Opportunity.

1. The Civil Rights, Housing and Community Development, and Age Discrimination Acts Assurances

During the performance of this Agreement, the Consultant assures that no otherwise qualified person shall be excluded from the participation or employment, denied program benefits, or be subjected to discrimination based on race, color, national origin, sex, age, or handicap, under any program or activity funded by this contract, as required by Title VI of the Civil Rights Act of 1964, Title I of the Housing and Community Development Act of 1974, as amended, and the Age Discrimination Act of 1975, the Fair Housing Act of 1988, and all implementing regulations.

2. Rehabilitation Act of 1973 and the "504 Coordinator"

The Consultant agrees to comply with the City's implementation of the Rehabilitation Act of 1973, as amended, and its regulations, 24 CFR Part 8, including, but not limited to, the local designation of a special person charged with local enforcement of this Act, as the "504 Coordinator".

3. The Training, Employment, and Contracting Opportunities Assurance of Compliance:

a. The work to be performed under this Agreement is on a project assisted under a program providing direct federal financial assistance from the Department of Housing and Urban Development and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u. Section 3 requires that to the greatest extent feasible, opportunities for training and employment be given lower income residents of the project area and contracts for Work in

connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the project.

b. The parties to this Agreement will comply with the provisions of said Section 3 and the regulations issued pursuant thereto by the Secretary of Housing and Urban Development set forth in 24 CFR Part 135, and all applicable rules and orders of the Department issued thereunder prior to the execution of this contract. The parties to this contract certify and agree that they are under no contractual or other disability, which would prevent them from complying with these requirements.

c. The Consultant will send to each labor organization or representative of workers with which he has a collective bargaining agreement or other contract or understanding, if any, a notice advertising the said labor organization or worker's representative of his commitments under this Section 3 clause and shall post copies of the notice in conspicuous places available to employees and applicants for employment or training.

d. The Consultant will include these Section 3 clauses in every contract and subcontract for Work in connection with the project and will, at the direction of the State, take appropriate action pursuant to the contract upon a finding that any subcontractor is in violation of regulations issued by the Secretary of Housing and Urban Development, 24 CFR Part 135 and, will not let any contract unless the Consultant has first provided it with a preliminary statement of ability to comply with the requirements of these regulations.

e. Compliance with the provisions of Section 3, the regulations set forth in 24 CFR Part 135, and all applicable rules and orders of the Department issued thereunder prior to the execution of the Agreement shall be a condition of the federal financial assistance provided to the project, binding upon the Consultant and its successors, and assigns to those sanctions specified by the grant or contract through which federal assistance is provided, and to such sanctions as are specified by 24 CFR Part 135.

4. State Nondiscrimination Clause:

a. During the performance of this contract, City, and Consultant shall not unlawfully discriminate, harass, or allow harassment, against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical handicap, medical condition (cancer), physical disability (including HIV and AIDS), marital status, age (over 40), sex, denial of family and medical leave, and denial of pregnancy leave. Consultant shall insure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination and harassment. Consultant shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12900 et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7258.0 et seq.) The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990(a-f), set forth in Chapter 5, of Division 4 of Title 2 of the California Code of Regulations, are incorporated into this agreement by reference and made a part hereof as if set forth in full. City, Consultant shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

b. City and Consultant shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

5. Americans with Disabilities Act (ADA) of 1990

By signing this agreement, the parties to this agreement assure the State that they will comply with the Americans with Disabilities Act (ADA) of 1990, (42 USC 12101 et seq.), which prohibits discrimination on the basis of disability as well as all applicable regulations and guidelines issued pursuant to the ADA.

6. Assurance of Compliance with Requirements Placed on Construction Contracts of $10,000 or More

The City and the Consultant hereby agree to place in every contract for construction exceeding $10,000 the Notice of Requirement for Affirmative Action to ensure Equal Employment Opportunity (Executive Order 11246), the Standard Equal Employment Opportunity, Construction Contract Specifications. The City furthermore agrees to insert the appropriate Goals and Timetables issued by the U.S. Department of Labor in such contracts and subcontracts.

7.2 Monitoring and Audit. Consultant agrees to allow the Housing and Community Development Department, Bureau of State Audits, HUD, or other State or federal agencies or their representatives, upon reasonable notice, unrestricted access to all relevant records, documents, books, accounts, and all other materials for grant monitoring or auditing purposes, including the monitoring for conformity with any Grant Agreement. City will monitor for conformity with its State contract.

7.3 Copeland Act. Consultant shall comply with the Copeland "Anti-Kickback" Act (18 U.S.C. §874) as supplemented in Department of Labor regulations (29 CFR Part 3).

7.4 Copyright. Any documents furnished by City or produced by Contractor in the performance of this Contract belong to City which shall own any and all intellectual property and copyrights thereto. Any discovery or invention developed by City or Consultant in the performance of this Contract shall belong to City which shall have the exclusive right to seek patent protection therefor.

7.5 Access to Records. Consultant shall provide City, the U.S. Department of Housing and Urban Development ("HUD"), the Comptroller General of the United States, or any of their duly authorized representatives to any books, documents, papers, and records of the Consultant which are directly pertinent to that specific contract for the purpose of making audit, examination, excerpts, and transcriptions.

7.6 Retention of Records. Consultant shall retain all records related to its performance under this Agreement and City's payments hereunder for five years after final payment has been made hereunder and all other pending matters are closed.

7.7. Environmental Compliance. Consultant shall comply with all applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. §1857(h)), section 508 of the Clean Water Act (33 U.S.C.§1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR part 15).

7.8. Energy Efficiency. Consultant shall comply with all mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. Law 94-163, 89 Stat. 871).

7.9. Anti-lobbying Requirements. The anti-lobbying certification attached hereto as Exhibit 1 is a material representation of fact upon which the City has relied in entering this agreement.

8.0 CONTRACT PROVISIONS

8.1 Ownership of Work. All documents furnished to Consultant by City and all documents or reports and supportive data prepared by Consultant under this Agreement are owned and become the property of the City upon their creation and shall be given to City immediately upon demand and at the completion of Consultant's services at no additional cost to City. Deliverables are identified in the Scope-of-Work, Attachment "1". All documents produced by Consultant shall be furnished to City in digital format and hardcopy. Consultant shall produce the digital format, using software and media approved by City.

8.2 Governing Law. Consultant shall comply with the laws and regulations of the United States, the State of California, and all local governments having jurisdiction over this Agreement. The interpretation and enforcement of this Agreement shall be governed by California law and any action arising under or in connection with this Agreement must be filed in a Court of competent jurisdiction in Mendocino County.

8.3 Entire Agreement. This Agreement plus its Attachment(s) and executed Amendments set forth the entire understanding between the parties.

8.4 Severability. If any term of this Agreement is held invalid by a court of competent jurisdiction, the remainder of this Agreement shall remain in effect.

8.5 Modification. No modification of this Agreement is valid unless made with the agreement of both parties in writing.

8.6 Assignment. Consultant's services are considered unique and personal. Consultant shall not assign, transfer, or sub-contract its interest or obligation under all or any portion of this Agreement without City's prior written consent.

8.7 Waiver. No waiver of a breach of any covenant, term, or condition of this Agreement shall be a waiver of any other or subsequent breach of the same or any other covenant, term or condition or a waiver of the covenant, term or condition itself.

8.8 Termination. This Agreement may only be terminated by either party: 1) for breach of the Agreement; 2) because funds are no longer available to pay Consultant for services provided under this Agreement; or 3) City has abandoned and does not wish to complete the project for which Consultant was retained. A party shall notify the other party of any alleged breach of the Agreement and of the action required to cure the breach. If the breaching party fails to cure the breach within the time specified in the notice, the contract shall be terminated as of that time. If terminated for lack of funds or abandonment of the project, the contract shall terminate on the date notice of

termination is given to Consultant. City shall pay the Consultant only for services performed and expenses incurred as of the effective termination date. In such event, as a condition to payment, Consultant shall provide to City all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs and reports prepared by the Consultant under this Agreement. Consultant shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder, subject to off-set for any direct or consequential damages City may incur as a result of Consultant's breach of contract.

8.9 Duplicate Originals. This Agreement may be executed in duplicate originals, each bearing the original signature of the parties. When so signed, each such document shall be admissible in administrative or judicial proceedings as proof of the terms of the Agreement between the parties.

9.0 NOTICES

Any notice given under this Agreement shall be in writing and deemed given when personally delivered or deposited in the mail (certified or registered) addressed to the parties as follows:

CITY OF UKIAH
CITY MANAGER'S OFFICE
300 SEMINARY AVE.
UKIAH, CA 95482

CONSULTANT
CONTACT PERSON
ADDRESS
CITY, STATE, ZIP

10.0 SIGNATURES

IN WITNESS WHEREOF, the parties have executed this Agreement the Effective Date:

CONSULTANT

BY: _____ _____
Date

PRINT NAME: _____

_____
IRS IDN Number

CITY OF UKIAH

BY: _____ _____
SAGE SANGIACOMO Date
CITY MANAGER

ATTEST

_____ _____
KRISTINE LAWLER Date
CITY CLERK

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ATTACHMENT 1
SCOPE OF WORK

The scope of services shall include tasks described below:

1. Review, monitor, and recommend refinements to the City's most recent Microenterprise Technical Assistance Services Program Guidelines. Adhere to adopted Microenterprise Technical Assistance Services Program Guidelines.
2. Provide program outreach, networking and marketing as needed to identify, contact and attract prospective eligible microenterprises and micro-entrepreneurs.
3. Perform income screening and collection of demographic and other required data of applicants to determine eligibility and to comply with grant reporting requirements, utilizing appropriate income certification methods per CDBG regulations depending upon services to be utilized by clients.
4. Perform CDBG-compliant program eligibility reviews per City Program Guidelines and CDBG regulations.
5. Provide needs assessment and identify strategies for provision of service; provide referrals for business support and technical assistance when appropriate, and provide direct business support and technical assistance to eligible microenterprises and micro-entrepreneurs.
6. Utilize a program-tracking/evaluation system to provide client demographic statistics and evaluation data about services provided (number of clients served, number of business plans developed, etc.) as well as outcomes (number of jobs created, number of businesses formed, etc.) and provide reports to City as necessary for grant reporting and program monitoring.
7. Assist clients in accessing or arranging financing for their businesses.
8. Coordinate with City staff to ensure timely submittal of all data, reports and cash requests associated with the program.
9. Prepare for and attend grant monitoring visits as necessary.
10. Provide other needed support and technical assistance to ensure accomplishment of the City's microenterprise program. This may include, but is not limited to, hosting workshops and community events or organizing other training and networking opportunities for clients.
11. Indicate the location where services will be provided. With the exception of web-based remote trainings, all services should be provided in a location accessible to persons with disabilities. Services should also be provided in a location easily accessible to Ukiah-based low- and moderate-income participants, so that the cost of transportation is minimized.

Provide other needed support and technical assistance to ensure accomplishment of the City's microenterprise program.

ATTACHMENT 2
FEE SCHEDULE

To be inserted after award of contract.

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ATTACHMENT 3

Anti-Lobbying Certification

The undersigned certifies to the best of his or her knowledge or belief that:

a. No Federal appropriated funds have been paid, or will be paid, by or on behalf of it, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress, in connection with the awarding of any Federal Contract, the making of any Federal Grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension of continuation, renewal, amendment or modification of any Federal contract, grant loan, or cooperative agreement;

b. If any funds other the Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress, in connection with this Federal contract, grant, loan, or cooperative agreement, it will complete and submit Standard Form -LLL, “Disclosure Form to Report Lobbying” in accordance with its instructions.

DATED:

_____

Name:
Title:

DRAFT

ATTACHMENT C
CITY OF UKIAH
MICROENTERPRISE TECHNICAL ASSISTANCE TASK MATRIX

Task	Program Operator	City of Ukiah
Approve Program Guidelines		X
Clear General and Special Conditions		X
Prepare Funds Requests		X
Monitor Grant Expenditures		X
Generate Fiscal/Performance Reports	X	X
Coordinate grant activities with Program Operator and Grantee	X	X
Oversee program implementation and activities		X
Compile/maintain grant Public Information files		X
Compile/maintain client files (separate TA/SS/FA)	X	
Monitor achievement of goals	X	X
Report on progress to Grantee and local governing body	X	X
Meet with local econ. developers to solicit referrals	X	
Create and distribute program flyers and newsletters	X	
Write press releases and market Microenterprise services	X	X
Create and update the program website	X	X
Collect and track eligible, enrolled participant data	X	
Prepare and submit cost allocation plan as needed	X	
Report on program outcomes	X	
Determine indicators for tracking	X	
Evaluate program effectiveness	X	X
Attend HCD Workshops		X
Determine business size and eligibility as a microenterprise	X	
Microenterprise Technical Assistance – Income screen for LMI status to establish eligibility	X	
Ascertain readiness and eligibility of potential participants	X	
Gather baseline data on potential participants	X	
Gather baseline data on eligible, enrolled participants	X	
Field calls from potential participants	X	
Create service plan for eligible, enrolled participant	X	
Coordinate course offerings with community colleges and other providers	X	
Set up courses and schedules for eligible, enrolled participants	X	

Task	Program Operator	City of Ukiah
Assist in preparing business plan and marketing strategy	X	
Conduct courses and host workshops	X	
Curriculum Development	X	
Class/Training Preparation	X	
Guide enrolled participants in resolving business issues	X	
Field calls from enrolled, eligible participants	X	
Meetings/counsel sessions with eligible, enrolled participants	X	



Guidelines
For
Microenterprise Technical Assistance Services Program

Funded By

City of Ukiah

With

Community Development Block Grant

Adopted: 6/21/17

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COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG)
MICROENTERPRISE TECHNICAL ASSISTANCE PROGRAM GUIDELINES

1.0 INTRODUCTION

The City of Ukiah, here after called the "Grantee," has established a microenterprise Technical Assistance (TA) program, here after called the "TA Program." The TA Program is designed to stimulate economic growth and create businesses and jobs that will improve the living conditions of residents in Ukiah. The TA Program provides technical assistance services to eligible businesses and persons for business start-up or expansion activities. These TA Program guidelines have been formally adopted by the Grantee and approved by the California Department of Housing and Community Development, here after called "the Department." See **Attachment A** for copy of the adopting resolution.

2.0 MICROENTERPRISE TA SERVICES PROGRAM OVERVIEW

2.1 GRANTEE AND PROGRAM OPERATOR

The Grantee will secure the services of a qualified service provider, here after called "the Program Operator," who has experience in providing and coordinating microenterprise TA services and is familiar with CDBG state and federal requirements. In general, the Program Operator will: 1) market the TA Program; 2) accept and process participant applications; 3) document participant CDBG income eligibility and proper number of employees; and 4) ensure participant files are set up to document all participant TA services provided and documentation of all eligible costs. Grantee will assign one or more staff to oversee Program Operator's work with Program Applicants and Participants to ensure CDBG compliance with these guidelines.

2.2 PROGRAM SERVICE AREA

TA services are available to all eligible businesses/persons located within Ukiah's jurisdictional boundaries. These CDBG funds may not be used in entitlement jurisdictions that receive CDBG funds directly from the federal Department of Housing and Urban Development (HUD) entitlement program.

2.3 FUNDING SOURCE FOR TA PROGRAM SERVICES

The TA Program is paid for with CDBG funds provided by HUD to the Department, and as such these funds have a number of federal requirements that must be met as described below. These CDBG funds come to the Grantee from Department grant awards that are administered under a formal grant contract or from local CDBG program income (PI) funds administered under an approved PI Waiver.

3.0 CDBG PROGRAM REQUIREMENTS

3.1 ELIGIBLE PROGRAM APPLICANTS

All eligible applicants must meet the definition of a microenterprise. For CDBG

purposes, a microenterprise is defined as a commercial enterprise that has five (5) or fewer employees, including the owner(s). All employees, part or full time, on the business payroll at the time of loan application will be counted. The term "employee" includes all owners of the business on the payroll, even if the owner's "salary draws" are not done on a regular basis. The Program Operator will require all program Applicants "certify" the number of employees at the time of application using the Department's Microenterprise Income Self-Certification Form (see Attachment D).

An eligible Applicant may be an existing microenterprise business that needs TA program services to build capacity or a person without a business that wants to create one. Most existing microenterprise business Applicants will be sole proprietorships. However, eligible Applicants may include private for-profit corporations or partnerships that are legal, properly licensed and operating. Non-profits are not eligible microenterprise businesses. An eligible Applicant must provide documentation that the physical location of the business is within the program service area, per Section 2.2. If the business's physical address is outside of the program service area, then they are not an eligible Applicant. A business owner may have their personal residence outside the program service area as long as the business's principal operating location is within the program service area.

Eligible Applicants can also be individual persons who do not have a business but wish to start a business. These persons may receive microenterprise TA services to help them take all the necessary steps to build capacity and set up a new business. The TA services provided to persons will typically be much more time consuming and require more work from the Applicant as they seek to start a for profit business. Applicants that are persons without an existing business must document that their primary residence is located in the program service area per Section 2.2.

3.2 INELIGIBLE PROGRAM APPLICANTS

An ineligible existing business applicant is one that has a physical business location outside of the service area. An ineligible person applying for the program is one with a residence outside of the service area. As stated in Section 3.1 non-profit organizations are not eligible microenterprise business. An applicant currently participating in a microenterprise TA or Financial Assistance program offered in the same service area as this program is not eligible.

3.3 ELIGIBLE PROGRAM COSTS

Use of CDBG funds for TA program services is restricted to certain eligible costs. All costs associated with funding TA must be "indirect costs." Indirect is defined as third party costs to a Program Operator and other consultants that provide TA to program participants. Common TA costs may include: 1) business development workshops or classes restricted to CDBG eligible program participants; 2) "one on one" counseling using professional business

development staff; 3) opportunities for "structured peer networking;" and 4) online business training courses. The Grantee's specific CDBG TA services are outlined in Sections 5.3 to 5.6.

3.4 INELIGIBLE PROGRAM COSTS

Microenterprise "direct financial assistance" costs will not be funded under this program. Direct financial assistance may be provided only under an approved CDBG microenterprise financial assistance program. Direct financial assistance activities are typically any costs associated with day to day business operations. These operational costs are ineligible, whether the business is operating out of a private leased commercial space, their home, or a public facility.

Examples of ineligible direct financial assistance costs include but are not limited to: 1) payment of costs to produce/purchase marketing materials (printing, language translations or professional design costs); 2) payment of marketing ads or distribution of marketing materials; 3) payment of third party costs for website building or hosting; 4) payment of rents / lease payments, utilities or other business fees or operating / overhead expenses; 5) payment of purchasing real property or furniture, fixtures or equipment for the business; 6) payment of any personal or business debt; 7) payment of any cash or wages; 8) paying for credit reports; and 9) paying for loan or grant underwriting services.

In addition, no payment of food or drinks offered at the TA classes or other instruction sessions are eligible costs. Cash or like-cash payments and other undocumented TA costs are also not eligible.

3.5 TIMEFRAME FOR RECEIVING TA SERVICES

Under federal regulations, a program participant may receive TA services for up to three (3) years, after completing income verification as an eligible microenterprise. It is expected that most program participants will use all microenterprise TA services well before the three year limit.

3.6 MEETING CDBG MICROENTERPRISE DEFINITION REQUIREMENT

Program applicants for this Program must meet the CDBG definition of a microenterprise business. The CDBG definition of a microenterprise business is one that has five (5) or fewer employees, including the owner(s). All employees, part time and full time, on the business payroll at the time of loan application will be counted. The term "employee" includes all owners of the business on the payroll, even if the owner's "salary draws" are not on a regular basis. The Program requires a current CDBG income self-certification form which should be placed in the program participant file to document the number of employees and compliance with the HUD microenterprise definition.

3.7 MEETING CDBG NATIONAL OBJECTIVE REQUIREMENT

Under federal regulations, use of CDBG funds for microenterprise activities must meet the national objective of benefit to low/mod income persons under the

Limited Clientele definition. As such, all microenterprise owners must be documented as meeting HUD low/mod income definition prior to receiving any Program services. This is in addition to meeting the "definition" of a microenterprise, as described above in Section 3.6. The CDBG income self-certification form will be used to verify income of program applicants for the microenterprise technical assistance services program.

As with other microenterprise program activities, if the Grantee or Program Operator finds that the applicant income information is not accurate and the program participant is over HUD's income limits, then a program applicant is ineligible and program services currently being offered to program participants must cease immediately.

3.8 OTHER CDBG FEDERAL LAWS AND REGULATIONS

There are a number of federal laws and state regulations that are triggered with the use of CDBG funding for a microenterprise assistance services Program. The Grantee will take the lead and ensure compliance with these other CDBG regulations.

National Environmental Policy Act (NEPA) federal environmental laws per regulation 24 CFR 58 are not triggered for individual Program participants. Nor are there any compliance requirements for Davis Bacon and related Acts for TA activities under these guidelines. Acquisition and relocation laws are also not triggered when using CDBG funds for microenterprise TA services. However, these federal laws may be triggered as part of using the TA funds in conjunction with providing the program participant with financial assistance.

Federal regulations require that local program income be spent first prior to drawing down any federal funds from an open grant. If a Grantee has a program Income (PI) "Waiver" for funding technical assistance services and also has a Department grant contract award for technical assistance services, the local PI waiver funds must be expended first, prior to drawing down any funds from the open grant contract with the Department.

4.0 APPLICATION PROCESSING FOR TA PROGRAM SERVICES

4.1 PROGRAM MARKETING AND OUTREACH

Upon the Grantee's receipt of a Department letter releasing TA Program funding, and after successful procurement of a Program Operator, the Program Operator will conduct outreach and marketing to all businesses and individuals in the program service area. Program operator staff will develop a marketing plan for the program to outreach to businesses and persons in the community regarding the availability and accessibility of the TA program. This plan should be kept on file and updated as needed to ensure that all residents in the service area are informed about and have access to program applications.

4.2 EQUAL OPPORTUNITY COMPLIANCE

This program will be implemented in ways consistent with the Grantee commitment to state and federal equal opportunity laws. No person or business shall be excluded from participation in, denied the benefit of, or be subjected to discrimination under any program or activity funded in whole or in part with CDBG program funds on the basis of his or her religion or religious affiliation, age, race, color, ancestry, national origin, sex, marital status, familial status (number or ages of children), physical or mental disability, sexual orientation, or other arbitrary cause.

4.3 PROGRAM APPLICATION PROCESSING

Applications will be processed on a first come first served basis. See **Attachment B** for microenterprise TA services program application form. The Program Operator will accept applications and review for HUD income eligibility and an allowable number of employees, per Department standards.

All program applications received, both denied and approved, will be logged and kept on file in accordance with federal records retention act. Applicants who do not meet eligibility requirements of the program will be notified in writing with an explanation of ineligibility. Files will be set up for all eligible program participants to document compliance with all CDBG regulations, Department policy, and adopted guideline and all provided TA services.

4.4 PROGRAM PARTICIPANT / APPLICANT CONFIDENTIALITY

All personal and business financial information will be kept confidential. Program participant files with personal and business confidential information will be kept in locked secured storage units.

4.5 DISPUTE RESOLUTION / APPEALS PROCEDURE

Any person applying for TA services through the CDBG program has the right to appeal a denied application. The appeal must be made in writing to the Grantee. A written response to the appeal will be provided to the applicant by the Grantee within 30 days of receipt of the applicant's appeal letter.

4.6 EXCEPTIONS / SPECIAL CIRCUMSTANCES

Exceptions are defined as any action, which would depart from policy and procedures stated in the guidelines.

5.0 TECHNICAL ASSISTANCE PROGRAM SERVICE DELIVERY

5.1 PROGRAM PARTICIPANT CAPACITY EVALUATION

Eligible program participants will meet with Program Operator staff to receive a "capacity" evaluation. This evaluation process will be completed via a face to face interview and standard written format. The current capacity of the business owner or person wishing to start a business will be assessed. Areas of strengths and weaknesses will be identified; steps will be provided to address weaknesses.

5.2 CREATING CAPACITY DEVELOPMENT WORK PLAN

Based on the capacity evaluation, the Program Operator will work with the program participant to develop a "work plan." The work plan will outline the TA needed by the program participant and give a timeline for scheduling the services. The work plan will contain expected outcomes from the TA, explain how those outcomes will address the capacity issues identified in the evaluation and provide an estimated cost. The work plan will clearly state the expectations for the program participant and the Grantee. All parties will sign the work plan. Copies of the work plan will be provided to all parties and included in the program participant file.

Eligible program participants will be provided detailed information on the TA provided with this program. TA services will be tracked and documented in the program participant file. The Program Operator will remain in contact with the program participant throughout the process.

5.3 TECHNICAL ASSISTANCE VIA CLASSES

Business development classes will be offered on a regular basis, when sufficient demand for the classes is present. "Mixed TA classes" (eligible CDBG participants and non-eligible CDBG participants) may be offered by the Program Operator, with prior approval in writing from the Grantee. When mixed TA classes are offered, the Grantee has received prior written approval from the Department to ensure compliance with federal regulations. Some examples of topics for the classes may include: 1) business plan development or updating; 2) market analysis and marketing plan development; 3) managing employees and payroll services; 4) choosing a legal structure for a business; 4) financial management tools and cash flow projections; 5) controlling inventory and operating expenses; 6) collection of accounts payable; 7) use of the internet and other electronic resources for sales and efficiency; 8) access to capital for growing the business. Other classes may be offered based on the needs of the program participants.

5.4 BUSINESS DEVELOPMENT VIA "ONE-ON-ONE" COUNSELING

Business development "one on one" TA will be provided as needed, typically after program participant has attended necessary microenterprise TA classes in Section 5.5.

One on one TA will be scheduled with Program Participants a month at a time beginning at the start of each month. The one on one TA will cover similar topics to what is offered in the classes, but this TA will be much more detailed and specific to the Program Participant. The one on one TA may be conducted in person or via video conference call. The one on one TA may be conducted at the location of the program participant or at the Program Operator's office. Notes on the TA provided at these sessions, along with time and training materials used, will be documented by the Program Operator in the program participant file.

5.5 BUSINESS DEVELOPMENT VIA "PEER TO PEER" COUNSELING

The Grantee may choose to allow the Program Operator to organize Peer to Peer TA if a sufficient number of program participants with similar types of businesses are enrolled in the TA Program. Peer to Peer TA will be provided in a formal meeting format. The Peer to Peer meetings will be facilitated by the Program Operator. Topics for discussion at the meetings will be provided by the members of the group which may include small group exercises and projects to facilitate participants working together to identify and find solutions to common problems experienced in their respective fields.

The date and time for each meeting should be documented with sign-in sheets. Discussion notes, activities conducted and outcomes at the meetings should be documented in program participant files.

5.6 BUSINESS DEVELOPMENT VIA ONLINE COMPUTER TRAINING

Program participants may obtain approval from the Program Operator to complete business development classes online. The topics for the online classes being requested must be in support of the capacity evaluation objectives. A list of eligible online training classes will be provided by the Program Operator. Any online training or class not on the approved list must be reviewed and approved in writing by the Grantee.

Online classes may be taken remotely or in the Program Operator's office. Classes will be paid for directly by the Program Operator to the third party vendor. Documentation of completion of the online class is required and will be filed in the program participant file.

5.7 COMPLETION OF CAPACITY DEVELOPMENT WORK PLAN

Program participants commit to completion of TA services as outlined in the capacity building evaluation and plan document. The Program Operator will commit to providing the TA in the capacity building evaluation and plan. The program participant, Program Operator and Grantee understand that the CDBG microenterprise TA services are a limited public resource. Therefore, if a program participant does not consistently complete their business development classes, one on one TA counseling sessions, peer to peer meetings or complete online classes, they may be disqualified from receiving any further CDBG microenterprise TA. Disqualification will be in writing and fully documented in the program participant file.

6.0 PROGRAM OVERSIGHT BY GRANTEE

6.1 OVERSIGHT OF PROGRAM OPERATOR

Grantee staff will serve as the primary contact with the Department. The Grantee will be responsible for securing services of a qualified Program Operator for implementation of this TA Services Program prior to starting any activities under these guidelines. The scope of work for the Program Operator will include all

administration and documentation required for TA services in these guidelines and for CDBG compliance.

6.2 TRACKING TA SERVICES OF PARTICIPANTS

The Grantee's staff oversee and monitor all work conducted by the Program Operator. Monthly or quarterly meetings will be conducted to review the program status: 1) marketing efforts; 2) applications received; 3) eligible program participants being served; 4) successful program participant stories; 5) demand for different services and need for more resources or partners; 6) review of program tracking forms, **See Attachment C**; 7) review of Department reports and funds request for reimbursement of TA Services; and 8) preparation for Department monitoring of grant contract and TA Services. As per the [future] executed agreement between the Grantee and the Program Operator, all required reports under open grant contracts or PI will be reviewed and approved by the Grantee staff prior to Grantee's signature.

ATTACHMENT A
GRANTEE'S EXECUTED RESOLUTION ADOPTING MICROENTERPRISE PROGRAM GUIDELINES

RESOLUTION NO. 2017- 28

RESOLUTION OF THE CITY OF UKIAH COUNCIL ADOPTING PROGRAM GUIDELINES FOR COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG) MICROENTERPRISE TECHNICAL ASSISTANCE SERVICES PROGRAM

WHEREAS, a Public hearing was held pursuant to federal Citizen Participation requirements before the City Council on June 21, 2017 to receive public comment regarding adoption of the City of Ukiah's Microenterprise Technical Assistance Services Program Guidelines; and

WHEREAS, the City of Ukiah has been awarded a 2016 Community Development Block Grant (CDBG) from the State Department of Housing and Community Development (HCD) to operate a Microenterprise Assistance Program, including Technical Assistance Services; and

WHEREAS, HCD requires that in order to operate a CDBG Microenterprise Technical Assistance Services Program, jurisdictions must adopt Program Guidelines to govern program operation and to ensure compliance with CDBG State and Federal requirements; and

WHEREAS, HCD has provided a template for the Program Guidelines, and the template has been revised only for local program details while retaining language reflecting State and Federal requirements.

NOW, THEREFORE, IT IS HEREBY RESOLVED that the City Council of the City of Ukiah does hereby adopt Program Guidelines for the Community Development Block Grant (CDBG) Microenterprise Technical Assistance Services Program.

PASSED AND ADOPTED this twenty-first day of June, 2017, by the following roll call vote:

AYES: Councilmembers Scalmanini, Crane, Mulheren, Doble, and Mayor Brown
NOES: None
ABSENT: None
ABSTAIN: None

Jim O. Brown, Mayor

ATTEST:

Kristine Lawler, City Clerk

ATTACHMENT B
CDBG MICROENTERPRISE TECHNICAL ASSISTANCE SERVICES PROGRAM APPLICATION

[This attachment will be included once developed with the selected Microenterprise Technical Assistance services Program Operator (after the Program Operator has been procured).]

ATTACHMENT C
APPLICANT AND PROGRAM PARTICIPANT TRACKING FORMS FOR TECHNICAL ASSISTANCE

[This attachment will be included once developed with the selected Microenterprise Technical Assistance services Program Operator (after the Program Operator has been procured).]

ATTACHMENT D
DEPARTMENT'S MICROENTERPRISE INCOME SELF-CERTIFICATION FORM

Microenterprise Program SELF-CERTIFICATION of Income *for*

☐ City of / ☐Town of / ☐ County of _____ **CDBG Funded Activity**

Program Activity: ☐ **Technical Assistance** ☐ **Support Services**

Page 1 to be filled out by Participant

Part I: Confidential Participant / Beneficiary HUD Demographic Data

(This section is voluntary.)

Ethnicity (Select One)	☐ **Not Hispanic**	☐ **Hispanic**
Race (Select One)		
☐ White	☐ Am. Indian/Alaskan Nat. & White	
☐ Black/African American	☐ Asian & White	
☐ Asian	☐ Black/African American & White	
☐ American Indian/Alaskan Native	☐ Am. Indian/Alaskan & Black/African	
☐ Nat. Hawaiian/Other Pacific Isl.	☐ Other Multi-Racial	
Other Demographic Data (Select each that Applies)		
☐ Female Head of Household ☐ Participant Disable ☐ Veteran ☐ Elderly	☐ Single / Non Elderly ☐ Related/Single Parent ☐ Related/Two Parent ☐ Other (_____)	

Part II: Confidential Participant / Beneficiary Income Certification

(Must be completed and signed before microenterprise services are provided.)

1) Number of Employees & Owners:

The total number of employee(s) is: _____. The total number of Owner(s) is: _____. Combined Employee(s) and Owner(s) =_____.

2) Number of Family Members & Gross Income:

My total family size consists of _____ members, and the total gross annual income* for all adult members is $_____.

*Gross annual income must include all sources of income (wages, child support, SSI, unemployment, pension, income from assets, etc., but does not include the income of live-in aids, per 24 CFR 5.403).

I certify that the information given on this form is true and accurate to the best of my knowledge. I am aware that there are penalties for willfully and knowingly giving false information on an application for Federal or State funds, which may include immediate repayment of all Federal or State funds received and/or prosecution under the law. I understand that the information on this form is subject to verification by state and federal personnel as part of compliance monitoring.

Participant / Beneficiary Signature:_____ **Date:**_____

Participant / Beneficiary Name (print): _____

Participant Physical Home Address: _____,**City**_____

Microenterprise Program SELF-CERTIFICATION Verification by

☐ City of / ☐Town of / ☐ County of _____ **CDBG Funded Activity**

Page 2 to be filled out by Program Operator

Microenterprise Program Information:

Name of Microenterprise Program Operator: _____

Source of CDBG funding: ☐ Grant #: _____ - Or - ☐ PI Waiver Fiscal Year: _____

Microenterprise Business Size (# of Employees & Owners) Verification:

Business has: ☐ No employees, as the Participant does not have an operating business
☐ Five or fewer employee positions with owners
☐ More than five employee positions with owners ***NOT ELIGIBLE for CDBG ASSISTANCE***

Microenterprise Participant/Beneficiary Income and Location Verification:

Effective Date of the Income Limit Chart being used: _____

Family is: ☐ 30% or less (Extremely Low Income)
☐ 31%-50% (Low Income)
☐ 51%- 80% (Moderate Income)
☐ *Over 80% of median income:* ***NOT ELIGIBLE for CDBG ASSISTANCE***

Program Operator must:
1) Print the current HCD Income limits from the HCD website (NOT HUD's); and
2) Circle the applicable family size and annual income on HCD limit printout and place in participant file.
3) Must complete confidential demographic data, if participant/beneficiary leaves blank.

Participant / Beneficiary Name: _____
Participant / Beneficiary Physical Home Address: _____ ☐ In Jurisdiction Limits
Business Physical Address: _____ ☐ In Jurisdiction Limits

NOTE: Physical location of business must be in Jurisdiction. If no business, then Participants / Beneficiary must live in Jurisdiction.

Program Operator Certification: *I certify that Participant / Beneficiary demographic data provided is true and correct, to the best of my knowledge. I certify that, using the current HCD annual income publication compared to stated family size and gross income, resulted in the income level indicated above. I certify that the information regarding microenterprise business size is correctly indicated above. I certify that the residency of the Participant / Beneficiary and business address is true and correct per the requirements of 24 CFR 570.486(b) and/or (c) as applicable.*

Note: This completed certification whether Participant / Beneficiary receives microenterprise TA or Support Services or not, must be maintained in the Confidential Program file for review at time of monitoring.

_____ _____
Program Operator Name (printed) **Job Title**

Signature:_____ **Date:**_____

Eligibility is valid until (three years after certification signed) Date: _____

ATTACHMENT E

REQUIRED CONTRACT PROVISIONS
FOR COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG)-AIDED CONTRACTS

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1. General Provisions

1.1. This project is funded wholly or in part by the State Community Development Block Grant (CDBG) Program and is subject to both Federal and State regulatory requirements. The Contractor and its sub-contractors agree to comply with all State and Federal laws and regulations that pertain to construction, health and safety, labor, fair employment practices, equal opportunity, and all other matters applicable to the Contractor and any subcontractors. The Contractor further agrees to comply with all Federal laws and regulations applicable to the CDBG Program and with other Federal provisions as set forth below and as described in 24 CFR Part 570, including OMB Circular A-87 and applicable provisions of 24 CFR Part 85 for governmental entities, or OMB Circular A-122 and applicable provisions of 24 CFR Part 84 for non-profit entities.

1.2. These contract provisions shall apply to all work performed on the contract by the Contractor's own organization and with the assistance of workers under the Contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

1.3. Except as otherwise provided for in each section, the Contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions for CDBG-Aided Contractor Contracts, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions for CDBG-Aided Contractor Contracts shall not be incorporated by reference in any case. The prime Contractor shall be responsible for compliance by any sub-Contractor or lower tier sub-Contractor with these Required Contract Provisions for CDBG-Aided Contractor Contracts.

1.4. The Contractor and its sub-Contractors shall perform the project in accordance with Federal, State and local housing and building codes as are applicable.

1.5. The Contractor and its sub-Contractors shall retain all books, records, accounts, documentation, and all other materials relevant to the agreement for a period of five (5) years from date of final payment under this agreement; or five (5) years from the date of termination of the City of Ukiah CDBG Grant Agreement; or five (5) years from the conclusion or resolution of any and all audits or litigation relevant to this agreement and/or to the CDBG Agreement and any amendments, whichever is later.

1.6. The Contractor and its sub-Contractors shall permit the State, Federal government, the Bureau of State Audits, the Department of Housing and Community Development, the City of Ukiah and/or their representatives, upon reasonable notice, the right to interview employees and unrestricted access to any or all books, records, accounts, documentation, and all other materials relevant to the agreement, for the purpose of monitoring, auditing, or otherwise examining said materials.

2. Conflict of Interest Provisions

2.1. Pursuant to 24 CFR 570.611, no member, officer, or employee of the Grantee, or its designees or agents, no member of the governing body of the locality in which the program is situated, an no other public official of such locality or localities who exercise or have exercised any functions or responsibilities with respect to CDBG activities assisted under this part, or who are in a position to participate in a decision-making process or gain inside information with regard to such activities, may obtain a financial interest or benefit from a CDBG-assisted activity, or have a financial interest in any contract, subcontract or agreement with respect to a CDBG-assisted activity or its proceeds, either for themselves or those with whom they have business or immediate family ties, during their tenure or for one (1) year thereafter.

3. Nondiscrimination

3.1. During the performance of this contract, Contractor and its subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of the following: race, religion, color, national origin, ancestry, disability, medical condition, marital status, age (over 40) or sex. Contractors and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination and harassment. Contractors and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12900 et seq.) and the applicable regulations promulgated there under (California Code of Regulations, Title 2, Section 7258.0 et seq.), the applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations are incorporated into this contract by reference and made a part hereof as if set forth in full, Contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

3.2. This Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

4. Maintenance of Workers' Compensation Insurance

The Contractor and its sub-Contractors shall maintain at least the minimum State-required Worker's Compensation Insurance for those employees who will perform the contract activity(ies) or any part of it.

5. Maintenance of Unemployment, Disability, and Liability Insurance

The Contractor and its sub-Contractors shall maintain, if so required by law, unemployment insurance, disability insurance and liability insurance in an amount to be determined by the State which is reasonable to compensate any person, firm, or corporation who may be injured or damaged by the Contractor or any sub-Contractor in performing the project or any part of it.

6. Equal Opportunity

6.1. The Civil Rights, Housing and Community Development, and Age Discrimination Acts Assurances:

During the performance of this Agreement, the Contractor assures that no otherwise qualified person shall be excluded from participation or employment, denied program benefits, or be subjected to discrimination based on race, color, national origin, sex, age, handicap, religion, familial status, or religious belief, under any program or activity funded by this contract, as required by Title VI of the Civil Rights Act of 1964, Title I of the Housing and Community Development Act of 1974, as amended, the Age Discrimination Act of 1975, and the Fair Housing Amendment Act (42 USC 3601-20) and all implementing regulations.

7. Energy Efficiency

The Contractor or subcontractor shall certify if its business or company will purchase ENERGY STAR qualified products, where applicable, in implementing the services outlined in the scope of work. Examples of ENERGY STAR qualified products can include, but will not be limited to the following: CFLs, sealants and insulation, high efficiency furnaces and air conditioning units, windows, doors, etc.

8. Anti-Lobbying

The Contractor shall complete and certify as to **Contractor's/Sub-Contractor's Certification Concerning Anti-Lobbying** form provided below, and the Contractor shall require that the language included in the **Contractor's/Sub-Contractor's Certification Concerning Anti-Lobbying** form provided below shall be included in all subcontracts entered into in connection with this activity and that Contractor and all subContractors shall certify and disclose per the requirements of that form.

CITY OF UKIAH
300 Seminary Ave., Ukiah, CA 95482

CONTRACTOR'S/SUB-CONTRACTOR'S CERTIFICATION
CONCERNING ANTI-LOBBYING

The Contractor shall require that the language of this certification be included in all contracts or subcontracts entered into in connection with this grant activity(ies) and that all subrecipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and no more than $100,000 for such failure.

"The undersigned certifies, to the best of his or her knowledge or belief, that:

A. No Federal appropriated funds have been paid or will be paid, by or on behalf of it, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement;

B. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, it will complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions."

(Contractor/Sub-Contractor)

By _____
Signature

_____
Typed/Printed Name and Title

_____
Date

Approved by OMB
0348-0046

Disclosure of Lobbying Activities

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure)

1. Type of Federal Action: a. contract ____ b. grant c. cooperative agreement d. loan e. loan guarantee f. loan insurance	**2. Status of Federal Action:** a. bid/offer/application _____ b. initial award c. post-award	**3. Report Type:** a. initial filing _____ b. material change **For material change only:** Year _____ quarter _____ Date of last report_____

4. Name and Address of Reporting Entity: ____ Prime _____ Subawardee Tier_____, if Known: **Congressional District,** *if known*:	**5. If Reporting Entity in No. 4 is Subawardee,** Enter Name and Address of Prime: **Congressional District,** *if known*:
6. Federal Department/Agency:	**7. Federal Program Name/Description:** CFDA Number, *if applicable*: _____
8. Federal Action Number, *if known:*	**9. Award Amount**, *if known:* **$**
10. a. Name and Address of Lobbying Registrant *(if individual, last name, first name, MI):*	**b. Individuals Performing Services** *(including address if different from No. 10a)* *(last name, first name, MI):*
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.	**Signature: _____** **Print Name: _____** **Title: _____** **Telephone No.: _____ Date: _____**
Federal Use Only	**Authorized for Local Reproduction** **Standard Form - LLL (Rev. 7-97)**

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any

lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitations for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Included prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full names of the individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).

11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503

Proposal Cover Sheet

Response to Request for Proposals:
City of Ukiah's CDBG TA Program

Center for Economic Development

35 Main Street, Suite 203
Chico, CA 95928

Jason Schwenkler, Executive Director
Phone: 530-898-4372
Email: jschwenkler@csuchico.edu

CHICO STATE | ENTERPRISES

July 21, 2020

Mary Horger
Financial Services Manager
300 Seminary Avenue, Ukiah
California 95482

Dear Ms. Horger,

Please accept this introductory letter for Chico State Enterprises – the Center for Economic Development (CED). The Center for Economic Development in partnership with Morrison and the Economic Development and Financing Corporation is proposing to provide microenterprise technical assistance through the City of Ukiah's Community Development Block Grant (CDBG) program (TA Program). The TA Program is designed to stimulate economic growth and create businesses and jobs that will improve the living conditions of the residents of Ukiah. The TA Program provides technical assistance services to eligible businesses and persons for business start-up or expansion activities.

Technical Assistance activities can include, but are not limited to, the following:

- Business plan development or updating
- Market analysis and marketing plan development
- Managing employees and payroll services
- Choosing a legal structure for a business
- Financial management tools and cash flow projections
- Controlling inventory and operating expenses
- Collection of accounts payable
- Use of internet and other electronic resources for sales and efficiencies
- Access to capital for growing the business

The following is the project director's contact information:

Chico State Enterprises
Center for Economic Development
35 Main Street, Suite 132
Chico, CA 95928
Jason Schwenkler, Executive Director
jschwenkler@csuchico.edu
530 898-4372 office
530 680-3653 mobile
530 898-6317 fax

The CED appreciates the opportunity to support the City of Ukiah in its activities to stimulate the economy for small business and entrepreneurial success.

Thank you in advance for your time and consideration.

Sincerely,

Mary Sidney

Mary Sidney
Chief Executive Officer Chico State Enterprises

Section I. – Introduction to the Team

The Center for Economic Development, Morrison and the Economic Development and Financing Corporation are partnering to provide technical assistance to microenterprise businesses located within the City of Ukiah. Each partner brings experience and expertise with identifying and working with low- to moderately-low income, microenterprise businesses and start-ups utilizing programs such as the Community Development Block Grant Technical (CDBG) Assistance.

Center for Economic Development

The Center for Economic Development (CED - est. 1986) is a department of the North State Planning and Development Collective at Chico State Enterprises. The CED (in tandem with its counterpart agency the Geographical Information Center (GIC – est. 1988) provides services and resources to the region's businesses, governments, and residents by pairing GIS mapping services and broadband infrastructure support with economic development research, surveying, analysis, planning and implementation throughout the state of California.

The Center for Economic Development was founded with the understanding of the need for targeted technical assistance, data collection and analysis, strategic planning and convening and facilitation of various partners and communities. This theme has continued and improved over the CED's 34 years. The CED team has the skillsets and experience to implement data collection, surveying, analysis and mapping while understanding trends, patterns and predictors of the predictors for the region's economy.

The CED supports small to medium-sized businesses and entrepreneurs throughout the North State by providing customized technical assistance to enhance their ability for growth and sustainability. Small businesses are the backbone of the North State economy. Providing technical assistance for businesses identified through the CDBG TA program is critical especially given the additional challenges of natural disasters and now COVID-19. These challenges are in addition to the obstacles many low- to moderately-low income small business owners face. Many owners struggle with limited time or expertise or simply do not know how to access resources that are available. This is why assistance like the TA program is so important.

The Center for Economic Development (CED is housed under Chico State Enterprises (formerly the CSU, Chico Research Foundation). Chico State Enterprises (CSE) was incorporated in 1997 following a reorganization of the responsibilities of the University Foundation. Chico State Enterprises was incorporated in 1940 as an auxiliary organization authorized by the Education Code of the State of California and currently is responsible for fundraising and philanthropic endeavors on behalf of the University. Chico State Enterprises has assumed responsibility for grants and contracts administration for the campus along with entrepreneurial activities. It is governed by a 12-member Board of Directors consisting of campus administration, faculty, a student, and members of the community. Chico State Enterprises Executive Director is

responsible to the Board of Directors for the administration of Foundation activities and to the University administration for adherence to campus policy.

As a public non-profit corporation, Chico State Enterprises is self-financed and receives no state appropriations. Chico State Enterprises must conform to non-profit corporation laws as well as the regulations and directives issued by the Trustees of the California State University. The purpose of Chico State Enterprises is to help develop and administer those activities that aid and supplement the educational mission of CSU, Chico. As an auxiliary organization of CSU, Chico, Chico State Enterprises provides service functions. As a non-profit corporation, it facilitates the work of campus units and provides alternatives to state procedures. Chico State Enterprises administers hundreds of projects annually with annual revenues of about $34 million. Chico State Enterprises employs more than 2,000 employees over the course of the year, in the form of 170 regular employees with full-benefits status, and 45-600 other temporary, part-time, and student employees during any particular pay period throughout the course of the year.

Chico State Enterprises provides fiscal management of its grants through the Office of Research and Sponsored Programs. Each contract is assigned to one analyst, who administers the grants in accordance with the Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards (Uniform Guidance, 2 CFR 200). Each award is assigned a unique project number, and all expenditures are tracked with that project number and object codes identifying the type of expense. Each expenditure is reviewed for allowability and allocability. Chico State Enterprises maintain policies to ensure compliance with federal guidance, including personnel time reporting, travel, purchase procedures, and cost share. Chico State Enterprises conducts an annual audit in conformance with the Uniform Guidance.

The Center for Economic Development receives no funding from Chico State Enterprises or California State University, Chico, rather the agency applies for public and private grants and provides services through contract agreements. All grants and contracts are acquired and managed by the CED team. The CED works with CSE for all financial and programmatic reports.

The CED has current and past successful grants/contracts from the following agencies (this is not an exhaustive list):

- United States Department of Agriculture (USDA)
- Economic Development Administration (EDA)
- California Manufacturing Technology Consultants (CMTC) (funding through US Department of Commerce)
- US Forest Service
- Facebook
- Public agency contracts
- California Public Utilities Commission (CPUC)

The Center for Economic Development will serve as the program operator and contact for the City of Ukiah. The CED is prepared to oversee and manage the designated tasks outlined in the Scope of Work.

Morrison
Morrison was founded in 2002 to provide specialized business consulting services. They have had the pleasure of serving government entities, economic development corporations, industry associations, food companies, farms and ranches, start-up businesses, institutions of higher education, and others across the nation.

From their beginnings providing primarily management and accounting assistance, they have grown to three major service lines led by three Principals (owners): Business & Accounting Advisory Services, led by Founder and Principal Brent Morrison; People Solutions (Human Resources and executive recruiting) led by Principal Shawn Miller; and, Grants led by Managing Principal Toni Scott. Ms. Scott also leads Morrison's market and economic research projects.

From Day 1, Morrison's focus has on been recognizing, respecting, and meeting the needs of their clients. With an understanding of both top-notch service organizations and real-world client needs (and how they can connect – or collide if not managed appropriately), their mission is to be a trusted advisor.

Economic Development Finance Corporation
The Economic Development Finance Corporation (EDFC) is a non-profit organization that makes loans to businesses in Mendocino and Lake Counties to create jobs and grow the local economy. In addition to its financing programs, EDFC provides a critical link between the public and private sectors acting not just as a lender but also as an economic development organization. EDFC works with a multitude of partners to develop plans and implement projects that support economic growth.

Section II. – Relevant Experience with Similar Projects

Center for Economic Development
The Center for Economic Development daily provides one-on-one mentoring, technical assistance and business services to clients throughout the North State. The CED specializes in data analysis and market research to assist businesses with understanding their market and customer bases, expand their reach, shift their business models, assess and set their price points and other activities that support their expansion. The CED also has the capacity to provide broadband assessments for businesses to identify and understand the business's needs to successfully operate online. The CED also provides workshops and trainings across all industry sectors.

The following are examples of the marketing support provided by the CED team:

- **Basic Wix website creation with account transfer to client – 10 to 20 hours**
    - Includes an About page, Product page (if information is provided) Contact/Location page, and links to social media accounts
    - Required: business name, address, phone number, email and social media account handles (if applicable)
    - Recommended: client provide paragraph about business history/background, provide photos and product descriptions if a product page is desired, client provide label and/or photos/videos -- for a more custom/unique website, it is suggested client provides as much content as possible. Alternative Option: If the client is unable to provide content, the CED team will work with the business to develop the content through interviews, meetings, photography, etc.
    - Expanded features and services are at expense of client (domain name, shopping cart/e-commerce).
- **Social media sample packet – 8 to 10 hours**
    - Includes 5 sample posts and suggested posting schedule
        - Choose from: Facebook, Instagram or Twitter sample posts (mix/match available)
    - Recommended: client provide 8 – 10 photos, 1 video
        - If photos/video are not provided by client – industry stock photos will be used or team can assist with acquiring photos of the business
- **Social media sample packet – 10 to 12 hours**
    - Includes 8 sample posts and suggested posting schedule
        - Choose from: Facebook, Instagram or Twitter sample posts (mix/match available)
    - Recommended: client provide 8 – 10 photos, 1 video
        - If photos/video are not provided by client – industry stock photos will be used or team can assist with acquiring photos of the business
- **ESRI Business Analyst Market Region Profiles – 4 hours each**
    - Business Market variable assessment – consumer spending (filtered by demographics – spending patterns, age, location), product pricing and income distribution
    - Competitive analysis – assessing similar businesses within a determined geography
    - Demographic profile – includes population, median age, number of households, median disposable income, educational attainment, unemployment rate, median household income, per capita income, median net worth, and household income.
    - Employment Overview – includes population, median age, number of households, median disposable income, educational attainment, unemployment rate, median household income, per capita income, median net worth, total businesses, total employees, and commuter data.
    - Key Facts – includes population, median age, average household size, median household income, educational attainment, total businesses, total employees, unemployment rate, per capita income, median net worth, and households by income.

    - Population Trends – includes total population, number of households, average household size, median age, median household income, median home value, wealth index, housing affordability, diversity index, population by age, mortgage indicators, historical population trends, home values, housing year built, and population by generation.
    - Coronavirus (COVID-19) Impact Planning Report – includes population, average household size, number of households, median age, median household income, median home value, housing affordability, percent with internet at home, daytime population, total businesses, total employees, households below the poverty level, household receiving Food Stamps/SNAP, households with disability, population 65+, households without a vehicle, population without health insurance by age, and population with health insurance coverage.
- **Policy and Regulatory research – 4 hours**
    - Provide information regarding policy and regulation for businesses to operate legally and within specific parameters for industry sectors. Research may include food regulations, manufacturing requirements, labeling and packaging specifications, etc.

The following are businesses the CED has provided services over the past year:

Winery/Vineyard - Durham, Ca (microenterprise)

- Market research focused on the client's target market region and demographic (spending patterns, median household income levels, age distribution, etc.)
- Provide research on effective social media outreach strategies
- Provide examples of social media posts
    - Social media post templates – Facebook, Instagram, Twitter
    - Suggested social media posting schedule
- COVID-19 business resource information
    - SBA Relief Program Information
    - Tax Breaks and Incentives
    - Ideas for continuing operations post shelter-in-place order

Cidery/Tasting Room – Chico, Ca (microenterprise)

- Market research focused on the client's target market region and demographic (spending patterns, median household income levels, age distribution, etc.)
- Provide research on effective social media outreach strategies
- Provide examples of social media posts
    - Social media post templates – Facebook, Instagram, Twitter
    - Suggested social media posting schedule
- Assist with development of basic business website
- COVID-19 business resource information
    - SBA Relief Program Information
    - Tax Breaks and Incentives
    - Ideas for continuing operations post shelter-in-place order

Brewery/Tap House – Chico, Ca

- Market research focused on the client's target market region and demographic (spending patterns, median household income levels, age distribution, etc.)
- Provide research on effective social media outreach strategies
- Provide examples of social media posts
    - Social media post templates – Facebook, Instagram, Twitter
    - Suggested social media posting schedule
- COVID-19 business resource information
    - SBA Relief Program Information
    - Tax Breaks and Incentives
    - Ideas for continuing operations post shelter-in-place order

Brewery - Princeton, Ca (microenterprise)

- Regional competitive cost analysis on beer
    - Gathered pricing data on 64 comparable 6-packs at 7 different retailers within the client's distribution area
    - Provided statistics (average, median, min and max) on prices of comparable beers for 3 of Farmer's Brewing beers
- Provided client with map and directory of local restaurants that are able to sell to-go alcohol with food purchase, as a business adaptation to the COVID-19 response

Kombucha Crafting - Redding, Ca (microenterprise)

- Research on FDA label requirements and regulations for Kombucha products
- Assistance with calculating calories and DV% for 1 Mama Shari's Kombucha recipe
- Provide examples of social media posts
    - Social media post templates – Facebook, Instagram, Twitter
    - Suggested social media posting schedule

Custom Furniture – Orland, Ca (microenterprise)

- Researched market expansion potential and options for client
- Assessment of best practices for E-commerce among comparable businesses
- Identification of potential suppliers and distributors within the client's market region
- Competitive analysis of comparable businesses

Salad Mixes/Farmstand – Corning, Ca (microenterprise)

- Research and provide information for client on difference between LLC and Partnership
- Researched market expansion potential and options for client
- Market research focused on the client's target market region and demographic (spending patterns, median household income levels, age distribution, etc.)
- Provide research on effective social media outreach strategies
- Provide examples of social media posts
    - Social media post templates – Facebook, Instagram, Twitter
    - Suggested social media posting schedule

Herbs and Microgreens – Redding, Ca (microenterprise)

- Researched market expansion potential and options for client
- Market research focused on the client's target market region and demographic (spending patterns, median household income levels, age distribution, etc.)
- Provide research on effective social media outreach strategies
- Provide examples of social media posts
    - Social media post templates – Facebook, Instagram, Twitter
    - Suggested social media posting schedule
- Assist with development of basic business website

Fruit and Vegetable Packaging – Finley, Ca

- Research and assessment of alternative packaging materials that are more sustainable based on researching comparable businesses

Auxiliary Fuel Tank Manufacturing – Chico, Ca

- Assisted with targeted marketing research to assess demand for a new product concept

Specialty Boysenberry Products – Orland, Ca (microenterprise)

- Market research focused on the client's target market region and demographic (spending patterns, median household income levels, age distribution, etc.)
- Identification of potential sales locations
- Market analysis of potential sales region
- Research and suggestions on how/where to gain product exposure

Bakery – Redding, Ca (microenterprise)

- Market research focused on the client's target market region and demographic (spending patterns, median household income levels, age distribution, etc.)
- Identification of potential sales locations
- Market analysis of potential sales region

Fermented and Pickled Products – Dunsmuir, Ca (microenterprise)

- Provided client with list of potential distributors within their target region

Cidery/Tap Room – Eureka, Ca

- Market analysis and consumer spending research for client's current sales region, and of three potential expanded sales regions

Heirloom Garlic Farm/Pickled Garlic – Anderson, Ca (microenterprise)

- Research and assistance with business start-up information
- Research on general requirements for manufacturing pickled garlic products
- Market research on client's potential sales region
- Identification of potential sales/distribution locations

Gluten-Free Bakery – Redding, Ca (microenterprise)

- Market research focused on the client's target market region and demographic (spending patterns, median household income levels, age distribution, etc.)

- Research and data on consumer spending on products labeled as gluten-free with client's target market region
- Identification of potential sales/distribution locations

Morrison

Morrison daily provides clients with direct one-on-one mentoring in all aspects of business management. Since their founding, Morrison has provided analyses of the financial feasibility and management of start-ups, well-established organizations, and expansions. Additionally, with a talented team of several Certified Public Accountants (CPAs), they have extensive experience in financial modeling, cash flow analysis, and projections to help organizations achieve fiscal sustainability. These CPAs have served in both industry and consulting capacities as financial executives.

Morrison has also engaged with organizations to provide workshops, classes, and direct one-on-one consulting to their members and clients, with attention to financial management, helping businesses reach new growth and stability, and through this work, has cooperatively worked with other contractors and agencies to deliver services. Their clients have included:

3CORE
Blue Diamond Growers
California Association of Winegrape Growers
California Center for Cooperative Development
California Olive Ranch
California State University, Chico
California Sustainable Winegrowing Alliance
ChicoBag
Chico Health Imaging
Challenge Dairy Products
City of Crescent City
City of Willows
Glenn County
Girls With Guns
Lundberg Family Farms
National Cooperative Business Association
National Farmers Organization
Northern California Regional Land Trust
Michigan Blueberry Growers
Napa Valley Grapegrowers
Reclamation District 108
Sheraton Real Estate
Sohnrey Family Foods
Sonoma County Winegrowers
Sunsweet Growers
Tehama County
Top O' the Morn Farms
University of California, Davis
University of Florida
Wine Institute
Work Truck Solution
Yuba-Sutter Economic Development Corporation

Morrison's most relevant firm experience includes having served as the Program Operator for the **City of Crescent City's Community Development Block Grant (CDBG) Microenterprise Assistance Program**. The goal of the program was to provide technical assistance to microenterprise businesses conducting business within the city limits. To qualify for the technical assistance program, a business had to operate within the city limits, have five or fewer employees, and the owner had to earn less than 80 percent of the County median income as adjusted for household size.

Crescent City CDBG Contact:
Bridget Lacey
Accountant
City of Crescent City
377 J Street
Crescent City, CA 95531
T: (707) 458-4814
F: (707) 465-1719
E: blacey@crescentcity.org

The Microenterprise Assistance Program provided the opportunity for qualifying businesses to receive up to 40 hours of direct technical assistance from a certified public accountant and up to 10 hours of direct communication and counseling with a business advisor for up to a total of 50 hours of business guidance. This technical assistance and guidance was tailored to the direct expressed needs of the business. The program provided support on financial issues microenterprise businesses owners requested to learn about and/or direct technical assistance on the challenges they were facing as business owners. Through the program, microenterprise business owners requested to receive assistance on best practices for small business record keeping, planning, tracking expenses, categorizing expenses, documenting income; preparation and analysis of financial statements; preparation and analysis of cash flow projections; identification of business needs; matching of potential lending/financial partners; and, other issues facing their businesses.

Morrison performed the following financial analysis for the program participants:

- A restaurant building owner – The key goal of Morrison's technical assistance was to assist in the development of financial projections to help determine the viability of a potential restaurant business and the working capital needs to operate the business. The final deliverable was an extensive analysis that included: the venture description, the history of existing financing relationships, Morrison's approach, relevant market data from a market research company engaged by the participant, Morrison's market research, a Representation Letter signed by the participant, Financial Projections, a Projection Sensitivity Analysis, the related Assumptions, an Appendix with all of the market research by Morrison, as well as the documentation provided by the participant that informed the projections and research.
- A farmers market business owner – The key goals of Morrison's technical assistance were to: provide a cash flow forecasting model so that the participant could better anticipate his revenue and expenses throughout the year in order to plan accordingly; and to help him select an accounting system and get trained on the use of the system to help them simplify his financial processes, streamline his financial information, and to help him better prepare for tax season. The final deliverables included the development of a three year cash flow plan Excel template (so he could adjust numbers as needed) and the related assumptions, a recommendation of an electronic accounting system and introductory training on that system.

- A coffee roasting business owner – The key goals of Morrison's technical assistance were to: provide the participant with a tool to facilitate a deeper understanding of the financial implications of purchasing and operating a coffee bike which would in turn provide greater insight on a decision to pursue financing for this business pursuit; and, to increase his understanding of market demand for his coffee in order to grow his business strategically. The final deliverables included a financial analysis of the coffee bike project, the assumptions, and the results of a market survey.
- A mobile safe company owner – The key goal of Morrison's technical assistance was to develop an invoicing system and provide related QuickBooks instructions to help the participant to have additional tools to keep his business finances organized and accounted for. In addition to developing the invoicing system and providing the related QuickBooks instructions, Morrison discussed developing a written system for when bills are due to help manage cash flow. Morrison also provided resources for QuickBooks training that were tailored to the business needs as well as resources for inexpensive online search engine optimization and digital marketing design. The final deliverables included invoicing instructions and related detailed QuickBooks instructions as well as a list of QuickBooks training links and other resources.
- A sandwich business owner – The key goals of Morrison's technical assistance were to: facilitate a better understanding of how current costs related to product pricing so that the participant could revise his prices as needed based on costs; help him implement a standardized invoicing system; increase his understanding of options for low cost advertising; and, to provide the information/training needed to select and implement an electronic accounting system for his business to enable him to keep track of income and expenses in preparation for the growth of his business. The final deliverables included the development of an Excel template for the participant to utilize as an electronic check register, recommendations of an electronic accounting system once his business grows bigger, as well as the development of a "sandwich calculator" in Excel enabling him to calculate ingredient costs for each type of sandwich.

In addition to running the Microenterprise Technical Assistance Program for the City of Crescent City, Morrison team members have served in CEO, CFO controller, and other positions, filling interim and outsource roles for companies from less than $2 million in revenues to hundreds of millions. They also have conducted dozens of feasibility studies and business plans throughout their 18-year history. These have included analyses of markets, proposed ventures, start-ups, well-established organizations, and expansions. Additionally, Morrison has extensive experience in financial modeling, cash flow analysis, and projections to help organizations achieve fiscal sustainability. Their feasibility studies and business plans have also been used to guide more than 50 United States Department of Agriculture supported projects.

Relevant interim engagements and feasibility studies and business plans have included:

- Serving as Outsource CFO for a processing, distribution, and consumer products food company (the largest US company in its industry) for over a year.
- Restructuring finance operations (staffing, procedures, ERP) during a period of rapid growth.
- Serving as Interim President & CEO for a northern California agribusiness firm while Morrison performed a search for a permanent replacement.
- Serving as Outsource controller for a large family-owned company that had struggled to retain professional-level accounting and finance staff or outsource assistance.
- Providing assistance and direction in meeting year-end closing needs, bank and other reporting requirements, and other deadline or project driven goals for several companies. This has included hands-on performance of tasks and oversight of client personnel if needed.
- Feasibility assessment to determine the general viability of a cold storage facility venture for a government entity which included a regional market overview, qualitative market research, secondary market research and volume estimates, an operational analysis, a management analysis, assessment of capital needs, a risk assessment, and pro forma financial projections.
- Feasibility assessment to determine the general viability of a community kitchen incubator venture at the Red Bluff Community Center for Tehama County. The feasibility assessment included a regional market overview, qualitative market research, secondary market research and volume estimates, an operational analysis, a management analysis, assessment of capital needs, a risk assessment, and pro forma financial projections.
- Feasibility assessment of the establishment of a regional community food hub to connect local growers to consumers and other markets, including evaluations of supply and buyer interest to determine a market analysis. Assessment included stakeholder interviews and financial projections under two separate operating models.
- Financial assessment and feasibility study of the Colusa, Glenn, and Trinity Community Action Partnership to identify program funding adequateness and options for organizational structure.

Section II. – Roles and Responsibilities

Center for Economic Development

The Center for Economic Development will serve as the program operator and contact for the City of Ukiah. The CED is prepared to oversee and manage the designated tasks outlined in the Scope of Work. The CED will be responsible for marketing the TA program in collaboration with EDFC, screening the businesses for eligibility of number of employees and the low- to moderately-low income requirements as outlined by Housing and Community Development's CDBG guidelines, ascertain needs and readiness of each business, and determine which member of the Team can best provide services to each business.

The CED will also be responsible for identifying any class/workshop topics identified as useful to a group of businesses with similar needs as appropriate.

Key Personnel

Courtney Farrell – Project Manager

Courtney has over 20 years' experience in economic and community development, business development, project management and funding development. She has coordinated development efforts and strategic planning sessions between cities, counties, government agencies, private companies and nonprofits. Her expertise is in strategic planning, relationship building, facilitation, conference and event planning, grant writing, donor cultivation and stewardship, and fundraising.

From 2012 to 2015, Courtney managed Butte County's CDBG Business Incubation Program (BiP). During that time, she was responsible for marketing the program, identifying and screening potential businesses based on the CDBG eligibility requirements, assessed business needs, created development plans, coordinated TA activities, developed workshops, completed grant reports and participated in monitoring activities. From 2015-2017, Courtney managed a Business Vitality Seed Fund in partnership with the City of Chico's CDBG program. This fund provided grants up to $5,000 per eligible business.

She is a founding member of Team Chico an economic development collaborative for the City of Chico and the City of Corning's Economic Development Action Committee. Courtney has a Master's Degree from CSU, Chico and successfully completed the School of Executive Leadership training, University of Michigan, Ross School of Business and the University of Arizona's Economic Development Course.

Hayley Stone – Senior Project Analyst

Hayley holds a BA in Geography and Planning, a Certificate in Rural and Town Planning, a minor in Diversity Studies and a Master's Degree in Public Administration from CSU, Chico. She has over 6 years of professional experience performing GIS data development and maintenance, as well as data analysis at the Geographical Information Center. Since March of 2018, Hayley has been responsible for managing several statewide, regional and local level GIS contracts and timelines.

In addition to her GIS background, Hayley works with the Center for Economic Development to design and implement research projects that are intended to fill data gaps on workforce, training, and industry needs. At the Center for Economic Development, Hayley manages a strategic partnership with California Manufacturing and Technology Consultants to provide technical assistance to manufacturing businesses within the North State region. Through this partnership, Hayley outreaches and connects with potential businesses, and together they establish a technical assistance plan that is geared to the specific goals and needs of each business.

Additionally, at both the Geographical Information Center and the Center for Economic Development, Hayley leads project teams of full-time staff and student research assistants, provides professional mentorship to interns, and assists with new project development and the development of resources for the North State.

Morrison
Morrison will provide direct technical assistance to identified, eligible businesses for the TA program.

Key Personnel
Toni Scott – Managing Principal
Toni Scott is responsible for Morrison's overall management and operations. She also leads and directs Morrison's grant services, working with clients in government, food, agribusiness, manufacturing, production agriculture, processing, and marketing to plan, prepare for, and secure competitive state and federal grant funding. She also oversees grant administration of client projects and contributes to business plan and feasibility study projects and conducts strategic planning and facilitation. Toni directs Morrison's external communications and industry outreach.

Shawn Miller – Principal, People Solution Services
Shawn Miller joined Morrison in 2016 and leads the People Solutions Services practice area, serving clients in industries including agribusiness, manufacturing and processing, distribution, health care, and non-profit, focusing on executive recruiting, organizational development, outsourced and interim human resources management, and human resources advisement and compliance.

Geoff Chinnock – Consultant, Business and Accounting Advisory Services
Geoff Chinnock joined Morrison in 2007 and serves as an advisor to clients in processing, agribusiness, distribution, manufacturing, marketing, and production agriculture. His service areas include virtually every aspect of Morrison's Business & Accounting Advisory Services, with a focus on strategy and overall business management.

Economic Development Finance Corporation
For the purposes of this program, EDFC will provide outreach activities throughout the City of Ukiah to promote the TA program by utilizing their mail chimp newsletter, Facebook, Twitter and referrals. CED will work with EDFC to create marketing material, social media posts, and press releases for promotion activities and to develop the program web site. Additionally, EDFC will provide in-person meeting space for the team to meet with businesses as needed.

At this time, due to COVID-19, the team has the capabilities to meet remotely with business owners. During the initial screening of each business for eligibility, the team will discuss the best approach for communication with the business to best accommodate the interaction and process of the development plan and implementation of the work.

The Team will make referrals to the EDFC as finance needs arise.

Key Personnel

Diann Simmons – Operations Manager

Diann brings a diverse background to EDFC. She grew up in the Midwest and spent almost two decades living the back-to-the-land life in northern Wisconsin and raising three children. She moved to Sonoma County from the Southwest in the late 90's and initiated nearly a decade of work as a project manager in affordable housing development. She has lived in Mendocino County since 2002 and worked in the county since 2004. In 2008 she turned her attention to her rural community in Round Valley and transferred her grant writing capacity from affordable housing, to funding and coordinating community wellness and youth programs for the Round Valley Indian Health Center and the Round Valley Unified School District. She was a co-leader in a volunteer group that imagined, funded and created the Round Valley Library Commons. When she and her husband moved to the eastern Ukiah hills, she brought her focus on community well-being to her work with EDFC.

Section III. – Budget and Schedule

Task A: Marketing and Outreach

Deliverables:

1. Development of marketing materials (flyers, social media, web site, press releases) – September 1 – September 30, 2020
2. Marketing and Outreach – September 1, 2020 – August 31, 2021

Task B: Business Eligibility Screening – (October 1, 2020 – August 31, 2021)

Deliverables:

1. Review businesses on a first-come basis
2. Assess income and microenterprise eligibility including completion of required forms
3. Evaluate business readiness

Task C: Identify Business Needs– (October 1, 2020 – August 31, 2021)

Deliverables:

1. Create business development plan with schedule and activities
2. Determine team member to implement development plan and timeline
3. Determine indicators for tracking
4. Work with business to accomplish deliverables

Task D: Business Technical Assistance – (October 1, 2020 – August 31, 2021)

Deliverables:

1. Implement development plan
2. Assess progress and effectiveness of technical assistance

3. Evaluate outcomes – job creation and number of businesses formed for grant reporting and program monitoring

Task E: Identify Workshop Demand – (October 1, 2020 – August 31, 2021)
Deliverables:

1. Determine similar needs shared by multiple businesses for coordination of workshops
2. Develop workshop content

Task F: Program Administration – (October 1, 2020 – August 31, 2021)
Deliverables:

1. Provide required data and information for grant reporting and program monitoring to City staff in a timely manner
2. Coordinate with City staff to ensure timely submittal of all data, reports and cash requests associated with the program
3. Assist with close out of program and any program monitoring upon completion

The Center for Economic Development proposes between 20 and 40 hours to be spent with each business client depending on the services needed. This would be a cost of approximately $2,500 to $5,000 per participant.

Morrison proposes to provide each participant that needs financial and accounting direct technical assistance up to 40 hours of direct technical assistance. This would be at a cost of $9,000 per participant.

The Team anticipates serving up to 20 clients in this program but could be adjusted as the budget allows.

City of Ukiah's Microenterprise TA Program Tasks and Budget	
Tasks	**Fixed Fee Per Task**
Task A: Marketing and Outreach	$10,000
Task B: Business Eligibility Screening	$121,800
Task C: Identify Business Needs	
Task D: Business Technical Assistance	
Task E: Identify Workshop Demand	$2,500
Task F: Program Administration	$5,700
Total Budget	**$140,000**

City of Ukiah
CDBG META Program Operator
Proposal Evaluation Summary

Evaluation Criteria	Maximum Points	Center for Economic Development – Individual Evaluator Ranking #1	#2	#3	West Business Development Center – Individual Evaluator Ranking #1	#2	#3
Capabilities, resources and applicable experience of the firm, especially as relates to performance on CDBG-funded activities.	**15**	15	15	13	10	13	15
Responsiveness - how firm addresses the Scope of Work.	**35**	35	35	33	20	35	28
Qualifications and experience of key individuals, especially as related to CDBG Microenterprise Technical Assistance Programs.	**10**	10	10	8	7	10	10
Schedule for completion of the work.	**5**	5	5	5	2	4	5
Budget and schedule of charges.	**35**	35	32	30	20	25	20
Individual evaluator totals:	**100**	*100*	*97*	*89*	*59*	*87*	*78*
Combined averaged totals for each consulting firm:		**95**			**75**		

Listed by Rank:	**Score:**
Center for Economic Development	95
West Business Development Center	75

Agenda Item No: 7.h.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-489

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Approval of Notice of Completion for Golf Course Storm Drain Project, Specification 19-07, Change Orders and Budget Amendment in the Amount of $35,955.26.

DEPARTMENT: Public Works **PREPARED BY:** Jason Benson, Senior Civil Engineer
PRESENTER:

ATTACHMENTS:

1. Contract Change Order #1-4
2. Notice of Completion-Spec 19-07
3. Invoices- Valley Paving, Tayman Park Golf Group
4. Contract_1920255

Summary: Council will Consider 1. Accepting the work as complete. 2. Directing the City Clerk to file the Notice of Completion with the County Recorder for Golf Course Storm Drain Replacement, Specification No.19-07. 3. Approval of Change Orders. 4. Approval of Budget Amendment in the Amount of $35,955.26

Background: The City Council awarded a contract on May 20, 2020, to T&T Paving Inc., dba Valley Paving of Redwood Valley, CA in the amount of $114,671, inclusive of quantities to be billed at actual amounts. The project involved the removal and replacement of the existing storm drains damaged as a result of the February storms in 2019. The project is FEMA-approved in the amount of $162,477. The total project costs will be reimbursed by FEMA at 75%, by Cal OES 18.75%, and the City will be responsible for the remaining 6.25%. With completion of the project, invoices will be submitted for reimbursable funds to be released.

Discussion: The work of the contract was completed by the contractor in substantial conformance with the approved plans and specification on July 10, 2020. The City Engineer approved four contract change orders (Attachment 1) totaling $31,270.50 for installation of storm drain pipe, drain inlets, replacement of existing sidewalk, and the inlet and outflow of the storm drain system.

Approved change orders consisted of the following:

Change Order 1 - A 4” water main for the golf course irrigation system near an existing storm drain being replaced is in the location of the new storm drain pipeline.

Change Order 2 – Conflict with a 4” water main for the golf course irrigation system near the storm drain and drain inlet replacement. Additional excavation and backfill required to revise the existing terrain slope, with additional adjustments to drain inlets.

Change Order 3 - Pave (4) areas of the golf course cart path outside of the construction zone damaged by construction equipment and materials traffic. These areas shall include approximately 2,000 SF.

Change Order 4 – Bid item deduct for item #2 installation of 44 LF of storm drain and item #15 turf replacement, and bid item add for item #3 installation of 44 LF of storm drain.

Based on actual quantities constructed and the authorized contract change orders, the final Valley Paving contract cost was $162,093.36. Final payment of the retention will be made to the contractor after 35 days from the date the Notice of Completion (Attachment 2) is filed with the County Recorder.

In addition to Change Order 4 for Valley Paving that had a deduction of $15,000 for turf replacement, the Golf Course Management Team (Tayman Park Golf Group) agreed upon the replacement of turf at or below the same cost. This work included materials: compost, grass seed, and fertilizer and labor time associated. The invoice for this work (Attachment 3) also includes the Time and Material associated with irrigation timer repairs that were damaged during excavation.

The total cost of the project is $162,093.36 and is below the FEMA approved amount of $162,477.00.

Staff is requesting approval of: Notice of Completion with the County Recorder for Golf Course Storm Drain Replacement, Specification No.19-07. 2. Approval of Change Orders. 3. Approval of Budget Amendment in the Amount of $35,955.26

The original contract has been attached for reference as Attachment 4.

Recommended Action: 1. Accept the work as complete. 2. Direct the City Clerk to file the Notice of Completion with the County Recorder for Golf Course Storm Drain Replacement, Specification No.19-07. 3. Approval of Change Orders. 4. Approval of Budget Amendment in the Amount of $35,955.26

BUDGET AMENDMENT REQUIRED: Yes- $35,955.26

CURRENT BUDGET AMOUNT: 72022400.80230.18191: $126,138.10 (including 10% contingency)

PROPOSED BUDGET AMOUNT: 72024400.43290.18191- $26,966.45; 72022400.43191.18191- $6,741.61; 10000000.95720- $2,247.20

FINANCING SOURCE: 75% FEMA Public Assistance Grant, 18.75% Cal OES, 6.25% General Fund

PREVIOUS CONTRACT/PURCHASE ORDER NO.: 1920255

COORDINATED WITH: Tim Eriksen, Director of Public Works/City Engineer; Mary Horger, Financial Services Manager

Approved: Sage Sangiacomo, City Manager

ATTACHMENT "1"

CITY OF UKIAH
CONTRACT CHANGE ORDER

ORDER NO. 001
DATE: July 1, 2020

Contract for: UVGC – Storm Drain Replacement Project; Specification No. 2019-07

Owner: City of Ukiah, 300 Seminary Avenue, Ukiah, California, 95482-5400

To: Valley Paving, PO Box 559, Redwood Valley, CA 95470

You are hereby directed to make the herein described changes from the contract plans and specifications or do the following described work not included in the contract plans and specifications:

Change requested by: Tim Eriksen

Description of Changes - Itemized Breakdown	ESTIMATED DECREASE To Contract Amount	ESTIMATED INCREASE To Contract Amount
A 4" water main for the golf course irrigation system near an existing storm drain being replaced is in the location of the new storm drain pipeline. Discussions were held with the Golf Course Management Team and COU for a revised plan for construction of the pipe and drain inlets designed for the area.	$0	$4,316.50
ESTIMATED NET CHANGE IN CONTRACT PRICE	**$0**	**$4,316.50**

The amount of the Contract will be (~~decreased~~/increased/~~unchanged~~) by the estimated sum of: $4,316.50

The contract total including this and previous Change Orders will be: **$118,987.50**

The contract period provided for completion will be (~~increased~~/~~decreased~~/unchanged):

This change order constitutes full and complete compensation for all labor equipment, materials, overhead, profit, any and all indirect costs, and time adjustments required to perform the above described change.

Recommended By: _____ City of Ukiah — Date _____

Approved By: _____ Jason Benson, City of Ukiah — Date 01 July 2020

Accepted: _____ Scott Ault, Project Manager — Date 7-1-2020

This information will be issued as a record of any changes to the original construction contract.

ORDER NO. 002
DATE: July 2, 2020

CITY OF UKIAH
CONTRACT CHANGE ORDER

Contract for: UVGC – Storm Drain Replacement Project; Specification No. 2019-07

Owner: City of Ukiah, 300 Seminary Avenue, Ukiah, California, 95482-5400

To: Valley Paving, PO Box 559, Redwood Valley, CA 95470

You are hereby directed to make the herein described changes from the contract plans and specifications or do the following described work not included in the contract plans and specifications:

Change requested by: Tim Eriksen

Description of Changes - Itemized Breakdown	ESTIMATED DECREASE To Contract Amount	ESTIMATED INCREASE To Contract Amount
Conflict with a 4" water main for the golf course irrigation system near the storm drain and D.I #1 replacement. Additional excavation and backfill is required to revise the existing terrain slope from D.I. #2 to D.I. #1. Additional removal and replacement of the small drain inlet that is adjacent to D.I. #2 requires adjustments to the top of D.I. #1 to raise to grade. Discussions were held with the Golf Course Management Team and COU for a revised plan for construction of the pipe and drain inlets designed for the area.	$0	$1,216.00
ESTIMATED NET CHANGE IN CONTRACT PRICE	**$0**	**$1,216.00**

The amount of the Contract will be (~~decreased~~/increased/~~unchanged~~) by the estimated sum of: $1,216.00

The contract total including this and previous Change Orders will be: **$120,203.50**

The contract period provided for completion will be (~~increased~~/~~decreased~~/unchanged):

This change order constitutes full and complete compensation for all labor equipment, materials, overhead, profit, any and all indirect costs, and time adjustments required to perform the above described change.

Recommended By: JRB
City of Ukiah — Date

Approved By: Jason Benson
Jason Benson, City of Ukiah — Date 20 July 2020

Accepted: Scott Ault
Scott Ault, Project Manager — Date 7/22/20

This information will be issued as a record of any changes to the original construction contract.

ORDER NO. 003
DATE: July 7, 2020

CITY OF UKIAH
CONTRACT CHANGE ORDER

Contract for: UVGC – Storm Drain Replacement Project; Specification No. 2019-07

Owner: City of Ukiah, 300 Seminary Avenue, Ukiah, California, 95482-5400

To: Valley Paving, PO Box 559, Redwood Valley, CA 95470

You are hereby directed to make the herein described changes from the contract plans and specifications or do the following described work not included in the contract plans and specifications:

Change requested by: Tim Eriksen

Description of Changes - Itemized Breakdown	ESTIMATED DECREASE To Contract Amount	ESTIMATED INCREASE To Contract Amount
Pave (4) areas of the golf course cart path damaged by construction equipment and materials traffic. The process shall include: saw cut and excavate the marked areas not exceed a 12" depth, load and off haul material from site, and furnish and compact 9" of base rock and 3" of asphalt concrete. The approximately 2,000 SF area: "Y" at the Hole 9 green and the Hole 10 tee box, top of hill along Hole 17 fairway, "Y" at the Hole 16 green and the Hole 17 tee box. Discussions were held with the Golf Course Management Team and COU for a revised plan for paving the cart paths in the area of the construction zone.	$0	$40,320.00
ESTIMATED NET CHANGE IN CONTRACT PRICE	**$0**	**$40,320.00**

The amount of the Contract will be (~~decreased~~/increased/~~unchanged~~) by the estimated sum of: $40,320.00

The contract total including this and previous Change Orders will be: **$160,523.50**

The contract period provided for completion will be (~~increased~~/~~decreased~~/unchanged~~)~~:

This change order constitutes full and complete compensation for all labor equipment, materials, overhead, profit, any and all indirect costs, and time adjustments required to perform the above described change.

Recommended By: _____ City of Ukiah — Date _____

Approved By: _____ Jason Benson, City of Ukiah — Date 20 July 2020

Accepted: _____ Scott Ault, Project Manager — Date 7/22/20

This information will be issued as a record of any changes to the original construction contract.

ORDER NO. 004
DATE: July 10, 2020

CITY OF UKIAH
CONTRACT CHANGE ORDER

Contract for: UVGC – Storm Drain Replacement Project; Specification No. 2019-07

Owner: City of Ukiah, 300 Seminary Avenue, Ukiah, California, 95482-5400

To: Valley Paving, PO Box 559, Redwood Valley, CA 95470

You are hereby directed to make the herein described changes from the contract plans and specifications or do the following described work not included in the contract plans and specifications:

Change requested by: Tim Eriksen

Description of Changes - Itemized Breakdown	ESTIMATED DECREASE To Contract Amount	ESTIMATED INCREASE To Contract Amount
Item #2: Install 12" HDPE Storm Drain Pipe. Deduct of 44 LF	$1,672.00	$0.00
Item #3: Install 18" HDPE Storm Drain Pipe. Addition of 44 LF	$0.00	$2,090.00
Item #15: Turf Replacement. Continue with bid item to provide work for grading, contouring, and placing amendments. Golf Course Management team to provide compost, grass seed, fertilizer, and the equipment for placement.	$15,000.00	$0.00
ESTIMATED NET CHANGE IN CONTRACT PRICE	**$16,672.00**	**$2,090.00**

The amount of the Contract will be (decreased/~~increased~~/~~unchanged~~) by the estimated sum of: $14,582.00

The contract total including this and previous Change Orders will be: **$145,941.50**

The contract period provided for completion will be (~~increased~~/~~decreased~~/unchanged):

This change order constitutes full and complete compensation for all labor equipment, materials, overhead, profit, any and all indirect costs, and time adjustments required to perform the above described change.

Recommended By: _____ City of Ukiah — Date _____

Approved By: _____ Jason Benson, City of Ukiah — Date 20 July 2020

Accepted: _____ Scott Ault, Project Manager — Date 7/22/20

This information will be issued as a record of any changes to the original construction contract.

Please return to:

CITY OF UKIAH
300 Seminary Avenue
Ukiah, California 95482-5400
(707) 463-6200

No fee pursuant to Government Code 27383

NOTICE OF COMPLETION

NOTICE IS HEREBY GIVEN:

1. That the real property described is owned by the following whose address is: City of Ukiah, a Municipal Corporation, 300 Seminary Avenue, Ukiah, California 95482-5400.

2. That the nature of the title to the UVGC- Storm Drain Replacement Project, Specification No. 19-07 of all said owners is that of fee simple.

3. That on the 10th day of July, 2020, the Contract work for this project was actually completed.

4. That the name and address of the Contractor is Valley Paving, PO Box 559, Redwood Valley, CA 95470.

5. That the real property herein referred to is described as the specific section of the Ukiah Valley Golf Course (UVGC) Mendocino County, California within the Ukiah City Limits beginning on the property in the south area near Fairway Avenue and terminating in the north near Orr Creek.

I hereby certify under penalty of perjury that the forgoing is true and correct:

City Council Approval CITY OF UKIAH, a Municipal Corporation

_____ By: _____ _____
Date Kristine Lawler, City Clerk Date

State of California

County of Mendocino

Exempt from recording fees pursuant to Government Code Section 27383

Tayman Park Golf Group
DBA Ukiah Valley Golf Course
599 Park Blvd.
Ukiah, Ca. 95482
707-467-2832

Invoice
7/22/20
Ukiah 599

Bill To
City of Ukiah

Materials for project damage mitigation	$622.49
Time and labor spent for project damage mitigation	$12,372.51
Pipe replacement 12” wide section and damage turf areas to cover 3,800 square yards.	
Compost 40 yards delivered	$2,083.20
12 Bags 600 lbs Rye Perennial Champion Grass @ 1.25/ lb	$815.63
11 Bags 550 lbs 15-15-15 hydro prills @ $21.57 / bag	$258.03
Total	$16,151.86

Please make check payable to Ukiah Valley Golf Course

If you have any questions about this invoice, please contact
Frank Johnson
707-291-1474
ukiahgolf@gmail.com

Bill To

City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Date	Invoice No.	Project
7/23/2020	20/071	Ukiah Valley Golf Course

Description	Qty	Unit $	Contract	Prior Amt	Prior %	Curr %	Amount
Project: #1920-255 UVGC Storm Drain Replacement							
1. Mobilization	1	6,500.00	6,500.00			100.00%	6,500.00
2. Install 12" HDPE storm drain pipe	280	38.00	10,640.00			100.00%	10,640.00
3. Install 18" HDPE storm drain pipe	630	47.50	29,925.00			100.00%	29,925.00
4. Install 24"x24" drain inlet	9	2,000.00	18,000.00			100.00%	18,000.00
5. Install riprap apron	6	172.00	1,032.00			100.00%	1,032.00
6. Remove and replace AC sidewalk	84	78.00	6,552.00			100.00%	6,552.00
7. Turf replacement	12,000	2.40	28,800.00			100.00%	28,800.00
8. Existing storm drain removal and disposal	889	10.00	8,890.00			100.00%	8,890.00
9. Existing SD small drain structure removal and disposal	10	175.00	1,750.00			100.00%	1,750.00
10. Install 36"x36" drain inlet	1	3,000.00	3,000.00			100.00%	3,000.00
CO #1 - Re-dig trench to lower grade and go under water line; additional sand backfill and spoils off haul per TM 01	1	4,316.50	4,316.50			100.00%	4,316.50
CO #2 - Conflict with second 4" main irrigation water line/small drain inlet, replacement/raising of D.I. #1	1	1,216.00	1,216.00			100.00%	1,216.00
CO #3 - Repair (4) areas of cart path damaged by construction	2,016	20.00	40,320.00			100.00%	40,320.00
CO #4 - Decrease in Item #15 Turf Replacement	1	-15,000.00	-15,000.00			100.00%	-15,000.00
Total project			145,941.50			100.00%	145,941.50

PO Box 559, Redwood Valley, CA 95470 Business: (707) 485-7505 FAx: (707) 485-8747
Email: valleypaving@comcast.net

Total $145,941.50

CONTRACT APPROVAL & AUTHORIZATION TO PROCEED

NOTE: The City Manager will sign contracts once all initials have been signed.

TO: CITY MANAGER **CONTRACT #:** 1920-255

SUBMITTED BY: Mary Horger

DATE: 6/3/2020

PROJECT NAME: T&T Paving dba Valley Paving - Golf Course Storm Drain Project

CHECKLIST & ROUTING FOR APPROVALS		Initial Below REVIEWED AND APPROVED BY
1.	**Procurement Manager** Sourcing method and justification (attach documentation if necessary): City Council Approval Date: 5/20/2020 Agenda Item No.: 7.i. Budget No(s).: 72022400.80230.18191 ***Note:*** *Please attach post meeting staff report showing approval, and any documentation or description showing funding.*	Mary Horger
2.	**City Attorney** ***Note:*** *If you have an email approval from the City Attorney, then you may attach a copy of the email and reference it in lieu of initials.*	David J. Rapport
3.	**Risk Manager** ***Note:*** *Attach insurance documents.*	Note - Course of Construction was removed by addenda. Sheri Marrion
4.	**City Clerk**	Kristine Lawler

ADDITIONAL COMMENTS: PLEASE NOTE ... This can only be signed off electronically by CA and Risk. Formal construction contract needs actual hardcopies signed by CC and CM. Kristine ... I will have the originals in your office Friday morning.

CITY OF UKIAH
Mendocino County, California

AGREEMENT

FOR
UKIAH VALLEY GOLF COURSE - STORM DRAIN REPLACEMENT PROJECT
SPECIFICATION NO. 19-07

THIS AGREEMENT, made this 21st day of May 21, 20 20, by and between the City of Ukiah, Mendocino County, California, hereinafter called the City and T&T Paving, Inc. dba Valley Paving hereinafter called the Contractor,

WITNESSETH:

WHEREAS, the City has caused to be prepared in accordance with law, specifications, drawings and other contract documents for the work herein described and shown and has approved and adopted these contract documents, specifications and drawings and has caused to be published in the manner and for the time required by law a notice to bidders inviting sealed proposals for doing the work in accordance with the terms of this contract and

WHEREAS, the Contractor, in response to the notice to bidders, has submitted to the City a sealed proposal accompanied by a proposal guaranty in an amount of not less than 10 percent of the bid price for the construction of the proposed work in accordance with the terms of this contract and

WHEREAS, the City, in the manner prescribed by law, has publicly opened, examined and canvassed the proposals submitted and as a result has determined and declared the Contractor to be the lowest and best regular responsible bidder for the work and for the sums named in the proposal,

NOW, THEREFORE, THIS AGREEMENT WITNESSETH:

Article 1. Work to be Done and Contract Days Allowed.

That the Contractor shall provide all necessary machinery, tools, apparatus and other means of construction; shall furnish all materials, superintendence, overhead, expenses, all labor and expenses of whatever nature necessary for completion of the work in conformity with the Special Provisions and other contract documents hereto attached and according to such instructions as may be given by the Engineer. The Contractor shall complete the work within 20 (twenty) working days. Contract days shall be counted starting with the 10th day following receipt of notice that the contract has been executed by the City. Contractor, at his or her option, may begin work prior to start of counting contract days, however, in no event shall the Contractor start work without giving notification to the Engineer at least 72 hours prior to the start of work, without obtaining an encroachment permit from the City, or without having submitted certificates of insurance that have been accepted and approved by the Engineer

Article II. Contract Prices.

That the City shall pay the Contractor the prices stated in the proposal submitted by the Contractor, for complete performance of the contract by the Contractor. The Contractor hereby agrees to accept the prices as full compensation for all material and appliances necessary to the work, for all labor and use of tools and other implements necessary to execute the work contemplated in this contract; for all loss or damage arising out of the nature of the work or from the action of the elements, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the work; for all risks of every description connected therewith; for all expenses of the work, as herein specified; for all liability and other insurance, for all overhead and other expenses incident to the work; all according to the Contract Drawings, the Special Provisions, the Details, the instructions and the requirements of the City.

Article III. Labor Discrimination.

Attention is directed to Section 1735 of the Labor Code, which reads as follows:

> "No discrimination shall be made in the employment of persons upon public works because of the race, color, national origin or ancestry, or religion of such persons and every contractor for public works violating this section is subject to all the penalties imposed for a violation of this chapter."

In connection with the performance of work under this contract, the Contractor agrees as follows:

(a) The Contractor will not willfully discriminate against any employee or an applicant for employment because of race, color, religion, ancestry, or national origin. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, ancestry, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the awarding authority setting forth the provisions of this Fair Employment Practice section.

(b) The Contractor will send to each labor union or representative of workers with which he or she has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the awarding authority, advising the said labor union or worker's representative of the Contractor's commitments under this section, to employees and applicants for employment.

(c) The Contractor will permit access to his or her records of employment, employment advertisements, application forms and other pertinent data and records by the Fair Employment Practices Commission, City of Ukiah or any other appropriate agency of the State of California designated by the awarding authority, for the purposes of investigation to ascertain compliance with the Fair Employment Practices section of this contract.

(d) A finding of willful violation of the Fair Employment Practices section of this Contract or of the Fair Employment Practices Act shall be regarded by the awarding authority as a basis for determining the Contractor to be not a "responsible bidder" as to future contracts for which such Contractor may submit bids, for revoking the Contractor's pre-qualification rating, if any and for refusing to establish, reestablish or renew a pre-qualification rating for the Contractor.

The City of Ukiah shall deem a finding of willful receipt of written notice from the Fair Employment Practices Act to have occurred upon that it has investigated and determined that the Contractor has violated the Fair Employment Practices Act and has issued an order under Labor Code Section 1426 or obtained an injunction under Labor Code Section 1429.

Upon receipt of such written notice from the Fair Employment Practices Commission, the City shall notify the Contractor that unless he or she demonstrates to the satisfaction of the awarding authority within a stated period that the violation has been corrected, his or her pre-qualification rating will be revoked at the expiration of such period.

(e) The Contractor agrees that should the City determine that the Contractor has not complied with the Fair Employment Practices section of this Contract, then pursuant to Labor Code Section 1735 and 1775 the Contractor shall, as a penalty to the City, forfeit for each calendar day or portion thereof, for each person who was denied employment as a result of such non-compliance, the penalties provided in the Labor Code for violation of prevailing wage rates. Such monies may be recovered from the Contractor. The City may deduct any such damages from any monies due the Contractor.

(f) Nothing contained in this Fair Employment Practices section shall be construed in any manner of fashion so as to prevent the City or the State of California from pursuing any other remedies that may be available at law.

(g) Prior to awarding the Contract, the Contractor shall certify to the awarding authority that he or she has or will meet the following standards for affirmative compliance, which shall be evaluated in each case by the awarding authority:

(1) The Contractor shall provide evidence, as required by the City that he or she has notified all supervisors, foremen and other personnel officers in writing of the content of the anti-discrimination clause and their responsibilities under it.

(2) The Contractor shall provide evidence, as required by the City, that he or she has notified all sources of employees' referrals (including unions, employment agencies, advertisements, Department of Employment) of the content of the anti-discrimination clause.

(3) The Contractor shall file a basic compliance report, as required by the City. Willfully false statements made in such reports shall be punishable as provided by law. The compliance report shall also spell out the sources of the work force and who has the responsibility for determining whom to hire, or whether or not to hire.

(4) Personally, or through his or her representatives, the Contractor shall, through negotiations with the unions with whom he or she has agreements, attempt to develop an agreement which will:

a. Spell out responsibilities for nondiscrimination in hiring, referral, upgrading and training.

b. Otherwise implement an affirmative anti-discrimination program in terms of the unions' specific areas of skill and geography to the end that qualified minority workers will be available and given and equal opportunity for employment.

(5) The Contractor shall notify the City of opposition to the anti-discrimination clause by individuals, firms or organizations during the period of its pre-qualification.

(h) The Contractor will include the provisions of the foregoing paragraphs 1 through 5 in every first tier subcontract so that such provisions will be binding upon each such subcontractor.

(i) The "Fair Employment Practices Certification" must be completed and signed prior to the time of submitting the bid.

Article IV. Parts of the Contract.

That the complete contract consists of the following documents, all of which shall be considered a part of this agreement.

1. Notice to Bidders
2. Wage Rates
3. General Conditions
4. Technical Specifications
5. Proposal
6. Fair Employment Practices Certification
7. Agreement
8. Contract Bonds
9. Contract Drawings and Construction Details
10. Standard Drawings
11. Indemnification Agreement

IN WITNESS WHEREOF, this contract being executed in duplicate and the parties having caused their names to be signed by authority of their duly authorized office this _____ day of _____, 20____.

CITY OF UKIAH, MENDOCINO COUNTY, CALIFORNIA

By: _____
CITY MANAGER, CITY OF UKIAH

Attest: _____
CITY CLERK, CITY OF UKIAH

By: _____
CONTRACTOR

Attest: Kathy Auer

Title: Corp. Secty.

The foregoing contract is approved as to form and legality this _____ day of _____, 20 ____.

_____
CITY ATTORNEY, CITY OF UKIAH

INDEMNIFICATION AGREEMENT

This Indemnification Agreement is made and entered in Ukiah, California, on May 21, 20 20, by and between the City of Ukiah (Ukiah) and T&T Paving Inc., dba Valley Paving (Contractor).

Contractor is

performing work per plans and specifications for Spec. 19-07 - Storm Drain Replacement Project for Ukiah.

As a condition of issuing the work order, attached hereto, Ukiah requires assurance that Contractor will protect Ukiah from damage or damage claims which arise from its performance of the work.

Accordingly, Contractor agrees as follows:

1. **Indemnification**. Contractor shall indemnify and hold harmless Ukiah and its officers, agents, and employees from and against any claim, loss, or damage, including the legal and other costs of defending against any claim of damage or loss which arises out of the Contractor's negligent or wrongful performance under the work order attached hereto, except for claims, losses, or damages resulting from the sole and exclusive negligence or other wrongful conduct of Ukiah or its officers, agents and employees.

CONTRACTOR - T&T Paving Inc. dba Valley Paving

BY: Kathy Ault

TITLE: Corp. Secty.

CITY OF UKIAH
Mendocino County, California

AGREEMENT

FOR
UKIAH VALLEY GOLF COURSE - STORM DRAIN REPLACEMENT PROJECT
SPECIFICATION NO. 19-07

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WITNESSETH:

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WHEREAS, the Contractor, in response to the notice to bidders, has submitted to the City a sealed proposal accompanied by a proposal guaranty in an amount of not less than 10 percent of the bid price for the construction of the proposed work in accordance with the terms of this contract and

WHEREAS, the City, in the manner prescribed by law, has publicly opened, examined and canvassed the proposals submitted and as a result has determined and declared the Contractor to be the lowest and best regular responsible bidder for the work and for the sums named in the proposal,

NOW, THEREFORE, THIS AGREEMENT WITNESSETH:

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In connection with the performance of work under this contract, the Contractor agrees as follows:

(a) The Contractor will not willfully discriminate against any employee or an applicant for employment because of race, color, religion, ancestry, or national origin. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, ancestry, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the awarding authority setting forth the provisions of this Fair Employment Practice section.

(b) The Contractor will send to each labor union or representative of workers with which he or she has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the awarding authority, advising the said labor union or worker's representative of the Contractor's commitments under this section, to employees and applicants for employment.

(c) The Contractor will permit access to his or her records of employment, employment advertisements, application forms and other pertinent data and records by the Fair Employment Practices Commission, City of Ukiah or any other appropriate agency of the State of California designated by the awarding authority, for the purposes of investigation to ascertain compliance with the Fair Employment Practices section of this contract.

(d) A finding of willful violation of the Fair Employment Practices section of this Contract or of the Fair Employment Practices Act shall be regarded by the awarding authority as a basis for determining the Contractor to be not a "responsible bidder" as to future contracts for which such Contractor may submit bids, for revoking the Contractor's pre-qualification rating, if any and for refusing to establish, reestablish or renew a pre-qualification rating for the Contractor.

The City of Ukiah shall deem a finding of willful receipt of written notice from the Fair Employment Practices Act to have occurred upon that it has investigated and determined that the Contractor has violated the Fair Employment Practices Act and has issued an order under Labor Code Section 1426 or obtained an injunction under Labor Code Section 1429.

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(e) The Contractor agrees that should the City determine that the Contractor has not complied with the Fair Employment Practices section of this Contract, then pursuant to Labor Code Section 1735 and 1775 the Contractor shall, as a penalty to the City, forfeit for each calendar day or portion thereof, for each person who was denied employment as a result of such non-compliance, the penalties provided in the Labor Code for violation of prevailing wage rates. Such monies may be recovered from the Contractor. The City may deduct any such damages from any monies due the Contractor.

(f) Nothing contained in this Fair Employment Practices section shall be construed in any manner of fashion so as to prevent the City or the State of California from pursuing any other remedies that may be available at law.

(g) Prior to awarding the Contract, the Contractor shall certify to the awarding authority that he or she has or will meet the following standards for affirmative compliance, which shall be evaluated in each case by the awarding authority:

(1) The Contractor shall provide evidence, as required by the City that he or she has notified all supervisors, foremen and other personnel officers in writing of the content of the anti-discrimination clause and their responsibilities under it.

(2) The Contractor shall provide evidence, as required by the City, that he or she has notified all sources of employees' referrals (including unions, employment agencies, advertisements, Department of Employment) of the content of the anti-discrimination clause.

(3) The Contractor shall file a basic compliance report, as required by the City. Willfully false statements made in such reports shall be punishable as provided by law. The compliance report shall also spell out the sources of the work force and who has the responsibility for determining whom to hire, or whether or not to hire.

(4) Personally, or through his or her representatives, the Contractor shall, through negotiations with the unions with whom he or she has agreements, attempt to develop an agreement which will:

a. Spell out responsibilities for nondiscrimination in hiring, referral, upgrading and training.

b. Otherwise implement an affirmative anti-discrimination program in terms of the unions' specific areas of skill and geography to the end that qualified minority workers will be available and given and equal opportunity for employment.

(5) The Contractor shall notify the City of opposition to the anti-discrimination clause by individuals, firms or organizations during the period of its pre-qualification.

(h) The Contractor will include the provisions of the foregoing paragraphs 1 through 5 in every first tier subcontract so that such provisions will be binding upon each such subcontractor.

(i) The "Fair Employment Practices Certification" must be completed and signed prior to the time of submitting the bid.

Article IV. Parts of the Contract.

That the complete contract consists of the following documents, all of which shall be considered a part of this agreement.

1. Notice to Bidders
2. Wage Rates
3. General Conditions
4. Technical Specifications
5. Proposal
6. Fair Employment Practices Certification
7. Agreement
8. Contract Bonds
9. Contract Drawings and Construction Details
10. Standard Drawings
11. Indemnification Agreement

IN WITNESS WHEREOF, this contract being executed in duplicate and the parties having caused their names to be signed by authority of their duly authorized office this _____ day of _____, 20____.

CITY OF UKIAH, MENDOCINO COUNTY, CALIFORNIA

By: _____
CITY MANAGER, CITY OF UKIAH

Attest: _____
CITY CLERK, CITY OF UKIAH

By: _____
CONTRACTOR

Attest: _____

Title: Corp. Secty.

The foregoing contract is approved as to form and legality this _____ day of _____, 20 ____.

_____
CITY ATTORNEY, CITY OF UKIAH

INDEMNIFICATION AGREEMENT

This Indemnification Agreement is made and entered in Ukiah, California, on May 21, 20 20, by and between the City of Ukiah (Ukiah) and T&T Paving Inc., dba Valley Paving (Contractor).

Contractor is
performing work per plans and specifications for Spec. 19-07 - Storm Drain Replacement Project
for Ukiah.

As a condition of issuing the work order, attached hereto, Ukiah requires assurance that Contractor will protect Ukiah from damage or damage claims which arise from its performance of the work.

Accordingly, Contractor agrees as follows:

1. **Indemnification**. Contractor shall indemnify and hold harmless Ukiah and its officers, agents, and employees from and against any claim, loss, or damage, including the legal and other costs of defending against any claim of damage or loss which arises out of the Contractor's negligent or wrongful performance under the work order attached hereto, except for claims, losses, or damages resulting from the sole and exclusive negligence or other wrongful conduct of Ukiah or its officers, agents and employees.

CONTRACTOR - T&T Paving Inc. dba Valley Paving

BY: Kathy Ault

TITLE: Corp. Secty.

CITY OF UKIAH
Mendocino County, California

FAITHFUL PERFORMANCE BOND Bond #PB1040090000

KNOW ALL MEN BY THESE PRESENTS,

That we the undersigned, T&T Paving, Inc. dba Valley Paving, Inc.

AS PRINCIPAL, and

Philadelphia Indemnity Insurance Company
AS SURETY,

are held firmly bound unto **THE CITY OF UKIAH**, hereinafter called the "City", in the penal sum of

One Hundred Fourteen Thousand, Six Hundred Seventy-One and 00/100 dollars ($ 114,671.00)
for the payment of which sum we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally.

WHEREAS, the Principal has entered into a certain Contract with the City, dated May 21, 2020, a copy of which is hereto attached and made a part hereof,

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall in all respects fully perform the Contract and all duly authorized modifications thereof, during its original term and any extensions thereof that may be granted and during any guaranty period for which the Contract provides, and if the Principal shall fully satisfy all claims, arising out of the prosecution of the work under the Contract and shall fully indemnify the City for all expenses which it may incur by reason of such claims, including its attorney's fees and court costs, and if the Principal shall make full payment to all persons supplying labor, services, materials, or equipment in the prosecution of the work under the Contract, in default of which such persons shall have a direct right of action hereupon; and if the Principal shall pay or cause to be paid all sales and use taxes payable as a result of the performance of the Contract as well as payment of gasoline and special motor fuels taxes in the performance of the Contract and all motor vehicle fees required for commercial motor vehicles used in connection with the performance of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect. No modification of the Contract or extension of the term thereof, nor any forbearance on the part of the City shall in any way release the Principal or the Surety from liability hereunder. Notice to the Surety of any such modification, extension, or forbearance is hereby waived.

IN WITNESS WHEREOF, the aforesaid Principal and Surety have executed this instrument and affixed their seals hereto, this 26th day of May, 2020.

In the presence of:

WITNESS:

_____

_____(SEAL)
(Individual Principal)

_____
(Business Address)

_____
(City/State/Zip Code)

WITNESS:

T&T Paving, Inc. dba Valley Paving, Inc.

Kathy Ault (SEAL)
(Corporate Principal)

2601 Road E
(Business Address)

Redwood Valley, CA 95470
(City/State/Zip Code)

ATTEST:

(Corporate Principal) Affix Corporate Seal

(Business Address)

(City/State/Zip Code)

ATTEST:

Philadelphia Indemnity Insurance Company

(Corporate Surety) Affix Corporate Seal

Sherryl L. Quint, Attorney-In-Fact
One Bala Plaza, Suite 100
(Business Address)

Bala Cynwyd, PA 19004-0950
(City/State/Zip Code)

The rate of premium on this bond is $25.00, $15.00 per thousand.

The total amount of premium charges is $2,720.00..

(The above is to be filled in by Surety Company). (Power of Attorney of person signing for Surety Company must be attached).

(CERTIFICATE AS TO CORPORATE PRINCIPAL)

I, JAMES THOMPSON, certify that I am the PRESIDENT ~~Secretary of~~ the corporation named as Principal in the foregoing bond; that KATHY AULT, who signed the said bond on behalf of the Principal, was then SECRETARY of said corporation; that I know his signature, and that his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of its governing body.

Affix Corporate Seal

CITY OF UKIAH
Mendocino County, California

MATERIAL AND LABOR BOND Bond #PB10400900006

KNOW ALL MEN BY THESE PRESENTS,

That we the undersigned, T&T Paving, Inc. dba Valley Paving, Inc.

_____, **AS PRINCIPAL,**

and

Philadelphia Indemnity Insurance Company

_____, **AS SURETY,**

are held firmly bound unto **THE CITY OF UKIAH**, hereinafter called the "City" in the penal sum of

dollars ($ 114,671.00)
for the payment of which sum we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally.

WHEREAS, the Principal has entered into a certain Contract with the City, dated May 21, 20 20,
a copy of which is hereto attached and made a part hereof,

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall in all respects fully perform the Contract and all duly authorized modifications thereof, during its original term and any extensions thereof that may be granted and during any guaranty period for which the Contract provides, and if the Principal shall fully satisfy all claims, arising out of the prosecution of the work under the Contract and shall fully indemnify the City for all expenses which it may incur by reason of such claims, including its attorney's fees and court costs, and if the Principal shall make full payment to all persons supplying labor, services, materials, or equipment in the prosecution of the work under the Contract, in default of which such persons shall have a direct right of action hereupon; and if the Principal shall pay or cause to be paid all sales and use taxes payable as a result of the performance of the Contract as well as payment of gasoline and special motor fuels taxes in the performance of the Contract and all motor vehicle fees required for commercial motor vehicles used in connection with the performance of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect. No modification of the Contract or extension of the term thereof, nor any forbearance on the part of the City shall in any way release the Principal or the Surety from liability hereunder. Notice to the Surety of any such modification, extension, or forbearance is hereby waived.

IN WITNESS WHEREOF, the aforesaid Principal and Surety have executed this instrument and affixed their seals hereto, this 26th day of May, 20 20.

In the presence of:

WITNESS:

_____

_____(SEAL)
(Individual Principal)

_____
(Business Address)

_____

(City/State/Zip Code)

WITNESS:

T&T Paving, Inc. dba Valley Paving, Inc.

Kathy Ault (SEAL)

(Corporate Principal)

2601 Road E

(Business Address)

Redwood Valley, CA 95470

(City/State/Zip Code)

ATTEST:

(Corporate Principal) Affix Corporate Seal

(Business Address)

(City/State/Zip Code)

ATTEST:

Philadelphia Indemnity Insurance Company

(Corporate Surety) Affix Corporate Seal

Sherryl L. Quint, Attorney-In-Fact

One Bala Plaza, Suite 100

(Business Address)

Bala Cynwyd, PA 19004-0950

(City/State/Zip Code)

The rate of premium on this bond is $25.00, $15.00 per thousand.

The total amount of premium charges is $2,720.00 ..

(The above is to be filled in by Surety Company). (Power of Attorney of person signing for Surety Company must be attached).

(CERTIFICATE AS TO CORPORATE PRINCIPAL)

I, JAMES THOMPSON, certify that I am the PRESIDENT ~~Secretary~~ of the corporation named as Principal in the foregoing bond; that KATHY AULT, who signed the said bond on behalf of the Principal, was then SECRETARY of said corporation; that I know his signature, and that his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of its governing body.

Affix Corporate Seal

CITY OF UKIAH
Mendocino County, California

DEFECTIVE MATERIAL AND WORKMANSHIP (MAINTENANCE) BOND Bond #PB1040090000

KNOW ALL MEN BY THESE PRESENTS,

That we, T&T Paving, Inc. dba Valley Paving, Inc.

, as **PRINCIPAL**

and Philadelphia Indemnity Insurance Company

, as **SURETY,**

are held and firmly bound unto the **City of Ukiah** as Obligee, in the penal sum of

Five Percent (5%) Of The Final Contract Amount

($ 5%),
(5 PERCENT OF THE FINAL CONTRACT AMOUNT)

to which payment well and truly to be made, we do bind ourselves, our and each of our heirs, executors, administrators successors and assigns jointly and severally, firmly by these presents.

WHEREAS, the said Principal entered into a Contract with the City of Ukiah
dated May 21, 2020
for
Ukiah Valley Golf Course - Storm Drain Replacement Project

WHEREAS, said Contract has been completed, and was approved on the _____ day of _____,
_____,

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal shall guarantee that the work will be free of any defective materials or workmanship which become apparent during the period of one (1) year following completion of the Contract, then this obligation shall be void, otherwise to remain in full force and effect, provided however, any additional warranty or guarantee whether expressed or implied is extended by the Principal or Manufacturer only, and the surety assumes no liability for such a guarantee.

Signed, sealed, and dated this 26th day of May, 2020.

(Seal)

BY: Kathy Ault (Seal)

T&T Paving, Inc. dba Valley Paving, Inc. (Seal)
Principal

(Seal)

BY: Sherryl L. Quint, Attorney-In-Fact (Seal)

Philadelphia Indemnity Insurance Company (Seal)
Surety

One Bala Plaza, Suite 100
Bala Cynwyd, PA 19004-0950

Power of Attorney

KNOW ALL PERSONS BY THESE PRESENTS: That **PHILADELPHIA INDEMNITY INSURANCE COMPANY** (the Company), a corporation organized and existing under the laws of the Commonwealth of Pennsylvania, does hereby constitute and appoint **Christian B. Downey, Joseph A. Menicucci, Sherryl L. Quint, Susan J. Vance of Downey and Company** its true and lawful Attorney-in-fact with full authority to execute on its behalf bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, issued in the course of its business and to bind the Company thereby, in an amount not to exceed **$50,000,000**.

This Power of Attorney is granted and is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of PHILADELPHIA INDEMNITY INSURANCE COMPANY on the 14th of November, 2016.

RESOLVED: That the Board of Directors hereby authorizes the President or any Vice President of the Company: (1) Appoint Attorney(s) in Fact and authorize the Attorney(s) in Fact to execute on behalf of the Company bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof and to attach the seal of the Company thereto; and (2) to remove, at any time, any such Attorney-in-Fact and revoke the authority given. And, be it

FURTHER RESOLVED: That the signatures of such officers and the seal of the Company may be affixed to any such Power of Attorney or certificate relating thereto by facsimile, and any such Power of Attorney so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached.

IN TESTIMONY WHEREOF, PHILADELPHIA INDEMNITY INSURANCE COMPANY HAS CAUSED THIS INSTRUMENT TO BE SIGNED AND ITS CORPORATE SEALTO BE AFFIXED BY ITS AUTHORIZED OFFICE THIS 27TH DAY OF OCTOBER, 2017.

(Seal)

Robert D. O'Leary Jr., President & CEO
Philadelphia Indemnity Insurance Company

On this 27th day of October, 2017, before me came the individual who executed the preceding instrument, to me personally known, and being by me duly sworn said that he is the therein described and authorized officer of the **PHILADELPHIA INDEMNITY INSURANCE COMPANY**; that the seal affixed to said instrument is the Corporate seal of said Company; that the said Corporate Seal and his signature were duly affixed.

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Morgan Knapp, Notary Public
Lower Merion Twp., Montgomery County
My Commission Expires Sept. 25, 2021
MEMBER PENNSYLVANIA ASSOCIATION OF NOTARIES

(Notary Seal)

Notary Public: Morgan Knapp

residing at: Bala Cynwyd, PA

My commission expires: September 25, 2021

I, Edward Sayago, Corporate Secretary of PHILADELPHIA INDEMNITY INSURANCE COMPANY, do hereby certify that the foregoing resolution of the Board of Directors and the Power of Attorney issued pursuant thereto on the 27th day of October, 2017 are true and correct and are still in full force and effect. I do further certify that Robert D. O'Leary Jr., who executed the Power of Attorney as President, was on the date of execution of the attached Power of Attorney the duly elected President of PHILADELPHIA INDEMNITY INSURANCE COMPANY.

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 26th day of May 20 20.

Edward Sayago, Corporate Secretary
PHILADELPHIA INDEMNITY INSURANCE COMPANY

PHILADELPHIA INDEMNITY INSURANCE COMPANY

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Approval of Contract with Stone Creek Environmental Consulting in the Amount of $39,600 for Engineering Services Related to the Municipal Separate Storm Sewer Systems Permit Issued by the North Coast Regional Water Quality Control Board.

DEPARTMENT: Public Works **PREPARED BY:** Jarod Thiele, Public Works Management Analyst
PRESENTER: Tim Eriksen, Director of Public Works/City Engineer

ATTACHMENTS:
1. 200715 Ukiah Storm Water Support LP

Summary: Council will consider approval of a Contract with Stone Creek Environmental Consulting in the amount of $39,600 for Engineering Services related to the Municipal Separate Storm Sewer Systems Permit issued by the North Coast Regional Water Quality Control Board.

Background: Discharges of storm water and non-storm water from a Municipal Separate Storm Sewer System (MS4), particularly in an urbanized area, have a high potential to convey pollutants to receiving waters. The higher percentage of impervious area in urbanized areas correlates to a greater pollutant loading, resulting in turbid water discharges, nutrient enrichment, bacterial contamination, and toxic compounds. Pollutants of concern in these discharges in the Russian River Watershed include: heavy metals, indicator bacteria, nutrients (e.g., phosphorus and nitrogen), pesticides, petroleum hydrocarbons, and trash.

Discussion: The City is designated as a Phase 1 Co-Permittee with other agencies regulated by the North Coast Regional Water Quality Control Board (Board). These agencies operate under a MS4 issued by the Board which requires specific Monitoring and Reporting Requirement as well as the development of Special Studies in order to maintain compliance with the permit.

This permit has a five-year term in which these requirements must be met and submitted to the Board. The main requirements are as follows:

1) Critical Source Program
2) Development of Facility Prevention Plans
3) Municipal Staff Training
4) Development of a Sediment Reduction Plan
5) Annual Reporting Requirements to the Board

In order to maintain compliance with the permit, staff requested a proposal (Attachment 1) from Stone Creek Environmental Consulting for Engineering Services for assistance in maintaining compliance with the permit. This firm specializes in direct regulatory compliance and training for multiple agencies in the North Coast and has direct experience in these activities as a former staff member of the Board.

Staff is requesting approval of a contract in the amount of $39,600 for these services.

Recommended Action: Approve contract with Stone Creek Environmental Consulting in the amount of $39,600 for Engineering Services related to the City's Stormwater Permit.

BUDGET AMENDMENT REQUIRED: Approve transfer from 50024214.52100 to 10024224.52100- $9,600

CURRENT BUDGET AMOUNT: $9,600- 50024224.52100; 10024224.52100- $10,000; 10024620.52100- $5,000; 10024620.54121- $10,000; 10024210.52100- $5,000

PROPOSED BUDGET AMOUNT: 10024224.52100- $39,600

FINANCING SOURCE:

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Tim Eriksen, Director of Public Works/City engineer

Approved: 
Sage Sangiacomo, City Manager

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Attachment 1

July 15, 2020

Mr. Tim Eriksen
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Subject: Proposal for Stormwater Support Services

Dear Mr. Eriksen:

Stone Creek Environmental Consulting (Stone Creek) is pleased to present this letter proposal and fee estimate to provide stormwater support services to the City of Ukiah (City). Colleen Hunt, owner and professional technical consultant is a Certified Professional in Municipal Stormwater Management and brings direct regulatory compliance experience with municipal stormwater permit requirements. I have worked directly with dozens of municipal stormwater Permittees during my time with the Regional Water Board and for the past two years as a consultant.

The City if subject to requirements of the Regional Water Board Waste Discharge Requirements Order No. R1-2015-0030, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0025054 for Discharges from the Municipal Separate Storm Sewer System (MS4) (Permit). The Permit has been effective since January 6, 2016 and has a five-year term, expiring on January 5, 2021. The Permit includes compliance time frames for development and implementation of various program elements. Based on recent conversations with the City, assistance is needed with meeting the following Permit requirements:

- Critical Source Program
- Facility Pollution Prevention Plans
- Municipal Staff Training
- Sediment Reduction Plan
- Annual Reporting

In addition to the Permit, the City is also subject to the *Trash Provision of the Water Quality Control Plan for Inland Surface Waters, enclosed Bays and Estuaries of California* (Trash Amendment). The City has elected to comply with the Trash Amendment with the selection of Track 2. The City has requested this proposal include assistance with completing a Trash Implementation Plan.

Scope of Work

The Scope of Work outlines tasks to assist the City with Permit requirements in a timely manner and within budget. The Scope of Work provides tasks associated with priority deliverables, focusing on requirements that are past due. A detailed approach is outlined below.

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Task 1. Critical Source Program

Permit Section C.2.d. requires the City to inspect all restaurants, automotive service facilities, auto-dismantlers, retail gasoline service stations, and nurseries and landscape material retailers, identified in the Permit as critical source facilities. Inspections are required twice during the five-year term of the Permit. However, the Permit allows the City to leverage inspection efforts of other agencies as to not duplicate similar efforts, as long as other agencies' inspections include a stormwater component. Table 1 indicates the agencies that have responsibilities to inspect critical source facilities within the City:

Table 1. Critical Source Facilities Inspection

Facility Type	Responsible Agency
Restaurants	County of Mendocino Public Health Department
Automotive Service Facilities	County of Mendocino Environmental Health (CUPA)
Retail Gasoline Service Stations	County of Mendocino Environmental Health (CUPA)
Auto-Dismantlers	County of Mendocino Environmental Health (CUPA)
Nurseries and Landscape Material Retailers	None

I am familiar with the inspection process for each of the agencies listed in Table 1. Both agencies include a stormwater component as part of their inspection protocols for the critical source facilities. Therefore, I recommend that the City use the existing inspection programs as part of the strategy for complying with this Permit requirement. However, the City will need to collaborate with the agencies to appropriately document that the inspections have taken place and that they meet the requirements of the Permit.

Task 1.1 Local Agency Record Review

To effectively demonstrate compliance with Permit Section C.2.d., I will coordinate with each agency identified in Table 1 to gather inspection records. I will provide each agency with the critical source inventory and the cross-reference records needed to query inspection records, primarily dates of inspections. This task is based on the assumption that each agency will be able to query records and provide inspection dates. The task will need to be revised if inspection records can only be obtained by conducting a file review of each individual facility.

Documented dates of inspections and the agency that completed the inspection gathered from the records review will be added to the City's existing critical source inventory. A Technical Memorandum (TM) will be developed to demonstrate that the inspections are meeting the requirements of the Permit. This task is developed with the assumption that local agency inspections and inspection frequencies will meet compliance with the Permit and no additional inspections will need to be conducted by the City. In the

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event it is determined that the local agency inspections are not meeting the requirements of the Permit, this Scope of Work will need to be revised to incorporate additional inspection assistance to the City.

Task 1.2 Nursery and Landscape Material Retailer Inspections

There is no local agency responsible for inspecting nurseries and landscape material yards for stormwater quality compliance. Therefore, to comply with this requirement of the Permit, the City must conduct the inspections directly. Under this task, I will assist the City with conducting inspections of all nurseries and landscape material retailers in the City to meet Permit Section C.2.d. as follows:

- Inspections will include confirmation that the operator is implementing source control Best Management Practices (BMPs) in compliance with municipal ordinances and the Permit;
- Require implementation of additional BMPs and controls as needed to reduce pollutants in stormwater runoff that may be causing or contributing to an exceedance of water quality standards; and
- For BMPs that are not adequate to achieve water quality standards, the operator will be required to implement additional site-specific controls.

Each inspection will include appropriate documentation, a brief summary of findings, and recommended follow-up actions.

Task 1 Deliverables: TM of local agency inspection record review and a nursery/landscape material retailer inspection summary report.

Task 2. Facility Pollution Prevention Plans

Permit Section G.4. requires the City to develop and implement a Facility Pollution Prevention Plan (FPPP) for each public facility (or group of facilities) where potential pollutant generating activities are conducted at City owned or operated facilities. Facilities with potential pollutant generating activities include:

- Airports;
- Animal control facilities;
- Chemical storage facilities;
- Composting facilities;
- Equipment storage and maintenance facilities;
- Fairgrounds; • Fueling or fuel storage facilities;
- Hazardous waste disposal facilities;
- Incinerators;
- Material storage yards; •
- Pesticide storage facilities;
- Fire stations;

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- Public parking lots;
- Public golf courses;
- Public swimming pools;
- Public parks;
- Public works yards;
- Public marinas;
- Recycling facilities; and
- Solid waste management facilities.

The first part of the task will be to identify all public facilities subject to these requirements. Once all facilities are identified, I propose to prepare a single FPPP that includes stormwater management practices for the facilities identified as having potential sources of stormwater pollution. As required by the Permit, the FPPP will include the following elements:

- Facility information, including the name of the facility, address, and supervisor contact information;
- Types of stormwater pollutant generating activities, including non-stormwater discharges;
- A site map showing the location of each pollutant generating activity and pollutant source areas;
- Staff roles and responsibilities related to stormwater pollution prevention and water quality protection;
- BMPs to address each type of pollutant generating activity and source areas;
- Spill prevention and response; and
- An inspection checklist.

The facility and pollutant generating activities information will be collected and identified in the FPPP. BMPs will be identified and developed according to section G.3. of the Permit, which requires the City to implement specific BMPs based on pollutants generating activities (Table 9 of the Permit: BMPs for Public Agency Facility and Activity Management). Based on the identified pollutant generating activities at each public facility, the FPPP will identify the associated BMPs needed for implementation. All other elements of the FPPP will be developed accordingly and will include a map of each facility. The Scope of Work assumes a site visit of each facility will be needed in order to identify specific pollutant generating activities. The FPPP does not need to be submitted to the Regional Water Board, but should remain on record to demonstrate compliance with the requirements.

Task 2 Deliverable: City-Wide Facility Pollution Prevention Plan.

Task 3 Municipal Staff Training

Permit Section G.12. requires the City to annually train staff whose interactions, job, and activities may affect stormwater quality. As part of this task I will provide one, two-hour training covering topics such as

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general permit overview, storm drain maintenance, operation and maintenance BMPs, Integrated Pest Management, illicit discharge, non-stormwater discharges, spill response, and reporting. The final training topic selection will be at the discretion of the City. Training is required on an annual basis and will be completed during the current fiscal year as directed by the City.

Task 3 Deliverable: Stormwater training, including preparation of a PowerPoint presentation, training materials, and training documentation records.

Task 4 Sediment Reduction Plan Development and Implementation

Section I.3. requires the City to develop and implement a sediment reduction workplan to address sediment in storm water. The workplan is required to include the following components:

- An inventory of sediment sources;
- Proposed BMPs to reduce the levels of sediment in the discharge to surface water;
- A proposal to conduct field monitoring, investigation, or research to confirm the source(s) identified as significantly impacting water quality;
- A monitoring proposal to verify BMP effectiveness; and
- A proposed implementation schedule.

Over the course of the Permit, the Co-Permittees have had several discussions with the Regional Water Board on the feasibility of developing the full scope of work under a single workplan. The Regional Water Board has agreed that the work can be proposed in phases, with each phase informing the scope for the subsequent phase. There are four phases total. The first two phases will be conducted during the current fiscal year. This proposal includes assisting the City with developing the workplan and implementing the first two phases of implementation.

Task 4.1 Develop a Sediment Reduction Workplan

It is my understanding the City has a draft workplan that was submitted to the Regional Water Board. The Regional Water Board provided comments on the draft. The City needs to address the Regional Water Boards comments and resubmit the draft workplan. Under this task, I will assist the City with incorporating the Regional Water Board's comments and submit the revised plan to the Regional Water Board.

Task 4.1 Deliverable: Draft Workplan.

Task 4.2 Phase I Source Investigation Research

Upon concurrence with the Regional Water Board on the workplan, the first phase of work is researching sediment sources. The first goal in meeting the workplan objectives is to develop a list of sediment sources that are potentially contributing to the discharge of sediment in the City's storm water runoff. To develop this list, I will assist the City with conducting in-office investigations including reviewing current storm water documents, gathering institutional

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knowledge, land use map review and other available resources. Upon completion of the research, I will compose a summary of findings, including a list of potential sources.

Upon completion of the Phase I investigation, a proposed Phase II Sediment Source Field Investigation Plan will be prepared for the City's review and submitted to the Regional Water Board. This plan will include a proposal for conducting baseline water quality monitoring. In order to develop the monitoring program, this task will also include monitoring reconnaissance to appropriately and effectively develop a feasible monitoring plan.

Task 4.2 Deliverables: Summary of potential sediment sources. Workplan for Phase II.

Task 4.3 Phase II Sediment Source Field Investigation

The Phase II Scope of Work will be dependent on the findings of Phase I. However, this Scope of Work has a general approach based on the anticipated components of Phase II. Once the Phase I investigation has identified the likely sources of sedimentation, sources will be prioritized and further investigated. The Scope of Work will include field reconnaissance of source areas to verify sources. Field reconnaissance will also take place at select receiving water locations to investigate evidence of storm drain related sediment discharges.

Phase II will also consist of baseline water quality monitoring, focusing on a turbidity assessment. The specific scope will be developed as part of Phase I, but we anticipate sampling up to four locations during one storm event. The focus will be to sample the discharge of storm water at various sediment sources. The sampling plan will also include surface water sampling to gain a baseline of the level of sediment in receiving water.

Upon completion of the Phase II investigation, a summary report will be developed which will include the findings of the investigation, a summary of monitoring data and inform next steps. the next scope of work. A proposed Sediment Source BMP Plan will be prepared for the City's review and submitted to the Regional Water Board at the conclusion of Phase II. This plan will include a proposal for effectiveness monitoring.

Task 4.3 Deliverables: Phase II Summary Report. Workplan for Phase III.

Task 5 Annual Reporting

The Annual Report for the 2019/2020 reporting period is due October 15, 2020. At the beginning of the new Permit term, the Regional Water Board developed an annual report template for Permittee use. The template provides a streamlined method for annual reporting. I will assist the City with populating the template and gathering information needed for reporting. The City will be responsible for completing the report with information not readily available and submitting the final report to the Regional Water Board.

Task 5. Deliverable: Draft Annual Report

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Task 6 Trash Implementation Plan

Task 6.1. Conduct Two On-land Visual Trash Assessment

I recommend conducting two On-land Visual Trash Assessments (OVTA) as the first step in developing the Trash Implementation Plan (TIP). Although the OVTA is not specifically required under the City's 13383 Order, it is a critical step in demonstrating long-term compliance with the Trash Amendments. Compliance with the Trash Amendments is measured by demonstrating an average trash load reduction of 10 percent per year, over 10 years. Baseline conditions must be known in order to demonstrate the load reduction requirements. The OVTAs will document the baseline conditions to inform future compliance measures.

Additionally, the OVTA is also critical for informing the City's approach to developing the TIP. One main goal of the stormwater trash control program is to maintain a low trash generation in all priority land uses (PLUs). Low trash generation is considered equivalent to the performance of a FCS. There is tremendous benefit in documenting low trash generating areas early in the process, as these areas will not require any additional trash control measures to comply with the Trash Amendments. These results will significantly inform the approach to developing the TIP and potentially provide a significant long-term cost savings to the City.

I will conduct two OVTAs by using the State Water Board's *Trash Assessment Minimum Level of Effort (TAMLE) for Establishing Baseline Trash Generation Levels* (Attachment A). The State Water Board has published this as a recommended and supported approach to establishing baseline trash generation levels.

The first step for this task is establishing a representative assessment area. Assessments will be conducting in all PLUs, as defined by the Trash Amendment including:

- High-density residential
- Industrial
- Commercial
- Mixed urban
- Public transportation stations

The Scope of Work will include the development of proposed assessment locations based on the San Francisco Bay Area's accepted approach to designing an OVTA area. The assessment area will be developed to conduct OVTA at randomly selected locations covering at least 10 percent of the PLU street miles. Assessments will be conducted at 1000-foot increments. Proposed assessment locations will be illustrated on a map. The assessment area will not include any Caltrans rights-of-way.

The TAMLE recommends that each permittee conduct two assessments: one in the wet season (October–March) and one in the dry season (April–September). I will conduct one assessment during each season to adequately assess trash conditions. The assessments will be conducted by walking the proposed assessment area on the sidewalk, observing the levels of trash present on the street, sidewalk and adjacent land areas that could be transported to the MS4. In areas where no sidewalk is present, the assessments may be conducted from the car, if safe to do so. The assessments will take place directly before street sweeping events, to the extent feasible.

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A trash generation rate will be assigned to the area being assessed using the following scale:

Low Trash: 0-5 gallons/acre/year. Effectively no trash can be observed on a city block or the equivalent. There may be some small pieces in the area, but they are not obvious at first glance and one individual could quickly pick them up. A low trash generation level is the goal of a stormwater trash control program and is considered equivalent to the performance of a full trash capture system.

Moderate: 5-10 gallons/acre/year. Predominantly free of trash except for a few pieces that are easily observed along a city block or the equivalent. The trash could be collected by one or two individuals in a short period of time.

High: 10-50 gallons/acre/year. Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets. It would take a more organized effort to remove the litter.

Very High: 50-150 gallons/acre/year. Trash is continuously seen throughout the area, with large piles and a strong impression of lack of concern for litter in that area. There is often significant litter even along gutters that are swept.

The appropriate trash generation level will be recorded in a field book and a picture will be taken of each city block within the assessment area to document the condition at the time of the assessment.

Task 6.2 Prepare Baseline Trash Generation Map

Upon completion of two OVTAs, a Baseline Trash Generation Map will be prepared illustrating the findings of both assessments. Maps will be color-coded based on the trash levels observed: Green=Low, Yellow=Moderate, Red=High, and Purple=Very High. Upon completion of the map, I will meet with the City to discuss the findings and provide recommendations for the next steps.

Task 6.2 Deliverables: Trash loading rates by PLU. Baseline Trash Generation Map illustrating the findings of the OVTAs.

Task 6.3 Develop Track 2 Compliance Approach

The Trash Amendments define full capture system equivalency (FCSE) as the trash load that would be reduced if FCS were installed, operated, and maintained for all storm drains that capture runoff from PLUs. Track 2 compliance is achieved with the implementation of any combination of FCS installations, multi-benefit projects, other treatment controls, and institutional controls.

In planning for Track 2 compliance with FCSE, I will evaluate the City's current institutional controls and practices. Institutional controls are non-structural BMPs that may include street sweeping, sidewalk trash bins, collection of trash, anti-litter educational and outreach programs, producer take-back programs for packaging, product bans, and ordinances. Current trash control BMPs will be included in the TIP as part of the methodology for achieving FCSE.

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For areas identified in the OVTA not meeting low trash generation, additional trash control measures are needed to reduce the trash generation rate to comply with the Trash Amendments. I will evaluate enhancement to current trash control BMPs. This may include a recommendation to adapt current practices to be more effective, such as increased street sweeping frequency or additional trash can receptacles. will also I evaluate and provide recommendations for additional trash control BMPs for the City to consider implementing in PLUs that are not designated as low trash generation.

Task 6.4 Finalize Jurisdictional Map

The 13383 Order requires the City to develop and submit a jurisdictional map, which includes the following information:

- All PLUs areas discharging to the MS4 system(s);
- The corresponding MS4 network, including the location of all storm drain inlets and collection areas that receive stormwater discharges from the identified PLU areas;
- Proposed locations of all certified FCS and, for Track 2, where any combination of controls will be implemented to achieve FCSE; and
- Proposed equivalent alternative land uses for PLUs, a justification demonstrating that the alternative land uses generate trash at rates that are equivalent to or greater than the PLUs for which they are being substituted.

A jurisdictional map will be prepared to be consistent with the 13383 Order requirements and include the map in the TIP.

Task 6.4 Deliverables: Updated Jurisdictional Map(s) illustrating PLUs, trash generation rates, proposed locations of FCS, locations of current trash control BMPs meeting FCSE, and proposed location of enhanced BMPs to meet FCSE.

Task 6.5. Develop Trash Implementation Plan

The 13383 Order requires the City to submit a TIP that includes the following information:

- The combination of FCS, Multi-Benefit Projects, other treatment controls, and/or institutional controls selected by the permittee and the rationale for the selection;
- How the combination of controls is designed to achieve FCSE;
- How FCSE will be demonstrated; and
- If proposing to substitute equivalent alternative land uses for PLUs, a justification demonstrating that the alternative land uses generate trash at rates that are equivalent to or greater than the PLUs for which they are being substituted.

The information collected under Tasks 6.1, 6.2, and 6.3 will be complied to develop the TIP to be consistent with the requirements of the 13383 Order. This will include the findings of the OVTA, proposed combination of institutional controls to select to meet FCSE and an approach to demonstrating compliance with meeting FCSE. This scope does not include assessing feasibility of FCS.

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As part of the TIP, an implementation schedule will be developed that will lead to the completion of the plan within ten years. The schedule will be consistent with the requirement to reduce the trash loading rate of 10 percent per year, over a 10-year time frame.

The TIP will also include the jurisdictional map, as described in Task 6.4.

Task 6.5 Deliverable: Trash Implementation Plan.

Task 7 Program Management

This task will include general project management tasks needed to properly and effectively manage the contract. Tasks will include a project schedule, managing budget, monthly invoicing and routine communications with SSU, including in person meetings to report progress and discuss key recommendations and decisions.

Fee Estimate and Level of Effort

The Scope of Work will be conducted as described above for an estimated not-to-exceed budget of $39,600. The estimated fee and associated level of effort are summarized below.

Task	Level of Effort, hours	Estimated Fee, $
Task 1. Critical Source Program	18	3,000
Task 2. Facility Pollution Prevention Plan	36	5,550
Task 3. Municipal Staff Training	10	1,650
Task 4. Sediment Reduction Plan	72	12,000
Task 5. Annual Report	10	1,650
Task 6. Trash Implementation Plan	84	13,500
Task 7. Project Management	14	2,250
Total	**244**	**39,600**

Billing rates for the estimate are provide below. Rates will be valid for the duration of the contract:

Technical Professional Services	$165 per hour
GIS/Mapping	$175 per hour
Administrative Assistance/Travel	$75 per hour
Quality Assurance Review	$185 per hour
Mileage	Standard Federal Rate

Any services not included in this Scope of Work will be performed only after receiving written authorization and a corresponding budget augmentation from the City.

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I am looking forward to working with you on this important work. Please feel free to contact me at 707-318-9415 or colleen@consultingstonecreek.com if you have any questions or would like to discuss this proposal further.

Sincerely,



Colleen Hunt, CPMSM #343
Professional Consultant

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Approval of Plans and Specifications for the Museum Roof Replacement Project, Specification No. 20-10, and Authorize Staff to Issue the Request for Bid.

DEPARTMENT: Finance **PREPARED BY:** Mary Horger, Financial Services Manager
PRESENTER: Consent Calendar

ATTACHMENTS:

1. Spec 20-10 Museum Roof Replacement

Summary: Council will consider approving plans and specifications for the Museum Roof Replacement Project, Specification No. 20-10, and authorize staff to issue the Request for Bid.

Background: Beginning in 2016, it has been acknowledged by both City Staff and City Council that the roof at the Grace Hudson Museum is failing and in need of replacement. Since that time, two separate bid attempts were made without receiving bids.

In May of 2016, Specification 16-03 was released without receiving any bids. As per the California Uniform Cost Accounting Act, when not receiving bids using the formal or informal bidding process, you are allowed to proceed with negotiated contract, which Staff did at that time. The proposals received came in much higher than was thought reasonable. Participating contractors had some suggested revisions to the specifications to save costs. It was decided to revise the specifications and rebid. At the time, patchwork repairs were adequate to get the Museum safely through the following winter.

In April of 2017, Staff released Specification 17-05. No bids were received. Staff again attempted to proceed with a negotiated contract, resulting in proposals even higher than before making the project unaffordable.

In the meantime, the roof continues to deteriorate, and patchwork repairs are no longer adequate, as was experienced this past winter when significant leaking occurred. Additionally, the leaking roof is also affecting the integrity of the glulam beams that provide the support to the roof. Temporary shoring and repair of the beams took place earlier this year, but it is imperative that the roof is replaced sooner than later, as it has been determined a major contributing factor in their continuing deterioration.

Discussion: Architect Thomas Hise was hired as a consultant to the City to inspect and prepare repair recommendations for the Museum's glulam beams, as their deterioration was becoming a growing safety concern. Once a temporary solution was identified, it led to revisiting the roof replacement issue.

City Staff requested that Mr. Hise evaluate alternate cost-effective roof replacement solutions, including the option of utilizing the existing metal roof panels, in addition to evaluating composition shingle versus metal roofing material. The following is a summary of his findings:

1. Using the existing metal roof panels: Budgetary estimate of $242,000. No warranty available.

2. Composite shingle roof: Budgetary estimate of $203,000. Standard manufacturer's warranty for

composition shingles is for material replacement only, no workmanship covered, and materials pro-rated after ten (10) years. One manufacturer was found to provide a "platinum protection" option including materials and installation only for fifty (50) years, and coverage reduced as pro-rated after twenty-five (25) years. No coverage other than their product.

3. Standing seam metal roof: Budgetary estimate of $390,000. A 30-year "No-Dollar-Limit" warranty will cover all authorized costs of repairs to the roofing system necessary to stop any leaks caused by defective materials or workmanship.

Final recommendation from Mr. Hise was that, given the priceless contents of the Grace Hudson Museum, and the warranty available, that the standing seam metal roof would provide the most protection against the potential ravages of weather and fire. The second option would be the composite roof material.

Staff has carefully reviewed the result of this study, discussed with key stakeholders, including the Museum Endowment Board, and as a result, agree with Mr. Hise's recommendation of using standing seam metal roof material for the roof replacement. Considering warranty options, as well as durability, this direction would present the best value for the City. Furthermore, after consultation with Mr. Hise, it was determined that the temporary repairs to the glulam beams are holding well and no further work is necessary as long as the beams are protected by the new roofing.

Consequently, Staff is presenting the plans and specifications for the Museum Roof Replacement Project, Specification 20-10 (Attachment 1) for your review and approval, that call-out for the standing seam metal roof. The Architect is still researching the option of insulated roof panels versus insulation installation in the attic. If the result of that assessment is to use insulated roof panels, the specifications will need to be modified by addendum after its release, as we don't anticipate the report being completed in time. If the recommendation is insulation installed in the attic, that work would be performed under a separate contract.

If approved as Staff recommends, the bid documents will be immediately released for bidding, with an anticipated Council contract award at the beginning of September.

The adopted budget for the 20/21 fiscal year was $350,000 for this project. This included a corresponding budgeted off-set revenue source representing that the project is to be financed. The financing facility will be subject to Council approval at a later date with the final amount to correspond with the awarded bid. Additionally, the Grace Hudson Museum Endowment has committed $60,000 to the project and supports the immediate replacement.

Recommended Action: Approve the plans and specifications for the Museum Roof Replacement Project, Specification No. 20-10, and authorize staff to issue the Request for Bid.

BUDGET AMENDMENT REQUIRED: Not at this time.

CURRENT BUDGET AMOUNT: 10022700.80220.18021: $350,000

PROPOSED BUDGET AMOUNT: TBD

FINANCING SOURCE: TBD

PREVIOUS CONTRACT/ORDER NO.: N/A

COORDINATED WITH: Thomas Hise, Architect; David Burton, Museum Director; Maya Simerson, Interim Community Services Administrator; Sage Sangiacomo, City Manager

Approved: _____
Sage Sangiacomo, City Manager

CITY OF UKIAH

MENDOCINO COUNTY, CALIFORNIA

SPECIAL PROVISIONS

FOR

ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM

SPECIFICATION NO. 20-10

NON-MANDATORY PRE-BID MEETING
<TIME/DATE>
Grace Hudson Museum
431 South Main Street
Ukiah, California 95482

CITY OF UKIAH
DEPARTMENT OF COMMUNITY SERVICES
300 Seminary Avenue
Ukiah, California 95482-5400

Bids Open: _____, _____, _____
2:00 p.m.
Office of City Clerk

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CITY OF UKIAH

MENDOCINO COUNTY, CALIFORNIA

CITY COUNCIL:

DOUGLAS CRANE – MAYOR

JUAN OROZCO – VICE-MAYOR

JIM BROWN – COUNCIL MEMBER

STEVE SCALMANINI – COUNCIL MEMBER

MAUREEN MULHEREN – COUNCIL MEMBER

SAGE SANGIACOMO – CITY MANAGER

TIM ERIKSEN - DIRECTOR OF PUBLIC WORKS / CITY ENGINEER

MARY HORGER – FINANCIAL SERVICES MANAGER

KRISTINE LAWLER – CITY CLERK

R. ALLEN CARTER - CITY TREASURER

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CITY OF UKIAH
DEPARTMENT OF COMMUNITY SERVICES
AUGUST 2020

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CITY OF UKIAH, MENDOCINO COUNTY, CALIFORNIA
NOTICE TO BIDDERS FOR THE ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM
SPECIFICATION NO. 20-10

NOTICE IS HEREBY GIVEN that sealed standard proposals for the ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM will be received at the Office of the City Clerk, Ukiah Civic Center **Annex** – located at **411 West Clay Street**, Ukiah, California until 2:00 p.m. on _____, ____, 20___. Bids shall be addressed to the City Clerk and shall be endorsed ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM. **DUE TO THE CITY'S CURRENT CLOSURE TO THE PUBLIC BECAUSE OF THE COVID-19 EPIDEMIC**, bids that are HAND DELIVERED must be placed in the Night Drop Box located to the right of the front doors of the Ukiah Civic Center Annex, at the address listed above. As soon thereafter as possible, the bids will be publicly opened via live streaming at http://www.cityofukiah.com/meetings/ and read. Bids are required for the entire work described herein. No fax bids will be accepted.

The work consists of all labor, equipment and materials to replacing the existing roof with a standing seam metal roof at the Grace Hudson Museum, located at 431 South Main Street in Ukiah, California.

A NON-MANDATORY PRE-BID MEETING will be held at _____ on _____, meeting outside the Grace Hudson Museum at 431 South Main Street, Ukiah, California 95482. *Social distancing will be mandatory, and maintained through the course of the meeting.*

Plans and Special Provisions may be inspected and/or copies obtained from the City's website at www.cityofukiah.com/purchasing. No bid will be considered unless it is made on the forms furnished by the City and is made in accordance with the details of the Special Provisions. Each bidder must be licensed as required by law. Further information regarding the work or these specifications can be obtained by calling Mary Horger, Procurement Manager at (707) 463-6233 or by email at mhorger@cityofukiah.com.

The City Council reserves the right to reject any or all bids and to determine which proposal is, in its opinion, the lowest responsive bid by a responsible bidder and which it deems in the best interest of the City to accept. The City Council also reserves the right, but not the obligation, to waive any irregularity or failure to strictly comply with the bidding requirements, that the City determines in the reasonable exercise of its discretion does not provide the bidder with a competitive advantage over other bidders.

No contractor or subcontractor may be listed on a bid proposal for a public works unless registered with the Department of Industrial Relations ("DIR") pursuant to Labor Code section 1725.5 except as allowed. under Labor Code section 1771.1(aThe prime contractor shall be responsible for posting job site notices as prescribed by regulation. This project is subject to compliance monitoring and enforcement by the DIR.

Pursuant to provisions of Section 1770, including amendments thereof, of the Labor Code of the State of California, the DIR Director has ascertained the general prevailing rate of wages for straight time, overtime, Saturdays, Sundays and Holidays including employer payment for health and welfare, vacation, pension and similar purposes for the City of Ukiah. Copies of his General Prevailing Wage Determination are available on the Internet at web address: http://www.dir.ca.gov/DLSR/PWD/ The prime contractor for the work herein shall possess a current, valid State of California, **Class C39 Roofing** Contractor's License. Pursuant to California Public Contract Code §22300, this contract includes provisions that allow substitutions of certain types of securities in lieu of the City withholding a portion of the partial payments due the Contractor to insure performance under this contract.

By order of the City Council, City of Ukiah, County of Mendocino, State of California.

Dated:_____ _____
Kristine Lawler, City Clerk, City of Ukiah, California

PUBLISH TWO TIMES:

DRAFT

INSTRUCTIONS TO BIDDERS

The ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM shall be performed in accordance with the Plans and Special Provisions therefor adopted, to which special reference is hereby made.

Each bidder must supply all the information required by the bid documents and Special Provisions.

Minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color or national origin in consideration for an award of any contract entered into pursuant to this advertisement. Women will be afforded equal opportunity in all areas of employment. However, the employment of women shall not diminish the standards or requirements for the employment of minorities.

All proposals or bids shall be accompanied by a cashier's check or certified check payable to the order of the City of Ukiah amounting to 10 percent of the bid, or by a bond in said amount and signed by the bidder and a corporate surety, payable to said City. Said check shall be forfeited, or said bond shall become payable to said City in case the bidder depositing the same does not, within fifteen (15) days after written notice that the contract has been awarded to him: (a) enter into a contract with the City and (b) furnish certificates of insurance and endorsements, a bond of faithful performance and a payment bond as described in the Special Provisions.

No bidder shall withdraw his or her bid for a period of thirty (30) calendar days after the date set by the City for the opening thereof.

The Contractor and any subcontractors shall each possess a valid City of Ukiah Business License prior to the start of any work.

The Contractor shall furnish a project schedule to the Engineer prior to the start of any work and start work as scheduled.

The work is to be completed within ninety (90) calendar days. The Contractor will pay to the City the sum of five hundred ($500.00) dollars per day for each and every calendar day's delay beyond the time prescribed.

The staff shall notify a bidder by telephone, email or fax, if it intends to recommend the rejection of the bidder's bid. Any bid protest must be filed with the City Clerk not more than five calendar days following the bid opening, or 2 calendar days following notice that staff is recommending the rejection of a bid. If any such timely written protest is filed, all bidders shall be provided a copy of the protest within 2 calendar days of its receipt, which may be delivered to the bidders as an email attachment or by fax. All such bidders may file with the City Manager a written objection or other response to the protest.

All objections or responses filed not more than 5 days after receipt of the written protest will be presented to the City Council at its next regular meeting occurring not less than 12 calendar days following the bid opening. The City Council will resolve the bid protest at that meeting based on the written protest, any staff recommendation and all timely written objections and responses. In accordance with the Brown Act, any person may address the City Council on this item during the meeting. The City Council action on the protest shall represent a final decision by the City on the protest.

Examination of Site, Drawings, Etc.

A non-mandatory pre-bid conference will be held at _____, meeting outside the Grace Hudson Museum, located at 431 South Main Street, Ukiah, California 95482, to fully acquaint interested Contractors with local conditions, construction and labor required so that he or she may fully understand the facilities, difficulties and restrictions attending the execution of the work under the Contract. *Social distancing will be mandatory, and maintained through the course of the meeting.* Failure to attend the mandatory bid conference will be just cause for the bid to be rejected as non-responsive. Bidders shall thoroughly examine and be familiar with the Plans and Special Provisions.

Oral statements or instructions made during this visit will not constitute an amendment to this solicitation. The City will determine the appropriate action necessary, if any, and may issue a written amendment to the bid request.

Each bidder shall visit the site of the proposed work and fully acquaint himself with local conditions, construction and labor required so that he or she may fully understand the facilities, difficulties and restrictions attending the execution of the work under the Contract. Bidders shall thoroughly examine and be familiar with the Plans and Special Provisions. The failure of any bidder to receive or examine any form, instrument, addendum, or other document, or to visit the site and acquaint himself with conditions there existing, shall in no way relieve the bidder from any obligation with respect to his or her proposal or to the contract. The drawings for the work show conditions as they are supposed or believed by the Engineer to exist; but, it is neither intended nor shall it be inferred that the conditions as shown thereon constitute a representation by the Engineer, the City or its officers that such conditions are actually existent, nor shall the City, the Engineer or any of their officers or representatives be liable for any loss sustained by the Contractor as a result of a variance between the conditions shown on the drawings and the conditions actually revealed during the progress of the work or otherwise.

The bidder's attention is directed to the possible existence of obstructions and public improvements within the limits of the work or adjacent thereto, which may or may not be shown on the Drawings. Any bid shall take into consideration that conditions may exist underground or otherwise that are not known to the City or easily detected during a site inspection that could impact the time or cost of completing the project. The City expects the bids to anticipate such conditions so that it can know for budgeting and other purposes the total cost to complete the project before accepting a bid and undertaking the legal obligation to construct the project. In awarding the contract the City relies on the contractor’s representation that its bid anticipates differing site conditions and the additional time or cost that such conditions may necessitate.

The bidder shall investigate to his or her satisfaction the conditions to be encountered, the character, quality and quantities of work to be performed and materials to be furnished and the requirements of the Plans, Special Provisions, Standard Specifications, Standard Plans, and Contract Documents. The submission of a proposal shall be considered conclusive evidence that the bidder has made such examination and has accepted the project workplace as a safe workplace to perform the work of the Contract.

Bidder Inquiries and Questions

Inquiries and questions must be submitted in writing via fax or email to the following designated contact person:

Mary Horger, Financial Services Manager
Fax: (707) 313-3621
Email: mhorger@cityofukiah.com

The City reserves the right to not respond to inquiries or questions submitted within 3 business days of the bid opening.

Location of the Work

All of the work to be performed is within the City of Ukiah. Project is located at the Grace Hudson Museum, 431 South State Street, Ukiah, California.

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GENERAL CONDITIONS

SECTION 1. PROPOSAL REQUIREMENTS AND GENERAL CONDITIONS

1-01. Definitions. Whenever any word or expression defined in this section, or pronoun used in its stead, occurs in these contract documents, it shall have and is mutually understood to have the meaning given:

a. "City of Ukiah" or "City" shall mean the City of Ukiah, Mendocino County, California, acting through its City Council or any other board, body, official or officials to which or to whom the power belonging to the Council shall by virtue of any act or acts, hereafter pass or be held to appertain.

b. "Engineer" shall mean the Engineer or Architect duly and officially appointed by the City to observe the work of construction under this contract, acting personally or through agents or assistants duly authorized by him, such agents or assistants acting within the scope of the particular duties entrusted to them.

c. "Inspector" shall mean the engineering or technical inspector or inspectors duly authorized or appointed by the Engineer, limited to the particular duties entrusted to him or her or them.

d. "Contractor" shall mean the party entering into contract with the City of Ukiah for the performance of work covered by this contract and his or her authorized agents or legal representatives.

e. "Date of signing of contract" or words equivalent thereto, shall mean the date upon which this contract, with the signature of the Contractor affixed, together with the prescribed bonds, shall be or shall have been delivered to the City or its duly authorized representatives.

f. "Day" or "days", unless herein otherwise expressly defined, shall mean a calendar day or days of twenty-four hours each.

g. "The work" shall mean and include all the work specified, indicated, shown or contemplated in the contract to construct the improvement, including all alterations, amendments or extensions thereto made by contract change order or other written orders of the Engineer.

h. "Contract drawings", "drawings", "plans" shall mean and include 1) all drawings or plans which may have been prepared by or on behalf of the City, as a basis for proposals, when duly signed and made a part of this contract by incorporation or reference, 2) all drawings submitted in pursuance of the terms of this contract by the successful bidder with his or her proposal and by the Contractor to the City if and when approved by the Engineer and 3) all drawings submitted by the Engineer to the Contractor during the progress of the work as provided for herein.

i. Where "as shown", "as indicated", "as detailed" or words of similar import are used, it shall be understood that reference to the drawings accompanying these Special Provisions is made unless stated otherwise.

Where "as directed", "as permitted", "approved" or words of similar import are used, it shall be understood that the direction, requirements, permission, approval or acceptance of the Engineer is intended unless stated otherwise.

As used herein, "provide" or "install" shall be understood to mean "provide or install complete in place", that is, "furnish and install". "Shall" is mandatory; "may" is permissive.

1-02. Examination of Plans, Special Provisions and Site of Work. The bidder shall examine carefully the Proposal, Plans, Special Provisions, Contract forms and the site of the work contemplated therefor. It will be assumed that the bidder has investigated to his or her satisfaction the conditions to be encountered and the character, quality and requirements of all Plans, Special Provisions, Standard Specifications, and Standard Plans involved.

1-03. Proposal. Bids shall be made on the blank forms prepared by the City. All bids shall give the prices bid, both in writing and in figures and shall be signed by the bidder or his or her authorized representative, with his or her address. If the bid is made by an individual or partner, his or her name and the post office address of his or her

business or partnership, along with his or her signature or the signature of one or more partners must be shown; if made by a corporation, the bid shall show the name of the state under the laws of which the corporation is chartered, the name of the corporation and the title of the person who signs on behalf of the corporation.

Each proposal shall be enclosed in a sealed envelope, endorsed as specified in the notice to bidders. Bidders are warned against making erasures or alterations of any kind and proposals which contain omissions, erasures, conditions, alterations, additions not called for, additional proposals or irregularities of any kind may be rejected.

1-04. Withdrawal of Bids. Any bid may be withdrawn at any time prior to the hour fixed in the notice to bidders for the openings of bids, provided that a request in writing, executed by the bidder or his or her duly authorized representative, for the withdrawal of such bid is filed with the City. The withdrawal of a bid will not prejudice the right of a bidder to file a new bid.

1-05. Public Opening of Bids. Bids will be opened and read publicly at the time and place indicated in the notice to bidders. Bidders or their agents are invited to be present.

1-06. Bid Guaranty. Each bid must be accompanied by a certified check, cashier's check or bidder's bond executed by an admitted surety insurer, payable to the order of the City of Ukiah in an amount not less than 10 percent of the bid as a guarantee that the bidder will enter into a contract, if awarded the work.

1-07. Qualification of Bidders. No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. The prime contractor shall be responsible for posting job site notices as prescribed by regulation. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

Each bidder shall be licensed under the provisions of Chapter 9, Division 3 of the Business and Professions Code and shall be skilled and regularly engaged in the general class or type of work called for under this contract. A statement setting forth this experience and business standing shall be submitted by each bidder on the form provided herewith. It is the intention of the City to award a contract only to a bidder who furnishes satisfactory evidence that he or she has the requisite experience and ability and that he or she has sufficient capital, facilities and equipment to enable him or her to prosecute the work successfully and promptly within the time and in the manner agreed.

In determining the degree of responsibility to be credited to a bidder, the City may weigh evidence that the bidder or his or her personnel charged with the responsibility in the work, has performed satisfactorily other contracts of like nature and magnitude or comparable difficulty at similar rates of progress.

1-08. Disqualification of Bidders. More than one bid from an individual business, partnership, corporation or association, under the same or different names, will not be considered. Reasonable grounds for believing that any bidder is financially interested in more than one bid for the work will cause the rejection of all bids in which he or she is so interested. If there is reason to believe that collusion exists among the bidders, none of the participants in such collusion will be considered. Bids in which the prices obviously are unbalanced may be rejected.

1-09. Identification of Subcontractors. All bids shall comply with the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 and following) and shall set forth:

(a) The name and the location of the place of business of each subcontractor who will perform work or labor, or render service to the prime contractor in or about the construction of the work, or to a subcontractor licensed by the State of California who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work according to detailed drawings contained in the plans and Special Provisions, in an amount in excess of one-half of 1 percent of the prime contractor's total bid.

(b) The portion of the work which will be done by each such subcontractor. The prime contractor shall list only one subcontractor for each such portion defined by the prime contractor in his or her bid.

1-10. General Provisions of the Standard Specifications. All provisions of the General Provisions, Sections 1 through 11, of the Standard Specifications, shall be applicable to the contract except as modified by these Special Provisions. The Standard Specifications are set forth in Section 12-06 of these Special Provisions.

1-11. Addenda. If it becomes necessary to revise any part of these plans and specifications after they have been released, the City will issue an addendum containing the revision. All addenda will be posted on the City's website at www.cityofukiah.com/purchasing with the rest of the bid documents. Anyone who intends to submit a bid in response to this Request for Bid must check the website frequently for any posted addenda. Anyone submitting a bid will be deemed to have seen and agreed to be bound by the posted addenda.

SECTION 2. AWARD AND EXECUTION OF CONTRACT

2-01. Award of Contract. Award of the contract, if it be awarded, will be to the lowest responsible bidder whose bid complies with all the specified requirements. The award, if made, will be made within thirty (30) days after opening of the bids. The City reserves the right to reject any and all bids and to waive any irregularity in the proposal not pertaining to cost.

2-02. Return of Proposal Guaranties. All bid guaranties will be held until the contract has been fully executed, after which they will be returned upon request to the respective bidders whose bids they accompany.

2-03. Execution of Contract. The contract agreement shall be executed in duplicate by the successful bidder and returned, together with the contract bonds, insurance certificates and endorsements, within fifteen (15) days after written notice of the award of the contract. After execution by the City; one copy shall be filed with the City and one copy shall be returned to the Contractor. If the bidder fails or refuses to enter into the contract agreement within the required time, then the bid guaranty accompanying the bid shall be forfeited to the City.

SECTION 3. SCOPE AND INTENT OF CONTRACT

3-01. Effect of Inspection and Payments. Neither the inspection by the Engineer or an inspector, nor any order, measurement or approved modification, nor certificate or payment of money, nor acceptance of any part or whole of the work, nor any extension of time, nor any possession by the City or its agents, shall operate as a waiver of any provision of this contract or of any power reserved therein to the City, or of any right to damages thereunder; nor shall any breach of this contract be held to be a waiver of any subsequent breach. All remedies shall be construed as cumulative.

3-02. Effect of Extension of Time. The granting of any extension of time on account of delays which, in the judgement of the City, are avoidable delays shall in no way operate as a waiver on the part of the City of its rights under this contract.

3-03. Extra Work. If extra work orders are given in accordance with provisions of this contract, such work shall be considered a part hereof and shall be subject to each and all of its terms and requirements.

3-04. Assignment of Contract. The contract may be assigned or sublet in whole or in part only upon the written consent of the City acting through its authorized agents. Consent will not be given to any proposed assignment which would relieve the original contractor or its surety of their responsibilities under the contract nor will the Engineer consent to any assignment of a part of the work under the contract.

3-05. Subcontractors. The Contractor shall be as fully responsible for the acts and omissions of his or her subcontractors and of persons either directly or indirectly employed by them, as he or she is for the acts and omissions of persons directly employed by him.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the terms of this Contract which are applicable to the work of subcontractors.

Nothing contained in this contract shall be construed to create or shall be relied upon to create any contractual relationship between any subcontractor and the City and no action may be brought by any subcontractor against the City based on this contract.

3-06. Interpretation of Special Provisions and Drawings. The Special Provisions and the Contract Drawings are intended to be explanatory of each other. Any work indicated in the Contract Drawings and not in the Special Provisions, or vice versa, is to be executed as if indicated in both. In case of a discrepancy or conflict between the Technical Specifications and Contract Plans, the Technical Specifications shall govern. All work shown on the Contract Drawings, the dimensions of which are not figured, shall be accurately followed to the scale to which the drawings are made, but figured dimensions are in all cases to be followed, where given, though they differ from scaled measurements. Large scale drawings shall be followed in preference to small scale drawings. Should it appear that the work to be done, or any of the matters relative thereto, are not sufficiently detailed or explained in these contract documents, including the contract drawings, the Contractor shall apply to the Engineer for such further explanations as may be necessary and shall conform thereto as part of this contract, so far as may be consistent with the terms of this contract. In the event of any doubt or questions arising respecting the true meaning of the Special Provisions, reference shall be made to the Engineer and his or her decision thereon shall be final. If the Contractor believes that a clarification or interpretation justifies an increase in the contract price or contract time, the Contractor must comply with the written notice provisions of Sections 9-05 and 10-07 of these Special Provisions. Contractor's attention is directed to Section 12-06 of the Technical Specifications regarding the Standard Specifications and Standard Plans.

3-07. Addenda. If it becomes necessary to revise any part of these plans and specifications after they have been released, the City will issue an addendum containing the revision. All addenda will be posted on the City's website at www.cityofukiah.com/purchasing with the rest of the bid documents. Anyone who intends to submit a bid in response to this Request for Bid must check the website frequently for any posted addenda. Anyone submitting a bid will be deemed to have seen and agreed to be bound by the posted addenda.

3-08. Liability of City Officials. No city official, nor the Engineer, nor any authorized assistant of any of them, shall be personally responsible for any liability arising under this contract.

3-09. Dispute Resolution. Claims of $375,000 or less by the Contractor that arise under this Contract are subject to the mandatory dispute resolutions provisions in Public Contract Code Sections 20104-20104.6.

SECTION 4. BONDS

4-01. Faithful Performance Bond. As a part of the execution of this contract, the Contractor shall furnish a bond of a surety company or other securities providing equivalent protection such as cash, letter of credit, or certificates of deposit, acceptable to the City, conditioned upon the faithful performance of all covenants and stipulations under this contract. The amount of the bond shall be 100 percent of the total contract price, as this sum is set forth in the agreement.

4-02. Material and Labor Bond. As a part of the execution of this contract, the Contractor shall furnish a bond of a surety company or other securities providing equivalent protection such as cash, letter of credit or certificates of deposit acceptable to the City in a sum not less than 50 percent of the total contract price, as this sum is set forth in the agreement for the payment in full of all persons, companies or corporations who perform labor upon or furnish materials to be used in the work under this contract, in accordance with the provisions of Sections 3247 through 3252 inclusive of the Civil Code of the State of California and any acts amendatory thereof.

4-03. Defective Material and Workmanship Bond. As a condition precedent to the completion of this contract, the Contractor shall furnish a bond of a surety company acceptable to the City in an amount not less than 5 percent (5%) of the final contract price, to hold good for a period of one (1) year after the completion and acceptance of the work, to protect the City against the results of defective materials, workmanship and equipment during that time. This bond shall be delivered to the City before the final payment under this contract will be made.

4-04. Notification of Surety Companies. The surety companies shall familiarize themselves with all of the conditions and provisions of this contract and they waive the right of special notification of any change or modification of this contract or of extension of time, or decreased or increased work, or of the cancellation of the contract, or of any other act or acts by the City or its authorized agents, under the terms of this contract; and failure to so notify the aforesaid surety companies of changes shall in no way relieve the surety companies of their obligation under this contract.

SECTION 5. INSURANCE REQUIREMENTS FOR CONTRACTORS (WITH CONSTRUCTION RISKS)

Contractor shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his or her agents, representatives, employees or subcontractors.

5-01. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office Commercial Liability Coverage (occurrence form CG 0001).
2. Insurance Services Office form number CA 0001 (Ed. 1/87) covering Automobile Liability, code 1 (any auto).
3. Worker's Compensation insurance as required by the State of California and Employer's Liability Insurance.
4. Course of Construction insurance covering for “all risks” of loss.

5-02. Minimum Limits of Insurance

Contractor shall maintain limits no less than:

1. General Liability: $2,000,000 per occurrence for bodily injury, personal injury and property damage including operations, products and completed operations. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

2. Automobile Liability: $2,000,000 per accident for bodily injury and property damage.

3. Employer's Liability: $1,000,000 per accident for bodily injury and property damage.

4. Course of Construction: Completed value of the project with no co-insurance penalty provisions.

5-03. Deductibles and Self-insured Retentions. Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, officials, employees and volunteers; or the Contractor shall provide a financial guarantee satisfactory to the City guaranteeing payment of losses and related investigations, claim administration and defense expenses.

5-04. Other Insurance Provisions

The general liability and automobile liability policies are to contain, or be endorsed to contain, the following provisions:

1. The City, its officers, officials, employees and volunteers are to be covered as Additional Insured with respect to liability arising out of automobiles owned, leased, hired or borrowed by or on behalf of the contractor; and with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts or equipment furnished in connection with such work or operations. General liability coverage can be provided in the form of an endorsement to the Contractor's insurance, or as a separate owner's policy.

2. The workers’ compensation policy is to be endorsed with a waiver of subrogation. The insurance company, in its endorsement, agrees to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses paid under the terms of this policy which arises from the work performed by the named insured for the City.

3. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance as respects the City, its officers, officials, employees or volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.

4. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be canceled by either party, except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City.

5. Coverage shall not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured would be invalid under Subdivision (b) of Section 2782 of Civil Code.

6. Course of Construction policies shall contain the following provisions:
   a.) The City shall be named as loss payee.
   b.) The insurer shall waive all rights of subrogation against the City.

5-05. Acceptability of Insurers

Insurance is to be placed with insurers with a current A.M. Best's rating of no less than the following:

A++ VII	A- VIII
A+ VII	B++ X
A VII	B+ X

5-06. Verification of Coverage. Contractor shall furnish the City with original certificates and amendatory endorsements effecting coverage required by this clause. The endorsements shall be on forms provided by the City or on other than the City's forms, provided those endorsements or policies conform to the requirements. All certificates and endorsements are to be received within 15 days from written notice of contract award, and the work shall not commence until the certificates and endorsements have been approved by the City. The City reserves the right to require complete certified copies of all required insurance policies, including endorsements affecting the coverage required by these Special Provisions at any time.

5-07. Subcontractors. Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

SECTION 6. RESPONSIBILITIES AND RIGHTS OF CONTRACTOR

6-01. Legal Address of Contractor. Both the address given in the proposal and the Contractor's office in the vicinity of the work are hereby designated as places to either of which drawings, samples, notices, letters or other articles or communications to the Contractor may be mailed or delivered. The delivery at either of these places of any such thing from the City or its agents to the Contractor shall be deemed sufficient service thereof upon the Contractor and the date of such service shall be the date of such delivery. The address named in the proposal may be changed at any time by notice in writing from the Contractor to the City. Nothing herein contained shall be deemed to preclude or render inoperative the service of any drawing, sample, notice, letter or other article or communication to or upon the Contractor personally.

6-02. Office of Contractor at Site. During the performance of this contract, the Contractor shall maintain a suitable office at the site of the work which shall be the headquarters of a representative authorized to receive drawings and any such thing given to the said representatives or delivered at the Contractor's office at the site of work in his or her absence shall be deemed to have been given to the Contractor.

6-03. Attention to Work. The Contractor shall give his or her personal attention to and shall supervise the work to the end that it shall be prosecuted faithfully and when he or she is not personally present on the work, he or she shall at all reasonable times be represented by a competent superintendent or foreman who shall receive and obey all instructions or orders given under this contract and who shall have full authority to execute the same and to supply materials, tools and labor without delay and who shall be the legal representative of the Contractor. The

Contractor shall be liable for the faithful observance of any instructions delivered to him or her or to his or her authorized representative.

6-04. Liability of Contractor. The Contractor shall do all of the work and furnish all labor, materials, tools and appliances, except as otherwise herein expressly stipulated, necessary or proper for performing and completing the work herein required in the manner and within the time herein specified. The mention of any specific duty or liability imposed upon the Contractor shall not be construed as a limitation or restriction of any general liability or duty imposed upon the Contractor by this contract, said reference to any specific duty or liability being made herein merely for the purpose of explanation.

The right of general supervision by the City shall not make the Contractor an agent of the City and the liability of the Contractor for all damages to persons or to public or private property, arising from the Contractor's execution of the work, shall not be lessened because of such general supervision.

Until the completion and final acceptance by the City of all the work under and implied by this contract, the work shall be under the Contractor's responsible care and charge. The Contractor shall rebuild, repair, restore and make good all injuries, damages, re-erections and repairs, occasioned or rendered necessary by causes of any nature whatsoever, excepting only acts of God and none other, to all or any portions of the work, except as otherwise stipulated.

To the fullest extent permitted by law, Contractor shall indemnify and hold harmless the City and its officers, directors, agents and employees from and against all claims, damages, losses and expenses including but not limited to attorneys' fees, costs of suit, expert witness fees and expenses and fees and costs of any necessary private investigators arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, other than the work itself, including the loss of use resulting therefrom and (2) is caused in whole or in part by any act or omission of the Contractor, any subcontractor, or anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder, or by the negligence or omission of a party indemnified herein.

In any and all claims against the City or any of its agents or employees by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under workers' or workmen's compensation acts, disability benefit acts, or other employee benefit acts. The obligation to indemnify shall extend to and include acts of the indemnified party which may be negligent or omissions which may cause negligence.

The City shall have the right to estimate the amount of such damage and to cause the City to pay the same and the amount so paid for such damage shall be deducted from the money due the Contractor under this contract; or the whole or so much of the money due or to become due the Contractor under this contract as may be considered necessary by the City, shall be retained by the City until such suits or claims for damages shall have been settled or otherwise disposed of and satisfactory evidence to that effect furnished to the City.

6-05. Protection of Persons and Property. The Contractor shall furnish such watchman, guards, fences, warning signs, walks and lights as shall be necessary and shall take all other necessary precautions to prevent damage or injury to persons or property.

All property line fences and improvements in the vicinity of the work shall be protected by the Contractor and, if they are injured or destroyed, they and any other property injured by the Contractor, his or her employees or agents, shall be restored to a condition as good as when he or she entered upon the work.

6-06. Protection of City Against Patent Claims. All fees, royalties or claims for any patented invention, article or method that may be used upon or in any manner connected with the work under this contract shall be included in the price bid for the work and the Contractor and his or her sureties shall protect and hold the City, together with all of its officers, agents, servants and employees, harmless against any and all demands made for such fees or claims brought or made on account of this contract. The Contractor shall, if requested by the Engineer, furnish acceptable proof of a proper release from all such fees or classes.

Should the Contractor, his or her agents, servants or employees, or any of them be enjoined from furnishing or using any invention, article, material or appliance supplied or required to be supplied or used under this contract, the Contractor shall promptly substitute other articles, materials or appliance, in lieu thereof, of equal efficiency, quality, finish, suitability and market value and satisfactory in all respects to the Engineer. Or, in the event that the Engineer elects, in lieu of such substitution, to have supplied and to retain and use, any such invention, article, material or appliance, as may by this contract be required to be supplied, in that event the Contractor shall pay such royalties and secure such valid licenses as may be requisite and necessary for the City, its officers, agents, servants and employees, or any of them, to use such invention, article, material or appliance without being disturbed or in any way interfered with by any proceeding in law or equity on account thereof. Should the Contractor neglect or refuse to make the substitution promptly, or to pay such royalties and secure such licenses as may be necessary, then in that event the Engineer shall have the right to make such substitution, or the City may pay such royalties and secure such licenses and charge the cost thereof against any money due to the Contractor from the City or recover the amount thereof from him or her and his or her sureties notwithstanding final payment under this contract may have been made.

6-07. Protection of Contractor's Work Property. The Contractor shall protect his or her work, supplies and materials from damage due to the nature of the work, the action of the elements, trespassers, or any cause whatsoever under his or her control, until the completion and acceptance of the work. Neither the City nor any of its agents assumes any responsibility for collecting indemnity from any person or persons causing damage to the work of the Contractor.

6-08. Regulations and Permits. The Contractor shall secure and pay for all permits, give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the Plans and Special Provisions are at variance therewith, he or she shall promptly notify the Engineer in writing and any necessary changes shall be adjusted as provided in the contract for changes in the work. The contractor and any subcontractors shall each secure and maintain a valid City of Ukiah Business License. The City of Ukiah will issue a no fee encroachment permit to the Contractor allowing him or her to perform work within City right of way or within City property after the Contract Documents have been executed and insurance certificates and endorsements have been approved by the City.

6-09. Construction Utilities. The Contractor shall be responsible for providing for and in behalf of his or her work under this contract, all necessary utilities, such as special connection to water supply, telephones, power lines, fences, roads, watchmen, suitable storage places, etc.

6-10. Approval of Contractor's Plans. The approval by the Engineer of any drawing or any method of work proposed by the Contractor in accordance with paragraph 8-06 shall not relieve the Contractor of any of his or her responsibility for his or her errors therein and shall not be regarded as any assumption of risk or liability by the City or any officer or employee thereof and the Contractor shall have no claim under this contract on account of the failure or partial failure or inefficiency of any plan or method so approved. Such approval shall be considered to mean merely that the Engineer has no objection to the Contractor's using, upon his or her own full responsibility the plan or method approved.

6-11. Suggestions to the Contractor. Any plan or method of work suggested by the Engineer to the Contractor, but not specified or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor; and the Engineer and the City shall assume no responsibility thereof.

6-12. Termination of Unsatisfactory Subcontracts. Should any subcontractor fail to perform in a satisfactory manner the work undertaken by him, such subcontract shall be terminated immediately by the Contractor upon notice from the Engineer.

6-13. Preservation of Stakes and Marks. The Contractor shall preserve carefully bench marks, reference points and stakes and in case of destruction he or she shall replace his or her stakes, reference points and bench marks and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance. Contractor’s attention is directed to Section 7-03 of these Special Provisions.

6-14. Assistance to Engineer. At the request of the Engineer the Contractor shall provide men from his or her force and tools, stakes and other materials to assist the Engineer temporarily in making measurements and surveys and in establishing temporary or permanent reference marks. Payment for such materials and assistance

will be made as provided for under the caption "Extra Work," provided, however, that the cost of setting stakes and marks carelessly lost or destroyed by the Contractor's employees will be assessed to the Contractor.

6-15. Removal of Condemned Materials and Structures. The Contractor shall remove from the site of the work, without delay, all rejected and condemned materials or structures of any kind brought to or incorporated in the work and upon his or her failure to do so, or to make satisfactory progress in so doing, within forty-eight (48) hours after the service of a written notice from the Engineer, the condemned material or work may be removed by the City and the cost of such removal shall be taken out of the money that may be due or may become due the Contractor on account of or by virtue of this contract. No such rejected or condemned material shall again be offered for use by the Contractor under this Contract.

6-16. Proof of Compliance with Contract. In order that the Engineer may determine whether the Contractor has complied with the requirements of this contract, not readily enforceable through inspection and tests of the work and materials, the Contractor shall, at any time when requested, submit to the Engineer properly authenticated documents or other satisfactory proofs as to his or her compliance with such requirements.

6-17. Errors and Omissions. If the Contractor, in the course of the work, finds any errors or omissions in plans or in the layout as given by survey points and instruction, or if he or she finds any discrepancy between the plans and the physical conditions of the locality, he or she shall immediately inform the Engineer, in writing and the Engineer shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

6-18. Cooperation. The Contractor shall cooperate with all other contractors who may be performing work in behalf of the City and workmen who may be employed by the City on any work in the vicinity of the work to be done under this contract with the work of such contractors or workmen. he or she shall make good promptly, at his or her own expense, any injury or damage that may be sustained by other contractors or employees of the City at his or her hands.

Any difference or conflict which may arise between the Contractor and other contractors, or between the contractor and workmen of the City in regard to their work shall be adjusted and determined by the Engineer. If the work of the Contractor is delayed because of any acts or omissions of any other contractor or of the City, the Contractor shall on that account have no claim against the City other than for an extension of time.

6-19. Right of Contractor to Stop Work. Under the following conditions the Contractor shall have the right, if he or she so desires, to stop the work and terminate the contract upon ten (10) days written notice to the Engineer and recover from the City payment for all work actually performed and for all satisfactory materials actually delivered to the site of the work for permanent incorporation therein, all as may be shown by the estimate of the Engineer.

(1) If the work is stopped under an order of any court or other competent public authority for a period of time of three (3) months through no act or fault of the Contractor or of anyone employed by him.

(2) If the Engineer fails to issue the monthly certificate for payment in accordance with the terms of this contract.

(3) If the City fails to pay the Contractor within sixty (60) days after it shall have become due, as provided by the terms of this contract, any sum certified by the Engineer or awarded by the City.

All provided that if such action to terminate the contract be not instituted by the Contractor within ten (10) days after the alleged existence of such condition and if written notice of such action be not at that time delivered to the City and the Engineer, then such right shall lapse until another occasion arises according to this section.

6-20. Hiring and Dismissal of Employees. The Contractor shall employ only such foremen, mechanics and laborers as are competent and skilled in their respective lines of work and whenever the Engineer shall notify the Contractor that any person on the work is, in his or her opinion, incompetent, unfaithful, intemperate or disorderly, or refuses to carry out the provisions of this contract, or uses threatening or abusive language to any person on the work representing the City, or is otherwise unsatisfactory, such person shall be discharged immediately from the work and shall not be re-employed upon it except with the consent of the Engineer.

6-21. Wage Rates.

1. Contractor shall pay all mechanics and laborers employed or working upon the site of the work unconditionally and without subsequent deductions or rebate on any account the full amounts due at the time of payment at wage rates not less than those contained in the applicable prevailing wage determination, regardless of any contractual relationship which may be alleged to exist between the Contractor and subcontractors and such laborers and mechanics.

2. Contractor shall comply with the California Labor Code Section 1775. In accordance with said Section 1775, Contractor shall forfeit as a penalty to the Owner, $50.00 (or the higher minimum penalty as provided in Section 1775(B)(ii) – (iii)) for each calendar day or portion thereof, for each workman paid less than the stipulated prevailing rates for such work or craft in which such workman is employed for any work done under the Contract by him or her or by any subcontractor under him or her in violation of the provisions of the Labor Code and in particular, Labor Code Sections 1770 to 1780, inclusive. In addition to said penalty and pursuant to Section 1775, the difference between such stipulated prevailing wage rates and the amount paid to each workman for each calendar day or portion thereof for which each workman was paid less than the stipulated prevailing wage rate shall be paid to each workman by the Contractor.

3. Pursuant to the provision of Section 1770 of the Labor Code of the State of California, Owner has ascertained the general prevailing rate of wages (which rate includes employer payments for health and welfare, vacation, pension and similar purposes) applicable to the work to be done, for straight time work. The holiday wage rate listed shall be applicable to all holidays recognized in the collective bargaining agreement of the particular craft, classification or type of workmen concerned. Copies of the General Prevailing Wage Determination are available on the Internet at web address: http://www.dir.ca.gov/DLSR/PWD The Contractor shall post the wage determination at the site of work in a prominent place where it can easily be seen by the workers.

4. City will not recognize any claim for additional compensation because the Contractor has paid any rate in excess of the prevailing wage rate obtained by the Contractor. The possibility of wage increases is one of the elements to be considered by the Contractor in determining his or her bid and will not in any circumstances be considered as the basis for a claim against the City.

5. The Labor Commissioner through the Division of Labor Standards Enforcement (DLSE) may at any time require contractors and subcontractors to furnish electronic certified payroll records directly to DLSE. Commencing with contracts awarded or after April 1, 2015, all contractors and subcontractors must furnish electronic certified payroll records directly to the DLSE.

6. Travel and Subsistence Payments.

   Contractor shall make travel and subsistence payments to each workman needed to execute the work in accordance with the requirements in Section 1773.8 of the Labor Code (Chapter 880, Statutes of 1968).

7. Apprentices.

   Attention is directed to the provisions in Sections 1777.5 (Chapter 1411, Statutes of 1968) and 1777.6 of the California Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him. Contractor and any subcontractor under him or her shall comply with the requirements of said sections in the employment of apprentices.

   Information relative to apprenticeship standards, wage schedules and other requirements may be obtained from the Director of Industrial Relations, ex officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

6-22. Cleaning Up. The Contractor shall not allow the site of the work to become littered with trash and waste material, but shall maintain the same in a neat and orderly condition throughout the construction period. The Engineer shall have the right to determine what is or is not waste material or rubbish and the place and manner of disposal.

On or before the completion of the work, the Contractor shall without charge therefore carefully clean out all pits, pipes, chambers or conduits and shall tear down and remove all temporary structures built by him or her and shall

remove rubbish of all kind from any of the grounds which he or she has occupied and leave them in first class condition.

6-23. Guaranty. All work shall be guaranteed for a period of one year from the date of acceptance by the City. The Contractor shall promptly make all needed repairs arising out of defective materials, workmanship and equipment.

The City is hereby authorized to make such repairs if within ten days after the mailing of a notice in writing to the Contractor or his or her agent, the Contractor shall neglect to make or undertake with due diligence the aforesaid repairs, provided, however, that in case of an emergency where, in the opinion of the City delay would cause serious loss or damage, repairs may be made without notice being sent to the Contractor and the Contractor shall pay the costs thereof.

Pursuant to the provisions of Section 4-03 of these Special Provisions, the Contractor shall furnish a Defective Material and Workmanship Bond in an amount not less than 5 percent of the final contract price, which shall be effective for a period of one (1) year after the completion and acceptance of the work.

SECTION 7. RESPONSIBILITIES AND RIGHTS OF CITY

7-01. Authority of the Engineer. All work done under this contract shall be done in a workmanlike manner and shall be performed to the reasonable satisfaction of the Engineer, who shall have general observation of all work included hereunder. To prevent disputes and litigation, the Engineer (1) shall in all cases determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for under this contract, (2) shall decide all questions relative to the true construction, meaning and intent of the Special Provisions and Drawings, (3) shall decide all questions which may arise relative to the classifications and measurements of quantities and materials and the fulfillment of this contract and (4) shall have the power to reject or condemn all work or material which does not conform to the terms of this contract. his or her estimate and decision in all matters shall be a condition precedent to an appeal for arbitration, or the right of the Contractor to receive, demand, or claim any money or other compensation under this agreement and a condition precedent to any liability on the part of the City to the Contractor on account of this contract. Whenever the Engineer shall be unable to act, in consequence of absence or other cause, then such engineer as the Engineer or the City shall designate, shall perform any and all of the duties and be vested with any or all of the powers herein given to the Engineer.

7-02. Inspection. The City will provide engineering personnel for the inspection of the work.

The Engineer and his or her representatives shall at all times have access to the work whenever it is in preparation or progress and the Contractor shall provide proper facilities for such access and inspection.

If the Special Provisions, the Engineer's instruction, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection and, if the inspection is by an authority other than the Engineer, of the date fixed for such inspection. Inspections by the Engineer shall be promptly made at the source of supply where practicable. If any work shall be covered up without approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for examination and properly restored at the Contractor's expense.

Re-examination of any work may be ordered by the Engineer and, if so ordered, the work must be uncovered by the Contractor. If such work is found to be in accordance with the contract documents, the City shall pay the cost of re-examination and replacement. If such work is not in accordance with the contract documents, the Contractor shall pay such cost.

Properly authorized and accredited inspectors shall be considered to be the representatives of the City limited to the duties and powers entrusted to them. It will be their duty to inspect materials and workmanship of those portions of the work to which they are assigned, either individually or collectively, under instructions of the Engineer and to report any and all deviations from the Drawings, Special Provisions and other contract provisions which may come to their notice. Any inspector may be considered to have the right to order the work entrusted to his or her supervision stopped, if in his or her opinion such action becomes necessary, until the Engineer is notified and has determined and ordered that the work may proceed in due fulfillment of all contract requirements.

7-03. Surveys. Contractor shall furnish all land surveys, establish all base lines and bench marks and make sufficient detailed surveys needed for working points, lines and elevations. The Contractor shall develop all slope

stakes and batter boards. Contractor shall also develop all additional working points, lines and elevations as he or she may desire to facilitate his or her methods and sequence of construction.

7-04. Rights-of-Way. The City will provide all necessary rights-of-way and easements in or beneath which work will be performed by the Contractor under this contract.

7-05. Retention of Imperfect Work. If any portion of the work done or material furnished under this contract shall prove defective and not in accordance with the Plans and Special Provisions, and if the imperfection in the same shall not be of sufficient magnitude or importance to make the work dangerous or undesirable, the Engineer shall have the right and authority to retain such work instead of requiring the imperfect work to be removed and reconstructed, but he or she shall make such deductions therefor in the payments due or to become due the Contractor as may be just and reasonable.

7-06. Changes in the Work. The Engineer shall have the right, in writing, to order additions to, omissions from, or corrections, alterations and modifications in the line, grade, form, dimensions, plan, or kind or amount of work or materials herein contemplated, or any part thereof, either before or after the beginning of construction. However, the arithmetical sum of the cost to the City of additions and subtractions from the work under this contract shall not exceed 10 percent of original contract amount or $5,000, whichever is the greater, unless based upon a supplementary agreement to be made therefore.

The order of such additions, omissions, corrections, alterations and modifications shall be in writing and signed by the Engineer and, in order, shall then be binding upon the Contractor. The Contractor shall proceed with the work as changed and the value of such change shall be determined as provided for in section 10-07 of these Special Provisions.

Such alterations shall in no way affect, vitiate, or make void this contract or any part thereof, except that which is necessarily affected by such alterations and is clearly the evident intention of the parties to this contract.

7-07. Additional Drawings by City. The drawings made a part of this contract at the time of its execution are intended to be fairly comprehensive and to indicate in more or less detail the scope of the work. In addition to these drawings, however, the Engineer shall furnish such additional drawings from time to time during the progress of the work as are necessary to make clear or to define in greater detail the intent of the Special Provisions and the contract drawings and the Contractor shall make his or her work conform to all such drawings.

7-08. Additional and Emergency Protection. Whenever, in the opinion of the Engineer, the Contractor has not taken sufficient precautions for the safety of the public or the protection of the works to be constructed under this contract, or of adjacent structures or property which may be injured by the processes of construction on account of such neglect and whenever, in the opinion of the Engineer, an emergency shall arise and immediate action shall be considered necessary in order to protect public or private, personal or property interest, then and in that event, the Engineer, with or without notice to the Contractor may provide suitable protection to the said interests by causing such work to be done and such material to be furnished as shall provide such protection as the Engineer may consider necessary and adequate.

The cost and expense of such work and material so furnished shall be borne by the Contractor and, if the same shall not be paid on presentation of the bills therefor, then such costs shall be deducted from any amounts due or to become due the Contractor.

The performance of such emergency work under the direction of the Engineer shall in no way relieve the Contractor from any damages which may occur during or after such precaution has been taken by the Engineer.

7-09. Suspension of Work. The City may at any time suspend the work or any part thereof by giving five (5) days written notice to the Contractor. The work shall be resumed by the Contractor within ten (10) days after the date fixed in the written notice from the City to the Contractor so to do. The City shall reimburse the Contractor for expense incurred by the Contractor in connection with the work under this contract as a result of such suspension.

If the work, or any part thereof, shall be stopped by the notice in writing aforesaid and if the City does not give notice in writing to the Contractor to resume work at a date within ten (10) days of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work so suspended and he or she will be entitled to the estimates and payments for all work done on the portions so abandoned, if any, plus 5 percent of the value of the work so abandoned, to compensate for loss of overhead, plant expense and anticipated profit.

7-10. Right of City to Terminate Contract. If the Contractor should be adjudged a bankrupt, or if he or she should make a general assignment for the benefit of his or her creditors, or if a receiver should be appointed on account of his or her insolvency, or if he or she should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply sufficient properly skilled workmen or proper materials, or if he or she should fail to make prompt payments to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Engineer, or otherwise be guilty of a substantial violation of any provision of the contract, then the City, upon the certificate of the Engineer that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor seven days written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools and appliances and finish the work by whatever method the City may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price shall exceed the expense of finishing the work, including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the City. The expense incurred by the City as herein provided and the damage incurred through the Contractor's default, shall be certified by the Engineer.

7-11. Use of Completed Portions. The City shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work or such portions which may not have expired; but such taking possession and using shall not be deemed an acceptance of any work not completed in accordance with the contract documents. If such prior use increases the cost of or delays the work, the Contractor shall be entitled to such extra compensation, or extension of time or both, as the Engineer may determine.

SECTION 8. WORKMANSHIP, MATERIALS and EQUIPMENT

8-01. General Quality. Materials and equipment shall be new and of a quality equal to that specified or approved. Work shall be done and completed in a thorough and workmanlike manner.

8-02. Quality in Absence of Detailed Specifications. Whenever under this contract it is provided that the Contractor shall furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the best grade in quality and workmanship obtainable in the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to the usual standards for first-class materials or articles of the kind required, with due consideration of the use to which they are to be put. In general, the work performed shall be in full conformity and harmony with the intent to secure the best standard of construction and equipment of the work as a whole or in part.

8-03. Materials and Equipment Specified by Name. Whenever any material or equipment is indicated or specified by patent or proprietary name or by the name of the manufacturer, such specification shall be considered as used for the purpose of describing the material or equipment desired and shall be considered as followed by the words "or approved equal". The Contractor may offer any material or equipment which shall be equal in every respect to that specified, provided that written approval first is obtained from the Engineer.

8-04. Source of Materials. Price, fitness and quality being equal, preference shall be given by the Contractor for supplies grown, manufactured or produced in the State of California and, next, for such products partially produced in this State in accordance with Government Code Section 4332.

8-05. Storage of Materials. Materials shall be so stored to ensure the preservation of their quality and fitness for the work. They shall be so located and disposed that prompt and proper inspection thereof may be made.

8-06. Drawings, Samples and Tests. As soon as possible after execution of the contract, the Contractor shall submit to the Engineer, in quintuplicate, sufficient information including, if necessary, assembly and detail drawings to demonstrate fully that the equipment and materials to be furnished comply with the provisions and intent of these Special Provisions and Drawings. If the information thus submitted indicates the equipment or materials is acceptable, the Engineer will return one copy stamped with his or her approval; otherwise, one copy will be returned with an explanation of why the equipment or material is unsatisfactory. The Contractor shall have no claims for damages or for extension of time on account of any delay due to the revision of drawings or rejection of material. Fabrication or other work performed in advance of approval shall be done entirely at the Contractor's risk. After

approval of equipment or material, the Contractor shall not deviate in any way from the design and specifications given without the written consent of the Engineer.

When requested by the Engineer, a sample or test specimens of the materials to be used or offered for use in connection with the work shall be prepared at the expense of the Contractor and furnished by him or her in such quantities and sizes as may be required for proper examination and tests, with all freight charges prepaid and with information as to their sources.

All samples shall be submitted before shipment and in ample time to permit the making of proper tests, analyses, or examination before the time at which it is desired to incorporate the material into the work. All tests of materials furnished by the Contractor shall be made by the Engineer. Samples shall be secured and tested whenever necessary to determine the quality of the material.

SECTION 9. PROSECUTION OF WORK

9-01. Equipment and Methods. The work under this contract shall be prosecuted with all materials, tools, machinery, apparatus and labor and by such methods as are necessary to the complete execution of everything described, shown, or reasonably implied. If at any time before the beginning or during the progress of the work, any part of the Contractor's plant or equipment, or any of his or her methods of execution of the work, appear to the Engineer to be unsafe, inefficient, or inadequate to insure the required quality or the rate of progress of the work, he or she may order the Contractor to increase or improve his or her facilities or methods and the Contractor shall comply promptly with such orders; but, neither compliance with such orders nor failure of the Engineer to issue such orders shall relieve the Contractor from his or her obligation to secure the degree of safety, the quality of the work and the rate of progress required of the Contractor. The Contractor alone shall be responsible for the safety, adequacy and efficiency of his or her plant, equipment and methods.

9-02. Time of Completion. The Contractor shall promptly begin the work under this contract and shall complete and make ready for full use all portions of the project made the subject of this contract within the time set forth in the agreement bound herewith.

9-03. Avoidable Delays. Avoidable delays in the prosecution or completion of the work shall include all delays which might have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor. The City will consider as avoidable delays within the meaning of this contract (1) delays in the prosecution of parts of the work, which may in themselves be unavoidable, but do not necessarily prevent or delay the prosecution of other parts of the work nor the completion of the whole work within the time herein specified, (2) reasonable loss of time resulting from the necessity of submitting plans to the Engineer for approval and from the making of surveys, measurements, inspections, and testing and (3) such interruptions as may occur in the prosecution of the work on account of the reasonable interference of other contractors employed by the City which do not necessarily prevent the completion of the whole work within the time herein specified.

9-04. Unavoidable Delays. Unavoidable delays in the prosecution or completion of the work under this contract shall include all delays which may result, through cause beyond the control of the Contractor and which he or she could not have provided against by the exercise of care, prudence, foresight and diligence. Orders issued by the City changing the amount of work to be done, the quantity of material to be furnished or the manner in which the work is to be prosecuted and unforeseen delays in the completion of the work of other contractors under contract with the City will be considered unavoidable delays, so far as they necessarily interfere with the Contractor's completion of the whole of the work. Delays due to normally adverse weather conditions will not be regarded as unavoidable delays. However, truly abnormal amounts of rainfall, temperatures or other weather conditions for the location of the work and time of year may be considered as unavoidable delays if those conditions necessarily cause a delay in the completion of the work.

9-05. Notice of Delays. Whenever the Contractor foresees any delay in the prosecution of the work and, in any event, immediately upon the occurrence of any delay which the contractor regards as an unavoidable delay, he or she shall notify the Engineer in writing of the probability of the occurrence of such delay and its cause, in order that the Engineer may take immediate steps to prevent, if possible, the occurrence or continuance of the delay, or, if this cannot be done, may determine whether the delay is to be considered avoidable or unavoidable, how long it continues and to what extent the prosecution and completion of the work are to be delayed thereby.

9-06. Extension of Time. Should any delays occur which the Engineer may consider unavoidable, as herein defined, the Contractor shall, pursuant to his or her application, be allowed an extension of time proportional to said delay or delays, beyond the time herein set forth, in which to complete this contract; and liquidated damages for delay shall not be charged against the Contractor by the City during an extension of time granted because of unavoidable delay or delays.

Any claim by Contractor for a time extension based on unavoidable delays shall be based on written notice delivered to the Engineer within 15 days of the occurrence of the event giving rise to the claim. Failure to file said written notice within the time specified shall constitute a waiver of said claim. Notice of the full extent of the claim and all supporting data must be delivered to the Engineer within 45 days of the occurrence unless the Engineer specifies in writing a longer period. All claims for a time extension must be approved by the Engineer and incorporated into a written change order.

9-07. Unfavorable Weather and Other Conditions. During unfavorable weather and other conditions, the Contractor shall pursue only such portions of the work as shall not be damaged thereby. No portions of the work whose satisfactory quality or efficiency will be affected by any unfavorable conditions shall be constructed while these conditions remain, unless, by special means or precautions approved by the Engineer, the Contractor shall be able to overcome them.

The Contractor shall be granted a time extension of one day for each unfavorable weather day which prevents him or her from placing concrete forms or placing and finishing concrete or asphalt concrete. Such unfavorable weather day is defined as a rain day where precipitation prevents the contractor from performing the work more than four (4) continuous hours within the authorized work period or a temperature day where the ambient temperature is below that specified for the placement of materials associated with the controlling work item for more than four (4) continuous work hours of the authorized work period.

9-08. Saturday, Sunday, Holiday and Night Work. No work shall be done between the hours of 6 p.m. and 7 a.m., nor on Saturdays, Sundays or legal holidays except such work as is necessary for the proper care and protection of work already performed, or except in cases of absolute necessity and in any case only with the permission of the Engineer.

It is understood, however, that night work may be established as a regular procedure by the Contractor if he or she first obtains the written permission of the Engineer and that such permission may be revoked at any time by the Engineer if the Contractor fails to maintain at night adequate force and equipment for reasonable prosecution and to justify inspection of the work.

9-09. Hours of Labor. Eight (8) hours of labor shall constitute a legal day's work and the Contractor or any subcontractor shall not require or permit more than eight hours of labor in a day from any person employed by him or her in the performance of the work under this contract, unless paying compensation for all hours worked in excess of eight (8) hours per day at not less than 1½ times the basic rate of pay. The Contractor shall forfeit to the City, as a penalty, the sum of twenty-five dollars ($25.00) for each workman employed in the execution of the contract by him or her or by any subcontractor, for each calendar day during which such laborer, workman, or mechanic is required or permitted to labor more than eight hours in violation of the provisions of Section 1810 to 1816, inclusive, (Article 3, Chapter 1, Part 7, Division 2) of the Labor Code of the State of California and any acts amendatory thereof.

SECTION 10. PAYMENT

10-01. Certification by Engineer. All payments under this contract shall be made upon the presentation of certificates in writing from the Engineer and shall show that the work covered by the payments has been done and the payments thereof are due in accordance with this contract.

10-02. Progress Estimates and Payment. The Engineer shall, within the first seven (7) days of each month, make an estimate of the value of the work performed in accordance with this contract during the previous calendar month.

The first estimate shall be of the value of the work satisfactorily completed in place and meeting the requirements of the contract. And every subsequent estimate, except the final estimate, shall be of the value of the work satisfactorily completed in place since the last preceding estimate was made; provided, however, that should the Contractor fail to adhere to the program of completion fixed in this contract, the Engineer shall deduct from the next

and all subsequent estimates the full calculated accruing amount of the liquidated damages to the date of said estimate, until such time as the compliance with the program has been restored.

The estimate shall be signed by the Engineer and, after approval, the City shall pay or cause to be paid to the Contractor in the manner provided by law, an amount equal to 95 percent of the estimated value of the work satisfactorily performed and complete in place.

10-03. Substitution of Securities.

1. At such times that Pubic Contract Code Section 22300 is in effect Contractor may propose the substitution of securities of at least equal market value for any moneys to be withheld to ensure performance under the Contract. Market value shall be determined as of the day prior to the date such substitution is to take place. Such substitution shall be made at the request and expense of the Contractor. The securities shall be one or more of the following types:

(a) Bonds or interest-bearing notes or obligations of the United States, or those for which the faith and credit of the United States are pledged for the payment of principal and interest.

(b) Bonds or interest-bearing notes on obligations that are guaranteed as to principal and interest by a federal agency of the United States.

(c) Bonds of the State of California, or those for which the faith and credit of the State of California are pledged for the payment of principal and interest.

(d) Bonds or warrants, including, but not limited to, revenue warrants, of any county, city, metropolitan water district, California water district, California water storage district, irrigation district in the State of California, municipal utility district, or school district of the State of California, which are rated by Moody's or Standard and Poor as A or better.

(e) Bonds, consolidated bonds, collateral trust debentures, consolidated debentures, or other obligations issued by federal land banks or federal intermediate credit banks established under the Federal Farm Loan Act, as amended; debentures and consolidated debentures issued by the Central Bank for Cooperatives and banks for cooperatives established under the Farm Credit Act of 1933, as amended; bonds, or debentures of the Federal Home Loan Bank Board established under the Federal Home Loan Bank Act; and stock, bonds, debentures and other obligations of the Federal National Mortgage Association established under the National Housing Act as amended and bonds of any Federal Home Loan Mortgage Corporation.

(f) Commercial paper of "prime" quality as defined by a nationally recognized organization which rates such securities. Eligible paper is further limited to issuing corporations: (1) organized and operating within the United States; (2) having total assets in excess of five hundred million dollars ($500,000,000); and (3) approved by the Pooled Money Investment Board of the State of California. Purchases of eligible commercial paper may not exceed 180 days' maturity, nor represent more than 10 percent of the outstanding paper of an issuing corporation.

(g) Bills of exchange or time drafts on and accepted by a commercial bank, otherwise known as bankers acceptances, which are eligible for purchase by the Federal Reserve System.

(h) Certificates of deposits issued by a nationally or state-chartered bank or savings and loan association.

(i) The portion of bank loans and obligations guaranteed by the United States Small Business Administration or the United States Farmers Home Administration.

(j) Student loan notes insured under the Guaranteed Student Loan Program established pursuant to the Higher Education Act of 1965, as amended (20 U.S.C. 1001, et seq.) and eligible for resale to the Student Loan Marketing Association established pursuant to Section 133 of the Education Amendments of 1972, as amended (20 U.S.C. 1087-2).

(k) Obligations issued, assumed or guaranteed by International Bank for Reconstruction and Development, the Inter-American Development Bank, the Asian Development Bank, or the Government Development Bank of Puerto Rico.

(l) Bonds, debentures and notes issued by corporations organized and operating within the United States. Such securities eligible for substitution shall be within the top three ratings of a nationally recognized rating service.

2. The securities shall be deposited with City or with any commercial bank as escrow agent, who shall arrange for transfer of such securities to the Contractor upon satisfactory completion of the contract. Any interest accrued or paid on such securities shall belong to the Contractor and shall be paid upon satisfactory completion of the contract.

The market value of the securities deposited shall at all times be maintained in an amount at least equal, in the sole judgment of City, to the moneys to be withheld pursuant to the Contract Documents to ensure performance of the Contract. In order to comply with this condition, Contractor shall deposit additional securities as necessary upon request by City or the escrow agent.

3. Upon acceptance of any Proposal that includes substituting securities for amounts withheld to ensure performance, a separate escrow agreement satisfactory in form and substance to City shall be prepared and executed by City, the Contractor and the escrow agent, which may be City. The escrow agreement shall specify, among other matters, value of securities to be deposited; procedures for valuing the securities and for adding or withdrawing securities to maintain the market value of the deposited securities at least equal to the amount of moneys which would otherwise be withheld; the terms and conditions of conversion to cash in case of the default by the Contractor; and terms, conditions and procedure for termination of the escrow. City shall have no obligation to enter any such Agreement that does not provide the City with the unilateral right to convert securities to cash and to gain immediate possession of the cash.

10-04. Acceptance. The work must be accepted by vote of the City Council of the City of Ukiah when the whole shall have been completed satisfactorily. The Contractor shall notify the Engineer, in writing, of the completion of the work, whereupon the Engineer shall promptly, by personal inspection, satisfy himself as to the actual completion of the work in accordance with the terms of the contract and shall thereupon recommend acceptance by the City Council.

10-05. Final Estimate and Payment. The Engineer shall, as soon as practicable after the final acceptance of the work done under this contract, make a final estimate of the amount of work done thereunder and the value thereof.

Such final estimate shall be signed by the Engineer, and after approval, the City shall pay or cause to be paid to the Contractor, in the manner provided by law, the entire sum so found to be due hereunder, after deducting therefrom all previous payments and such other lawful amounts as the terms of this contract prescribe.

In no case will final payment be made in less than thirty-five (35) days after the filing of the notice of completion with the County Recorder.

10-06. Delay Payments. Should any payment due the Contractor or any estimate be delayed, through fault of the City beyond the time stipulated, such delay shall not constitute a breach of contract or be the basis for a claim for damages, but the City shall pay the Contractor interest on the amount of the payment at the rate of 6 percent per annum for the period of such delay. The terms for which interest will be paid shall be reckoned, in the case of any monthly or progress payment, from the twentieth day of the month next succeeding the month in which the work was performed to the date of payment of the estimate; and in the case of the final estimate, from the forty-fifth day after acceptance to the date of payment of the final estimate.

The date of payment of any estimate shall be considered the day on which the payment is offered or mailed as evidenced by the records of the Treasurer of the City. If interest shall become due on any delayed payment, the amount thereof, as determined by the City, shall be added to a succeeding payment. If the interest shall become due on the final payment, it shall be paid on a supplementary voucher to interest or any sum or sums which, by the terms of this contract, the City is authorized to reserve or retain.

10-07. Extra Work and Work Omitted. Whenever corrections, alterations, or modifications of the work under this contract ordered by the Engineer and approved by the City increase the amount of work to be done, such added

work shall be known as "extra work"; and when such corrections, alterations, or modifications decrease the amount of work to be done, such subtracted work shall be known as "work omitted".

When the Contractor considers that any changes ordered involve extra work, he or she shall immediately notify the Engineer in writing and subsequently keep him or her informed as to when and where extra work is to be performed and shall make claim for compensation therefor each month not later than the first day of the month following that in which the work claimed to be extra work was performed and he or she shall submit a daily complete statement of materials and labor used and expenses incurred on account of extra work performed, showing allocation of all materials, labor and expenses.

All such claims shall state the date of the Engineer's written order and the date of approval by the City authorizing the work on account of which claim is made. Unless such notification is made in writing within the time specified and unless complete statements of materials used and expenses incurred on account of such extra work are furnished as above required, the Contractor shall not be entitled to payment on account of extra work and Contractor shall be deemed to have waived the right to make any future claims for compensation for such extra work.

When changes decrease the amount of work to be done, they shall not constitute a claim for damages on account of anticipated profits on the work that may be omitted.

10-08. Compensation for Extra Work or Work Omitted. Whenever corrections, additions, or modifications in the work under this contract change the amount of work to be done or the amount of compensation due the Contractor, excepting increases or decreases in contract items having unit contract prices for each measurable quantity installed in place, and such changes have been ordered in writing by the Engineer and approved by the City prior to the Contractor performing the extra work, then a price may be agreed upon. Failing such an agreement in price, the Contractor shall be compensated for performing extra work pursuant to the provisions of Section 4-1.03 D, "Extra Work", and Section 9-1.03,"Force Account Payment" of the Standard Specifications.

This method of determining the price of work shall not apply to the performance of any work which is required or reasonably implied to be performed or furnished under this contract.

10-09. Compensation to the City for Extension of Time. In case the work called for under this contract is not completed within the time limit stipulated herein, the City shall have the right as provided hereinabove, to extend the time of completion thereof. If the time limit be so extended, the City shall have the right to charge to the Contractor and to deduct from the final payment for the work the actual cost to the City of engineering, inspection, superintendence and other overhead expenses which are directly chargeable to the contract and which accrue during the period of such extension, except that the cost of final unavoidable delays shall not be included in such charges.

10-10. Liquidated Damages for Delay. It is agreed by the parties to the contract that time is of the essence and that, in case all the work is not completed before or upon the expiration of the time limit as set forth, damage, other than those cost items identified in section 10-09, will be sustained by the City and that it is and will be impracticable to determine the actual amount of damage by reason of such delay; and it is therefore agreed that the Contractor will pay to the City the sum of five hundred dollars ($500.00) per day for each and every calendar day's delay beyond the time prescribed.

SECTION 11. MISCELLANEOUS

11-01. Notice. Whenever any provision of the contract documents requires the giving of written notice, it shall be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice. If mailed, the notice shall be deemed received on the date of delivery stated in the return receipt.

11-02. Computation of Time. When any period of time is referred to in the Contract Documents by days, it shall be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day shall be omitted from the computation.

11-03. Claims Procedure Required by Public Contract Code Section 9204. This section shall apply to any claim by the Contractor arising in connection with this project in accordance with Public Contract Code Section 9204.

a, For purposes of this section "Claim" means a separate demand by the Contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

(A) A time extension, including, without limitation, for relief from damages or penalties for delay assessed by the City under this contract.

(B) Payment by the City of money or damages arising from work done by, or on behalf of, the Contractor pursuant to this contract and payment for which is not otherwise expressly provided or to which the Contractor is not otherwise entitled.

(C) Payment of an amount that is disputed by the City.

b.

(1)

(A) Upon receipt of a claim pursuant to this section, the City shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, a public entity and the contractor may, by mutual agreement, extend the time period provided in this subdivision.

(B) The Contractor shall furnish reasonable documentation to support the claim.

(C) If the City needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the City shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide the claimant a written statement identifying the disputed portion and the undisputed portion.

(D) Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the City issues its written statement. If the City fails to issue a written statement, paragraph (3) shall apply.

(2)

(A) If the Contractor disputes the City's written response, or if the City fails to respond to a claim issued pursuant to this section within the time prescribed, the Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the City shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(B) Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the City shall provide the claimant a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the public entity issues its written statement. Any disputed portion of the claim, as identified by the contractor in writing, shall be submitted to nonbinding mediation, with the City and the Contractor sharing the associated costs equally. The City and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside this section.

(C) For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the

parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

(D) Unless otherwise agreed to in writing by the City and the Contractor, the mediation conducted pursuant to this section shall excuse any further obligation under Public Contract Code Section 20104.4 to mediate after litigation has been commenced.

(3) Failure by the City to respond to a claim from the Contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of the public entity's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the Contractor.

(4) Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.

(5) If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a public entity because privity of contract does not exist, the Contractor may present to the public entity a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the Contractor present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the public entity shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the Contractor shall notify the subcontractor in writing as to whether the Contractor presented the claim to the public entity and, if the original contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

c. A waiver of the rights granted by this section is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable; and (2) the City may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of this section, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in this section.

11-04. Litigation and Forum Selection. Contractor and City stipulate and agree that any litigation relating to the enforcement or interpretation of this contract, arising out of Contractor's performance or relating in any way to the work shall be brought in Mendocino County and that venue will lie in Mendocino County.

Except as otherwise expressly provided by law, the parties waive any objections they might otherwise have to the propriety of jurisdiction or venue in the state courts in Mendocino County and agree that California law shall govern any such litigation.

The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto and, in particular but without limitation, the warranties, guaranties and obligations imposed upon the Contractor and all of the rights and remedies available to the City thereunder, shall be in addition to and shall not be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by law or contract, by special warranty or guaranty, or by other provisions of the contract documents and the provisions of this paragraph shall be as effective as if repeated specifically in the contract documents in connection with each particular duty, obligation, right and remedy to which they apply. All warranties and guaranties made in the contract document shall survive final payment and termination or completion of this contract. The City disclaims an express or implied warranty that the plans and specifications identify all site conditions that could affect the time or cost to complete the Work.

11-05. Waiver. The Contractor shall strictly comply with all notices and other contract requirements. Waiver by the City of any failure of the Contractor to comply with any term of the contract, including the notice provisions, shall not be deemed a waiver of a subsequent breach.

TECHNICAL SPECIFICATIONS

SECTION 12. GENERAL INFORMATION

12-01. Location and Scope of Work. All of the work to be performed is within the City of Ukiah and consists of of all labor, equipment and materials to replacing the existing roof with a standing seam metal roof at the Grace Hudson Museum, located at 431 South Main Street in Ukiah, California.

The Contractor should familiarize himself with the local conditions of the project sites. Failure to do so will in no way relieve him of the responsibility for performing any of the work or operations required as a part of this contract. Further information regarding the work or these specifications can be obtained from Mary Horger at (707) 463-6233.

12-02. Arrangement of Technical Specifications. The Technical Specifications are arranged in sections covering the various phases of work as follows:

Section No.	Title
12	General Information
13	Construction Details
14	Exclusions from General Conditions
15	Amendments to General Conditions

12-03. Arrangement of Plans. General locations and linear quantities of the work are shown in Appendix "A". A map will be provided to the successful bidder showing the exact locations of the work to be done.

12-04. Business Licenses. The Contractor and any subcontractors shall each secure and maintain a valid City of Ukiah Business License prior to the start of any portion of the work.

12-05. Permits. The Contractor shall provide, procure, and pay for all permits required to complete this work.

12-06. Standard Specifications and Standard Plans. The Standard Specifications and Standard Plans of the California State Department of Transportation, 2015, are hereby made a part of these Special Provisions and are hereinafter referred to as "California Standard Specifications" and "California Standard Plans."

Whenever in the California Standard Specifications and the California Standard Plans the following terms are used, they shall be understood to mean and refer to the following:

Department of Transportation - The City Council.

Director of Public Works - The City of Ukiah Director of Public Works.

Engineer - The Engineer designated by the City Council, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

Laboratory - The designated laboratory authorized by the City of Ukiah to test materials and work involved in the contract.

State - The City of Ukiah

Other terms appearing in the California Standard Specifications and the California Standard Plans shall have the intent and meaning specified in Section I, Definition of Terms of the California Standard Specifications.

In case of discrepancy between the contract documents, the order of precedence from the highest to lowest is as follows:
1. (City) Special Provisions
2. (City) Project Plans
3. City Standard Plans and Details
4. California Standard Plans

5. California Standard Specifications

12-07. Temporary Facilities. All temporary facilities are the responsibility of the Contractor. The removal of said facilities shall be the responsibility of the Contractor. The Contractor shall be responsible for any and all damages to existing facilities which are a result of the work.

12-08. Public Convenience and Safety. The Contractor shall conduct operations so as to cause the least possible obstruction and inconvenience to public traffic. The Contractor shall, at his or her expense, furnish such flag persons and furnish, erect, construct and maintain such fences, barriers, lights, signs, detours, pedestrian walkways, driveway ramps and bridging as may be necessary to give adequate warning to the public that work is in progress and that dangerous conditions exist, to provide access to abutting properties and to permit the flow of pedestrian and vehicular traffic to safely and expeditiously pass the work.

12-09. Maintaining Traffic. Attention is directed to Section 7-1.08, "Public Convenience," 7-1.09, "Public Safety," 7-1.092, "Lane Closure," and 7-1.095, "Flagging Costs," of the California Standard Specifications.

Streets shall be open to through vehicular traffic during non-working hours. All public traffic shall be permitted to pass through the work with as little inconvenience and delay as possible.

Full costs for "Maintaining Traffic", including "Flagging Costs", shall be considered as included in the various items of work and no additional compensation will be made.

12.10. Stream Pollution. The Contractor shall exercise every reasonable precaution to prevent muddying or silting of live streams, and the Contractor's attention is called to the fact that the terms of this contract do not relieve him or her of responsibility for compliance with Sections 5650 and 12015 of the Fish and Game Code or other applicable statutes relating to pollution prevention or abatement.

12-11. Warranties. Unless otherwise indicated, the Contractor shall warrant all materials provided and work performed under this contract for a period of one year from the date of final acceptance. He shall replace promptly and at his own expense any materials and/or workmanship which fail during this warranty period.

12-12. Utilities. No water, sewer or electrical services will be provided by the owner. It is the Contractor's sole responsibility to arrange such services as necessary.

12-13. Preconstruction Conference. A preconstruction conference will be held before any work will be allowed to commence. This meeting will cover inspection, schedule for work, and among other items, the responsibilities and procedures of each of the interested parties to assure that the project will be completed in accordance with the contract documents.

12-14. Safety Requirements. The Contractor shall comply with all pertinent provisions of the Department of Labor "Safety and Health Regulations for Construction (29 FCS Part 1518, 36 CFR 7340)", with additions or modifications thereto, in effect during construction of this project.

SECTION 13 - CONSTRUCTION DETAILS

13-01. Technical Specifications and Project Drawings. Please refer to Appendix A and B.

SECTION 14. EXCLUSIONS FROM GENERAL CONDITIONS

14-01. Provisions to be Excluded from General Conditions. The following designated provisions of the General Conditions are hereby determined to be inapplicable to the proposed work and, therefore, are hereby excluded from the terms of the Notice to Bidders, Proposal, Agreement and other contract documents as though entirely omitted from said General Conditions:

(1) Section 6-02. Office at the Site
(2) Section 7-03. Surveys

No other exclusions.

SECTION 15. AMENDMENTS TO GENERAL CONDITIONS

15-01. Sections of General Conditions to be Amended.

The following designated sections of the Special Provisions are hereby amended to read as follows:

Add the following to Section 1. Proposal Requirements and General Conditions:

No amendments.

BID SUBMITTAL CHECKLIST

The following is a checklist to assist you in your submission of your bid documents. Please make sure you include the following when submitting your bid documents to reduce the risk of having your bid rejected:

Did you include?...

- **Proposal** (Page ___)
  - Unit prices filled out clearly.
  - Extended prices filled out clearly and calculated correctly
  - Total bid amount filled out clearly and calculated correctly
  - Sign the proposal, and provide complete information
  - CLSB No. and expiration date
  - Department of Industrial Relations Public Works Contractor Registration Number

- **Fair Employment Practices Certification** (Page ___)
  - Filled out completely per instruction

- **Worker's Compensation Certificate** (Page ____)
  - Filled out completely per instruction

- **Certification of Non-Discrimination in Employment** (Page ___)
  - Filled out completely per instruction

- **List of Proposed Subcontractors** (Page _____)
  - Filled out completely per instruction

- **Statement of Experience** (Page ____)

- **Signature of Bidder** (Page _____)
  - Filled out completely per instruction
  - Authorized signature provided

- **Bidder's Bond** (Page _____)
  - Filled out completely per instruction

- **Non-Collusion Affidavit** (Page _____)
  - Filled out completely per instruction
  - Notarized

- **Addenda Issued**
  - Check the City website for any addenda issued: www.cityofukiah.com/purchasing.

- **Additional Documentation to be Submitted with Bid:**
  - Standing Seam Metal Roof Manufacturer Material Cut Sheets for roofing material being proposed.
  - Standing Seam Metal Roof Manufacturer Warranty
  - Manufacturer's Statement regarding Roofer Certification

CITY OF UKIAH
MENDOCINO COUNTY, CALIFORNIA

PROPOSAL

FOR
ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM

Specification No. 20-10

The undersigned, as bidder,
declares that he or she has examined thoroughly all of the contract documents herein contained, that this proposal is made without collusion with any other person, firm or corporation and that all laws and ordinances relating to the interest of public officers in this contract have been complied with in every respect.

AND he or she proposes and agrees, if this proposal is accepted,

1) that he or she will contract with the City of Ukiah, Mendocino County, California, in the form of the copy of the agreement herein contained

    a) to provide all necessary machinery, tools, apparatus and other means of construction;

    b) to furnish all materials;

    c) to provide all superintendence, overhead expenses and all labor and expenses of whatever nature necessary to complete the job in conformity with the specifications and drawings and other contract provisions herein or reasonably implied hereby or as necessary to complete the work in the manner and within the time named herein and according to the requirements and to the reasonable satisfaction of the City Engineer;

    d) to pay all charges of freight transportation and hauling;

2) that he or she indemnifies the City against any loss or damage arising from any act of the undersigned as Contractor; and

3) that he or she will accept as full payment therefor the following sums:

BIDDING SCHEDULE

In the case of any discrepancy between the unit price and the total set forth for the item, the unit price shall prevail; provided, however, that if the amount set forth as a unit price is ambiguous, unintelligible or uncertain for any reason, or is omitted, or in the case of lump sum items, is not the same amount as the entry in the "Total" column, then the amount set forth in the "Total" column for the item shall prevail in accordance with the following:

1. As to lump sum items, the amount set forth in the "Total" column shall be the unit price;
2. As to unit basis items, the amount set forth in the "Total" column shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price.

The Total Base Bid shall be the sum of the items in the "Total" column. In case of discrepancy between the sum of the items in the "Total" column and the amount entered as Total Base Bid, the sum of the "Total" column items shall prevail. The bid comparison will be based on the sum of the items in the "total" column for each bidder.

The Unit prices for the various Construction Items below include all costs associated with the General Conditions, Special Provisions, Requirements of the Construction Contract, and represent the total, complete, in-place cost for each specific Construction Item in accordance with the Construction Documents, including all elements, work components, accessories, and connections, shown in applicable details or required to yield a complete, sound and functional component or system appropriate for its intended function, whether or not such is specifically described or listed in any description of measurement or payment. The total amount of the Construction items below shall represent the total and complete cost of the fully functional Project. All work not specifically listed below be required to complete the work of the various construction items and the cost of such shall be considered as included throughout the various unit prices indicated.

Lowest bid will be based on the lowest Base Bid.

NAME OF BIDDER: _____
SPEC #: **20-10**
PROJECT NAME: **ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM**

BASE BID

ITEM #	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	TOTAL
1	All material, equipment, labor and incidentals of any kind to replace the roof at the Grace Hudson Museum as per these specifications.	LS	1	$_____	$_____
				TOTAL BID ==>>	$_____

We, the undersigned, acknowledge that the City Council has reserved the right to reject any or all bids and to determine which proposal is, in its opinion, the lowest responsive bid from a responsible bidder and that which it deems in the best interest of the City to accept. We, the undersigned, further agree, if this proposal shall be accepted, to sign the agreement and to furnish the required bonds with satisfactory surety, or sureties, within fifteen (15) calendar days after written notice that the contract is ready for signature; and, if the undersigned shall fail to contract, as aforesaid, it shall be understood that he or she has abandoned the contract and that, therefore, this proposal shall be null and void and the proposal guaranty accompanying this proposal, or the amount of said guaranty, shall be forfeited to and become the property of the City. Otherwise, the proposal guaranty accompanying this proposal shall be returned to the undersigned.

Witness our hands this day of _____, 20____.

Licensed in accordance with an act providing for the registration of California Contractors License No. _____, expiration date _____.

THE CONTRACTOR'S LICENSE NUMBER AND EXPIRATION DATE STATED HEREIN ARE MADE UNDER PENALTY OF PERJURY.

Department of Industrial Relations Public Works Contractor Registration Number:_____

Signature of bidder or bidders, with business name, address, phone number and fax number:

_____

_____

_____

_____

Notice: In the case of a corporation, give below the addresses of the principal office thereof and names and addresses of the President, Secretary, Treasurer.

_____

_____

_____

FAIR EMPLOYMENT PRACTICES CERTIFICATION

TO:_____

_____

The undersigned, in submitting a bid for performing the following work by Contract, hereby certifies that he or she has or will meet the standards of affirmative compliance with the Fair Employment Practices requirements of the Special Provisions contained herein.

ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM

_____
(Signature of Bidder)

Business Mailing Address:

_____

_____

_____

Business Location:

_____

_____

(The bidder shall execute the certification of this page prior to submitting his or her proposal.)

WORKER'S COMPENSATION CERTIFICATE

I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Worker's Compensation or undertake self-insurance in accordance with the provisions of that code and I will comply with such provisions before commencing the performance of the work of this contract.

Witness my hand this_____ day of _____, 200____

Signature of Bidder, with Business Address:

_____

_____

_____

_____

CERTIFICATION OF NONDISCRIMINATION IN EMPLOYMENT

The bidder represents that he or she has/has not, participated in a previous contract or subcontract subject to either the equal opportunity clause herein or the clause contained in Section 301 of Executive Order 10925; that he or she has/has not, filed all required compliance reports; and that representations indicating submission of required compliance prior to subcontract awards.

Signature and address of Bidder:

_____ Date_____

_____

_____

_____

(This certification shall be executed by the bidder in accordance with Section 60-1.6 of the Regulations of the President's Committee on Equal Employment Opportunity for implementing Executive Orders 10925 and 11114.)

LIST OF PROPOSED SUBCONTRACTORS

In compliance with the provisions of Sections 4100-4108 of the California Public Contract Code and any amendments thereof, each bidder shall set forth (a) the name and location of the place of business of each subcontractor who will perform work or labor or render service in or about the construction site or a subcontractor licensed by the State of California who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of 1 percent of the total bid and (b) the California Contractor License Number for each subcontractor, and (c) the portion of the work to be done by each subcontractor.(See General Conditions Section 1-09.) Include with the name of each sub-contractor their Department of Industrial Relations Public Works Contractor Registration Number.

SUBCONTRACTOR NAME	SUBCONTRACTOR LICENSE NUMBER	SUBCONTRACTOR DIR REGISTRATION NUMBER	SUBCONTRACTOR BUSINESS ADDRESS	DESCRIPTION OF WORK

STATEMENT OF EXPERIENCE OF BIDDER

The bidder is required to state below what work of similar magnitude or character he or she has done and to give references that will enable the City Council to judge of his or her experience, skill and business standing and his or her ability to conduct work as completely and rapidly as required under the terms of the contract. *Please refer to "Bid Submittal Checklist" for additional submittals needed to accompany bid documents.*

SIGNATURE(S) OF BIDDER

Accompanying this proposal is _____
(insert the words "cash ($)", "cashier's check" or "bidder's bond", as the case may be) in an amount equal to at least 10 percent of the bid.

The names of all persons interested in the foregoing proposal as principals are as follows:

IMPORTANT NOTICE: If bidder or other interested person is a corporation, provide the legal name of corporation and also the names of the president, secretary, treasurer and manager thereof. If a co-partnership, provide the true name of firm and also the names of all individual co-partners composing the firm. If bidder or other interested person is an individual, provide the first and last names in full.

_____

_____

_____

Licensed in accordance with an act providing for the registration of Contractors:

License No. _____, License Expiration Date _____.

Signature(s) of Bidder: _____

_____

_____

NOTE: If bidder is a corporation, the legal name of the corporation shall be set forth above together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation; if bidder is a co-partnership, the true name of the firm shall be set forth above together with the signature of the partner or partners authorized to sign contracts in behalf of the co-partnership; and if bidder is an individual, his or her signature shall be placed above. If a member of a partnership, a Power of Attorney must be on file with the Department prior to opening bids or submitted with the bid; otherwise, the bid will be disregarded as irregular and unauthorized.

Business address: _____

_____

Place of residence: _____

_____

Dated: _____

CITY OF UKIAH
Mendocino County, California

BIDDER'S BOND

KNOW ALL MEN BY THESE PRESENTS,

That we, _____

_____, as PRINCIPAL and

_____

_____, as SURETY,

are held and firmly bound unto the City of Ukiah in the penal sum of 10 PERCENT OF THE TOTAL AMOUNT OF THE BID of the Principal above named, submitted by said Principal to the City of Ukiah, as the case may be, for the work described below, for the payment of which sum in lawful money of the United States, well and truly to be made, to the City Clerk to which said bid was submitted, we bind ourselves, our heirs, executors, administrators and successors jointly and severally, firmly by these presents. In no case shall the liability of the surety hereunder exceed the sum of $_____

THE CONDITION OF THIS OBLIGATION IS SUCH,

That whereas the Principal has submitted the above mentioned bid to the City of Ukiah, as aforesaid, for certain construction specifically described as follows, for which bids are to be opened at the Office of the City Clerk, Ukiah Civic Center, Ukiah, California, on <<DATE OF BID OPENING>> for ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM.

NOW, THEREFORE, If the aforesaid Principal is awarded the contract and, within the time and manner required under the specifications, after the prescribed forms are presented to him or her for signatures, enters into a written contract, in the prescribed form, in accordance with the bid and files two bonds with the City of Ukiah, one to guarantee faithful performance and the other to guarantee payment for labor and materials, as required by law, then this obligation shall be null and void; otherwise, it shall be and remain in full force and virtue.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this _____ day of _____, A.D. 20_____.

_____(Seal)

_____(Seal)

_____(Seal)
Principal

_____(Seal)

_____(Seal)

_____(Seal)
Surety

Address: _____

_____

_____

NON-COLLUSION AFFIDAVIT

Note: Bidder shall execute the affidavit on this page prior to submitting his or her bid.

To City Council, City of Ukiah:

The undersigned in submitting a bid for performing ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM by contract, being duly sworn, deposes and says:

that he or she has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such contract.

_____

_____

_____
Signature(s) of Bidder

Business Address:_____

_____

_____

Place of Residence:_____

_____

_____

NOTARIZATION

Subscribed and sworn to before me this _____ day of _____, 20____.

_____

Notary Public in and for the County of_____, State of California.

My Commission Expires _____, 20 ____.

CITY OF UKIAH
Mendocino County, California

AGREEMENT

FOR

ROOF REPLACEMENT AT THE GRACE HUDSON MUSEUM

Specification No. 20-10

THIS AGREEMENT, made this _____ day of _____, 20____, by and between the City of Ukiah, Mendocino County, California, hereinafter called the City and _____ hereinafter called the Contractor,

WITNESSETH:

WHEREAS, the City has caused to be prepared in accordance with law, specifications, drawings and other contract documents for the work herein described and shown and has approved and adopted these contract documents, specifications and drawings and has caused to be published in the manner and for the time required by law a notice to bidders inviting sealed proposals for doing the work in accordance with the terms of this contract and

WHEREAS, the Contractor, in response to the notice to bidders, has submitted to the City a sealed proposal accompanied by a proposal guaranty in an amount of not less than 10 percent of the bid price for the construction of the proposed work in accordance with the terms of this contract and

WHEREAS, the City, in the manner prescribed by law, has publicly opened, examined and canvassed the proposals submitted and as a result has determined and declared the Contractor to be the lowest and best regular responsible bidder for the work and for the sums named in the proposal,

NOW, THEREFORE, THIS AGREEMENT WITNESSETH:

Article 1. Work to be Done and Contract Days Allowed.

That the Contractor shall provide all necessary machinery, tools, apparatus and other means of construction; shall furnish all materials, superintendence, overhead, expenses, all labor and expenses of whatever nature necessary for completion of the work in conformity with the Special Provisions and other contract documents hereto attached and according to such instructions as may be given by the Engineer. The Contractor shall complete the work within ninety (90) calendar days. Contract days shall be counted starting with the 10th day following receipt of notice that the contract has been executed by the City. Contractor, at his or her option, may begin work prior to start of counting contract days, however, in no event shall the Contractor start work without giving notification to the Engineer at least 72 hours prior to the start of work, without obtaining an encroachment permit from the City, or without having submitted certificates of insurance that have been accepted and approved by the Engineer

Article II. Contract Prices.

That the City shall pay the Contractor the prices stated in the proposal submitted by the Contractor, for complete performance of the contract by the Contractor. The Contractor hereby agrees to accept the prices as full compensation for all material and appliances necessary to the work, for all labor and use of tools and other implements necessary to execute the work contemplated in this contract; for all loss or damage arising out of the nature of the work or from the action of the elements, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the work; for all risks of every description connected therewith; for all expenses of the work, as herein specified; for all liability and other insurance, for all overhead and other expenses incident to the work; all according to the Contract Drawings, the Special Provisions, the Details, the instructions and the requirements of the City.

Article III. Labor Discrimination.

Attention is directed to Section 1735 of the Labor Code, which reads as follows:

> "No discrimination shall be made in the employment of persons upon public works because of the race, color, national origin or ancestry, or religion of such persons and every contractor for public works violating this section is subject to all the penalties imposed for a violation of this chapter."

In connection with the performance of work under this contract, the Contractor agrees as follows:

(a) The Contractor will not willfully discriminate against any employee or an applicant for employment because of race, color, religion, ancestry, or national origin. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, ancestry, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the awarding authority setting forth the provisions of this Fair Employment Practice section.

(b) The Contractor will send to each labor union or representative of workers with which he or she has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the awarding authority, advising the said labor union or worker's representative of the Contractor's commitments under this section, to employees and applicants for employment.

(c) The Contractor will permit access to his or her records of employment, employment advertisements, application forms and other pertinent data and records by the Fair Employment Practices Commission, City of Ukiah or any other appropriate agency of the State of California designated by the awarding authority, for the purposes of investigation to ascertain compliance with the Fair Employment Practices section of this contract.

(d) A finding of willful violation of the Fair Employment Practices section of this Contract or of the Fair Employment Practices Act shall be regarded by the awarding authority as a basis for determining the Contractor to be not a "responsible bidder" as to future contracts for which such Contractor may submit bids, for revoking the Contractor's pre-qualification rating, if any and for refusing to establish, reestablish or renew a pre-qualification rating for the Contractor.

The City of Ukiah shall deem a finding of willful receipt of written notice from the Fair Employment Practices Act to have occurred upon that it has investigated and determined that the Contractor has violated the Fair Employment Practices Act and has issued an order under Labor Code Section 1426 or obtained an injunction under Labor Code Section 1429.

Upon receipt of such written notice from the Fair Employment Practices Commission, the City shall notify the Contractor that unless he or she demonstrates to the satisfaction of the awarding authority within a stated period that the violation has been corrected, his or her pre-qualification rating will be revoked at the expiration of such period.

(e) The Contractor agrees that should the City determine that the Contractor has not complied with the Fair Employment Practices section of this Contract, then pursuant to Labor Code Section 1735 and 1775 the Contractor shall, as a penalty to the City, forfeit for each calendar day or portion thereof, for each person who was denied employment as a result of such non-compliance, the penalties provided in the Labor Code for violation of prevailing wage rates. Such monies may be recovered from the Contractor. The City may deduct any such damages from any monies due the Contractor.

(f) Nothing contained in this Fair Employment Practices section shall be construed in any manner of fashion so as to prevent the City or the State of California from pursuing any other remedies that may be available at law.

(g) Prior to awarding the Contract, the Contractor shall certify to the awarding authority that he or she has or will meet the following standards for affirmative compliance, which shall be evaluated in each case by the awarding authority:

(1) The Contractor shall provide evidence, as required by the City that he or she has notified all supervisors, foremen and other personnel officers in writing of the content of the anti-discrimination clause and their responsibilities under it.

(2) The Contractor shall provide evidence, as required by the City, that he or she has notified all sources of employees' referrals (including unions, employment agencies, advertisements, Department of Employment) of the content of the anti-discrimination clause.

(3) The Contractor shall file a basic compliance report, as required by the City. Willfully false statements made in such reports shall be punishable as provided by law. The compliance report shall also spell out the sources of the work force and who has the responsibility for determining whom to hire, or whether or not to hire.

(4) Personally, or through his or her representatives, the Contractor shall, through negotiations with the unions with whom he or she has agreements, attempt to develop an agreement which will:

a. Spell out responsibilities for nondiscrimination in hiring, referral, upgrading and training.

b. Otherwise implement an affirmative anti-discrimination program in terms of the unions' specific areas of skill and geography to the end that qualified minority workers will be available and given and equal opportunity for employment.

(5) The Contractor shall notify the City of opposition to the anti-discrimination clause by individuals, firms or organizations during the period of its pre-qualification.

(h) The Contractor will include the provisions of the foregoing paragraphs 1 through 5 in every first tier subcontract so that such provisions will be binding upon each such subcontractor.

(i) The "Fair Employment Practices Certification" must be completed and signed prior to the time of submitting the bid.

Article IV. Parts of the Contract.

That the complete contract consists of the following documents, all of which shall be considered a part of this agreement.

1. Notice to Bidders
2. Wage Rates
3. General Conditions
4. Technical Specifications
5. Proposal
6. Fair Employment Practices Certification
7. Agreement
8. Contract Bonds
9. Contract Drawings and Construction Details
10. Standard Drawings
11. Indemnification Agreement

IN WITNESS WHEREOF, this contract being executed in duplicate and the parties having caused their names to be signed by authority of their duly authorized office this _____ day of _____, 20____.

CITY OF UKIAH, MENDOCINO COUNTY, CALIFORNIA

By: _____
CITY MANAGER, CITY OF UKIAH

Attest: _____
CITY CLERK, CITY OF UKIAH

By: _____
CONTRACTOR

Attest: _____

Title: _____

The foregoing contract is approved as to form and legality this _____ day of _____, 20 ____.

_____
CITY ATTORNEY, CITY OF UKIAH

INDEMNIFICATION AGREEMENT

This Indemnification Agreement is made and entered in Ukiah, California, on _____, 20____, by and between the City of Ukiah (Ukiah) and _____ (Contractor).

Contractor is

_____

_____ for Ukiah.

As a condition of issuing the work order, attached hereto, Ukiah requires assurance that Contractor will protect Ukiah from damage or damage claims which arise from its performance of the work.

Accordingly, Contractor agrees as follows:

1. **Indemnification**. Contractor shall indemnify and hold harmless Ukiah and its officers, agents, and employees from and against any claim, loss, or damage, including the legal and other costs of defending against any claim of damage or loss which arises out of the Contractor's negligent or wrongful performance under the work order attached hereto, except for claims, losses, or damages resulting from the sole and exclusive negligence or other wrongful conduct of Ukiah or its officers, agents and employees.

CONTRACTOR

BY: _____

TITLE: _____

CITY OF UKIAH
Mendocino County, California

FAITHFUL PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS,

That we the undersigned, _____

_____,
AS PRINCIPAL, and

_____,
AS SURETY,

are held firmly bound unto **THE CITY OF UKIAH**, hereinafter called the "City", in the penal sum of

_____dollars ($_____)
for the payment of which sum we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally.

WHEREAS, the Principal has entered into a certain Contract with the City, dated _____, 20_____, a copy of which is hereto attached and made a part hereof,

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall in all respects fully perform the Contract and all duly authorized modifications thereof, during its original term and any extensions thereof that may be granted and during any guaranty period for which the Contract provides, and if the Principal shall fully satisfy all claims, arising out of the prosecution of the work under the Contract and shall fully indemnify the City for all expenses which it may incur by reason of such claims, including its attorney's fees and court costs, and if the Principal shall make full payment to all persons supplying labor, services, materials, or equipment in the prosecution of the work under the Contract, in default of which such persons shall have a direct right of action hereupon; and if the Principal shall pay or cause to be paid all sales and use taxes payable as a result of the performance of the Contract as well as payment of gasoline and special motor fuels taxes in the performance of the Contract and all motor vehicle fees required for commercial motor vehicles used in connection with the performance of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect. No modification of the Contract or extension of the term thereof, nor any forbearance on the part of the City shall in any way release the Principal or the Surety from liability hereunder. Notice to the Surety of any such modification, extension, or forbearance is hereby waived.

IN WITNESS WHEREOF, the aforesaid Principal and Surety have executed this instrument and affixed their seals hereto, this _____ day of _____,20_____.

In the presence of:

WITNESS:

_____

_____(SEAL)
(Individual Principal)

_____
(Business Address)

_____
(City/State/Zip Code)

WITNESS:

_____

_____(SEAL)
(Corporate Principal)

_____
(Business Address)

_____
(City/State/Zip Code)

ATTEST:

_____

_____
(Corporate Principal) Affix Corporate Seal

_____
(Business Address)

_____
(City/State/Zip Code)

ATTEST:

_____ _____ Affix
(Corporate Surety) Corporate Seal

_____
(Business Address)

_____
(City/State/Zip Code)

The rate of premium on this bond is $_____ per thousand.

The total amount of premium charges is $_____..

(The above is to be filled in by Surety Company). (Power of Attorney of person signing for Surety Company must be attached).

(CERTIFICATE AS TO CORPORATE PRINCIPAL)

I,_____, certify that I am the _____ Secretary of the corporation named as Principal in the foregoing bond; that _____, who signed the said bond on behalf of the Principal, was then _____ of said corporation; that I know his signature, and that his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of its governing body.

_____ Affix Corporate Seal

CITY OF UKIAH
Mendocino County, California

MATERIAL AND LABOR BOND

KNOW ALL MEN BY THESE PRESENTS,

That we the undersigned, _____

_____, **AS PRINCIPAL**, and

_____

_____, **AS SURETY**,

are held firmly bound unto **THE CITY OF UKIAH**, hereinafter called the "City" in the penal sum of

_____ dollars ($_____)
for the payment of which sum we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally.

WHEREAS, the Principal has entered into a certain Contract with the City, dated _____, 20_____, a copy of which is hereto attached and made a part hereof,

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall in all respects fully perform the Contract and all duly authorized modifications thereof, during its original term and any extensions thereof that may be granted and during any guaranty period for which the Contract provides, and if the Principal shall fully satisfy all claims, arising out of the prosecution of the work under the Contract and shall fully indemnify the City for all expenses which it may incur by reason of such claims, including its attorney's fees and court costs, and if the Principal shall make full payment to all persons supplying labor, services, materials, or equipment in the prosecution of the work under the Contract, in default of which such persons shall have a direct right of action hereupon; and if the Principal shall pay or cause to be paid all sales and use taxes payable as a result of the performance of the Contract as well as payment of gasoline and special motor fuels taxes in the performance of the Contract and all motor vehicle fees required for commercial motor vehicles used in connection with the performance of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect. No modification of the Contract or extension of the term thereof, nor any forbearance on the part of the City shall in any way release the Principal or the Surety from liability hereunder. Notice to the Surety of any such modification, extension, or forbearance is hereby waived.

IN WITNESS WHEREOF, the aforesaid Principal and Surety have executed this instrument and affixed their seals hereto, this _____ day of _____,20_____.

In the presence of:

WITNESS:

_____

_____(SEAL)
(Individual Principal)

_____
(Business Address)

_____
(City/State/Zip Code)

WITNESS:

_____

_____(SEAL)
(Corporate Principal)

_____
(Business Address)

_____
(City/State/Zip Code)

ATTEST:

_____

_____
(Corporate Principal) Affix Corporate Seal

_____
(Business Address)

_____
(City/State/Zip Code)

ATTEST:

_____ _____ Affix
(Corporate Surety) Corporate Seal

_____
(Business Address)

_____
(City/State/Zip Code)

The rate of premium on this bond is $_____ per thousand.

The total amount of premium charges is $_____..

(The above is to be filled in by Surety Company). (Power of Attorney of person signing for Surety Company must be attached).

(CERTIFICATE AS TO CORPORATE PRINCIPAL)

I,_____, certify that I am the _____ Secretary of the corporation named as Principal in the foregoing bond; that _____, who signed the said bond on behalf of the Principal, was then _____ of said corporation; that I know his signature, and that his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of its governing body.

_____ Affix Corporate Seal

DIRECTIONS FOR PREPARATION OF PERFORMANCE AND MATERIAL AND LABOR BOND

1. Individual sureties, partnerships, or corporations not in the surety business will not be acceptable.

2. The name of the Principal shall be shown exactly as it appears in the Contract.

3. The penal sum shall not be less than required by the Specifications.

4. If the Principals are partners or joint venturers, each member shall execute the bond as an individual and state his place of residence.

5. If the Principal is a corporation, the bond shall be executed under its corporate seal.
If the corporation has no corporate seal, it shall so state and affix a scroll or adhesive seal following the corporate name.

6. The official character and authority of the person(s) executing the bond for the Principal, if a corporation, shall be certified by the Secretary or Assistant Secretary thereof under the corporate seal, or copies attached to such records of the corporation as will evidence the official character and authority of the officer signing, duly certified by the Secretary or Assistant Secretary, under the corporate seal, to be true copies.

7. The current power-of-attorney of the person signing for the surety company must be attached to the bond.

8. The date of the bond must not be prior to the date of the Contract.

9. The following information must be placed on the bond by the surety company:

   a. The rate of premium in dollars per thousand; and

   b. The total dollar amount of premium charged.

10. The signature of a witness shall appear in the appropriate place attending to the signature of each party of the bond.

11. Type or print the name underneath each signature appearing on the bond.

12. An executed copy of the bond must be attached to each copy of the Contract (original counterpart) intended for signing.

CITY OF UKIAH
Mendocino County, California

DEFECTIVE MATERIAL AND WORKMANSHIP (MAINTENANCE) BOND

KNOW ALL MEN BY THESE PRESENTS,

That we, _____

_____, as **PRINCIPAL**

and_____

_____, as **SURETY**,

are held and firmly bound unto the **City of Ukiah** as Obligee, in the penal sum of

_____

_____($_____),
(5 PERCENT OF THE FINAL CONTRACT AMOUNT)

to which payment well and truly to be made, we do bind ourselves, our and each of our heirs, executors, administrators successors and assigns jointly and severally, firmly by these presents.

WHEREAS, the said Principal entered into a Contract with the City of Ukiah
dated_____
for _____
_____

WHEREAS, said Contract has been completed, and was approved on the _____ day of _____, _____,

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal shall guarantee that the work will be free of any defective materials or workmanship which become apparent during the period of one (1) year following completion of the Contract, then this obligation shall be void, otherwise to remain in full force and effect, provided however, any additional warranty or guarantee whether expressed or implied is extended by the Principal or Manufacturer only, and the surety assumes no liability for such a guarantee.

Signed, sealed, and dated this _____ day of _____, 20_____.

_____(Seal)

BY:_____(Seal)

_____(Seal)
Principal

_____(Seal)

BY:_____(Seal)

_____(Seal)
Surety

S P E C I F I C A T I O N S

FOR
RE-ROOFING
OF THE

CITY OF UKIAH
GRACE HUDSON MUSEUM

431 SOUTH MAIN STREET
UKIAH, CA 95482

PROJECT COORDINATOR

MARY HORGER / PROCOUREMENT MANAGER
FINANCE AND PURCHASING DIVISION
CITY OF UKIAH
411 WEST CLAY STREET, UKIAH, CA 95482
(707) 463-6233
mhorger@cityofukiah.com

ARCHITECT

THOMAS HISE ARCHITECTS2
580 VICHY HILLS DRIVE
UKIAH, CA 95482

Thomas Hise Architect
(707) 744-1921
hiseaia@pacific.net

DATE

July 27,2020

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SECTION 02070 - SELECTIVE DEMOLITION

PART 1 – GENERAL

1.01 CONDITIONS AND REQUIREMENTS
- A. Refer to Division 1 - General Requirements.

1.02 DESCRIPTION
- A. This Section describes the requirements for Selective Demolition and removal of portions of the existing building to accommodate new Work under other Sections, including, but not limited to eaves, fascias, overhangs, and soffits (as needed), and to any existing non-functioning and/or abandoned roof equipment and penetrations.
- B. Removal of the existing Cor-Ten "Bermuda Style" metal panel roofing, patching and repair of all fungus or water damaged wood structure, and all unforeseen related demolition and repairs work (as needed).
- C. Related Work
  1. Metal Roofing Panels: Section 07410
  2. Miscellaneous Carpentry: Section 06100
  3. Flashing and Sheet Metal: Section 07620

1.03 QUALITY ASSURANCE
- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain, demolished materials shall become the Contractor's property, and shall be removed from Project Site.

1.03 PROJECT CONDITIONS
- A. The City of Ukiah will not be occupying the Museum building or the immediate area of this Work. However, the Contractor shall provide not less than seventy-two (72) hours written notice to the Architect and the City of Ukiah's Project Manager, activities that will impact the security of the Museum or it's contents, beyond the Contractor's normal working hour.
- B. Access: The Contractor shall maintain access to the unaffected areas of the site, and other adjacent facilities.
  1. The Contractor shall not close or obstruct, unoccupied facilities without written permission from the City of Ukiah.
  2. Utility Service: The Contractor shall maintain existing utilities and protect them against damage during Selective Demolition operations, especially fire suppression and security systems, including fences and gates currently securing the property.

PART 2 - PRODUCTS

2.01 REPAIR MATERIALS
- A. Use repair materials identical to existing materials.
  1. If identical materials are unavailable or cannot be used for repair of exposed surfaces, use materials that visually match existing adjacent surfaces, to the fullest extent possible.
  2. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 – EXECUTION

3.01 EXAMINATION OF EXISTING CONDITIONS

A. The Contractor shall survey the existing conditions of the site, and correlate with requirements indicated in the Construction Documents,to determine extent of Selective Demolition required.

B. Where unanticipated mechanical, electrical, or structural elements conflict with intended function or design are encountered, investigate and document the nature and extent of conflict, and promptly submit a written report to the Architect for clarification on how to proceed with the Work.

C. Perform surveys as the Work progresses to detect possible hazards resulting from Selective Demolition activities, and report to the Architect for clarification on how to proceed with the Work.

3.02 PREPARATION

A. Site Access and Temporary Controls: Conduct Selective Demolition and debris-removal operations to ensure minimum interference with other areas of the site, including, streets, walks, walkways, and other adjacent occupied facilities, or the occupants of neighboring properties.

B. Protect existing site improvements, appurtenances, and landscaping, not part of this Work, and scheduled to remain.

C. Provide protection to ensure the safe passage of people around Selective Demolition activities, and to other areas of the Project site.

3.03 SELECTIVE DEMOLITION

A. General: Remove existing metal roofing panels and any damaged existing construction, only to the extent required to accommodate new Work, and as indicated in the Construction Documents. Use methods required to complete the Work, within limitations as follows:

1. *Remove and palletize existing metal roofing panels and all related trim and attachments, and secure in the Parking Area as agreed upon by the Architect and the City of Ukiah.*
2. *Remove decayed, vermin or fungus-infested, or otherwise dangerous or unsuitable materials, and promptly dispose of off-site.*
3. *Remove all such materials, and lower to ground by methods suitable to avoid free fall, and to prevent ground impact or dust generation.*
4. *Dispose of demolished items and materials promptly.*
5. *Return elements of construction and surfaces that are to remain, to their condition existing prior to any Selective Demolition operations.*

B. For all removed and reinstalled items, the Contractor shall comply with the following:

1. *Clean and repair items to functional condition and adequate for the intended re-use. Paint equipment to match new equipment.*
2. *Protect items from damage during transport and storage.*
3. *Reinstall items in locations indicated on the Construction Documents, and comply with the installation requirements for new materials and equipment.*
4. *Provide connections, supports, and miscellaneous materials necessary to make re-use items functional for the use indicated in the Construction Documents, or that can reasonably be inferred.*

C. Existing Items to Remain: Protect construction indicated to remain, against damage and soiling during Selective Demolition activities. When permitted by the Architect, items may be moved to a suitable, protected storage location, during Selective Demolition, until reinstalled in their original locations after Selective Demolition operations are complete.

D. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris, caused by Selective Demolition operations. Return adjacent areas to condition existing prior to Selective Demolition operations.

3.04 PATCHING AND REPAIRS

A. General: Promptly repair all damage to adjacent construction caused by Selective Demolition operations.

B. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

C. Finishes: Restore exposed finishes of patched areas or areas damaged by construction, and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.05 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Disposal: Transport demolished materials off the City of Ukiah's property and legally dispose of them.

END OF SECTION

SECTION 06100 – MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.01 CONDITIONS AND REQUIREMENTS

A. Refer to Division 1 - General Requirements.

1.02 DESCRIPTION

A. This Section includes all Miscellaneous Carpentry required to complete this Work as required and specified in the Construction Documents.

B. Carpentry includes, but is not limited to selective demolition and rebuilding of the existing roof eaves, soffits, and fascia, as needed to accommodate new Work. Also, for tear-off and replacement of plywood and other roof and decking material as needed. This Work will be completed at a fixed material and/or hourly rate as agreed to as part of this contract.

C. Related Work:

1. Selective Demolition: Section 02070
2. Roofing: Section 07410
3. Flashing and Sheet Metal: Section 07620

1.03 REFERENCE DOCUMENTS

A. Governing Documents, include:

1. American Society of Testing and Materials (ASTM) "ASTM Standards in Building Codes."
2. West Coast Lumber Inspection Bureau's (WCLIB) "Standard Grading Rules"

B. Guideline Standards for Quality of Work:

1. "National Design Specification for Wood Construction (NDS)
2. American National Standard Institute (ANSI)

PART 2 – PRODUCTS

2.01 MATERIALS

A. Wood: The following shall apply:

1. Framing Lumber: (S4S) Douglas Fir, No. (2) & Better grade, (19%) moisture content maximum.
2. Fascia & Soffit Trim Boards: Redwood, kiln dried, clear heart or better. Match existing sizes and profiles.

B. Fasteners: The following shall apply:

1. Vinyl coated nails shall be used for weather protected framing conditions.
2. Hot dipped galvanized or stainless nails shall be used for all exterior weather exposed locations.
3. Construction Adhesive: Dap Latex Construction and Sub-Floor Adhesive, or owner approved equal.

PART 3 EXECUTION

3.01 CARPENTRY GENERAL

A. Carpentry shall be done by competent workmen, experienced in Work of the types specified herein, and in accordance with the best standards of carpentry practice.

B. Workmanship: Fit members closely, set accurately to required lines and levels, and secure rigidly in place. Set horizontal and inclined members with crown edge up. Bolt, nail, and spike thoroughly with not less than sizes and quantities

required to conform to Chapter 23 of the California Building Code (CBC), and provide full contact at all bearing surfaces for structural members.

C. Verify all conditions at the Project site, effecting the Work. Coordinate carpentry with rough-ins and installations under other sections Work applying to this Project.

3.02 FINISH CARPENTRY GENERAL

A. Completed exposed Work shall be free of dents and tool marks, un-sanded or rough faces (unless scheduled to be so), or other detracting appearance defects and issues.

B. Care should be taken to match existing finish appearance, with tight mitre and butt joints.

C. Set and putty all nail heads, and prep for painting or specified finishes, unless scheduled to be natural finish.

END OF SECTION

SECTION 07410 – METAL ROOFING PANELS: STANDING SEAM

PART 1 GENERAL

1.01 CONDITIONS AND REQUIREMENTS

A. Refer to Division 1 - General Requirements.

1.02 DESCRIPTION

A. This Section describes the requirements for installing Standing Seam Metal Roofing Panels as required by the Construction Documents for Work of this Contract.

B. Furnish and install all Metal Roofing Panels and accessories as required and specified for a complete and weatherproof installation

C. Related Work

1. Selective Demolition: Section 02070
2. Miscellaneous Carpentry: Section 06100
3. Flashing and Sheet Metal: Section 07620

1.03 QUALITY ASSURANCE

A. Metal Roofing Panels shall carry Underwriter's Laboratory (UL) Labels.

1. UL 790, Class A Fire Resistance.
2. UL 997, Wind Resistance.

B. Install to meet requirements of Manufacturer's published specifications & instructions. Do not install underlayment or roofing on wet surfaces.

1.04 PRODUCT WARRENTY

A. Product Minimum Warranty:

1. The Roof Panel Manufacturer further warrants that the roof system will not leak due to manufacturing defects or defective workmanship by the installation contractor.
2. The Roof Panel Manufacturer will pay all authorized costs of repairs to the roofing system necessary to stop any leaks caused by defective materials or workmanship that occur with thirty (30) years from the final completion date, with no dollar cost limit to the Owner.
3. The Roof Panel Manufacturer further warrants that the panel materials and coatings will not rupture, perforate, or fail structurally under normal atmospheric conditions and that the fluorocarbon finish will not peel or blister.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in sealed packages, with Manufacturer's labels intact and legible.

2 Store materials in accordance with the Manufacturer's directions and under cover to prevent damage and contamination.

1.05 SUBMITTALS

A. Product Data: Submit product data, test reports, and certifications, in accordance with quality assurance and performance requirements specified herein.

B. Design Load Evaluation: Submit Manufacturer's design load calculations in according to ASCE-7, Method-2, for components and cladding. In no case shall the design loads be less than specified herein.

C. *Dead Load Evaluation: Provide documentation from a licensed Structural Engineer of a structural evaluation for the roof structure and it's suitability for the new imposed roof loads per CBC.*
D. *Shop Drawings: Prepare shop drawings specifically for this Project, showing dimensions of Metal Roofing Panels and accessories, fastening details, and connections with other products.*
E. *Selection Samples: Submit samples for each finish product specified, with actual color and textures, and a min/max of (6") square.*
F. *Manufacturer's Certificates: Certify that products meet or exceed specified requirements.*
G. *Closeout Submittals:*
   1. *Provide Manufacturer's maintenance of installed system.*
   2. *Provide executed copy of Manufacturer's warranty .*

PART 2 PRODUCTS

2.01 MATERIALS

A. *Metal Standing Seam Roof Panels: R-Mer by the Garland Company Inc. or Architect and City of Ukiah approved equal. Garland Company Inc. Contact Info: 3800 E 91 Street, Cleveland OH 44105 Phone 800-321-9336*
   1. *Dimensions: (1") T-seam & (18") wide panels.*
   2. *(2-3/8") high mechanically seamed with factory installed hot melt sealant in-seam cap, with (4) layers of metal surrounding anchor clips.*
   3. *Panel Profile: Flat panel between standing seams typical.*
   4. *Panel Material: Aluminum (3105-H14) alloy, smooth per ASTM B-209, & (.040") thickness,*
   5. *Flashing & Flat Stock: Material to be fabricated in profiles as indicated in the Shop Drawings, and of the same material and thickness as the roof system.*
   6. *Accessory Components:*
      a. *Anchor Clips: Concealed (16) gauge Stainless steel (316L)*
      b. *Gable Anchor Clips: (same)*
      c. *Concealed Fasteners: Corrosion resistant steel (zinc plated or stainless steel), designed to meet or exceed design loads.*
      d. *Exposed Fasteners: Stainless steel (410) series and shall be factory painted to match panel color.*
      e. *Closures: Factory pre-cut closed cell foam meeting ASTM D-1056 or 3575, enclosed in metal channels matching panel.*
      f. *Misc Fasteners: Provide as needed to complete installation.*

B. *Accessories*
   1. *Underlayment: R-Mer Seal 40 mil high temp self adhesive membrane, installed per Manufacturer's recommendations.*
   2. *Barrier Boards: Gypsum wallboard (1/2") protective barrier with Class-A fire rating over deck surfaces.*
   3. *Bearing Plates: Galvanized steel (3" x 5" x 16 ga), pre-punched with a hole pattern matching panel anchors clips. Slotted holes acceptable.*
   4. *Sealant-Concealed: Use non-curing Butyl Sealant Schnee-Morehead Inc SM5430 Acryl-R or approved equal.*
   5. *Sealant-Exposed: Use UV resistant Tripolymer-Geocel Corp 2300 or equal.*

C. *Edge Treatment:*
   1. *R-Mer Edge Coping.*
   2. *R-Mer Snap-On Fascia.*

D. *Design Standards:*
   4. *Capable of withstanding expansion and contraction by temperature without buckling or producing or producing excess stress on the structure, fasteners, or reducing performance.*

5. *Design Temperature differential shall not be less than (200) degrees fahrenheit.*
6. *Panel clips shall provide for unlimited thermal movement in the longitudinal direction.*
7. *Panels rigid connections shall be at the roof ridge unless otherwise approved in advance by the Architect.*
8. *Design Wind Load Capacity: Per calculations provided by the Architect and his Structural Engineer at time of Bidding.*

E. *Color: To be selected by the Architect and City of Ukiah, from R-Mer Standard Color Collection*
F. *Venting: Use R-Mer vent components at the ridge and eaves.*

2.02 QUALITY ASSURANCE

A. *Roofing Manufacturer shall have in place, a documented standardized quality control program such as ISO-9001 approval.*
B. *Installer shall be certified and approved by the Roofing Manufacturer.*
C. *Mock-Up: Contractor shall provide a mock-up for evaluation of surface preparation techniques and application workmanship. Contractor shall not proceed without the Architect's approval of workmanship, color, and sheen.*

A. PRE-INSTALLATION CONFERENCE

A. *The Contractor shall convene a pre-installation conference at least two (2) weeks prior to intended installation date.*
B. *The Roofing and Sub-Strate Installer and a representative of the Manufacturer's technical team shall be in attendance, as well as the Architect and City of Ukiah representative.*

B. PROJECT CONDITIONS

A. *Environmental Controls: The Contractor shall maintain environmental conditions for temperature, humidity, and ventilation, within the Manufacturer's recommendations for optimum results, and no installation shall proceed when conditions are outside the Manufacturer's absolute limits.*

PART 3 EXECUTION

3.01 EXAMINATIONS

A. *Examine surfaces to receive metal roofing, and notify the Architect in writing of any defective conditions encountered. Starting of Work shall constitute acceptance of such conditions.*

3.02 INSTALLATION

A. *Install in conformance with the NRCA Roofing and Waterproofing Manual and Manufacturer's requirements.*

END OF SECTION

SECTION 07620 - FLASHING & SHEET METAL

PART 1 GENERAL

1.01 CONDITIONS AND REQUIREMENTS
A. Refer to Division 1 General Requirements.

1.02 DESCRIPTION
A. Provide all flashing and sheet metal as required and specified.
B. Related Work
   1. Selective Demolition: Section 02070
   2. Miscellaneous Carpentry: Section 06100
   3. Standing Seam Metal Roof Panels: Section 07410

1.03 QUALITY ASSURANCE
A. Comply with latest edition of "Architectural Sheet Metal Manual" of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
B. Work includes approved anchorage devices, and methods.

PART 2 PRODUCTS

2.01 SUBMITTALS
A. Shop drawings of all beam end flashing profiles.

2.02 MATERIALS
A. Great care should be taken to isolate dissimilar metals in the new work.
B. Flashing: To be (22) gauge galvanized steel typical, ASTM A526, G90, commercial quality.
C. Fasteners: Size all fasteners to be appropriate for use including penetration into framing members. Non-corrosive coating at exterior. Fasteners include but are not limited to the following:
   1. Screws: Sheet-metal or self-tapping type.
   2. Nails: Appropriate to Work, compatible with metal being fastened.
D. Asphalt Plastic Cement: Fibrated asphalt cement, ASTM D2822, for trowel application.

PART 3 EXECUTION

INSTALLATION
A. Inspect and clean all surfaces to receive flashing prior to installation. Commencement is indication of acceptance of condition.
B. Coordinate with affected trades work to be installed under their supervision.
C. Fabrication
   1. All sheet metal shall be fabricated to comply with profiles and sizes as required and in accordance with standard details shown in “Architectural Sheet Metal Manual” by SMACNA.
   2. Finished work shall be strong and rigid, neat in appearance, and free from defects.
   3. Surfaces shall be smooth and free from warping or buckling.
   4. Work exposed to moisture and weather shall be thoroughly watertight, with provisions for free expansion without leaks of deforming.

5. *Provide for thermal expansion and contraction and building movement in completed work, without overstressing, breaking, or producing wrinkles and distortion. Provide slotted holes with neoprene washers.*
6. *Make seam in direction of flow.*
7. *Place expansion joints at a maximum or (10'-0"). With no joints within (24") of corners or intersections.*
8. *Repair and replace damaged Work, or Work of poor or unacceptable workmanship, as determined by the industry standards cited, or as determined by the Architect.*

END OF SECTION

SECTION 07510 – BUILT-UP BITUMINOUS ROOFING

PART 1 – GENERAL

1.01 CONDITIONS AND REQUIREMENTS

A. Refer to Division 1 General Requirements.

1.02 DESCRIPTION

A. Furnish and install all Built-up Roofing and related components as required, shown, and specified.
B. Provide supervision of sheet metal work in connection with roofing work.
C. Related Work:
   1. Selective Demolition: Section 02070
A. Miscellaneous Carpentry: Section 06100
B. Standing Seam Metal Roof Panels: Section 07410
C. Sheet Metal: Section 06420

1.03 SYSTEM DESCRIPTION

A. GS Roofing Products Roofing Specifications No. A-4-M-4 Ply Mineral Surface Roofing System.
B. Product Ratings:
   1. Underwriters Laboratory: Class A built-up roofing assembly with Class (60) wind-uplift resistance.
   2. Factory Mutual: Class 1 or Noncombustible built-up roofing assembly and zoned wind resistance.
C. Include aggregate surfacing for over-runs of asphalt and where standing or ponding water may occur.

1.04 REFERENCE DOCUMENTS

A. Governing Documents, including:
   1. American Society of Testing and Materials (ASTM) "Standards in Building Codes."
   2. California Building Code (CBC), latest edition, Chapter 15, "Roofing and Roof Structures."
B. Guideline Standards for Quality of Work
   1. National Roofing Contractor's Association (NRCA) "Roofing and Waterproofing Manual."
   2. Schuller Roofing Systems "Commercial and Industrial Roofing Systems Manual," latest edition.

1.05 QUALITY ASSURANCE

A. Installer's Qualifications; Specializing in applying bituminous roofing with minimum (5) years verifiable experience, approved by manufacturer to issue a warranty as specified.
B. Owner to provide full-time roofing inspection.

1.06 MANUFACTURER'S GUARANTEE

A. In addition to contractor's normal warranty for all items in Division 7, Roofing Installer to provide an additional written ten (10) year warranty for the Built-up Membrane Roof system and all incorporated components.

PART 2 - PRODUCTS

2.01 SHEET PRODUCTS

A. Base sheet: (1) layer asphalt coated fiber glass base sheet per ASTM D 4601, Type II - GS GlasBase.

B. Glass fiber felts: (2) layers asphalt coated fiber glass ply sheet per ASTM D 2178, Type IV - GS Flintglass.

C. Mineral surfaces felts: (1) layer white colored mineral-surfaced, asphalt coated fiber glass cap sheet per ASTM D 3909 - GS Flintglass.

2.02 VISCOUS SURFACE PRODUCTS

A. Asphalt Bitumen: per ASTM D 312 Type III, 190 degrees F. equiviscous temperature (EVT) for slopes up to (3) inches per foot, to be applied at 25 lb. per ply per (100) sq. ft – (75) lbs. total per square.

B. Asphalt Emulsion: per ASTM D 1227, Type I.

2.03 FLASHING PRODUCTS

A. Provide all crickets, cant strips, flashing, cement coatings, and primers required by manufacturer for a complete watertight system.

2.04 ACCESSORIES

A. Roofing nails: Nonferrous ring-shank with (1) inch diameter head, by Simplex Nail & Mfg. Co., or equal.

B. Mineral aggregate: per ASTM D1863, to match color of roofing cap sheet.

C. See Roof Specialties Division 7-07210.

PART 3 - EXECUTION

3.01 PREPARATION

A. Install complete system on any (1) roof section all in one day. Do not apply during inclement weather.

B. Verify that roof deck is smooth, free of depressions, gaps, waves or projections, structurally sound, and sloped to drains.

C. Sweep roof surface broom clean, fill knot holes with latex filler.

D. Confirm dry deck by moisture meter with (12) percent moisture maximum.

E. Verify that curbs, pipes, sleeves, and vents through roof are solidly set, and cant strips and reglets are in place.

F. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install built-up roofing according to GS A-4-M-3 specification.

B. Coordinate Built-up Bituminous Roofing installation with Owner's special inspector (to be selected), with at least (72) hours notice. Miss-scheduling or re-inspections will be at the Contractor's expense.

3.03 CLEANING

A. Remove bituminous markings from finished surfaces.

B. Leave roof and surrounding area clean and free of roofing waste materials, especially nails.

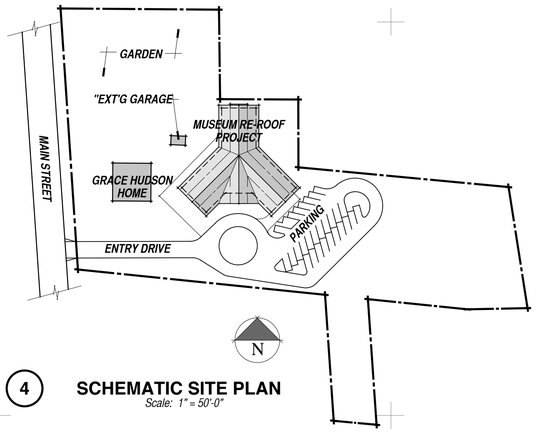
3.04 ADDITIONAL REQUIREMENTS

A. See Construction Documents

END OF SECTION



8 VICINITY MAP



4 SCHEMATIC SITE PLAN

Scale: 1" = 50'-0"

The "Work" of this Project is summarized as follows:

The Museum has a "Cor-Ten" Burmuda style metal roof system that is now (35) years old, and has started to leak. The decision has been made to remove that roof, and replace it with a traditional standing seam metal roof, which includes a proven compliment of reliable and time-tested attachment and trim components.

The Museum's was built on the grounds of Grace Hudson's residence, and houses a priceless and irreplaceable collection of her art and artifacts of the Pomo people who made this land their home. The City of Ukiah is expecting the highest level of craftsmanship and expertise, and who can bring both to bear on this project. Also, if possible, to execute the work early this Fall.

1. *Remove the existing roofing, palatize and secure the Cor-Ten panel components and make ready for the re-use by others. The actual short term storage will be the Museum parking area, and will be coordinated between the Contractro and the Architect in consultation with the Museum staff. The Museum is currently not open to the public, and staff are working from home.*
2. *Recon and repair any fungus rot or water damaged to the building as needed. This work will be on a time and materials basis, and is further described in the Bidding Docs. Also, the Contractor will make all other repairs and additions to accomodate the new roofing system, including fascia and related building trim and flashings.*
3. *Prep the roof deck and install the weather barrier.*
4. *The Contractor will also coordinate with other Owner contracted trades, including insulation, and and attic ventilation.*
5. *The Contractor will need to supply support items to accomodate workmen, such as restrooms, as maintaining the Museum security is of upmost concern.*
6. *The Contractor is contractually bound to make available all workman and materials, and proceed to completion except during rain days.*
7. *The Bid Docs will specify the schedule for pre-construction meetins, responding to Contractor's questions, Bids due date, insurance requirements, selection criteria for evaluating Bids and Contractor's, and other Bidding and Contractual requirements.*

7 DESCRIPTION OF WORK

CONTACT

Project Name	*Grace Hudson Museum / Re-Roof*
Project Address	*431 South Main Street Ukiah, CA 95482*
APN	*002–281–26 & 27*
Zoning	*PF-Public Facility*
Permitting Agency	*City of Ukiah / Building & Code Enforcement Services 300 Seminary Avenue Ukiah, CA 95482 Phone: (707) 463–6206*

CODE ANALYSIS

Building Code Edition	*CBC 2019*
Construction Type	*Type V-B Sprinklers (Built as V-N w/ Sprinklers)*
Roof Rating	*Class "A"*
Energy Compliance	*Nonresidential Compliance Manual 2019 Building Envelope – Add'tns & Alter'tns Page 3–76C Roofs (100%) Replacement & o/ (2,000) sqft R14 for Climate Zone 2 "E" Roof Data Exposed Deck Area (4" ave) below metal R-0.9 Vapor Barr R-0.2 (1/2") Plywd R-0.6 (3/4") Air Space R-0.8 (2") R-10 (3") Wood-Lock Deck R-3.5 R-15.2 Roof w/ Attic Fiberglass Batt R-30*

UTILITY & SUPPORT

Fire District	*Ukiah Valley Fire Protection District (707) 462–2918*
School District	*Ukiah Unified School District (707) 472–5000*
Utilities	*City of Ukiah Utilities Department*

BUILDING DATA

"E" Building Area First Floor	*(~11,137) sqft*
Re-Roof Area	*(~14,144) sqft (Contractor to Verify)*

DEFERRED SUBMITTALS

Deferred Submittal	*1. Insulation Upgrade by Apperson Energy 2. Wind Calculation for Fasteners by D. Jankovski PE 3. Metal Roofing Shop Drawings by Contractor*

COST DATA

Architect's Estimate	*$390,000*

PLUMBING FIXTURE DATE

	EXIST'G REMOVED	***NEW ADDED***
Water Delivery Fixture	*(0)*	*(0)*

2 PROJECT DATA

HIDDEN LINE (BELOW OR ABOVE)

GRID LINE

DETAIL CUT w/ DRW'G & PAGE

SECTION ELEVAT'N w/ DRW'G & PAGE

DATUM LINE / POINT

SECTION CUT w/ DRW'G & PAGE

ELEVATION VIEW w/ DRW'G & PAGE

ACCESSIBLE or EXIT'G PATH

MASONRY / CONC WALL

DEMO EXIST'G WALL

EXIST'G WALL

NEW WALL

PARTIAL HEIGHT WALL

WALL WITH WINDOW

WALL WITH DOOR

FACE-OF-STUD TO FACE-OF-STUD

FACE-OF-STUD TO CENTER LINE OF STUD

FACE-OF-STUD TO FACE OF FINISH

5 DRAWING SYMBOLS

ATTACHMENTS

(n/a)

DRAWING SHEETS

A1.1	*PROJECT DATA*
A1.2	*PROJECT PHOTOS*
A1	*ROOF PLAN, BLDG SECTIONS, & DETAILSs*

1 SHEET INDEX

LICENSED ARCHITECT
THOMAS HUSE
NO. C-014042
8/22/2021
STATE OF CALIFORNIA

◆ DATE
7 / 27 / 2020

▲ REVISIONS

● PAGE
A1.1

PRINTER TRIM SHEET AFTER STAPLING INTO DRAWING SET



8 EAVE SOFFIT DETAILS



4 NORTH GABLE



7 WEST GABLE FASCIA DETAIL



3 WEST GABLE



6 EAST GABLE FASCIA DETAIL



2 EAST GABLE



5 ENTRY BEAM & FASCIA DETAIL



1 SOUTH ENTRANCE

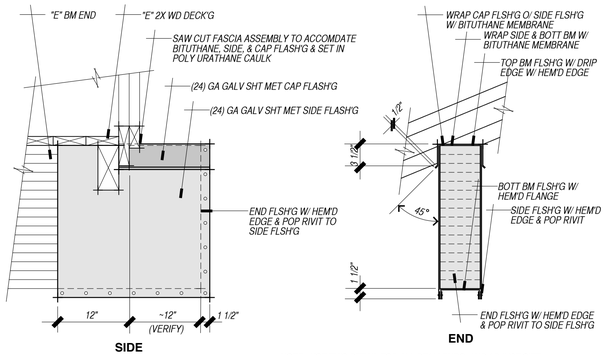
LICENSED ARCHITECT
THOMAS HIBSE
NO. C-014042
8/22/2021
STATE OF CALIFORNIA

◆ DATE
7 / 27 / 2020

▲ REVISIONS

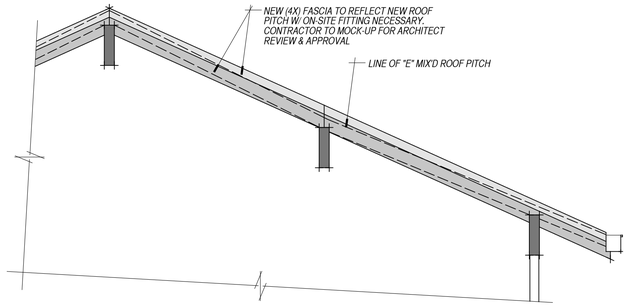
● PAGE
A1.2

PRINTER TRIM SHEET AFTER STAPLING INTO DRAWING SET

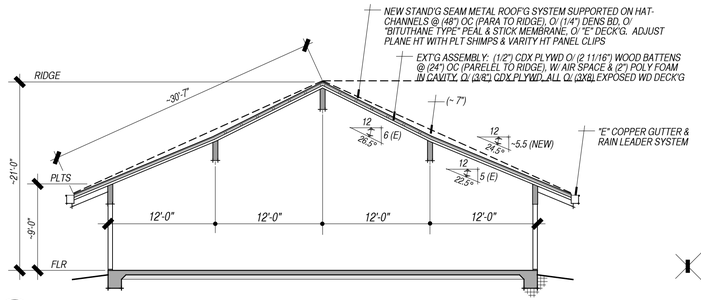


NOTE: USE THIS DETAIL FOR ALL BEAM ENDS, AND ADJUST SIZE ACCORDINGLY. SUBMIT SHOP DRAWINGS TO ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO FABRICATN & INSTALLATN.

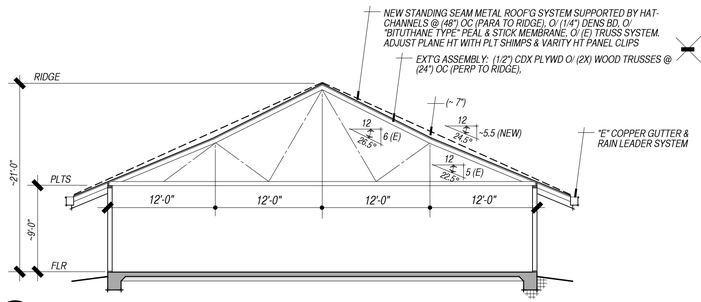
4 BEAM END FLSH'G DETAIL
SCALE: 1"=1'-0"



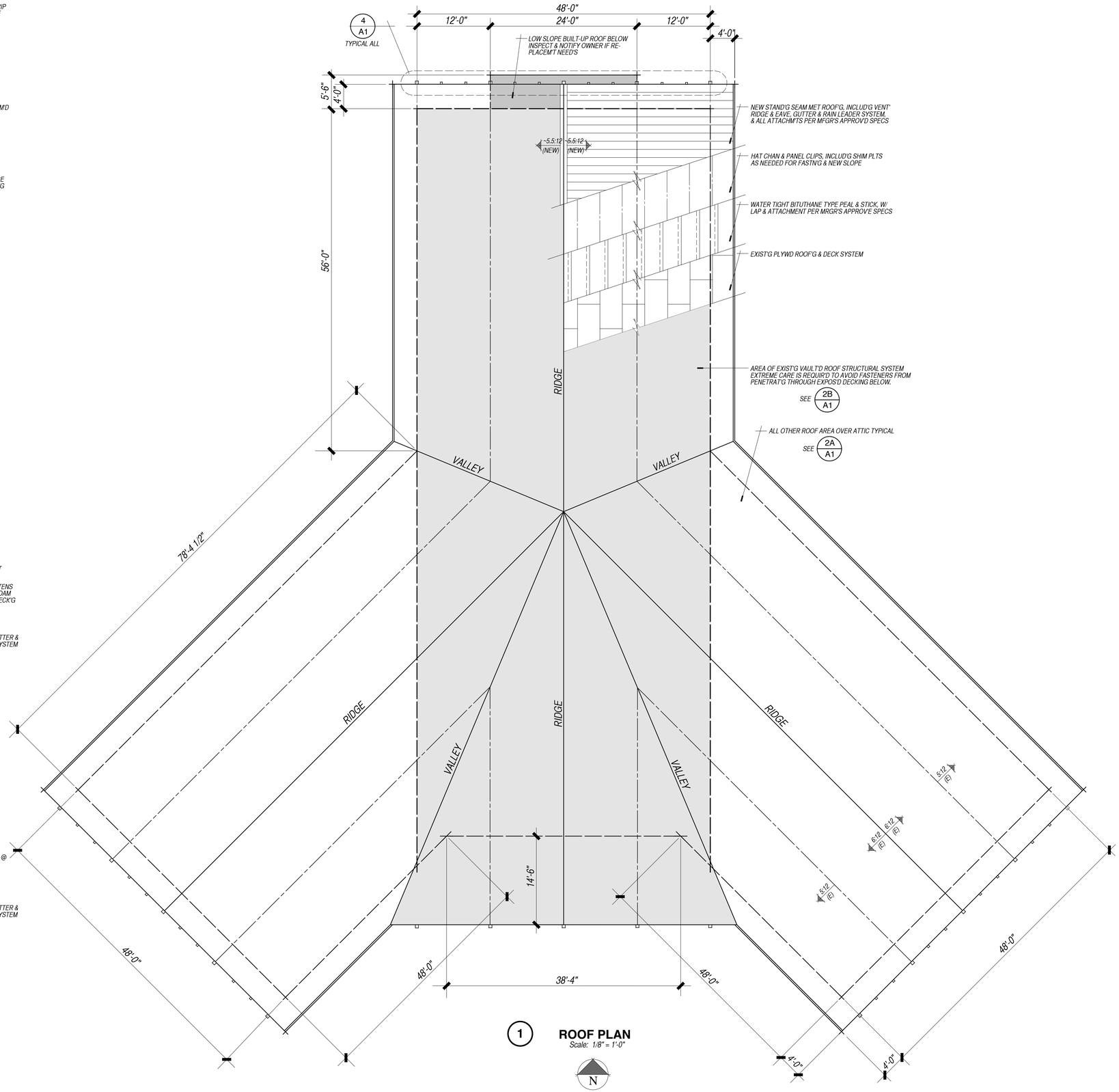
3 GABLE END FASCIA REPLACEM'T
Scale: 1/4" = 1'-0"



2B SCHEMATIC VAULTED BLDG SECTION
Scale: 1/8" = 1'-0"



2A SCHEMATIC VAULTED BLDG SECTION
Scale: 1/8" = 1'-0"



1 ROOF PLAN
Scale: 1/8" = 1'-0"

N

8 4 0

LICENSED ARCHITECT
THOMAS HISE
NO. C-014042
8/22/2021
STATE OF CALIFORNIA

■ ARCHITECTURAL TEAM
THOMAS HISE ARCHITECTS / BUILDER
580 Vichy Hills Drive Ukiah, CA 95482 Phone: 707 / 744-1921
Lic#: C14042 & B369767 e-mail: hiseaia@pacific.net

■ CLIENT & PROJECT
CITY OF UKIAH / GRACE HUDSON MUSEUM
Re-Roof & Misc Repairs
431 South Main Street
Ukiah, CA 95482

◆ DATE
7 / 27 / 2020

▲ REVISIONS

● PAGE
A1

Agenda Item No: 7.k.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-493

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Approve Amendment to the Original Agreement with Coastland Civil Engineering for Professional Services Related to Clara Avenue Phase 2 Improvement Project to be Competitive for CDBG Funding and Corresponding Budget Transfer.

DEPARTMENT: Public Works **PREPARED BY:** Jason Benson, Senior Civil Engineer

PRESENTER: Tim Eriksen, Public Works Director/City Engineer and Jason Benson, Senior Civic Engineer.

ATTACHMENTS:

1. 1920231_Coastland Contract
2. Clara Ave Phase 2 - Amendment No. 1 Proposal

Summary: City Council will consider an amendment to the original agreement with Coastland Civil Engineering for professional services related to Clara Avenue Phase 2 Improvement Project to be competitive for CDBG funding, and an associated budget transfer.

Background: The City Council awarded a contract on March 4, 2020, to Coastland Civil Engineering of Santa Rosa, CA, in the amount of $25,240 to update the plans, specifications, and engineers estimate (PSE) for Clara Avenue Phase 2 Improvement project. This work was required to have the design complete and the construction of the project to be “shovel ready” to be eligible for CDBG funds. The engineering work was completed in April 2020. The City is applying for CDBG funding is in the approximate amount of three million dollars from the State for the project.

Discussion: Staff contacted Coastland Civil Engineering for the updated engineering design work for Phase 2. During the design process, City and Coastland Staff found a section of the existing water main within the paving reconstruction limits that requires replacement. This pipe is approximately 700 linear feet on the east end of Clara Avenue near the intersection at Orchard. The other existing water mains within the paving reconstruction limits were replaced in 2010 under the Clara Avenue Improvements Phase 1 construction project. The improvements for the water main were not part of Coastland’s original scope of work (SOW), and the additional design efforts were required to finalize bid documents. These efforts include updates to the plans, specifications, and cost estimate. This extra work is the subject of this issue and the costs for this extra work was $4,615.

Coastland performed the design work in April 2020, and staff found the fees to be commensurate with the scope of work. A copy of the agreement for this work is included as Attachment #1 for reference. An agreed upon addendum proposal to the contract for this work is included as Attachment #2. The budget transfer, if approved, will authorize transferring $4,615 from 10024224.52100 into the following accounts: 12024200.80230.18184: $2,307.50 and 84427221.80230.18184: $2,307.50.

Recommended Action: Approve contract amendment to agreement with Coastland Civil Engineering in the

amount not to exceed $4,615 for additional engineering design services for the Clara Avenue Phase 2 Project, and approve corresponding budget transfer.

BUDGET AMENDMENT REQUIRED: YES

CURRENT BUDGET AMOUNT: 10024224.52100: $4,615

PROPOSED BUDGET AMOUNT: 12024200.80230.18184: $2,307.50; 84427221.80230.18184: $2,307.50

FINANCING SOURCE: N/A

PREVIOUS CONTRACT/PURCHASE ORDER NO.: Contract Number 1920-231

COORDINATED WITH: Tim Eriksen, Director of Public Works/City Engineer

Approved: Sage Sangiacomo, City Manager

COU No. 1920-231

AGREEMENT FOR PROFESSIONAL CONSULTING SERVICES [Design Professional]

This Agreement, made and entered into this 5th day of March, 2020 ("Effective Date"), by and between CITY OF UKIAH, CALIFORNIA, hereinafter referred to as "City" and Coastland Civil Engineering, Inc., a California Corporation, organized and in good standing under the laws of the state of California, hereinafter referred to as "Consultant".

RECITALS

This Agreement is predicated on the following facts:

a. City requires consulting services related to engineering design series for the Clara Avenue Phase 2 project.

b. Consultant represents that it has the qualifications, skills, experience and properly licensed to provide these services, and is willing to provide them according to the terms of this Agreement.

c. City and Consultant agree upon the Scope-of-Work and Work Schedule attached hereto as Attachment "A", describing contract provisions for the project and setting forth the completion dates for the various services to be provided pursuant to this Agreement.

TERMS OF AGREEMENT

1.0 DESCRIPTION OF PROJECT

1.1 The Project is described in detail in the attached Scope-of-Work (Attachment "A").

2.0 SCOPE OF SERVICES

2.1 As set forth in Attachment "A".

2.2. Additional Services. Additional services, if any, shall only proceed upon written agreement between City and Consultant. The written Agreement shall be in the form of an Amendment to this Agreement.

3.0 CONDUCT OF WORK

3.1 Time of Completion. Consultant shall commence performance of services as required by the Scope-of-Work upon receipt of a Notice to Proceed from City and shall complete the updated plans and specifications before April 15, 2020, and the balance of the work by June 30, 2020. Consultant shall complete the work to the City's reasonable satisfaction, even if contract disputes arise or Consultant contends it is entitled to further compensation.

4.0 COMPENSATION FOR SERVICES

4.1 Basis for Compensation. For the performance of the professional services of this Agreement, Consultant shall be compensated on a time and expense basis not to exceed a guaranteed maximum dollar amount of $25,240. Labor charges shall be based upon hourly billing rates for the various classifications of personnel employed by Consultant to perform the Scope of Work as set forth in the attached Attachment B, which shall include all indirect costs and

expenses of every kind or nature, except direct expenses. The direct expenses and the fees to be charged for same shall be as set forth in Attachment B. Consultant shall complete the Scope of Work for the not-to-exceed guaranteed maximum, even if actual time and expenses exceed that amount.

4.2 Changes. Should changes in compensation be required because of changes to the Scope-of-Work of this Agreement, the parties shall agree in writing to any changes in compensation. "Changes to the Scope-of-Work" means different activities than those described in Attachment "A" and not additional time to complete those activities than the parties anticipated on the date they entered this Agreement.

4.3 Sub-contractor Payment. The use of sub-consultants or other services to perform a portion of the work of this Agreement shall be approved by City prior to commencement of work. The cost of sub-consultants shall be included within guaranteed not-to-exceed amount set forth in Section 4.1.

4.4 Terms of Payment. Payment to Consultant for services rendered in accordance with this contract shall be based upon submission of monthly invoices for the work satisfactorily performed prior to the date of invoice less any amount already paid to Consultant, which amounts shall be due and payable thirty (30) days after receipt by City. The invoices shall provide a description of each item of work performed, the time expended to perform each task, the fees charged for that task, and the direct expenses incurred and billed for. Invoices shall be accompanied by documentation sufficient to enable City to determine progress made and the expenses claimed.

5.0 ASSURANCES OF CONSULTANT

5.1 Independent Contractor. Consultant is an independent contractor and is solely responsible for its acts or omissions. Consultant (including its agents, servants, and employees) is not City's agent, employee, or representative for any purpose.

It is the express intention of the parties hereto that Consultant is an independent contractor and not an employee, joint venturer, or partner of City for any purpose whatsoever. City shall have no right to, and shall not control the manner or prescribe the method of accomplishing those services contracted to and performed by Consultant under this Agreement, and the general public and all governmental agencies regulating such activity shall be so informed.

Those provisions of this Agreement that reserve ultimate authority in City have been inserted solely to achieve compliance with federal and state laws, rules, regulations, and interpretations thereof. No such provisions and no other provisions of this Agreement shall be interpreted or construed as creating or establishing the relationship of employer and employee between Consultant and City.

Consultant shall pay all estimated and actual federal and state income and self-employment taxes that are due the state and federal government and shall furnish and pay worker's compensation insurance, unemployment insurance and any other benefits required by law for himself and his employees, if any. Consultant agrees to indemnify and hold City and its officers, agents and employees harmless from and against any claims or demands by federal, state or local government agencies for any such taxes or benefits due but not paid by Consultant, including the legal costs associated with defending against any audit, claim, demand or law suit.

Consultant warrants and represents that it is a properly licensed professional or professional organization with a substantial investment in its business and that it maintains its own offices and staff which it will use in performing under this Agreement.

5.2 Conflict of Interest. Consultant understands that its professional responsibility is solely to City. Consultant has no interest and will not acquire any direct or indirect interest that would conflict with its performance of the Agreement. Consultant shall not in the performance of this Agreement employ a person having such an interest. If the City Manager determines that the Consultant has a disclosure obligation under the City's local conflict of interest code, the Consultant shall file the required disclosure form with the City Clerk within 10 days of being notified of the City Manager's determination.

6.0 INDEMNIFICATION

6.1 Insurance Liability. Without limiting Consultant's obligations arising under Paragraph 6.2 Consultant shall not begin work under this Agreement until it procures and maintains for the full period of time allowed by law, surviving the termination of this Agreement insurance against claims for injuries to persons or damages to property, which may arise from or in connection with its performance under this Agreement.

A. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office ("ISO) Commercial General Liability Coverage Form No. CG 20 10 10 01 and Commercial General Liability Coverage – Completed Operations Form No. CG 20 37 10 01.

2. ISO Form No. CA 0001 (Ed. 1/87) covering Automobile Liability, Code 1 "any auto" or Code 8, 9 if no owned autos and endorsement CA 0025.

3. Worker's Compensation Insurance as required by the Labor Code of the State of California and Employers Liability Insurance.

4. Errors and Omissions liability insurance appropriate to the consultant's profession. Architects' and engineers' coverage is to be endorsed to include contractual liability.

B. Minimum Limits of Insurance

Consultant shall maintain limits no less than:

1. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage including operations, products and completed operations. If Commercial General Liability Insurance or other form with a general aggregate limit is used, the general aggregate limit shall apply separately to the work performed under this Agreement, or the aggregate limit shall be twice the prescribed per occurrence limit.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

3. Worker's Compensation and Employers Liability: Worker's compensation limits as required by the Labor Code of the State of California and Employers Liability limits of $1,000,000 per accident.

4. Errors and Omissions liability: $1,000,000 per *claim and annual aggregate.*

C. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects to the City, its officers, officials, employees and volunteers; or the Consultant shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

D. Other Insurance Provisions

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages

a. The City, it officers, officials, employees and volunteers are to be covered as additional insureds as respects; liability arising out of activities performed by or on behalf of the Consultant, products and completed operations of the Consultant, premises owned, occupied or used by the Consultant, or automobiles owned, hired or borrowed by the Consultant for the full period of time allowed by law, surviving the termination of this Agreement. The coverage shall contain no special limitations on the scope-of-protection afforded to the City, its officers, officials, employees or volunteers.

b. The Consultant's insurance coverage shall be primary insurance as respects to the City, its officers, officials, employees and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be in excess of the Consultant's insurance and shall not contribute with it.

c. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

d. The Consultant's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Worker's Compensation and Employers Liability Coverage

The insurer shall agree to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses arising from Consultant's performance of the work, pursuant to this Agreement.

3. Professional Liability Coverage

If written on a claims-made basis, the retroactivity date shall be the effective date of this Agreement. The policy period shall extend one year from date of final approved invoice.

4. All Coverages

Each Insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the City.

E. Acceptability of Insurers

Insurance is to be placed with admitted California insurers with an A.M. Best's rating of no less than A- for financial strength, AA for long-term credit rating and AMB-1 for short-term credit rating.

F. Verification of Coverage

Consultant shall furnish the City with Certificates of Insurance and with original Endorsements effecting coverage required by this Agreement. The Certificates and Endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates and Endorsements are to be on forms provided or approved by the City. All Certificates and Endorsements are to be received and approved by the City before Consultant begins the work of this Agreement. The City reserves the right to require complete, certified copies of all required insurance policies, at any time. If Consultant fails to provide the coverages required herein, the City shall have the right, but not the obligation, to purchase any or all of them. In that event, after notice to Consultant that City has paid the premium, the cost of insurance may be deducted from the compensation otherwise due the contractor under the terms of this Contract.

G. Subcontractors

Consultant shall include all sub-contractors or sub-consultants as insured under its policies or shall furnish separate certificates and endorsements for each sub-contractor or sub-consultant. All coverage for sub-contractors or sub-consultants shall be subject to all insurance requirements set forth in this Paragraph 6.1.

6.2 Indemnification. Notwithstanding the foregoing insurance requirements, and in addition thereto, Consultant agrees, for the full period of time allowed by law, surviving the termination of this Agreement, to indemnify the City for any claim, cost or liability that arises out of, or pertains to, or relates to any negligent act or omission or the willful misconduct of Consultant and its agents in the performance of services under this contract, but this indemnity does not apply to liability for damages for death or bodily injury to persons, injury to property, or other loss, arising from the sole negligence, willful misconduct or defects in design by the City, or arising from the active negligence of the City.

"Indemnify," as used herein includes the expenses of defending against a claim and the payment of any settlement or judgment arising out of the claim. Defense costs include all

costs associated with defending the claim, including, but not limited to, the fees of attorneys, investigators, consultants, experts and expert witnesses, and litigation expenses.

References in this paragraph to City or Consultant, include their officers, employees, agents, and subcontractors.

7.0 CONTRACT PROVISIONS

7.1 Documents and Ownership of Work. All documents furnished to Consultant by City and all documents or reports and supportive data prepared by Consultant under this Agreement are owned and become the property of the City upon their creation and shall be given to City immediately upon demand and at the completion of Consultant's services at no additional cost to City. Deliverables are identified in the Scope-of-Work, Attachment "A". All documents produced by Consultant shall be furnished to City in digital format and hardcopy. Consultant shall produce the digital format, using software and media approved by City.

7.2 Governing Law. Consultant shall comply with the laws and regulations of the United States, the State of California, and all local governments having jurisdiction over this Agreement. The interpretation and enforcement of this Agreement shall be governed by California law and any action arising under or in connection with this Agreement must be filed in a Court of competent jurisdiction in Mendocino County.

7.3 Entire Agreement. This Agreement plus its Attachment(s) and executed Amendments set forth the entire understanding between the parties.

7.4 Severability. If any term of this Agreement is held invalid by a court of competent jurisdiction, the remainder of this Agreement shall remain in effect.

7.5 Modification. No modification of this Agreement is valid unless made with the agreement of both parties in writing.

7.6 Assignment. Consultant's services are considered unique and personal. Consultant shall not assign, transfer, or sub-contract its interest or obligation under all or any portion of this Agreement without City's prior written consent.

7.7 Waiver. No waiver of a breach of any covenant, term, or condition of this Agreement shall be a waiver of any other or subsequent breach of the same or any other covenant, term or condition or a waiver of the covenant, term or condition itself.

7.8 Termination. This Agreement may only be terminated by either party: 1) for breach of the Agreement; 2) because funds are no longer available to pay Consultant for services provided under this Agreement; or 3) City has abandoned and does not wish to complete the project for which Consultant was retained. A party shall notify the other party of any alleged breach of the Agreement and of the action required to cure the breach. If the breaching party fails to cure the breach within the time specified in the notice, the contract shall be terminated as of that time. If terminated for lack of funds or abandonment of the project, the contract shall terminate on the date notice of termination is given to Consultant. City shall pay the Consultant only for services performed and expenses incurred as of the effective termination date. In such event, as a condition to payment, Consultant shall provide to City all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs and reports prepared by the Consultant under this Agreement. Consultant shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder,

subject to off-set for any direct or consequential damages City may incur as a result of Consultant's breach of contract.

7.9 Execution of Agreement. This Agreement may be executed in duplicate originals, each bearing the original signature of the parties. Alternatively, this Agreement may be executed and delivered by facsimile or other electronic transmission, and in more than one counterpart, each of which shall be deemed an original, and all of which together shall constitute one and the same instrument. When executed using either alternative, the executed agreement shall be deemed an original admissible as evidence in any administrative or judicial proceeding to prove the terms and content of this Agreement.

8.0 NOTICES

Any notice given under this Agreement shall be in writing and deemed given when personally delivered or deposited in the mail (certified or registered) addressed to the parties as follows:

CITY OF UKIAH
DEPT. OF PUBLIC WORKS
300 SEMINARY AVENUE
UKIAH, CALIFORNIA 95482-5400

COASTLAND CIVIL ENGINEERING, INC.
HEIDI UTTERBACK, PE
1400 NEOLOMAS AVENUE
SANTA ROSA, CALIFORNIA 95405

9.0 SIGNATURES

IN WITNESS WHEREOF, the parties have executed this Agreement the Effective Date:

CONSULTANT

BY: John L Wanger — 3-9-20
Date

PRINT NAME: John L. Wanger

Heidi E Utterback — 3/9/20
Heidi E. Utterback

68-0256235
IRS IDN Number

CITY OF UKIAH

BY: _____ — 3-12-2020
SAGE SANGIACOMO
CITY MANAGER
Date

ATTEST

Kristine Lamb — 3-13-2020
CITY CLERK
Date

COASTLAND
CIVIL ENGINEERING - CONSTRUCTION MANAGEMENT - BUILDING DEPARTMENT SERVICES

March 2, 2020

Mr. Tim Erickson
Director of Public Works/City Engineer
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Subject: Proposal for Engineering Design Services for the Clara Ave Phase 2 Project

Dear Tim,

In follow-up to your request and our phone meeting on February 25, 2020, I am pleased to provide you with this letter proposal for the design of improvements associated with the Clara Avenue Phase 2 project.

Project Understanding

Coastland prepared the 100% complete Clara Avenue Phase 2 improvement plans and engineer's estimate of construction costs in July 2012. At that time the City did not have funds available for the construction improvements and the project was shelved. We now understand the City has CDBG and local funds to cover the construction costs and would like to move forward with refreshing the improvement plans as well as preparation of specification documents and put the project out to bid. The City also wants to add replacement of the sewer main, laterals and manholes along the entire length of Clara Ave. Sewer lateral replacements will include a cleanout placed at the back of sidewalk. Where possible the sewer main will need to be placed horizontally 10 feet from the water main. There may be some areas along Clara where its infeasible to obtain the 10' horizontal separation due to other utilities, and the new sewer main will need to be specified as a higher-pressure class of pipe per State Water Resources Board, Division of Drinking Water requirements. The City would also be required to file a waiver with the State Water Resources Board.

As it has been almost 8 years since the improvement plans were completed, we will need to spend some effort updating the documents to current standards and site conditions. We will conduct a site review of the entire length of the project and assess any changed conditions that need to be reflected on the improvement plans. We understand there have been some improvements at the Mason Street intersection for the NWPR Trail project since the plans were completed in July 2012. We will need to update the plans to reflect these improvements as well as eliminate the bulb outs and adjust the ramp configurations at Mason to conform/connect to the newly constructed trail. The City will be providing survey information for the areas that have changed conditions (Clara and Mason intersection). The City's survey will need to be on the same horizontal and vertical datum as the original survey that Cinquini and Passarino did for the Clara Avenue project in 2009.

The City will provide us with their most current front-end boiler plate specifications as well as any required language/forms that need to be included per CDBG funding requirements. Technical specifications will be prepared in accordance with Caltrans 2018 Standard Specifications.

Santa Rosa
1400 Neotomas Avenue
Santa Rosa CA 95405
Tel. 707 571 8005

Auburn
11641 Blocker Drive, Ste. 170
Auburn, CA 95603
Tel: 530.888.9929

Pleasant Hill
3478 Buskirk Avenue Ste 1000
Pleasant Hill CA 94523
Tel 925 233.5333

Fairfield
324 Campus Lane Ste A
Fairfield CA 94534
Tel: 707 702 1961

www.coastlandcivil.com

With respect to environmental clearances for this project, it is our understanding that the City will be obtaining any necessary environmental clearances. Accordingly, environmental clearances are not included in our scope of services.

Based on the above understanding of the project, we have prepared the following scope of work and estimated fee for your consideration:

SCOPE OF WORK

Task 1 – Meetings with City

We will attend one (1) meeting with the City Public Works staff to discuss project details, goals and to coordinate efforts.

Task 2 – Background Information

Coastland will assemble all of the available recent City information pertaining to the project including as-built drawings, GIS files and any additional pertinent information for the project.

We will conduct a field review and take digital photos of the project site. We will also observe existing conditions against the July 2012 improvement plans and note any changed conditions.

Due to the project being on hold for almost 8 years, Coastland will coordinate with outside utility companies to ensure that we have the most current information on existing facilities. This task will include writing letters to PG&E, AT&T and Comcast, informing them of the project and requesting their facility drawings.

Task 3 – Topographic Survey

The City will survey and provide electronic files of the survey information to Coastland to incorporate into the improvement plans. The City's survey shall be on the same horizontal and vertical datum as the original survey for the project that was done by Cinquini and Passarino.

Task 4 – 100% Submittal

Following our background efforts and receipt of the City's topographic survey, we will prepare the 100% submittal. The 100% improvement plans will show the proposed lines, grades and extent of the proposed curb, gutter, sidewalk, roadway and sewer improvements. If required, we will prepare the waiver forms and submittal to State Water Resources Board for sewer mains with less than 10 feet of horizontal separation from the water main. As part of the submittal, we will prepare front end and technical specifications and an estimate of probable construction costs. This proposal assumes the City will provide the front-end specification boiler plate Word document.

Coastland's Construction Management Department will perform a constructability review of the contract documents. Through this review, we will help minimize change orders and potential claims.

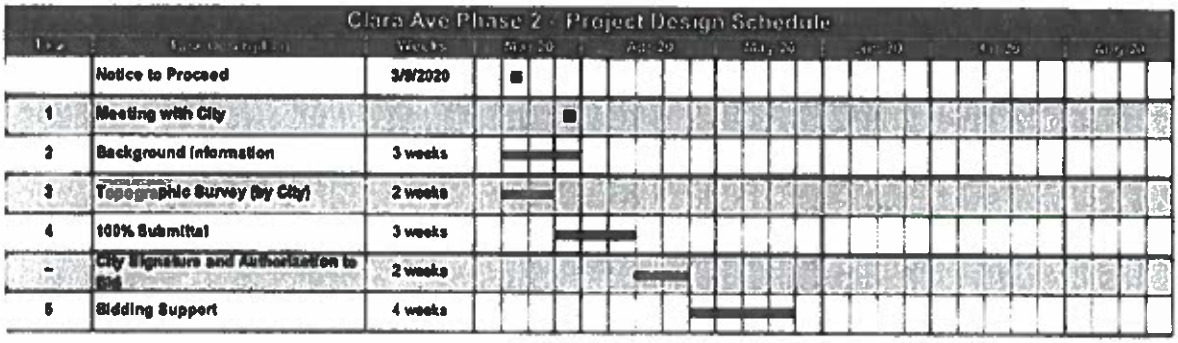
We will provide stamped and signed archival quality mylar drawings, and camera-ready signed and stamped specifications We will also provide the City with electronic copies of the documents (PDF-plans, Word-specifications and Excel-engineer's estimate).

Task 5 – Bidding Support

It is our understanding the City will advertise, reproduce and distribute bid documents. During the bidding process, we will provide bid assistance to the City to answer any questions that may arise. This will include assisting the City with clarifications or preparing an addendum that may be necessary.

Schedule

Coastland is prepared to begin work upon receipt of a Notice to Proceed. We have prepared the following schedule based on the above scope of work. This schedule assumes a notice to proceed by March 9th, 2020.



Exceptions

The following work is not included in our proposal. However, Coastland would be pleased to provide these services if the Town desires:

- Environmental assessments and clearances
- Public participation efforts.
- Meetings beyond those noted above.
- Potholing and associated survey efforts.
- Council presentation or other staff presentations.
- Construction Design Support
- Record Drawings

WORK ESTIMATE

Based on our Scope of Work, we have prepared a detailed budget that identifies staffing rates, total cost per task, and direct expenses (see work estimate on the following page). We are proposing that the design services associated with this project can be completed for a not-to-exceed fee of $25,240. This amount assumes all of the work for this project will fall under the Scope of Work described in our proposal. If additional work is necessary that falls outside of this scope of work, we can either re-negotiate a new scope of work or provide these services on a time and materials basis per our adopted schedule of hourly rates.

DESIGN WORK ESTIMATE

Clara Ave Phase 2	Proposal for Professional Engineering Services	City of Ukiah

Task Information	Billing Classification & Rate								
TASK	Project Manager	Senior Engineer	Assistant Engineer	CAD Designer	Admin	Const. Manager	TOTAL HOURS	TOTAL FEE	NOTES
	$195	$180	$140	$140	$90	$185			
1 MEETINGS WITH CITY									
Design Progress Meetings (1)	4						4	$780	
Subtotal							4	$780	
2 BACKGROUND INFORMATION									
Background Information	2		2	4			8	$1,230	
Field Review & Photo Log	6		6				12	$2,010	
Utility Coordination	1		4	4			9	$1,515	
Subtotal							29	$4,555	
3 TOPOGRAPHIC SURVEY									
Topographic Survey by City							0	$0	
Coordinate with Surveyor	2			4			6	$950	
Subtotal							6	$950	
4 100% SUBMITTAL									
Improvement Plans	8		12	48			68	$9,960	
Specifications	4		16		2		22	$3,200	
Cost Estimate	1		6	2			11	$1,595	
QA/QC Review		4				4	8	$1,300	
Subtotal							109	$16,055	
5 BIDDING SUPPORT									
Bid & Contract Assistance	4		4	4			12	$1,900	
Subtotal							12	$1,900	
Direct Costs (repro, mileage)								$1,000	
Total Design Cost	[illegible]							[illegible]	

If the City wishes to modify the proposed Scope of Work, we would be happy to discuss such a change and how it would affect the overall project cost. We greatly appreciate the opportunity to provide this proposal and look forward to serving the City of Ukiah again. Please feel free to contact me if you have any questions or are in need of additional information.

Sincerely,

Heidi E. Utterback

Heidi Utterback, PE
Supervising Engineer / Principal

Attachments: Schedule of Hourly Rates

Cc: John Wanger

COASTLAND

SCHEDULE OF HOURLY RATES
July 01, 2019 through June 30, 2020

PROFESSIONAL SERVICES

Principal Engineer	$200-220/hour
Supervising Engineer	$170-200/hour
Senior Engineer	$155-180/hour
Associate Engineer	$140-155/hour
Assistant Engineer	$125-140/hour
Junior Engineer	$115-130/hour
Engineering Assistant	$120-150/hour
Senior Engineering Technician	$140-160/hour
Engineering Technician	$120-140/hour
Engineering Aide	$95-115/hour
Resident Engineer	$155-180/hour
Construction Manager	$160-180/hour
Construction Inspector*	$130-165/hour
Construction Administrator	$85-95/hour
Building Plan Check Engineer/Architect	$140-175/hour
Building Official and/or CASp	$150-180/hour
Supervising Building Inspector	$150-170/hour
Senior Building Inspector	$120-145/hour
Building Inspector (I & II)	$95-125/hour
Senior Plans Examiner	$125-140/hour
Plans Examiner (I & II)	$105-120/hour
Supervising Permit Technician	$115-130/hour
Senior Permit Technician	$95-115/hour
Permit Technician (I & II)	$85-95/hour
Administrative	$85-95/hour

VEHICLE	$15-20/hour
MILEAGE	$0.68/mile**
OUTSIDE SERVICES	Cost + 15%
MATERIALS	Cost + 15%

- Computer time is included in the hourly rates used above.
- When applicable, mileage or vehicle rates will be charged, but not both.
- * Includes services subject to prevailing wage rates.

Rev. 06/10/19

Agenda Item No: a.
MEETING DATE/TIME: 3/4/2020
ITEM NO: 2020-324

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Approve Contract with Coastline Engineering for the Update of the Plans and Specifications for the Reconstruction of Clara Ave.

DEPARTMENT: Public Works **PREPARED BY:** Tim Eriksen, Public Works Director/City Engineer, Mary Horger, Financial Services Manager

PRESENTER:

ATTACHMENTS:

1. Coastland Proposal V1

Summary: City Council will consider awarding a design contract to Coastland Civil Engineering in the $25,240 for the reconstruction of Clara Avenue from State Street to Orchard Avenue.

Background: In 2010 Coastland responded to a Request for Proposal (RFP) for the improvement for Clara Avenue and replacement of the water line in Clara Avenue. This project was driven by a water line issue and the funds available from the general fund were extremely limited for any street repairs. The City Engineer determined that the project should be split into two phases. Phase 1 was to replace the water infrastructure, install a storm drain system and fully reconstruct a one block portions of the entire length of the street. Phase 1 was finished in 2012. The Phase 2 plans were complete by Coastland but funding was not available to accomplish this work. Staff has continued to search for funds to complete this work.

In the last few weeks, staff has identified funds for the completion of the surface portion of this work. These funds are the 2019-2020 State Community Development Block Grant (CDBG) Program.

Discussion: The CDBG funds have several requirements to qualify for the funding. One of the requirements is that the project is "shovel ready". This project is shovel ready, but it is a bit dated, and some design features need to be updated. Staff engaged Coastland and asked for a proposal to update the plans, specifications, and engineers estimate (PSE). These have to be completed by April 15th to meet the internal deadline for the funding. Coastland has the ability to meet this timeline and update the PSE to reflect current conditions. They provided a proposal on Monday to complete this work (Attachment 1).

The funds that are proposed to be used for the update of the (PSE) are Measure Y and the Wastewater Fund. This project will complete a much needed project in the Wagenseller Neighborhood.

Recommended Action: Award a contract to Coastland Civil Engineering in the amount not to exceed $25,240, for Design Services for the Clara Avenue Phase 2 Project.

BUDGET AMENDMENT REQUIRED: Yes

CURRENT BUDGET AMOUNT: 12024200.80230.18184: $13,830.92; 84427221.80230.18184: $0

PROPOSED BUDGET AMOUNT: 84427221.80230.18184: $11,410

FINANCING SOURCE:

PREVIOUS CONTRACT/PURCHASE ORDER NO.:

COORDINATED WITH:

Approved: 
Sajid Sangiacomo, City Manager

COASTLAND
CIVIL ENGINEERING - CONSTRUCTION MANAGEMENT - BUILDING DEPARTMENT SERVICES

July 23, 2020

Mr. Tim Erickson
Director of Public Works/City Engineer
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Subject: Proposal for Professional Engineering Services Relating to the Clara Avenue Phase 2 Improvement Project
Amendment No. 1 Proposal – Additional Engineering Services

Dear Tim,

We are pleased to provide you with this amendment proposal for the additional engineering design services for the Clara Ave Phase 2 Project relating to the water main replacement.

Project Background

During the design process of this project we brought to the City's attention that there was a section of 40+ year old 6" ACP water main within the paving reconstruction limits that they should consider replacing with new PVC pipe. This ACP section of water main is approximately 690 feet in length (1978 vintage) that goes from 160' west of the Sidnie intersection to N. Orchard. All of the other water main within the paving reconstruction limits was replaced with new 6" PVC pipe in 2010 with phase 1 of the Clara Avenue improvements. Due to the age of the existing ACP water main and to prevent the need to do future trenching in the newly placed pavement, the City elected to have this water main replacement added to the project. As these improvements for the water main were not part of the original scope of work, we are asking for an amendment to cover the additional design efforts required to incorporate the water main improvements into the final bid documents. Additional design efforts include plan and profile plans, construction notes, research/coordination with City on the waterline background information and miscellaneous construction details. Other additional efforts include preparation of the water facility specifications and an engineer's estimate of construction cost.

Based on the above understanding of the additional required services, we have prepared the following scope of work and estimated fee for your consideration. For clarity, the tasks below follow the original scope of work.

Santa Rosa
1400 Neotomas Avenue
Santa Rosa, CA 95405
Tel: 707.571.8005

Auburn
11641 Blocker Drive, Ste. 170
Auburn, CA 95603
Tel: 530.888.9929

Pleasant Hill
3478 Buskirk Avenue, Ste. 1000
Pleasant Hill, CA 94523
Tel: 925.233.5333

Fairfield
324 Campus Lane, Ste. A
Fairfield, CA 94534
Tel: 707.702.1961

www.coastlandcivil.com

SCOPE OF SERVICES

Task 1 – Meetings with City Staff

No additional work under this task.

Task 2 – Background Information

Coastland will assemble all of the available City information pertaining to the existing water main including as-built drawings, GIS files and any additional pertinent information.

Task 3 – Topographic Survey

No additional work under this task.

Task 4 – 100% Submittal

Preparation of water main plan and profiles plans, construction notes and miscellaneous details. Preparation of technical specifications for water main and associated appurtenances and an engineer's estimate of construction cost.

Task 5 – Bid Support

No additional work under this task.

ESTIMATED COSTS

Based on our scope of work, we are proposing that the services associated with additional design efforts be completed for a not-to-exceed amount of $4,615. The amount quoted is assuming that all of the work for this project will fall under the scope of work as previously described. If additional work is necessary that falls outside of this scope of work, we can either re-negotiate a new scope of work or provide these services on a time and materials basis per our adopted schedule of hourly rates.

Please let me know if you have any questions.

Sincerely,
COASTLAND

Heidi E. Utterback

Heidi Utterback, PE
Principal / Engineering Design Manager

Attachment: Work Estimate

DESIGN WORK ESTIMATE

Clara Ave Phase 2 - Amendment No. 1	Proposal for Professional Engineering Services	City of Ukiah

	Task Information	Billing Classification & Rate								
	TASK	Project Manager $195	Senior Engineer $160	Assistant Engineer $140	CAD Designer $140	Admin $90	Const. Manager $165	TOTAL HOURS	TOTAL FEE	NOTES
1	**MEETINGS WITH CITY**									
	Design Progress Meetings (1)							0	$0	
	Subtotal							**0**	**$0**	
2	**BACKGROUND INFORMATION**									
	Background Information	1			2			3	$475	
	Field Review & Photo Log							0	$0	
	Utility Coordination							0	$0	
	Subtotal							**3**	**$475**	
3	**TOPOGRAPHIC SURVEY**									
	Topographic Survey-by City							0	$0	
	Coordinate with Surveyor							0	$0	
	Subtotal							**0**	**$0**	
4	**100% SUBMITTAL**									
	Improvement Plans	1			24			25	$3,555	
	Specifications	2						2	$390	
	Cost Estimate	1						1	$195	
	QA/QC Review							0	$0	
	Subtotal							**28**	**$4,140**	
5	**BIDDING SUPPORT**									
	Bid & Contract Assistance							0	$0	
	Subtotal							**0**	**$0**	
	Direct Costs (repro, mileage)								**$0**	
	Total Design Cost	**5**	**0**	**0**	**26**	**0**	**0**	**31**	**$4,615**	

Agenda Item No: 7.I.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-494

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Adopt Plans and Specifications for the Electric Service Center Site Improvements (Spec No. 16-07) to Provide Access Modifications, Roof Replacement and Other Site Improvements ($2.7M).

DEPARTMENT: Electric Utility **PREPARED BY:** Mel Grandi, Electric Utility Director
PRESENTER: Consent Calendar

ATTACHMENTS:
1. Spec 16-07 Hastings
2. Hasting Drawings

Summary: Council will consider adopting the Plans and Specifications (Spec No. 16-07) for the Electric Service Center to provide access modification, roof replacement and other site improvements ($2.7M).

Background: The Ukiah City Council approved the purchase of 2.8 acres with a 15,800 sq. ft. building located at 1350 Hasting Rd (The Electric Service Center) to house the Electric Utility Department's operation. The Electric Service Center will centralize electric operations for Engineering, Construction and Technical Services. In addition, the Department intends to use the Electric Service Center for training, material warehousing and construction preparation.

Currently, due to COVID-19, half of the electric workforce are reporting to work at the Electric Service Center.

The Electric Utility Department has secured various professional services that evaluated the site and identified needs and opportunities for improvements. These include Improvements to security, structural systems, electrical, and site grading. The facility will promote energy efficiency, carbon free solar generation and additional service offerings. The warehouse area has been renovated with high-bay LED lighting, material racking systems and other interior improvements.

Discussion: The project plans and specifications (Phase 1 improvements) provided as Attachments 1 and 2, if approved, will enable the Electric Utility Department to fully secure the site and enable the department to manage material storage at the facility. The Phase 1 work scope includes site improvements for access, roof replacement, structural evaluation, electrical, mechanical, lighting, grading and fencing and landscape additions.

Phase 2 will add solar and further modify the interior spaces for maximum efficiency and functionality.

Recommended Action: Adopt Plans and Specifications for the Electric Service Center Site Improvements (Spec No. 16-07) to Provide Access Modifications, Roof Replacement and Other Site Improvements ($2.7M).

BUDGET AMENDMENT REQUIRED: Not at this time.

CURRENT BUDGET AMOUNT: $1,800,000; 801.26100.80220.174023, $1,700,000; 80126100.80220.ECC01

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: N/A

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Mary Horger, Financial Services Manager

Approved: Sage Sangiacomo, City Manager

CITY OF UKIAH

MENDOCINO COUNTY, CALIFORNIA

DRAFT

SPECIAL PROVISIONS

FOR

UKIAH ELECTRIC UTILITY
FIELD OPERATION CENTER – SITE WORK
1350 Hastings Avenue, Ukiah

SPECIFICATION NO. 16-07

CITY OF UKIAH
DEPARTMENT OF ELECTRIC UTILITY
300 Seminary Avenue
Ukiah, California 95482-5400

Bids Open: _____, _____, _____
2:00 p.m.
Office of City Clerk

CITY OF UKIAH

MENDOCINO COUNTY, CALIFORNIA

CITY COUNCIL:

MAUREEN MULHEREN – MAYOR

DOUGLAS CRANE – VICE-MAYOR

JIM BROWN – COUNCIL MEMBER

STEVE SCALMANINI – COUNCIL MEMBER

JUAN OROZCO – COUNCIL MEMBER

SAGE SANGIACOMO – CITY MANAGER

TIM ERIKSEN - DIRECTOR OF PUBLIC WORKS / CITY ENGINEER

MARY HORGER – PROCUREMENT MANAGER

KRISTINE LAWLER – CITY CLERK

R. ALLEN CARTER - CITY TREASURER

CITY OF UKIAH
DEPARTMENT OF ELECTRIC UTILITY
JULY - 2019

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CITY OF UKIAH, MENDOCINO COUNTY, CALIFORNIA
NOTICE TO BIDDERS FOR ELECTRIC UTILITY - FOC SPECIFICATION NO. 16-07

NOTICE IS HEREBY GIVEN that sealed standard proposals for ELECTRIC UTILITY - FOC will be received at the Office of the City Clerk, Ukiah Civic Center, 300 Seminary Avenue, Ukiah California until 2:00 p.m. on _____, ____, 20___, at which time, or as soon thereafter as possible, they will be publicly opened and read. Bids shall be addressed to the City Clerk and shall be endorsed ELECTRIC UTILITY - FOC" Bids are required for the entire work described herein. No fax bids will be accepted.

ENGINEER'S ESTIMATE OF QUANTITIES

Item No.	Description	Quantity	Unit of Measure
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			

Plans and Special Provisions may be inspected and/or copies obtained from the City's website at www.cityofukiah.com/purchasing. No bid will be considered unless it is made on the forms furnished by the City and is made in accordance with the details of the Special Provisions. Each bidder must be licensed as required by law. Further information regarding the work or these specifications can be obtained by calling Mary Horger, Procurement Manager at (707) 463-6233 or by email at mhorger@cityofukiah.com.

The City Council reserves the right to reject any or all bids and to determine which proposal is, in its opinion, the lowest responsive bid by a responsible bidder and which it deems in the best interest of the City to accept. The City Council also reserves the right, but not the obligation, to waive any irregularity or failure to strictly comply with the bidding requirements, that the City determines in the reasonable exercise of its discretion does not provide the bidder with a competitive advantage over other bidders.

No contractor or subcontractor may be listed on a bid proposal for a public works unless registered with the Department of Industrial Relations ("DIR") pursuant to Labor Code section 1725.5 except as allowed. under Labor Code section 1771.1(a). The prime contractor shall be responsible for posting job site notices as prescribed by regulation. This project is subject to compliance monitoring and enforcement by the DIR.

Pursuant to provisions of Section 1770, including amendments thereof, of the Labor Code of the State of California, the DIR Director has ascertained the general prevailing rate of wages for straight time, overtime, Saturdays, Sundays and Holidays including employer payment for health and welfare, vacation, pension and similar purposes for the City of Ukiah. Copies of his General Prevailing Wage Determination are available on the Internet at web address: http://www.dir.ca.gov/DLSR/PWD/ The prime contractor for the work herein shall possess a current, valid State of California, Class "A" Contractor's License. Pursuant to California Public Contract Code §22300, this contract includes provisions that allow substitutions of certain types of securities in lieu of the City withholding a portion of the partial payments due the Contractor to insure performance under this contract.

By order of the City Council, City of Ukiah, County of Mendocino, State of California.

Dated:_____ _____

Kristine Lawler, City Clerk, City of Ukiah, California

PUBLISH TWO TIMES:

INSTRUCTIONS TO BIDDERS

ELECTRIC UTILITY - FOC shall be performed in accordance with the Plans and Special Provisions therefor adopted, to which special reference is hereby made.

Each bidder must supply all the information required by the bid documents and Special Provisions.

Minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color or national origin in consideration for an award of any contract entered into pursuant to this advertisement. Women will be afforded equal opportunity in all areas of employment. However, the employment of women shall not diminish the standards or requirements for the employment of minorities.

All proposals or bids shall be accompanied by a cashier's check or certified check payable to the order of the City of Ukiah amounting to 10 percent of the bid, or by a bond in said amount and signed by the bidder and a corporate surety, payable to said City. Said check shall be forfeited, or said bond shall become payable to said City in case the bidder depositing the same does not, within fifteen (15) days after written notice that the contract has been awarded to him: (a) enter into a contract with the City and (b) furnish certificates of insurance and endorsements, a bond of faithful performance and a payment bond as described in the Special Provisions.

No bidder shall withdraw his or her bid for a period of thirty (30) calendar days after the date set by the City for the opening thereof.

The Contractor and any subcontractors shall each possess a valid City of Ukiah Business License prior to the start of any work.

The Contractor shall furnish a project schedule to the Engineer prior to the start of any work and start work as scheduled.

The work is to be completed within One hundred fifty (150) calendar days. The Contractor will pay to the City the sum of five hundred ($500.00) dollars per day for each and every calendar day's delay beyond the time prescribed.

The staff shall notify a bidder by telephone, email or fax, if it intends to recommend the rejection of the bidder's bid. Any bid protest must be filed with the City Clerk not more than five calendar days following the bid opening, or 2 calendar days following notice that staff is recommending the rejection of a bid. If any such timely written protest is filed, all bidders shall be provided a copy of the protest within 2 calendar days of its receipt, which may be delivered to the bidders as an email attachment or by fax. All such bidders may file with the City Manager a written objection or other response to the protest.

All objections or responses filed not more than 5 days after receipt of the written protest will be presented to the City Council at its next regular meeting occurring not less than 12 calendar days following the bid opening. The City Council will resolve the bid protest at that meeting based on the written protest, any staff recommendation and all timely written objections and responses. In accordance with the Brown Act, any person may address the City Council on this item during the meeting. The City Council action on the protest shall represent a final decision by the City on the protest.

Examination of Construction Documents

Each bidder shall visit the site of the proposed work and fully acquaint himself with local conditions, construction and labor required so that he or she may fully understand the facilities, difficulties and restrictions attending the execution of the work under the Contract. Bidders shall thoroughly examine and be familiar with the Plans and Special Provisions. The failure of any bidder to receive or examine any form, instrument, addendum, or other document, or to visit the site and acquaint himself with conditions there existing, shall in no way relieve the bidder from any obligation with respect to his or her proposal or to the contract. The drawings for the work show conditions as they are supposed or believed by the Engineer to exist; but, it is neither intended nor shall it be inferred that the conditions as shown thereon constitute a representation by the Engineer, the City or its officers that such conditions are actually existent, nor shall the City, the Engineer or any of their officers or representatives be liable for any loss

sustained by the Contractor as a result of a variance between the conditions shown on the drawings and the conditions actually revealed during the progress of the work or otherwise.

The bidder's attention is directed to the possible existence of obstructions and public improvements within the limits of the work or adjacent thereto, which may or may not be shown on the Drawings. Any bid shall take into consideration that conditions may exist underground or otherwise that are not known to the City or easily detected during a site inspection that could impact the time or cost of completing the project. The City expects the bids to anticipate such conditions so that it can know for budgeting and other purposes the total cost to complete the project before accepting a bid and undertaking the legal obligation to construct the project. In awarding the contract the City relies on the contractor's representation that its bid anticipates differing site conditions and the additional time or cost that such conditions may necessitate.

The bidder shall investigate to his or her satisfaction the conditions to be encountered, the character, quality and quantities of work to be performed and materials to be furnished and the requirements of the Plans, Special Provisions, Standard Specifications, Standard Plans, and Contract Documents. The submission of a proposal shall be considered conclusive evidence that the bidder has made such examination and has accepted the project workplace as a safe workplace to perform the work of the Contract.

Bidder Inquiries and Questions

Inquiries and questions must be submitted in writing via fax or email to the following designated contact person:

Mary Horger, Procurement Manager
Fax: (707) 313-3621
Email: mhorger@cityofukiah.com

The City reserves the right to not respond to inquiries or questions submitted within 3 business days of the bid opening.

Location of the Work

All of the work is to be performed is within the City of Ukiah. Project is located at 1350 Hasting Avenue, Ukiah, California.

GENERAL CONDITIONS

SECTION 1. PROPOSAL REQUIREMENTS AND GENERAL CONDITIONS

1-01. Definitions. Whenever any word or expression defined in this section, or pronoun used in its stead, occurs in these contract documents, it shall have and is mutually understood to have the meaning given:

a. "City of Ukiah" or "City" shall mean the City of Ukiah, Mendocino County, California, acting through its City Council or any other board, body, official or officials to which or to whom the power belonging to the Council shall by virtue of any act or acts, hereafter pass or be held to appertain.

b. "Engineer" shall mean the Engineer duly and officially appointed by the City to supervise and direct the work of construction under this contract, acting personally or through agents or assistants duly authorized by him, such agents or assistants acting within the scope of the particular duties entrusted to them.

c. "Inspector" shall mean the engineering or technical inspector or inspectors duly authorized or appointed by the Engineer, limited to the particular duties entrusted to him or her or them.

d. "Contractor" shall mean the party entering into contract with the City of Ukiah for the performance of work covered by this contract and his or her authorized agents or legal representatives.

e. "Date of signing of contract" or words equivalent thereto, shall mean the date upon which this contract, with the signature of the Contractor affixed, together with the prescribed bonds, shall be or shall have been delivered to the City or its duly authorized representatives.

f. "Day" or "days", unless herein otherwise expressly defined, shall mean a calendar day or days of twenty-four hours each.

g. "The work" shall mean and include all the work specified, indicated, shown or contemplated in the contract to construct the improvement, including all alterations, amendments or extensions thereto made by contract change order or other written orders of the Engineer.

h. "Contract drawings", "drawings", "plans" shall mean and include 1) all drawings or plans which may have been prepared by or on behalf of the City, as a basis for proposals, when duly signed and made a part of this contract by incorporation or reference, 2) all drawings submitted in pursuance of the terms of this contract by the successful bidder with his or her proposal and by the Contractor to the City if and when approved by the Engineer and 3) all drawings submitted by the Engineer to the Contractor during the progress of the work as provided for herein.

i. Where "as shown", "as indicated", "as detailed" or words of similar import are used, it shall be understood that reference to the drawings accompanying these Special Provisions is made unless stated otherwise.

Where "as directed", "as permitted", "approved" or words of similar import are used, it shall be understood that the direction, requirements, permission, approval or acceptance of the Engineer is intended unless stated otherwise.

As used herein, "provide" or "install" shall be understood to mean "provide or install complete in place", that is, "furnish and install". "Shall" is mandatory; "may" is permissive.

1-02. Examination of Plans, Special Provisions and Site of Work. The bidder shall examine carefully the Proposal, Plans, Special Provisions, Contract forms and the site of the work contemplated therefor. It will be assumed that the bidder has investigated to his or her satisfaction the conditions to be encountered and the character, quality and requirements of all Plans, Special Provisions, Standard Specifications, and Standard Plans involved.

1-03. Proposal. Bids shall be made on the blank forms prepared by the City. All bids shall give the prices bid, both in writing and in figures and shall be signed by the bidder or his or her authorized representative, with his or her address. If the bid is made by an individual or partner, his or her name and the post office address of his or her business or partnership, along with his or her signature or the signature of one or more partners must be shown; if made by a corporation, the bid shall show the name of the state under the laws of which the corporation is chartered, the name of the corporation and the title of the person who signs on behalf of the corporation.

Each proposal shall be enclosed in a sealed envelope, endorsed as specified in the notice to bidders. Bidders are warned against making erasures or alterations of any kind and proposals which contain omissions, erasures, conditions, alterations, additions not called for, additional proposals or irregularities of any kind may be rejected.

1-04. Withdrawal of Bids. Any bid may be withdrawn at any time prior to the hour fixed in the notice to bidders for the openings of bids, provided that a request in writing, executed by the bidder or his or her duly authorized representative, for the withdrawal of such bid is filed with the City. The withdrawal of a bid will not prejudice the right of a bidder to file a new bid.

1-05. Public Opening of Bids. Bids will be opened and read publicly at the time and place indicated in the notice to bidders. Bidders or their agents are invited to be present.

1-06. Bid Guaranty. Each bid must be accompanied by a certified check, cashier's check or bidder's bond executed by an admitted surety insurer, payable to the order of the City of Ukiah in an amount not less than 10 percent of the bid as a guarantee that the bidder will enter into a contract, if awarded the work.

1-07. Qualification of Bidders. No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. The prime contractor shall be responsible for posting job site notices as prescribed by regulation. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

Each bidder shall be licensed under the provisions of Chapter 9, Division 3 of the Business and Professions Code and shall be skilled and regularly engaged in the general class or type of work called for under this contract. A statement setting forth this experience and business standing shall be submitted by each bidder on the form provided herewith. It is the intention of the City to award a contract only to a bidder who furnishes satisfactory evidence that he or she has the requisite experience and ability and that he or she has sufficient capital, facilities and equipment to enable him or her to prosecute the work successfully and promptly within the time and in the manner agreed.

In determining the degree of responsibility to be credited to a bidder, the City may weigh evidence that the bidder or his or her personnel charged with the responsibility in the work, has performed satisfactorily other contracts of like nature and magnitude or comparable difficulty at similar rates of progress.

1-08. Disqualification of Bidders. More than one bid from an individual business, partnership, corporation or association, under the same or different names, will not be considered. Reasonable grounds for believing that any bidder is financially interested in more than one bid for the work will cause the rejection of all bids in which he or she is so interested. If there is reason to believe that collusion exists among the bidders, none of the participants in such collusion will be considered. Bids in which the prices obviously are unbalanced may be rejected.

1-09. Identification of Subcontractors. All bids shall comply with the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 and following) and shall set forth:

> (a) The name and the location of the place of business of each subcontractor who will perform work or labor, or render service to the prime contractor in or about the construction of the work, or to a subcontractor licensed by the State of California who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work according to detailed drawings contained in the plans and Special Provisions, in an amount in excess of one-half of 1 percent of the prime contractor's total bid.

(b) The portion of the work which will be done by each such subcontractor. The prime contractor shall list only one subcontractor for each such portion defined by the prime contractor in his or her bid.

1-10. General Provisions of the Standard Specifications. All provisions of the General Provisions, Sections 1 through 11, of the Standard Specifications, shall be applicable to the contract except as modified by these Special Provisions. The Standard Specifications are set forth in Section 12-06 of these Special Provisions.

1-11. Addenda. If it becomes necessary to revise any part of these plans and specifications after they have been released, the City will issue an addendum containing the revision. All addenda will be posted on the City's website at www.cityofukiah.com/purchasing with the rest of the bid documents. Anyone who intends to submit a bid in response to this Request for Bid must check the website frequently for any posted addenda. Anyone submitting a bid will be deemed to have seen and agreed to be bound by the posted addenda.

SECTION 2. AWARD AND EXECUTION OF CONTRACT

2-01. Award of Contract. Award of the contract, if it be awarded, will be to the lowest responsible bidder whose bid complies with all the specified requirements. The award, if made, will be made within thirty (30) days after opening of the bids. The City reserves the right to reject any and all bids and to waive any irregularity in the proposal not pertaining to cost.

2-02. Return of Proposal Guaranties. All bid guaranties will be held until the contract has been fully executed, after which they will be returned upon request to the respective bidders whose bids they accompany.

2-03. Execution of Contract. The contract agreement shall be executed in duplicate by the successful bidder and returned, together with the contract bonds, insurance certificates and endorsements, within fifteen (15) days after written notice of the award of the contract. After execution by the City; one copy shall be filed with the City and one copy shall be returned to the Contractor. If the bidder fails or refuses to enter into the contract agreement within the required time, then the bid guaranty accompanying the bid shall be forfeited to the City.

SECTION 3. SCOPE AND INTENT OF CONTRACT

3-01. Effect of Inspection and Payments. Neither the inspection by the Engineer or an inspector, nor any order, measurement or approved modification, nor certificate or payment of money, nor acceptance of any part or whole of the work, nor any extension of time, nor any possession by the City or its agents, shall operate as a waiver of any provision of this contract or of any power reserved therein to the City, or of any right to damages thereunder; nor shall any breach of this contract be held to be a waiver of any subsequent breach. All remedies shall be construed as cumulative.

3-02. Effect of Extension of Time. The granting of any extension of time on account of delays which, in the judgement of the City, are avoidable delays shall in no way operate as a waiver on the part of the City of its rights under this contract.

3-03. Extra Work. If extra work orders are given in accordance with provisions of this contract, such work shall be considered a part hereof and shall be subject to each and all of its terms and requirements.

3-04. Assignment of Contract. The contract may be assigned or sublet in whole or in part only upon the written consent of the City acting through its authorized agents. Consent will not be given to any proposed assignment which would relieve the original contractor or its surety of their responsibilities under the contract nor will the Engineer consent to any assignment of a part of the work under the contract.

3-05. Subcontractors. The Contractor shall be as fully responsible for the acts and omissions of his or her subcontractors and of persons either directly or indirectly employed by them, as he or she is for the acts and omissions of persons directly employed by him.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the terms of this Contract which are applicable to the work of subcontractors.

Nothing contained in this contract shall be construed to create or shall be relied upon to create any contractual relationship between any subcontractor and the City and no action may be brought by any subcontractor against the City based on this contract.

3-06. Interpretation of Special Provisions and Drawings. The Special Provisions and the Contract Drawings are intended to be explanatory of each other. Any work indicated in the Contract Drawings and not in the Special Provisions, or vice versa, is to be executed as if indicated in both. In case of a discrepancy or conflict between the Technical Specifications and Contract Plans, the Technical Specifications shall govern. All work shown on the Contract Drawings, the dimensions of which are not figured, shall be accurately followed to the scale to which the drawings are made, but figured dimensions are in all cases to be followed, where given, though they differ from scaled measurements. Large scale drawings shall be followed in preference to small scale drawings. Should it appear that the work to be done, or any of the matters relative thereto, are not sufficiently detailed or explained in these contract documents, including the contract drawings, the Contractor shall apply to the Engineer for such further explanations as may be necessary and shall conform thereto as part of this contract, so far as may be consistent with the terms of this contract. In the event of any doubt or questions arising respecting the true meaning of the Special Provisions, reference shall be made to the Engineer and his or her decision thereon shall be final. If the Contractor believes that a clarification or interpretation justifies an increase in the contract price or contract time, the Contractor must comply with the written notice provisions of Sections 9-05 and 10-07 of these Special Provisions. Contractor's attention is directed to Section 12-06 of the Technical Specifications regarding the Standard Specifications and Standard Plans.

3-07. Addenda. If it becomes necessary to revise any part of these plans and specifications after they have been released, the City will issue an addendum containing the revision. All addenda will be posted on the City's website at www.cityofukiah.com/purchasing with the rest of the bid documents. Anyone who intends to submit a bid in response to this Request for Bid must check the website frequently for any posted addenda. Anyone submitting a bid will be deemed to have seen and agreed to be bound by the posted addenda.

3-08. Liability of City Officials. No city official, nor the Engineer, nor any authorized assistant of any of them, shall be personally responsible for any liability arising under this contract.

3-09. Dispute Resolution. Claims of $375,000 or less by the Contractor that arise under this Contract are subject to the mandatory dispute resolutions provisions in Public Contract Code Sections 20104-20104.6.

SECTION 4. BONDS

4-01. Faithful Performance Bond. As a part of the execution of this contract, the Contractor shall furnish a bond of a surety company or other securities providing equivalent protection such as cash, letter of credit, or certificates of deposit, acceptable to the City, conditioned upon the faithful performance of all covenants and stipulations under this contract. The amount of the bond shall be 100 percent of the total contract price, as this sum is set forth in the agreement.

4-02. Material and Labor Bond. As a part of the execution of this contract, the Contractor shall furnish a bond of a surety company or other securities providing equivalent protection such as cash, letter of credit or certificates of deposit acceptable to the City in a sum not less than 50 percent of the total contract price, as this sum is set forth in the agreement for the payment in full of all persons, companies or corporations who perform labor upon or furnish materials to be used in the work under this contract, in accordance with the provisions of Sections 3247 through 3252 inclusive of the Civil Code of the State of California and any acts amendatory thereof.

4-03. Defective Material and Workmanship Bond. As a condition precedent to the completion of this contract, the Contractor shall furnish a bond of a surety company acceptable to the City in an amount not less than 5 percent (5%) of the final contract price, to hold good for a period of one (1) year after the completion and acceptance of the work, to protect the City against the results of defective materials, workmanship and equipment during that time. This bond shall be delivered to the City before the final payment under this contract will be made.

4-04. Notification of Surety Companies. The surety companies shall familiarize themselves with all of the conditions and provisions of this contract and they waive the right of special notification of any change or modification of this contract or of extension of time, or decreased or increased work, or of the cancellation of the

contract, or of any other act or acts by the City or its authorized agents, under the terms of this contract; and failure to so notify the aforesaid surety companies of changes shall in no way relieve the surety companies of their obligation under this contract.

SECTION 5. INSURANCE REQUIREMENTS FOR CONTRACTORS (WITH CONSTRUCTION RISKS)

Contractor shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his or her agents, representatives, employees or subcontractors.

5-01. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office Commercial Liability Coverage (occurrence form CG 0001).
2. Insurance Services Office form number CA 0001 (Ed. 1/87) covering Automobile Liability, code 1 (any auto).
3. Worker's Compensation insurance as required by the State of California and Employer's Liability Insurance.
4. Course of Construction insurance covering for “all risks” of loss.

5-02. Minimum Limits of Insurance

Contractor shall maintain limits no less than:

1. General Liability: $1,000,000 per occurrence for bodily injury, personal injury and property damage including operations, products and completed operations. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

2. Automobile Liability: $1,000,000 per accident for bodily injury and property damage.

3. Employer's Liability: $1,000,000 per accident for bodily injury and property damage.

4. Course of Construction: Completed value of the project with no co-insurance penalty provisions.

5-03. Deductibles and Self-insured Retentions. Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, officials, employees and volunteers; or the Contractor shall provide a financial guarantee satisfactory to the City guaranteeing payment of losses and related investigations, claim administration and defense expenses.

5-04. Other Insurance Provisions

The general liability and automobile liability policies are to contain, or be endorsed to contain, the following provisions:

1. The City, its officers, officials, employees and volunteers are to be covered as Additional Insured with respect to liability arising out of automobiles owned, leased, hired or borrowed by or on behalf of the contractor; and with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts or equipment furnished in connection with such work or operations.

General liability coverage can be provided in the form of an endorsement to the Contractor's insurance, or as a separate owner's policy.

2. The workers' compensation policy is to be endorsed with a waiver of subrogation. The insurance company, in its endorsement, agrees to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses paid under the terms of this policy which arises from the work performed by the named insured for the City.

3. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance as respects the City, its officers, officials, employees or volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.

4. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be canceled by either party, except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City.

5. Coverage shall not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured would be invalid under Subdivision (b) of Section 2782 of Civil Code.

6. Course of Construction policies shall contain the following provisions:
   a.) The City shall be named as loss payee.
   b.) The insurer shall waive all rights of subrogation against the City.

5-05. Acceptability of Insurers

Insurance is to be placed with insurers with a current A.M. Best's rating of no less than the following:

A++ VII	A- VIII
A+ VII	B++ X
A VII	B+ X

5-06. Verification of Coverage. Contractor shall furnish the City with original certificates and amendatory endorsements effecting coverage required by this clause. The endorsements shall be on forms provided by the City or on other than the City's forms, provided those endorsements or policies conform to the requirements. All certificates and endorsements are to be received within 15 days from written notice of contract award, and the work shall not commence until the certificates and endorsements have been approved by the City. The City reserves the right to require complete certified copies of all required insurance policies, including endorsements affecting the coverage required by these Special Provisions at any time.

5-07. Subcontractors. Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

SECTION 6. RESPONSIBILITIES AND RIGHTS OF CONTRACTOR

6-01. Legal Address of Contractor. Both the address given in the proposal and the Contractor's office in the vicinity of the work are hereby designated as places to either of which drawings, samples, notices, letters or other articles or communications to the Contractor may be mailed or delivered. The delivery at either of these places of any such thing from the City or its agents to the Contractor shall be deemed sufficient service thereof upon the Contractor and the date of such service shall be the date of such delivery. The address named in the proposal may be changed at any time by notice in writing from the Contractor to the City. Nothing herein contained shall be deemed to preclude or render inoperative the service of any drawing, sample, notice, letter or other article or communication to or upon the Contractor personally.

6-02. Office of Contractor at Site. During the performance of this contract, the Contractor shall maintain a suitable office at the site of the work which shall be the headquarters of a representative authorized to receive drawings and any such thing given to the said representatives or delivered at the Contractor's office at the site of work in his or her absence shall be deemed to have been given to the Contractor.

6-03. Attention to Work. The Contractor shall give his or her personal attention to and shall supervise the work to the end that it shall be prosecuted faithfully and when he or she is not personally present on the work, he or she shall at all reasonable times be represented by a competent superintendent or foreman who shall receive and obey all instructions or orders given under this contract and who shall have full authority to execute the same and to supply materials, tools and labor without delay and who shall be the legal representative of the Contractor. The Contractor shall be liable for the faithful observance of any instructions delivered to him or her or to his or her authorized representative.

6-04. Liability of Contractor. The Contractor shall do all of the work and furnish all labor, materials, tools and appliances, except as otherwise herein expressly stipulated, necessary or proper for performing and completing the work herein required in the manner and within the time herein specified. The mention of any specific duty or liability imposed upon the Contractor shall not be construed as a limitation or restriction of any general liability or duty imposed upon the Contractor by this contract, said reference to any specific duty or liability being made herein merely for the purpose of explanation.

The right of general supervision by the City shall not make the Contractor an agent of the City and the liability of the Contractor for all damages to persons or to public or private property, arising from the Contractor's execution of the work, shall not be lessened because of such general supervision.

Until the completion and final acceptance by the City of all the work under and implied by this contract, the work shall be under the Contractor's responsible care and charge. The Contractor shall rebuild, repair, restore and make good all injuries, damages, re-erections and repairs, occasioned or rendered necessary by causes of any nature whatsoever, excepting only acts of God and none other, to all or any portions of the work, except as otherwise stipulated.

To the fullest extent permitted by law, Contractor shall indemnify and hold harmless the City and its officers, directors, agents and employees from and against all claims, damages, losses and expenses including but not limited to attorneys' fees, costs of suit, expert witness fees and expenses and fees and costs of any necessary private investigators arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, other than the work itself, including the loss of use resulting therefrom and (2) is caused in whole or in part by any act or omission of the Contractor, any subcontractor, or anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder, or by the negligence or omission of a party indemnified herein.

In any and all claims against the City or any of its agents or employees by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under workers' or workmen's compensation acts, disability benefit acts, or other employee benefit acts. The obligation to indemnify shall extend to and include acts of the indemnified party which may be negligent or omissions which may cause negligence.

The City shall have the right to estimate the amount of such damage and to cause the City to pay the same and the amount so paid for such damage shall be deducted from the money due the Contractor under this contract; or the whole or so much of the money due or to become due the Contractor under this contract as may be considered necessary by the City, shall be retained by the City until such suits or claims for damages shall have been settled or otherwise disposed of and satisfactory evidence to that effect furnished to the City.

6-05. Protection of Persons and Property. The Contractor shall furnish such watchman, guards, fences, warning signs, walks and lights as shall be necessary and shall take all other necessary precautions to prevent damage or injury to persons or property.

All property line fences and improvements in the vicinity of the work shall be protected by the Contractor and, if they are injured or destroyed, they and any other property injured by the Contractor, his or her employees or agents, shall be restored to a condition as good as when he or she entered upon the work.

6-06. Protection of City Against Patent Claims. All fees, royalties or claims for any patented invention, article or method that may be used upon or in any manner connected with the work under this contract shall be included in the price bid for the work and the Contractor and his or her sureties shall protect and hold the City, together with all of its officers, agents, servants and employees, harmless against any and all demands made for such fees or claims brought or made on account of this contract. The Contractor shall, if requested by the Engineer, furnish acceptable proof of a proper release from all such fees or classes.

Should the Contractor, his or her agents, servants or employees, or any of them be enjoined from furnishing or using any invention, article, material or appliance supplied or required to be supplied or used under this contract, the Contractor shall promptly substitute other articles, materials or appliance, in lieu thereof, of equal efficiency, quality, finish, suitability and market value and satisfactory in all respects to the Engineer. Or, in the event that the Engineer elects, in lieu of such substitution, to have supplied and to retain and use, any such invention, article, material or appliance, as may by this contract be required to be supplied, in that event the Contractor shall pay such royalties and secure such valid licenses as may be requisite and necessary for the City, its officers, agents, servants and employees, or any of them, to use such invention, article, material or appliance without being disturbed or in any way interfered with by any proceeding in law or equity on account thereof. Should the Contractor neglect or refuse to make the substitution promptly, or to pay such royalties and secure such licenses as may be necessary, then in that event the Engineer shall have the right to make such substitution, or the City may pay such royalties and secure such licenses and charge the cost thereof against any money due to the Contractor from the City or recover the amount thereof from him or her and his or her sureties notwithstanding final payment under this contract may have been made.

6-07. Protection of Contractor's Work Property. The Contractor shall protect his or her work, supplies and materials from damage due to the nature of the work, the action of the elements, trespassers, or any cause whatsoever under his or her control, until the completion and acceptance of the work. Neither the City nor any of its agents assumes any responsibility for collecting indemnity from any person or persons causing damage to the work of the Contractor.

6-08. Regulations and Permits. The Contractor shall secure and pay for all permits, give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the Plans and Special Provisions are at variance therewith, he or she shall promptly notify the Engineer in writing and any necessary changes shall be adjusted as provided in the contract for changes in the work. The contractor and any subcontractors shall each secure and maintain a valid City of Ukiah Business License. The City of Ukiah will issue a no fee encroachment permit to the Contractor allowing him or her to perform work within City right of way or within City property after the Contract Documents have been executed and insurance certificates and endorsements have been approved by the City.

6-09. Construction Utilities. The Contractor shall be responsible for providing for and in behalf of his or her work under this contract, all necessary utilities, such as special connection to water supply, telephones, power lines, fences, roads, watchmen, suitable storage places, etc.

6-10. Approval of Contractor's Plans. The approval by the Engineer of any drawing or any method of work proposed by the Contractor in accordance with paragraph 8-06 shall not relieve the Contractor of any of his or her responsibility for his or her errors therein and shall not be regarded as any assumption of risk or liability by the City or any officer or employee thereof and the Contractor shall have no claim under this contract on account of the failure or partial failure or inefficiency of any plan or method so approved. Such approval shall be considered to mean merely that the Engineer has no objection to the Contractor's using, upon his or her own full responsibility the plan or method approved.

6-11. Suggestions to the Contractor. Any plan or method of work suggested by the Engineer to the Contractor, but not specified or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor; and the Engineer and the City shall assume no responsibility thereof.

6-12. Termination of Unsatisfactory Subcontracts. Should any subcontractor fail to perform in a satisfactory manner the work undertaken by him, such subcontract shall be terminated immediately by the Contractor upon notice from the Engineer.

6-13. Preservation of Stakes and Marks. The Contractor shall preserve carefully bench marks, reference points and stakes and in case of destruction he or she shall replace his or her stakes, reference points and bench marks and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance. Contractor's attention is directed to Section 7-03 of these Special Provisions.

6-14. Assistance to Engineer. At the request of the Engineer the Contractor shall provide men from his or her force and tools, stakes and other materials to assist the Engineer temporarily in making measurements and surveys and in establishing temporary or permanent reference marks. Payment for such materials and assistance will be made as provided for under the caption "Extra Work," provided, however, that the cost of setting stakes and marks carelessly lost or destroyed by the Contractor's employees will be assessed to the Contractor.

6-15. Removal of Condemned Materials and Structures. The Contractor shall remove from the site of the work, without delay, all rejected and condemned materials or structures of any kind brought to or incorporated in the work and upon his or her failure to do so, or to make satisfactory progress in so doing, within forty-eight (48) hours after the service of a written notice from the Engineer, the condemned material or work may be removed by the City and the cost of such removal shall be taken out of the money that may be due or may become due the Contractor on account of or by virtue of this contract. No such rejected or condemned material shall again be offered for use by the Contractor under this Contract.

6-16. Proof of Compliance with Contract. In order that the Engineer may determine whether the Contractor has complied with the requirements of this contract, not readily enforceable through inspection and tests of the work and materials, the Contractor shall, at any time when requested, submit to the Engineer properly authenticated documents or other satisfactory proofs as to his or her compliance with such requirements.

6-17. Errors and Omissions. If the Contractor, in the course of the work, finds any errors or omissions in plans or in the layout as given by survey points and instruction, or if he or she finds any discrepancy between the plans and the physical conditions of the locality, he or she shall immediately inform the Engineer, in writing and the Engineer shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

6-18. Cooperation. The Contractor shall cooperate with all other contractors who may be performing work in behalf of the City and workmen who may be employed by the City on any work in the vicinity of the work to be done under this contract with the work of such contractors or workmen. he or she shall make good promptly, at his or her own expense, any injury or damage that may be sustained by other contractors or employees of the City at his or her hands.

Any difference or conflict which may arise between the Contractor and other contractors, or between the contractor and workmen of the City in regard to their work shall be adjusted and determined by the Engineer. If the work of the Contractor is delayed because of any acts or omissions of any other contractor or of the City, the Contractor shall on that account have no claim against the City other than for an extension of time.

6-19. Right of Contractor to Stop Work. Under the following conditions the Contractor shall have the right, if he or she so desires, to stop the work and terminate the contract upon ten (10) days written notice to the Engineer and recover from the City payment for all work actually performed and for all satisfactory materials actually delivered to the site of the work for permanent incorporation therein, all as may be shown by the estimate of the Engineer.

(1) If the work is stopped under an order of any court or other competent public authority for a period of time of three (3) months through no act or fault of the Contractor or of anyone employed by him.

(2) If the Engineer fails to issue the monthly certificate for payment in accordance with the terms of this contract.

(3) If the City fails to pay the Contractor within sixty (60) days after it shall have become due, as provided by the terms of this contract, any sum certified by the Engineer or awarded by the City.

All provided that if such action to terminate the contract be not instituted by the Contractor within ten (10) days after the alleged existence of such condition and if written notice of such action be not at that time delivered to the City and the Engineer, then such right shall lapse until another occasion arises according to this section.

6-20. Hiring and Dismissal of Employees. The Contractor shall employ only such foremen, mechanics and laborers as are competent and skilled in their respective lines of work and whenever the Engineer shall notify the Contractor that any person on the work is, in his or her opinion, incompetent, unfaithful, intemperate or disorderly, or refuses to carry out the provisions of this contract, or uses threatening or abusive language to any person on the work representing the City, or is otherwise unsatisfactory, such person shall be discharged immediately from the work and shall not be re-employed upon it except with the consent of the Engineer.

6-21. Wage Rates.

1. Contractor shall pay all mechanics and laborers employed or working upon the site of the work unconditionally and without subsequent deductions or rebate on any account the full amounts due at the time of payment at wage rates not less than those contained in the applicable prevailing wage determination, regardless of any contractual relationship which may be alleged to exist between the Contractor and subcontractors and such laborers and mechanics.

2. Contractor shall comply with the California Labor Code Section 1775. In accordance with said Section 1775, Contractor shall forfeit as a penalty to the Owner, $50.00 (or the higher minimum penalty as provided in Section 1775(B)(ii) – (iii)) for each calendar day or portion thereof, for each workman paid less than the stipulated prevailing rates for such work or craft in which such workman is employed for any work done under the Contract by him or her or by any subcontractor under him or her in violation of the provisions of the Labor Code and in particular, Labor Code Sections 1770 to 1780, inclusive. In addition to said penalty and pursuant to Section 1775, the difference between such stipulated prevailing wage rates and the amount paid to each workman for each calendar day or portion thereof for which each workman was paid less than the stipulated prevailing wage rate shall be paid to each workman by the Contractor.

3. Pursuant to the provision of Section 1770 of the Labor Code of the State of California, Owner has ascertained the general prevailing rate of wages (which rate includes employer payments for health and welfare, vacation, pension and similar purposes) applicable to the work to be done, for straight time work. The holiday wage rate listed shall be applicable to all holidays recognized in the collective bargaining agreement of the particular craft, classification or type of workmen concerned. Copies of the General Prevailing Wage Determination are available on the Internet at web address: http://www.dir.ca.gov/DLSR/PWD The Contractor shall post the wage determination at the site of work in a prominent place where it can easily be seen by the workers.

4. City will not recognize any claim for additional compensation because the Contractor has paid any rate in excess of the prevailing wage rate obtained by the Contractor. The possibility of wage increases is one of the elements to be considered by the Contractor in determining his or her bid and will not in any circumstances be considered as the basis for a claim against the City.

5. The Labor Commissioner through the Division of Labor Standards Enforcement (DLSE) may at any time require contractors and subcontractors to furnish electronic certified payroll records directly to DLSE. Commencing with contracts awarded or after April 1, 2015, all contractors and subcontractors must furnish electronic certified payroll records directly to the DLSE.

6. Travel and Subsistence Payments.

   Contractor shall make travel and subsistence payments to each workman needed to execute the work in accordance with the requirements in Section 1773.8 of the Labor Code (Chapter 880, Statutes of 1968).

7. Apprentices.

Attention is directed to the provisions in Sections 1777.5 (Chapter 1411, Statutes of 1968) and 1777.6 of the California Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him. Contractor and any subcontractor under him or her shall comply with the requirements of said sections in the employment of apprentices.

Information relative to apprenticeship standards, wage schedules and other requirements may be obtained from the Director of Industrial Relations, ex officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

6-22. Cleaning Up. The Contractor shall not allow the site of the work to become littered with trash and waste material, but shall maintain the same in a neat and orderly condition throughout the construction period. The Engineer shall have the right to determine what is or is not waste material or rubbish and the place and manner of disposal.

On or before the completion of the work, the Contractor shall without charge therefore carefully clean out all pits, pipes, chambers or conduits and shall tear down and remove all temporary structures built by him or her and shall remove rubbish of all kind from any of the grounds which he or she has occupied and leave them in first class condition.

6-23. Guaranty. All work shall be guaranteed for a period of one year from the date of acceptance by the City. The Contractor shall promptly make all needed repairs arising out of defective materials, workmanship and equipment.

The City is hereby authorized to make such repairs if within ten days after the mailing of a notice in writing to the Contractor or his or her agent, the Contractor shall neglect to make or undertake with due diligence the aforesaid repairs, provided, however, that in case of an emergency where, in the opinion of the City delay would cause serious loss or damage, repairs may be made without notice being sent to the Contractor and the Contractor shall pay the costs thereof.

Pursuant to the provisions of Section 4-03 of these Special Provisions, the Contractor shall furnish a Defective Material and Workmanship Bond in an amount not less than 5 percent of the final contract price, which shall be effective for a period of one (1) year after the completion and acceptance of the work.

SECTION 7. RESPONSIBILITIES AND RIGHTS OF CITY

7-01. Authority of the Engineer. All work done under this contract shall be done in a workmanlike manner and shall be performed to the reasonable satisfaction of the Engineer, who shall have general supervision of all work included hereunder. To prevent disputes and litigation, the Engineer (1) shall in all cases determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for under this contract, (2) shall decide all questions relative to the true construction, meaning and intent of the Special Provisions and Drawings, (3) shall decide all questions which may arise relative to the classifications and measurements of quantities and materials and the fulfillment of this contract and (4) shall have the power to reject or condemn all work or material which does not conform to the terms of this contract. his or her estimate and decision in all matters shall be a condition precedent to an appeal for arbitration, or the right of the Contractor to receive, demand, or claim any money or other compensation under this agreement and a condition precedent to any liability on the part of the City to the Contractor on account of this contract. Whenever the Engineer shall be unable to act, in consequence of absence or other cause, then such engineer as the Engineer or the City shall designate, shall perform any and all of the duties and be vested with any or all of the powers herein given to the Engineer.

7-02. Inspection. The City will provide engineering personnel for the inspection of the work.

The Engineer and his or her representatives shall at all times have access to the work whenever it is in preparation or progress and the Contractor shall provide proper facilities for such access and inspection.

If the Special Provisions, the Engineer's instruction, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection and, if the inspection is by an authority other than the Engineer, of the date fixed for such inspection. Inspections by the Engineer shall be promptly made at the source of supply where practicable. If any work shall be covered up without

approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for examination and properly restored at the Contractor's expense.

Re-examination of any work may be ordered by the Engineer and, if so ordered, the work must be uncovered by the Contractor. If such work is found to be in accordance with the contract documents, the City shall pay the cost of re-examination and replacement. If such work is not in accordance with the contract documents, the Contractor shall pay such cost.

Properly authorized and accredited inspectors shall be considered to be the representatives of the City limited to the duties and powers entrusted to them. It will be their duty to inspect materials and workmanship of those portions of the work to which they are assigned, either individually or collectively, under instructions of the Engineer and to report any and all deviations from the Drawings, Special Provisions and other contract provisions which may come to their notice. Any inspector may be considered to have the right to order the work entrusted to his or her supervision stopped, if in his or her opinion such action becomes necessary, until the Engineer is notified and has determined and ordered that the work may proceed in due fulfillment of all contract requirements.

7-03. Surveys. Contractor shall furnish all land surveys, establish all base lines and bench marks and make sufficient detailed surveys needed for working points, lines and elevations. The Contractor shall develop all slope stakes and batter boards. Contractor shall also develop all additional working points, lines and elevations as he or she may desire to facilitate his or her methods and sequence of construction.

7-04. Rights-of-Way. The City will provide all necessary rights-of-way and easements in or beneath which work will be performed by the Contractor under this contract.

7-05. Retention of Imperfect Work. If any portion of the work done or material furnished under this contract shall prove defective and not in accordance with the Plans and Special Provisions, and if the imperfection in the same shall not be of sufficient magnitude or importance to make the work dangerous or undesirable, the Engineer shall have the right and authority to retain such work instead of requiring the imperfect work to be removed and reconstructed, but he or she shall make such deductions therefor in the payments due or to become due the Contractor as may be just and reasonable.

7-06. Changes in the Work. The Engineer shall have the right, in writing, to order additions to, omissions from, or corrections, alterations and modifications in the line, grade, form, dimensions, plan, or kind or amount of work or materials herein contemplated, or any part thereof, either before or after the beginning of construction. However, the arithmetical sum of the cost to the City of additions and subtractions from the work under this contract shall not exceed 10 percent of original contract amount or $5,000, whichever is the greater, unless based upon a supplementary agreement to be made therefore.

The order of such additions, omissions, corrections, alterations and modifications shall be in writing and signed by the Engineer and, in order, shall then be binding upon the Contractor. The Contractor shall proceed with the work as changed and the value of such change shall be determined as provided for in section 10-07 of these Special Provisions.

Such alterations shall in no way affect, vitiate, or make void this contract or any part thereof, except that which is necessarily affected by such alterations and is clearly the evident intention of the parties to this contract.

7-07. Additional Drawings by City. The drawings made a part of this contract at the time of its execution are intended to be fairly comprehensive and to indicate in more or less detail the scope of the work. In addition to these drawings, however, the Engineer shall furnish such additional drawings from time to time during the progress of the work as are necessary to make clear or to define in greater detail the intent of the Special Provisions and the contract drawings and the Contractor shall make his or her work conform to all such drawings.

7-08. Additional and Emergency Protection. Whenever, in the opinion of the Engineer, the Contractor has not taken sufficient precautions for the safety of the public or the protection of the works to be constructed under this contract, or of adjacent structures or property which may be injured by the processes of construction on account of such neglect and whenever, in the opinion of the Engineer, an emergency shall arise and immediate action shall be considered necessary in order to protect public or private, personal or property interest, then and in that event, the Engineer, with or without notice to the Contractor may provide suitable protection to the said interests by causing

such work to be done and such material to be furnished as shall provide such protection as the Engineer may consider necessary and adequate.

The cost and expense of such work and material so furnished shall be borne by the Contractor and, if the same shall not be paid on presentation of the bills therefor, then such costs shall be deducted from any amounts due or to become due the Contractor.

The performance of such emergency work under the direction of the Engineer shall in no way relieve the Contractor from any damages which may occur during or after such precaution has been taken by the Engineer.

7-09. Suspension of Work. The City may at any time suspend the work or any part thereof by giving five (5) days written notice to the Contractor. The work shall be resumed by the Contractor within ten (10) days after the date fixed in the written notice from the City to the Contractor so to do. The City shall reimburse the Contractor for expense incurred by the Contractor in connection with the work under this contract as a result of such suspension.

If the work, or any part thereof, shall be stopped by the notice in writing aforesaid and if the City does not give notice in writing to the Contractor to resume work at a date within ten (10) days of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work so suspended and he or she will be entitled to the estimates and payments for all work done on the portions so abandoned, if any, plus 5 percent of the value of the work so abandoned, to compensate for loss of overhead, plant expense and anticipated profit.

7-10. Right of City to Terminate Contract. If the Contractor should be adjudged a bankrupt, or if he or she should make a general assignment for the benefit of his or her creditors, or if a receiver should be appointed on account of his or her insolvency, or if he or she should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply sufficient properly skilled workmen or proper materials, or if he or she should fail to make prompt payments to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Engineer, or otherwise be guilty of a substantial violation of any provision of the contract, then the City, upon the certificate of the Engineer that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor seven days written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools and appliances and finish the work by whatever method the City may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price shall exceed the expense of finishing the work, including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the City. The expense incurred by the City as herein provided and the damage incurred through the Contractor's default, shall be certified by the Engineer.

7-11. Use of Completed Portions. The City shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work or such portions which may not have expired; but such taking possession and using shall not be deemed an acceptance of any work not completed in accordance with the contract documents. If such prior use increases the cost of or delays the work, the Contractor shall be entitled to such extra compensation, or extension of time or both, as the Engineer may determine.

SECTION 8. WORKMANSHIP, MATERIALS and EQUIPMENT

8-01. General Quality. Materials and equipment shall be new and of a quality equal to that specified or approved. Work shall be done and completed in a thorough and workmanlike manner.

8-02. Quality in Absence of Detailed Specifications. Whenever under this contract it is provided that the Contractor shall furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the best grade in quality and workmanship obtainable in the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to the usual standards for first-class materials or articles of the kind required, with due consideration of the use to which they are to be put. In general, the work performed shall be in full conformity and harmony with the intent to secure the best standard of construction and equipment of the work as a whole or in part.

8-03. Materials and Equipment Specified by Name. Whenever any material or equipment is indicated or specified by patent or proprietary name or by the name of the manufacturer, such specification shall be considered as used for the purpose of describing the material or equipment desired and shall be considered as followed by the words "or approved equal". The Contractor may offer any material or equipment which shall be equal in every respect to that specified, provided that written approval first is obtained from the Engineer.

8-04. Source of Materials. Price, fitness and quality being equal, preference shall be given by the Contractor for supplies grown, manufactured or produced in the State of California and, next, for such products partially produced in this State in accordance with Government Code Section 4332.

8-05. Storage of Materials. Materials shall be so stored to ensure the preservation of their quality and fitness for the work. They shall be so located and disposed that prompt and proper inspection thereof may be made.

8-06. Drawings, Samples and Tests. As soon as possible after execution of the contract, the Contractor shall submit to the Engineer, in quintuplicate, sufficient information including, if necessary, assembly and detail drawings to demonstrate fully that the equipment and materials to be furnished comply with the provisions and intent of these Special Provisions and Drawings. If the information thus submitted indicates the equipment or materials is acceptable, the Engineer will return one copy stamped with his or her approval; otherwise, one copy will be returned with an explanation of why the equipment or material is unsatisfactory. The Contractor shall have no claims for damages or for extension of time on account of any delay due to the revision of drawings or rejection of material. Fabrication or other work performed in advance of approval shall be done entirely at the Contractor's risk. After approval of equipment or material, the Contractor shall not deviate in any way from the design and specifications given without the written consent of the Engineer.

When requested by the Engineer, a sample or test specimens of the materials to be used or offered for use in connection with the work shall be prepared at the expense of the Contractor and furnished by him or her in such quantities and sizes as may be required for proper examination and tests, with all freight charges prepaid and with information as to their sources.

All samples shall be submitted before shipment and in ample time to permit the making of proper tests, analyses, or examination before the time at which it is desired to incorporate the material into the work. All tests of materials furnished by the Contractor shall be made by the Engineer. Samples shall be secured and tested whenever necessary to determine the quality of the material.

SECTION 9. PROSECUTION OF WORK

9-01. Equipment and Methods. The work under this contract shall be prosecuted with all materials, tools, machinery, apparatus and labor and by such methods as are necessary to the complete execution of everything described, shown, or reasonably implied. If at any time before the beginning or during the progress of the work, any part of the Contractor's plant or equipment, or any of his or her methods of execution of the work, appear to the Engineer to be unsafe, inefficient, or inadequate to insure the required quality or the rate of progress of the work, he or she may order the Contractor to increase or improve his or her facilities or methods and the Contractor shall comply promptly with such orders; but, neither compliance with such orders nor failure of the Engineer to issue such orders shall relieve the Contractor from his or her obligation to secure the degree of safety, the quality of the work and the rate of progress required of the Contractor. The Contractor alone shall be responsible for the safety, adequacy and efficiency of his or her plant, equipment and methods.

9-02. Time of Completion. The Contractor shall promptly begin the work under this contract and shall complete and make ready for full use all portions of the project made the subject of this contract within the time set forth in the agreement bound herewith.

9-03. Avoidable Delays. Avoidable delays in the prosecution or completion of the work shall include all delays which might have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor. The City will consider as avoidable delays within the meaning of this contract (1) delays in the prosecution of parts of the work, which may in themselves be unavoidable, but do not necessarily prevent or delay the prosecution of other parts of the work nor the completion of the whole work within the time herein specified, (2) reasonable loss of time resulting from the necessity of submitting plans to the Engineer for approval and from the making of surveys, measurements, inspections, and testing and (3) such interruptions as may occur in the prosecution of the work on account of the reasonable interference of other contractors employed by the City which do not necessarily prevent the completion of the whole work within the time herein specified.

9-04. Unavoidable Delays. Unavoidable delays in the prosecution or completion of the work under this contract shall include all delays which may result, through cause beyond the control of the Contractor and which he or she could not have provided against by the exercise of care, prudence, foresight and diligence. Orders issued by the City changing the amount of work to be done, the quantity of material to be furnished or the manner in which the work is to be prosecuted and unforeseen delays in the completion of the work of other contractors under contract with the City will be considered unavoidable delays, so far as they necessarily interfere with the Contractor's completion of the whole of the work. Delays due to normally adverse weather conditions will not be regarded as unavoidable delays. However, truly abnormal amounts of rainfall, temperatures or other weather conditions for the location of the work and time of year may be considered as unavoidable delays if those conditions necessarily cause a delay in the completion of the work.

9-05. Notice of Delays. Whenever the Contractor foresees any delay in the prosecution of the work and, in any event, immediately upon the occurrence of any delay which the contractor regards as an unavoidable delay, he or she shall notify the Engineer in writing of the probability of the occurrence of such delay and its cause, in order that the Engineer may take immediate steps to prevent, if possible, the occurrence or continuance of the delay, or, if this cannot be done, may determine whether the delay is to be considered avoidable or unavoidable, how long it continues and to what extent the prosecution and completion of the work are to be delayed thereby.

9-06. Extension of Time. Should any delays occur which the Engineer may consider unavoidable, as herein defined, the Contractor shall, pursuant to his or her application, be allowed an extension of time proportional to said delay or delays, beyond the time herein set forth, in which to complete this contract; and liquidated damages for delay shall not be charged against the Contractor by the City during an extension of time granted because of unavoidable delay or delays.

Any claim by Contractor for a time extension based on unavoidable delays shall be based on written notice delivered to the Engineer within 15 days of the occurrence of the event giving rise to the claim. Failure to file said written notice within the time specified shall constitute a waiver of said claim. Notice of the full extent of the claim and all supporting data must be delivered to the Engineer within 45 days of the occurrence unless the Engineer specifies in writing a longer period. All claims for a time extension must be approved by the Engineer and incorporated into a written change order.

9-07. Unfavorable Weather and Other Conditions. During unfavorable weather and other conditions, the Contractor shall pursue only such portions of the work as shall not be damaged thereby. No portions of the work whose satisfactory quality or efficiency will be affected by any unfavorable conditions shall be constructed while these conditions remain, unless, by special means or precautions approved by the Engineer, the Contractor shall be able to overcome them.

The Contractor shall be granted a time extension of one day for each unfavorable weather day which prevents him or her from placing concrete forms or placing and finishing concrete or asphalt concrete. Such unfavorable weather day is defined as a rain day where precipitation prevents the contractor from performing the work more than four (4) continuous hours within the authorized work period or a temperature day where the ambient temperature is below that specified for the placement of materials associated with the controlling work item for more than four (4) continuous work hours of the authorized work period.

9-08. Saturday, Sunday, Holiday and Night Work. No work shall be done between the hours of 6 p.m. and 7 a.m., nor on Saturdays, Sundays or legal holidays except such work as is necessary for the proper care and protection of work already performed, or except in cases of absolute necessity and in any case only with the permission of the Engineer.

It is understood, however, that night work may be established as a regular procedure by the Contractor if he or she first obtains the written permission of the Engineer and that such permission may be revoked at any time by the Engineer if the Contractor fails to maintain at night adequate force and equipment for reasonable prosecution and to justify inspection of the work.

9-09. Hours of Labor. Eight (8) hours of labor shall constitute a legal day's work and the Contractor or any subcontractor shall not require or permit more than eight hours of labor in a day from any person employed by him or her in the performance of the work under this contract, unless paying compensation for all hours worked in excess of eight (8) hours per day at not less than 1½ times the basic rate of pay. The Contractor shall forfeit to the City, as a penalty, the sum of twenty-five dollars ($25.00) for each workman employed in the execution of the contract by him or her or by any subcontractor, for each calendar day during which such laborer, workman, or mechanic is required or permitted to labor more than eight hours in violation of the provisions of Section 1810 to 1816, inclusive, (Article 3, Chapter 1, Part 7, Division 2) of the Labor Code of the State of California and any acts amendatory thereof.

SECTION 10. PAYMENT

10-01. Certification by Engineer. All payments under this contract shall be made upon the presentation of certificates in writing from the Engineer and shall show that the work covered by the payments has been done and the payments thereof are due in accordance with this contract.

10-02. Progress Estimates and Payment. The Engineer shall, within the first seven (7) days of each month, make an estimate of the value of the work performed in accordance with this contract during the previous calendar month.

The first estimate shall be of the value of the work satisfactorily completed in place and meeting the requirements of the contract. And every subsequent estimate, except the final estimate, shall be of the value of the work satisfactorily completed in place since the last preceding estimate was made; provided, however, that should the Contractor fail to adhere to the program of completion fixed in this contract, the Engineer shall deduct from the next and all subsequent estimates the full calculated accruing amount of the liquidated damages to the date of said estimate, until such time as the compliance with the program has been restored.

The estimate shall be signed by the Engineer and, after approval, the City shall pay or cause to be paid to the Contractor in the manner provided by law, an amount equal to 95 percent of the estimated value of the work satisfactorily performed and complete in place.

10-03. Substitution of Securities.

1. At such times that Pubic Contract Code Section 22300 is in effect Contractor may propose the substitution of securities of at least equal market value for any moneys to be withheld to ensure performance under the Contract.

Market value shall be determined as of the day prior to the date such substitution is to take place. Such substitution shall be made at the request and expense of the Contractor. The securities shall be one or more of the following types:

(a) Bonds or interest-bearing notes or obligations of the United States, or those for which the faith and credit of the United States are pledged for the payment of principal and interest.

(b) Bonds or interest-bearing notes on obligations that are guaranteed as to principal and interest by a federal agency of the United States.

(c) Bonds of the State of California, or those for which the faith and credit of the State of California are pledged for the payment of principal and interest.

(d) Bonds or warrants, including, but not limited to, revenue warrants, of any county, city, metropolitan water district, California water district, California water storage district, irrigation district in the State of California, municipal utility district, or school district of the State of California, which are rated by Moody's or Standard and Poor as A or better.

(e) Bonds, consolidated bonds, collateral trust debentures, consolidated debentures, or other obligations issued by federal land banks or federal intermediate credit banks established under the Federal Farm Loan Act, as amended; debentures and consolidated debentures issued by the Central Bank for Cooperatives and banks for cooperatives established under the Farm Credit Act of 1933, as amended; bonds, or debentures of the Federal Home Loan Bank Board established under the Federal Home Loan Bank Act; and stock, bonds, debentures and other obligations of the Federal National Mortgage Association established under the National Housing Act as amended and bonds of any Federal Home Loan Mortgage Corporation.

(f) Commercial paper of "prime" quality as defined by a nationally recognized organization which rates such securities. Eligible paper is further limited to issuing corporations: (1) organized and operating within the United States; (2) having total assets in excess of five hundred million dollars ($500,000,000); and (3) approved by the Pooled Money Investment Board of the State of California. Purchases of eligible commercial paper may not exceed 180 days' maturity, nor represent more than 10 percent of the outstanding paper of an issuing corporation.

(g) Bills of exchange or time drafts on and accepted by a commercial bank, otherwise known as bankers' acceptances, which are eligible for purchase by the Federal Reserve System.

(h) Certificates of deposits issued by a nationally or state-chartered bank or savings and loan association.

(i) The portion of bank loans and obligations guaranteed by the United States Small Business Administration or the United States Farmers Home Administration.

(j) Student loan notes insured under the Guaranteed Student Loan Program established pursuant to the Higher Education Act of 1965, as amended (20 U.S.C. 1001, et seq.) and eligible for resale to the Student Loan Marketing Association established pursuant to Section 133 of the Education Amendments of 1972, as amended (20 U.S.C. 1087-2).

(k) Obligations issued, assumed or guaranteed by International Bank for Reconstruction and Development, the Inter-American Development Bank, the Asian Development Bank, or the Government Development Bank of Puerto Rico.

(l) Bonds, debentures and notes issued by corporations organized and operating within the United States. Such securities eligible for substitution shall be within the top three ratings of a nationally recognized rating service.

2. The securities shall be deposited with City or with any commercial bank as escrow agent, who shall arrange for transfer of such securities to the Contractor upon satisfactory completion of the contract. Any interest accrued or paid on such securities shall belong to the Contractor and shall be paid upon satisfactory completion of the contract.

The market value of the securities deposited shall at all times be maintained in an amount at least equal, in the sole judgment of City, to the moneys to be withheld pursuant to the Contract Documents to ensure performance of the Contract. In order to comply with this condition, Contractor shall deposit additional securities as necessary upon request by City or the escrow agent.

3. Upon acceptance of any Proposal that includes substituting securities for amounts withheld to ensure performance, a separate escrow agreement satisfactory in form and substance to City shall be prepared and executed by City, the Contractor and the escrow agent, which may be City. The escrow agreement shall specify, among other matters, value of securities to be deposited; procedures for valuing the securities and for adding or withdrawing securities to maintain the market value of the deposited securities at least equal to the amount of moneys which would otherwise be withheld; the terms and conditions of conversion to cash in case of the default by the Contractor; and terms, conditions and procedure for termination of the escrow. City shall have no obligation to enter any such Agreement that does not provide the City with the unilateral right to convert securities to cash and to gain immediate possession of the cash.

10-04. Acceptance. The work must be accepted by vote of the City Council of the City of Ukiah when the whole shall have been completed satisfactorily. The Contractor shall notify the Engineer, in writing, of the completion of the work, whereupon the Engineer shall promptly, by personal inspection, satisfy himself as to the actual completion of the work in accordance with the terms of the contract and shall thereupon recommend acceptance by the City Council.

10-05. Final Estimate and Payment. The Engineer shall, as soon as practicable after the final acceptance of the work done under this contract, make a final estimate of the amount of work done thereunder and the value thereof.

Such final estimate shall be signed by the Engineer, and after approval, the City shall pay or cause to be paid to the Contractor, in the manner provided by law, the entire sum so found to be due hereunder, after deducting therefrom all previous payments and such other lawful amounts as the terms of this contract prescribe.

In no case will final payment be made in less than thirty-five (35) days after the filing of the notice of completion with the County Recorder.

10-06. Delay Payments. Should any payment due the Contractor or any estimate be delayed, through fault of the City beyond the time stipulated, such delay shall not constitute a breach of contract or be the basis for a claim for damages, but the City shall pay the Contractor interest on the amount of the payment at the rate of 6 percent per annum for the period of such delay. The terms for which interest will be paid shall be reckoned, in the case of any monthly or progress payment, from the twentieth day of the month next succeeding the month in which the work was performed to the date of payment of the estimate; and in the case of the final estimate, from the forty-fifth day after acceptance to the date of payment of the final estimate.

The date of payment of any estimate shall be considered the day on which the payment is offered or mailed as evidenced by the records of the Treasurer of the City. If interest shall become due on any delayed payment, the amount thereof, as determined by the City, shall be added to a succeeding payment. If the interest shall become due on the final payment, it shall be paid on a supplementary voucher to interest or any sum or sums which, by the terms of this contract, the City is authorized to reserve or retain.

10-07. Extra Work and Work Omitted. Whenever corrections, alterations, or modifications of the work under this contract ordered by the Engineer and approved by the City increase the amount of work to be done, such added work shall be known as "extra work"; and when such corrections, alterations, or modifications decrease the amount of work to be done, such subtracted work shall be known as "work omitted".

When the Contractor considers that any changes ordered involve extra work, he or she shall immediately notify the Engineer in writing and subsequently keep him or her informed as to when and where extra work is to be performed and shall make claim for compensation therefor each month not later than the first day of the month following that in which the work claimed to be extra work was performed and he or she shall submit a daily complete statement of materials and labor used and expenses incurred on account of extra work performed, showing allocation of all materials, labor and expenses.

All such claims shall state the date of the Engineer's written order and the date of approval by the City authorizing the work on account of which claim is made. Unless such notification is made in writing within the time specified and unless complete statements of materials used and expenses incurred on account of such extra work are furnished as above required, the Contractor shall not be entitled to payment on account of extra work and Contractor shall be deemed to have waived the right to make any future claims for compensation for such extra work.

When changes decrease the amount of work to be done, they shall not constitute a claim for damages on account of anticipated profits on the work that may be omitted.

10-08. Compensation for Extra Work or Work Omitted. Whenever corrections, additions, or modifications in the work under this contract change the amount of work to be done or the amount of compensation due the Contractor, excepting increases or decreases in contract items having unit contract prices for each measurable quantity installed in place, and such changes have been ordered in writing by the Engineer and approved by the City prior to the Contractor performing the extra work, then a price may be agreed upon. Failing such an agreement in price, the Contractor shall be compensated for performing extra work pursuant to the provisions of Section 4-1.03 D, "Extra Work", and Section 9-1.03,"Force Account Payment" of the Standard Specifications.

This method of determining the price of work shall not apply to the performance of any work which is required or reasonably implied to be performed or furnished under this contract.

10-09. Compensation to the City for Extension of Time. In case the work called for under this contract is not completed within the time limit stipulated herein, the City shall have the right as provided hereinabove, to extend the time of completion thereof. If the time limit be so extended, the City shall have the right to charge to the Contractor and to deduct from the final payment for the work the actual cost to the City of engineering, inspection, superintendence and other overhead expenses which are directly chargeable to the contract and which accrue during the period of such extension, except that the cost of final unavoidable delays shall not be included in such charges.

10-10. Liquidated Damages for Delay. It is agreed by the parties to the contract that time is of the essence and that, in case all the work is not completed before or upon the expiration of the time limit as set forth, damage, other than those cost items identified in section 10-09, will be sustained by the City and that it is and will be impracticable to determine the actual amount of damage by reason of such delay; and it is therefore agreed that the Contractor will pay to the City the sum of five hundred dollars ($500.00) per day for each and every calendar day's delay beyond the time prescribed.

SECTION 11. MISCELLANEOUS

11-01. Notice. Whenever any provision of the contract documents requires the giving of written notice, it shall be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice. If mailed, the notice shall be deemed received on the date of delivery stated in the return receipt.

11-02. Computation of Time. When any period of time is referred to in the Contract Documents by days, it shall be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day shall be omitted from the computation.

11-03. Claims Procedure Required by Public Contract Code Section 9204. This section shall apply to any claim by the Contractor arising in connection with this project in accordance with Public Contract Code Section 9204.

a, For purposes of this section "Claim" means a separate demand by the Contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

(A) A time extension, including, without limitation, for relief from damages or penalties for delay assessed by the City under this contract.

(B) Payment by the City of money or damages arising from work done by, or on behalf of, the Contractor pursuant to this contract and payment for which is not otherwise expressly provided or to which the Contractor is not otherwise entitled.

(C) Payment of an amount that is disputed by the City.

b.

(1)

(A) Upon receipt of a claim pursuant to this section, the City shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, a public entity and the contractor may, by mutual agreement, extend the time period provided in this subdivision.

(B) The Contractor shall furnish reasonable documentation to support the claim.

(C) If the City needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the City shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide the claimant a written statement identifying the disputed portion and the undisputed portion.

(D) Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the City issues its written statement. If the City fails to issue a written statement, paragraph (3) shall apply.

(2)

(A) If the Contractor disputes the City's written response, or if the City fails to respond to a claim issued pursuant to this section within the time prescribed, the Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the City shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(B) Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the City shall provide the claimant a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the public entity issues its written statement. Any disputed portion of the claim, as identified by the contractor in writing, shall be submitted to nonbinding mediation, with the City and the Contractor sharing the associated costs equally. The City and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside this section.

(C) For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

(D) Unless otherwise agreed to in writing by the City and the Contractor, the mediation conducted pursuant to this section shall excuse any further obligation under Public Contract Code Section 20104.4 to mediate after litigation has been commenced.

(3) Failure by the City to respond to a claim from the Contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of the public entity's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the Contractor.

(4) Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.

(5) If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a public entity because privity of contract does not exist, the Contractor may present to the public entity a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the Contractor present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the public entity shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the Contractor shall notify the subcontractor in writing as to whether the Contractor presented the claim to the public entity and, if the original contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

c. A waiver of the rights granted by this section is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable; and (2) the City may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of this section, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in this section.

11-04. Litigation and Forum Selection. Contractor and City stipulate and agree that any litigation relating to the enforcement or interpretation of this contract, arising out of Contractor's performance or relating in any way to the work shall be brought in Mendocino County and that venue will lie in Mendocino County.

Except as otherwise expressly provided by law, the parties waive any objections they might otherwise have to the propriety of jurisdiction or venue in the state courts in Mendocino County and agree that California law shall govern any such litigation.

The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto and, in particular but without limitation, the warranties, guaranties and obligations imposed upon the Contractor and all of the rights and remedies available to the City thereunder, shall be in addition to and shall not be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by law or contract, by special warranty or guaranty, or by other provisions of the contract documents and the provisions of this paragraph shall be as effective as if repeated specifically in the contract documents in connection with each particular duty, obligation, right and remedy to which they apply. All warranties and guaranties made in the contract document shall survive final payment and termination or completion of this contract. The City disclaims an express or implied warranty that the plans and specifications identify all site conditions that could affect the time or cost to complete the Work.

11-05. Waiver. The Contractor shall strictly comply with all notices and other contract requirements. Waiver by the City of any failure of the Contractor to comply with any term of the contract, including the notice provisions, shall not be deemed a waiver of a subsequent breach.

SECTION 12. GENERAL INFORMATION

12-01. Location and Scope of Work. All of the work to be performed is within the City of Ukiah and consists of Earthwork, select utility rough-ins, provision and installation of fencing and gates (both rolling & swinging), re-roofing, and solar system installation (both building mounted and freestanding). General locations of the work is 1350 Hasting Avenue, Ukiah, California.

The Contractor should familiarize himself with the local conditions of the project sites. Failure to do so will in no way relieve him of the responsibility for performing any of the work or operations required as a part of this contract. Further information regarding the work or these specifications can be obtained from Mary Horger at (707) 463-6233.

12-02. List of Construction Documents [Specifications]. The Technical Specifications are arranged in sections covering the various elements of work for this phase as follows:

CONSTRUCTION DOCUMENTS (SPECIFICATIONS)

DIVISION	Section No.	Title	
1	GENERAL REQUIREMENTS		
	01000	GENERAL REQUIREMENTS	3
	01010	SUMMARY OF THE WORK	3
	01060	REGULATORY REQUIREMENTS	3
	01015	CONTRACTOR'S USE OF THE PREMISES	4
	01100	PROJECT MANAGEMENT & COORDINATION	10
	01200	PROJECT MEETINGS	4
	01311	CONSTRUCTION SCHEDULE	6
	01340	SUBMITTALS	7
	01450	STRUCTURAL TESTING & LABORATORY SERVICES	33
	01700	PROJECT CLOSEOUT	7
2	SITE WORK		
	02200	EARTHWORK	4
	02221	TRENCHING, BACKFILLING, & COMPACTION	8
	02710	STEEL FENCING – HIGH SECURITY	4
	02829	ELECTRIC GATE OPERATOR	5
	02833	STEEL ROLLING GATE SYSTEM	2
	02833	STEEL SWING GATE	4
3	CONCRETE		
	03100	CONCRETE FORMWORK	3
	03200	CONCRETE REINFORCEMENT	5
	03300	CAST-IN-PLACE	18
7	THERMAL AND MOISTURE PROTECTION		
	07400	METAL ROOFING PANEL SYSTEM	9
	07600	FLASHING AND SHEET METAL	2

12-03. List of Construction Documents [Plans]. General locations of the work s shown in Appendix "A". A set of construction plans is included in each bid package that will be provided to the bidder showing the exact locations of the work to be done during this phase of the work.

CONSTRUCTION DOCUMENTS (PLANS)

GENERAL SHEET	TITLE
TP100	TITLE PAGE, INDEX, LEGENDS & VICINITY MAP
CG1.0	CAL GREEN BUILDING STANDARDS CODE
CG1.1	CAL GREEN BUILDING STANDARDS CODE
CG1.2	CAL GREEN BUILDING STANDARDS CODE
ADA.1	SITE ACCESSIBILITY FEATURES
ADA.2	BUILDING ACCESSIBILITY FEATURES
COA10	CONDITIONS OF APPROVAL
CIVIL	
C-1	TOPO MAP (EXISTING CONDITIONS) AND DEMO PLAN
C-2	GRADING AND DRAINAGE PLAN
C-3	PARKING/RAMP PLAN AND DETAILS
LANDSCAPE	
L101	PLANTING CONCEPT PLAN
L102	IRRIGATION CONCEPT PLAN
L103	DETAILS
L104	LANDSCAPE SPECIFICATIONS
ARCHITECTURAL	
AS100	ARCHITECTURAL SITE PLAN, NOTES & DETAILS
AS110	COURTYARD PARTIAL PLAN, NOTES & DETAILS
AS111	TRASH & RECYCLE STORAGE ENCLOSURE, NOTES & DETAILS
AS200	VEHICLE GATE PLAN, NOTES & DETAILS
AS201	MAN GATE & FENCE NOTES & DETAILS
A100	ARCHITECTURAL FLOOR PLAN (EXISTING – NO WORK)
A200	NOT USED
A300	COURTYARD INTERIOR ELEVATIONS
A400	EXTERIOR ELEVATIONS, NOTES & DETAILS
A500	ROOF PLAN NOTES & DETAILS
A501	ROOF DETAILS
ELECTRICAL	
ES001	ELECTRICAL COVER SHEET
ES100	ELECTRICAL SITE PLAN
ES200	DETAILS
ES700	SPECIFICATIONS
ES701	SPECIFICATIONS

12-04. Business Licenses. The Contractor and any subcontractors shall each secure and maintain a valid City of Ukiah Business License prior to the start of any portion of the work.

12-05. Permits. The Contractor shall provide, procure, and pay for all permits required to complete this work.

12-06. Standard Specifications and Standard Plans. The Standard Specifications and Standard Plans of the California State Department of Transportation, 2015, are hereby made a part of these Special Provisions and are hereinafter referred to as "California Standard Specifications" and "California Standard Plans."

Whenever in the California Standard Specifications and the California Standard Plans the following terms are used, they shall be understood to mean and refer to the following:

Department of Transportation - The City Council.

Director of Public Works - The City of Ukiah Director of Public Works.

Engineer - The Engineer, designated by the City Council, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

Laboratory - The designated laboratory authorized by the City of Ukiah to test materials and work involved in the contract.

State - The City of Ukiah

Other terms appearing in the California Standard Specifications and the California Standard Plans shall have the intent and meaning specified in Section I, Definition of Terms of the California Standard Specifications.

In case of discrepancy between the contract documents, the order of precedence from the highest to lowest is as follows:
1. Special Provisions
2. Project Plans
3. City Standard Plans and Details
4. California Standard Plans
5. California Standard Specifications

12-07. Temporary Facilities. All temporary facilities are the responsibility of the Contractor. The removal of said facilities shall be the responsibility of the Contractor. The Contractor shall be responsible for any and all damages to existing facilities which are a result of the work.

12-08. Public Convenience and Safety. The Contractor shall conduct operations so as to cause the least possible obstruction and inconvenience to public traffic. The Contractor shall, at his or her expense, furnish such flag persons and furnish, erect, construct and maintain such fences, barriers, lights, signs, detours, pedestrian walkways, driveway ramps and bridging as may be necessary to give adequate warning to the public that work is in progress and that dangerous conditions exist, to provide access to abutting properties and to permit the flow of pedestrian and vehicular traffic to safely and expeditiously pass the work.

12-09. Maintaining Traffic. Attention is directed to Section 7-1.08, "Public Convenience," 7-1.09, "Public Safety," 7-1.092, "Lane Closure," and 7-1.095, "Flagging Costs," of the California Standard Specifications.

Streets shall be open to through vehicular traffic during non-working hours. All public traffic shall be permitted to pass through the work with as little inconvenience and delay as possible.

Full costs for "Maintaining Traffic", including "Flagging Costs", shall be considered as included in the various items of work and no additional compensation will be made.

12.10. Stream Pollution. The Contractor shall exercise every reasonable precaution to prevent muddying or silting of live streams, and the Contractor's attention is called to the fact that the terms of this contract do not relieve him or her of responsibility for compliance with Sections 5650 and 12015 of the Fish and Game Code or other applicable statutes relating to pollution prevention or abatement.

12-11. Warranties. Unless otherwise indicated, the Contractor shall warrant all materials provided and work performed under this contract for a period of one year from the date of final acceptance. He shall replace promptly and at his own expense any materials and/or workmanship which fail during this warranty period.

12-12. Utilities. No water, sewer or electrical services will be provided by the owner. It is the Contractor's sole responsibility to arrange such services as necessary.

12-13. Preconstruction Conference. A preconstruction conference will be held before any work will be allowed to commence. This meeting will cover inspection, schedule for work, and among other items, the responsibilities and procedures of each of the interested parties to assure that the project will be completed in accordance with the contract documents.

12-14. Safety Requirements. The Contractor shall comply with all pertinent provisions of the Department of Labor "Safety and Health Regulations for Construction (29 FCS Part 1518, 36 CFR 7340)", with additions or modifications thereto, in effect during construction of this project.

SECTION 13. EXCLUSIONS FROM GENERAL CONDITIONS

13-01. Provisions to be Excluded from General Conditions. The following designated provisions of the General Conditions are hereby determined to be inapplicable to the proposed work and, therefore, are hereby excluded from the terms of the Notice to Bidders, Proposal, Agreement and other contract documents as though entirely omitted from said General Conditions:

(1) Section 6-02. Office at the Site
(2) Section 7-03. Surveys

No other exclusions.

SECTION 14. AMENDMENTS TO GENERAL CONDITIONS

14-01. Sections of General Conditions to be Amended.

The following designated sections of the Special Provisions are hereby amended to read as follows:

No amendments.

BID SUBMITTAL CHECKLIST

The following is a checklist to assist you in your submission of your bid documents. Please make sure you include the following when submitting your bid documents to reduce the risk of having your bid rejected:

Did you include?...

- o **Proposal** (Page ___)
  - ➢ Unit prices filled out clearly.
  - ➢ Extended prices filled out clearly and calculated correctly
  - ➢ Total bid amount filled out clearly and calculated correctly
  - ➢ Sign the proposal, and provide complete information
  - ➢ CLSB No. and expiration date
  - ➢ Department of Industrial Relations Public Works Contractor Registration Number

- o **Fair Employment Practices Certification** (Page ___)
  - ➢ Filled out completely per instruction

- o **Worker's Compensation Certificate** (Page ____)
  - ➢ Filled out completely per instruction

- o **Certification of Non-Discrimination in Employment** (Page ___)
  - ➢ Filled out completely per instruction

- o **List of Proposed Subcontractors** (Page _____)
  - ➢ Filled out completely per instruction

- o **Statement of Experience** (Page ____)

- o **Signature of Bidder** (Page _____)
  - ➢ Filled out completely per instruction
  - ➢ Authorized signature provided

- o **Bidder's Bond** (Page _____)
  - ➢ Filled out completely per instruction

- o **Non-Collusion Affidavit** (Page _____)
  - ➢ Filled out completely per instruction
  - ➢ Notarized

- o **Addenda Issued**
  - ➢ Check the City website for any addenda issued: www.cityofukiah.com/purchasing.

CITY OF UKIAH
MENDOCINO COUNTY, CALIFORNIA

PROPOSAL

FOR
ELECTRIC UTILITY - FOC

Specification No. 16-7

The undersigned, as bidder,
declares that he or she has examined thoroughly all of the contract documents herein contained, that this proposal is made without collusion with any other person, firm or corporation and that all laws and ordinances relating to the interest of public officers in this contract have been complied with in every respect.

AND he or she proposes and agrees, if this proposal is accepted,

1) that he or she will contract with the City of Ukiah, Mendocino County, California, in the form of the copy of the agreement herein contained

    a) to provide all necessary machinery, tools, apparatus and other means of construction;

    b) to furnish all materials;

    c) to provide all superintendence, overhead expenses and all labor and expenses of whatever nature necessary to complete the job in conformity with the specifications and drawings and other contract provisions herein or reasonably implied hereby or as necessary to complete the work in the manner and within the time named herein and according to the requirements and to the reasonable satisfaction of the City Engineer;

    d) to pay all charges of freight transportation and hauling;

2) that he or she indemnifies the City against any loss or damage arising from any act of the undersigned as Contractor; and

3) that he or she will accept as full payment therefor the following sums:

BIDDING SCHEDULE

In the case of any discrepancy between the unit price and the total set forth for the item, the unit price shall prevail; provided, however, that if the amount set forth as a unit price is ambiguous, unintelligible or uncertain for any reason, or is omitted, or in the case of lump sum items, is not the same amount as the entry in the "Total" column, then the amount set forth in the "Total" column for the item shall prevail in accordance with the following:

1. As to lump sum items, the amount set forth in the "Total" column shall be the unit price;
2. As to unit basis items, the amount set forth in the "Total" column shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price.

The Total Base Bid shall be the sum of the items in the "Total" column. In case of discrepancy between the sum of the items in the "Total" column and the amount entered as Total Base Bid, the sum of the "Total" column items shall prevail. The bid comparison will be based on the sum of the items in the "total" column for each bidder.

The Unit prices for the various Construction Items below include all costs associated with the General Conditions, Special Provisions, Requirements of the Construction Contract, and represent the total, complete, in-place cost for each specific Construction Item in accordance with the Construction Documents, including all elements, work components, accessories, and connections, shown in applicable details or required to yield a complete, sound and functional component or system appropriate for its intended function, whether or not such is specifically described or listed in any description of measurement or payment. The total amount of the Construction items below shall represent the total and complete cost of the fully functional Project. All work not specifically listed below be required to complete the work of the various construction items and the cost of such shall be considered as included throughout the various unit prices indicated.

Lowest bid will be based on the lowest Base Bid.

NAME OF BIDDER: _____

SPEC #: **16-07**

PROJECT NAME: **Electric Utility - FOC**

ITEM #	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	TOTAL
1		LS		$_____	$_____
2		LS		$_____	$_____
3		LS		$_____	$_____
4		LS		$_____	$_____
5		LS		$_____	$_____
6		LS		$_____	$_____
7		LS		$_____	$_____
8		LS		$_____	$_____
				TOTAL BID ==>>	$_____

We, the undersigned, acknowledge that the City Council has reserved the right to reject any or all bids and to determine which proposal is, in its opinion, the lowest responsive bid from a responsible bidder and that which it deems in the best interest of the City to accept. We, the undersigned, further agree, if this proposal shall be accepted, to sign the agreement and to furnish the required bonds with satisfactory surety, or sureties, within fifteen (15) calendar days after written notice that the contract is ready for signature; and, if the undersigned shall fail to contract, as aforesaid, it shall be understood that he or she has abandoned the contract and that, therefore, this proposal shall be null and void and the proposal guaranty accompanying this proposal, or the amount of said guaranty, shall be forfeited to and become the property of the City. Otherwise, the proposal guaranty accompanying this proposal shall be returned to the undersigned.

Witness our hands this day of _____, 2019.

Licensed in accordance with an act providing for the registration of California Contractors License No. _____, expiration date _____.

THE CONTRACTOR'S LICENSE NUMBER AND EXPIRATION DATE STATED HEREIN ARE MADE UNDER PENALTY OF PERJURY.

Department of Industrial Relations Public Works Contractor Registration Number:_____

Signature of bidder or bidders, with business name, address, phone number and fax number:

_____

_____

_____

_____

Notice: In the case of a corporation, give below the addresses of the principal office thereof and names and addresses of the President, Secretary, Treasurer.

_____

_____

_____

FAIR EMPLOYMENT PRACTICES CERTIFICATION

TO:_____

_____

The undersigned, in submitting a bid for performing the following work by Contract, hereby certifies that he or she has or will meet the standards of affirmative compliance with the Fair Employment Practices requirements of the Special Provisions contained herein.

ELECTRIC UTILITY - FOC

_____
(Signature of Bidder)

Business Mailing Address:

_____

_____

_____

Business Location:

_____

_____

(The bidder shall execute the certification of this page prior to submitting his or her proposal.)

WORKER'S COMPENSATION CERTIFICATE

I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Worker's Compensation or undertake self-insurance in accordance with the provisions of that code and I will comply with such provisions before commencing the performance of the work of this contract.

Witness my hand this_____ day of _____, 2019___

Signature of Bidder, with Business Address:

_____

_____

_____

_____

CERTIFICATION OF NONDISCRIMINATION IN EMPLOYMENT

The bidder represents that he or she has/has not, participated in a previous contract or subcontract subject to either the equal opportunity clause herein or the clause contained in Section 301 of Executive Order 10925; that he or she has/has not, filed all required compliance reports; and that representations indicating submission of required compliance prior to subcontract awards.

Signature and address of Bidder:

_____ Date_____

_____

_____

_____

(This certification shall be executed by the bidder in accordance with Section 60-1.6 of the Regulations of the President's Committee on Equal Employment Opportunity for implementing Executive Orders 10925 and 11114.)

LIST OF PROPOSED SUBCONTRACTORS

In compliance with the provisions of Sections 4100-4108 of the California Public Contract Code and any amendments thereof, each bidder shall set forth (a) the name and location of the place of business of each subcontractor who will perform work or labor or render service in or about the construction site or a subcontractor licensed by the State of California who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of 1 percent of the total bid and (b) the California Contractor License Number for each subcontractor, and (c) the portion of the work to be done by each subcontractor.(See General Conditions Section 1-09.) Include with the name of each sub-contractor their Department of Industrial Relations Public Works Contractor Registration Number.

SUBCONTRACTOR NAME	SUBCONTRACTOR LICENSE NUMBER	SUBCONTRACTOR DIR REGISTRATION NUMBER	SUBCONTRACTOR BUSINESS ADDRESS	DESCRIPTION OF WORK

STATEMENT OF EXPERIENCE OF BIDDER

The bidder is required to state below what work of similar magnitude or character he or she has done and to give references that will enable the City Council to judge of his or her experience, skill and business standing and his or her ability to conduct work as completely and rapidly as required under the terms of the contract.

SIGNATURE(S) OF BIDDER

Accompanying this proposal is _____
(insert the words "cash ($)", "cashier's check" or "bidder's bond", as the case may be) in an amount equal to at least 10 percent of the bid.

The names of all persons interested in the foregoing proposal as principals are as follows:

IMPORTANT NOTICE: If bidder or other interested person is a corporation, provide the legal name of corporation and also the names of the president, secretary, treasurer and manager thereof. If a co-partnership, provide the true name of firm and also the names of all individual co-partners composing the firm. If bidder or other interested person is an individual, provide the first and last names in full.

_____

_____

_____

Licensed in accordance with an act providing for the registration of Contractors:

License No. _____, License Expiration Date _____.

Signature(s) of Bidder: _____

_____

_____

NOTE: If bidder is a corporation, the legal name of the corporation shall be set forth above together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation; if bidder is a co-partnership, the true name of the firm shall be set forth above together with the signature of the partner or partners authorized to sign contracts in behalf of the co-partnership; and if bidder is an individual, his or her signature shall be placed above. If a member of a partnership, a Power of Attorney must be on file with the Department prior to opening bids or submitted with the bid; otherwise, the bid will be disregarded as irregular and unauthorized.

Business address: _____

_____

Place of residence: _____

_____

Dated: _____

CITY OF UKIAH
Mendocino County, California

BIDDER'S BOND

KNOW ALL MEN BY THESE PRESENTS,

That we, _____

_____, as PRINCIPAL and

_____

_____, as SURETY,

are held and firmly bound unto the City of Ukiah in the penal sum of 10 PERCENT OF THE TOTAL AMOUNT OF THE BID of the Principal above named, submitted by said Principal to the City of Ukiah, as the case may be, for the work described below, for the payment of which sum in lawful money of the United States, well and truly to be made, to the City Clerk to which said bid was submitted, we bind ourselves, our heirs, executors, administrators and successors jointly and severally, firmly by these presents. In no case shall the liability of the surety hereunder exceed the sum of $_____

THE CONDITION OF THIS OBLIGATION IS SUCH,

That whereas the Principal has submitted the above mentioned bid to the City of Ukiah, as aforesaid, for certain construction specifically described as follows, for which bids are to be opened at the Office of the City Clerk, Ukiah Civic Center, Ukiah, California, on <<DATE OF BID OPENING>> for ELECTRIC UTILITY – FOC.

NOW, THEREFORE, If the aforesaid Principal is awarded the contract and, within the time and manner required under the specifications, after the prescribed forms are presented to him or her for signatures, enters into a written contract, in the prescribed form, in accordance with the bid and files two bonds with the City of Ukiah, one to guarantee faithful performance and the other to guarantee payment for labor and materials, as required by law, then this obligation shall be null and void; otherwise, it shall be and remain in full force and virtue.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this _____ day of _____, A.D. 20_____.

_____(Seal)

_____(Seal)

_____(Seal)
Principal

_____(Seal)

_____(Seal)

_____(Seal)
Surety

Address: _____

_____

_____

NON-COLLUSION AFFIDAVIT

Note: Bidder shall execute the affidavit on this page prior to submitting his or her bid.

To City Council, City of Ukiah:

The undersigned in submitting a bid for performing ELECTRIC UTILITY - FOC by contract, being duly sworn, deposes and says:

> that he or she has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such contract.

_____

_____

_____
Signature(s) of Bidder

Business Address:_____

_____

_____

Place of Residence:_____

_____

_____

NOTARIZATION

Subscribed and sworn to before me this _____ day of _____, 20____.

_____

Notary Public in and for the County of_____, State of California.

My Commission Expires _____, 20 ____.

CITY OF UKIAH
Mendocino County, California

AGREEMENT

FOR

ELECTRIC UTILITY - FOC
Specification No. 16-07

THIS AGREEMENT, made this _____ day of _____, 20____, by and between the City of Ukiah,

Mendocino County, California, hereinafter called the City and _____ hereinafter called the

Contractor,

WITNESSETH:

WHEREAS, the City has caused to be prepared in accordance with law, specifications, drawings and other contract documents for the work herein described and shown and has approved and adopted these contract documents, specifications and drawings and has caused to be published in the manner and for the time required by law a notice to bidders inviting sealed proposals for doing the work in accordance with the terms of this contract and

WHEREAS, the Contractor, in response to the notice to bidders, has submitted to the City a sealed proposal accompanied by a proposal guaranty in an amount of not less than 10 percent of the bid price for the construction of the proposed work in accordance with the terms of this contract and

WHEREAS, the City, in the manner prescribed by law, has publicly opened, examined and canvassed the proposals submitted and as a result has determined and declared the Contractor to be the lowest and best regular responsible bidder for the work and for the sums named in the proposal,

NOW, THEREFORE, THIS AGREEMENT WITNESSETH:

Article 1. Work to be Done and Contract Days Allowed.

That the Contractor shall provide all necessary machinery, tools, apparatus and other means of construction; shall furnish all materials, superintendence, overhead, expenses, all labor and expenses of whatever nature necessary for completion of the work in conformity with the Special Provisions and other contract documents hereto attached and according to such instructions as may be given by the Engineer. The Contractor shall complete the work within One hundred fifty (150) calendar days. Contract days shall be counted starting with the 10th day following receipt of notice that the contract has been executed by the City. Contractor, at his or her option, may begin work prior to start of counting contract days, however, in no event shall the Contractor start work without giving notification to the Engineer at least 72 hours prior to the start of work, without obtaining an encroachment permit from the City, or without having submitted certificates of insurance that have been accepted and approved by the Engineer

Article II. Contract Prices.

That the City shall pay the Contractor the prices stated in the proposal submitted by the Contractor, for complete performance of the contract by the Contractor. The Contractor hereby agrees to accept the prices as full compensation for all material and appliances necessary to the work, for all labor and use of tools and other implements necessary to execute the work contemplated in this contract; for all loss or damage arising out of the nature of the work or from the action of the elements, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the work; for all risks of every description connected therewith; for all expenses of the work, as herein specified; for all liability and other insurance, for all overhead and other expenses incident to the work; all according to the Contract Drawings, the Special Provisions, the Details, the instructions and the requirements of the City.

Article III. Labor Discrimination.

Attention is directed to Section 1735 of the Labor Code, which reads as follows:

> "No discrimination shall be made in the employment of persons upon public works because of the race, color, national origin or ancestry, or religion of such persons and every contractor for public works violating this section is subject to all the penalties imposed for a violation of this chapter."

In connection with the performance of work under this contract, the Contractor agrees as follows:

(a) The Contractor will not willfully discriminate against any employee or an applicant for employment because of race, color, religion, ancestry, or national origin. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, ancestry, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the awarding authority setting forth the provisions of this Fair Employment Practice section.

(b) The Contractor will send to each labor union or representative of workers with which he or she has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the awarding authority, advising the said labor union or worker's representative of the Contractor's commitments under this section, to employees and applicants for employment.

(c) The Contractor will permit access to his or her records of employment, employment advertisements, application forms and other pertinent data and records by the Fair Employment Practices Commission, City of Ukiah or any other appropriate agency of the State of California designated by the awarding authority, for the purposes of investigation to ascertain compliance with the Fair Employment Practices section of this contract.

(d) A finding of willful violation of the Fair Employment Practices section of this Contract or of the Fair Employment Practices Act shall be regarded by the awarding authority as a basis for determining the Contractor to be not a "responsible bidder" as to future contracts for which such Contractor may submit bids, for revoking the Contractor's pre-qualification rating, if any and for refusing to establish, reestablish or renew a pre-qualification rating for the Contractor.

The City of Ukiah shall deem a finding of willful receipt of written notice from the Fair Employment Practices Act to have occurred upon that it has investigated and determined that the Contractor has

violated the Fair Employment Practices Act and has issued an order under Labor Code Section 1426 or obtained an injunction under Labor Code Section 1429.

Upon receipt of such written notice from the Fair Employment Practices Commission, the City shall notify the Contractor that unless he or she demonstrates to the satisfaction of the awarding authority within a stated period that the violation has been corrected, his or her pre-qualification rating will be revoked at the expiration of such period.

(e) The Contractor agrees that should the City determine that the Contractor has not complied with the Fair Employment Practices section of this Contract, then pursuant to Labor Code Section 1735 and 1775 the Contractor shall, as a penalty to the City, forfeit for each calendar day or portion thereof, for each person who was denied employment as a result of such non-compliance, the penalties provided in the Labor Code for violation of prevailing wage rates. Such monies may be recovered from the Contractor. The City may deduct any such damages from any monies due the Contractor.

(f) Nothing contained in this Fair Employment Practices section shall be construed in any manner of fashion so as to prevent the City or the State of California from pursuing any other remedies that may be available at law.

(g) Prior to awarding the Contract, the Contractor shall certify to the awarding authority that he or she has or will meet the following standards for affirmative compliance, which shall be evaluated in each case by the awarding authority:

(1) The Contractor shall provide evidence, as required by the City that he or she has notified all supervisors, foremen and other personnel officers in writing of the content of the anti-discrimination clause and their responsibilities under it.

(2) The Contractor shall provide evidence, as required by the City, that he or she has notified all sources of employees' referrals (including unions, employment agencies, advertisements, Department of Employment) of the content of the anti-discrimination clause.

(3) The Contractor shall file a basic compliance report, as required by the City. Willfully false statements made in such reports shall be punishable as provided by law. The compliance report shall also spell out the sources of the work force and who has the responsibility for determining whom to hire, or whether or not to hire.

(4) Personally, or through his or her representatives, the Contractor shall, through negotiations with the unions with whom he or she has agreements, attempt to develop an agreement which will:

a. Spell out responsibilities for nondiscrimination in hiring, referral, upgrading and training.

b. Otherwise implement an affirmative anti-discrimination program in terms of the unions' specific areas of skill and geography to the end that qualified minority workers will be available and given and equal opportunity for employment.

(5) The Contractor shall notify the City of opposition to the anti-discrimination clause by individuals, firms or organizations during the period of its pre-qualification.

(h) The Contractor will include the provisions of the foregoing paragraphs 1 through 5 in every first tier subcontract so that such provisions will be binding upon each such subcontractor.

(i) The "Fair Employment Practices Certification" must be completed and signed prior to the time of submitting the bid.

Article IV. Parts of the Contract.

That the complete contract consists of the following documents, all of which shall be considered a part of this agreement.

1. Notice to Bidders
2. Wage Rates
3. General Conditions
4. Technical Specifications
5. Proposal
6. Fair Employment Practices Certification
7. Agreement
8. Contract Bonds
9. Contract Drawings and Construction Details
10. Standard Drawings
11. Indemnification Agreement

IN WITNESS WHEREOF, this contract being executed in duplicate and the parties having caused their names to be signed by authority of their duly authorized office this _____ day of _____, 20____.

CITY OF UKIAH, MENDOCINO COUNTY, CALIFORNIA

By: _____
CITY MANAGER, CITY OF UKIAH

Attest: _____
CITY CLERK, CITY OF UKIAH

By: _____
CONTRACTOR

Attest: _____

Title: _____

The foregoing contract is approved as to form and legality this _____ day of _____, 20 ____.

_____
CITY ATTORNEY, CITY OF UKIAH

INDEMNIFICATION AGREEMENT

This Indemnification Agreement is made and entered in Ukiah, California, on _____, 20____, by and between the City of Ukiah (Ukiah) and _____ (Contractor).

Contractor is

_____

_____ for Ukiah.

As a condition of issuing the work order, attached hereto, Ukiah requires assurance that Contractor will protect Ukiah from damage or damage claims which arise from its performance of the work.

Accordingly, Contractor agrees as follows:

1. **Indemnification**. Contractor shall indemnify and hold harmless Ukiah and its officers, agents, and employees from and against any claim, loss, or damage, including the legal and other costs of defending against any claim of damage or loss which arises out of the Contractor's negligent or wrongful performance under the work order attached hereto, except for claims, losses, or damages resulting from the sole and exclusive negligence or other wrongful conduct of Ukiah or its officers, agents and employees.

CONTRACTOR

BY: _____

TITLE: _____

CITY OF UKIAH
Mendocino County, California

FAITHFUL PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS,

That we the undersigned, _____

_____,
AS PRINCIPAL, and

_____,
AS SURETY,

are held firmly bound unto **THE CITY OF UKIAH**, hereinafter called the "City", in the penal sum of

_____dollars ($_____)
for the payment of which sum we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally.

WHEREAS, the Principal has entered into a certain Contract with the City, dated _____, 20_____, a copy of which is hereto attached and made a part hereof,

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall in all respects fully perform the Contract and all duly authorized modifications thereof, during its original term and any extensions thereof that may be granted and during any guaranty period for which the Contract provides, and if the Principal shall fully satisfy all claims, arising out of the prosecution of the work under the Contract and shall fully indemnify the City for all expenses which it may incur by reason of such claims, including its attorney's fees and court costs, and if the Principal shall make full payment to all persons supplying labor, services, materials, or equipment in the prosecution of the work under the Contract, in default of which such persons shall have a direct right of action hereupon; and if the Principal shall pay or cause to be paid all sales and use taxes payable as a result of the performance of the Contract as well as payment of gasoline and special motor fuels taxes in the performance of the Contract and all motor vehicle fees required for commercial motor vehicles used in connection with the performance of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect. No modification of the Contract or extension of the term thereof, nor any forbearance on the part of the City shall in any way release the Principal or the Surety from liability hereunder. Notice to the Surety of any such modification, extension, or forbearance is hereby waived.

IN WITNESS WHEREOF, the aforesaid Principal and Surety have executed this instrument and affixed their seals hereto, this _____ day of _____,20_____.

In the presence of:

WITNESS:

_____

_____(SEAL)
(Individual Principal)

_____
(Business Address)

_____
(City/State/Zip Code)

WITNESS:

_____

_____(SEAL)
(Corporate Principal)

_____
(Business Address)

_____
(City/State/Zip Code)

ATTEST:

_____

_____
(Corporate Principal) Affix Corporate Seal

_____
(Business Address)

_____
(City/State/Zip Code)

ATTEST:

_____ _____
(Corporate Surety) Affix Corporate Seal

_____
(Business Address)

_____
(City/State/Zip Code)

The rate of premium on this bond is $_____ per thousand.

The total amount of premium charges is $_____..

(The above is to be filled in by Surety Company). (Power of Attorney of person signing for Surety Company must be attached).

(CERTIFICATE AS TO CORPORATE PRINCIPAL)

I,_____, certify that I am the _____ Secretary of the corporation named as Principal in the foregoing bond; that _____, who signed the said bond on behalf of the Principal, was then _____ of said corporation; that I know his signature, and that his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of its governing body.

_____ Affix Corporate Seal

CITY OF UKIAH
Mendocino County, California

MATERIAL AND LABOR BOND

KNOW ALL MEN BY THESE PRESENTS,

That we the undersigned, _____

_____, **AS PRINCIPAL**, and

_____

_____, **AS SURETY**,

are held firmly bound unto **THE CITY OF UKIAH**, hereinafter called the "City" in the penal sum of

_____ dollars ($_____)
for the payment of which sum we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally.

WHEREAS, the Principal has entered into a certain Contract with the City, dated _____, 20_____, a copy of which is hereto attached and made a part hereof,

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall in all respects fully perform the Contract and all duly authorized modifications thereof, during its original term and any extensions thereof that may be granted and during any guaranty period for which the Contract provides, and if the Principal shall fully satisfy all claims, arising out of the prosecution of the work under the Contract and shall fully indemnify the City for all expenses which it may incur by reason of such claims, including its attorney's fees and court costs, and if the Principal shall make full payment to all persons supplying labor, services, materials, or equipment in the prosecution of the work under the Contract, in default of which such persons shall have a direct right of action hereupon; and if the Principal shall pay or cause to be paid all sales and use taxes payable as a result of the performance of the Contract as well as payment of gasoline and special motor fuels taxes in the performance of the Contract and all motor vehicle fees required for commercial motor vehicles used in connection with the performance of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect. No modification of the Contract or extension of the term thereof, nor any forbearance on the part of the City shall in any way release the Principal or the Surety from liability hereunder. Notice to the Surety of any such modification, extension, or forbearance is hereby waived.

IN WITNESS WHEREOF, the aforesaid Principal and Surety have executed this instrument and affixed their seals hereto, this _____ day of _____,20_____.

In the presence of:

WITNESS:

_____

_____(SEAL)
(Individual Principal)

_____
(Business Address)

_____
(City/State/Zip Code)

WITNESS:

_____

_____(SEAL)
(Corporate Principal)

_____
(Business Address)

_____
(City/State/Zip Code)

ATTEST:

_____

_____
(Corporate Principal) Affix Corporate Seal

_____
(Business Address)

_____
(City/State/Zip Code)

ATTEST:

_____ _____
(Corporate Surety) Affix Corporate Seal

_____
(Business Address)

_____
(City/State/Zip Code)

The rate of premium on this bond is $_____ per thousand.

The total amount of premium charges is $_____..

(The above is to be filled in by Surety Company). (Power of Attorney of person signing for Surety Company must be attached).

(CERTIFICATE AS TO CORPORATE PRINCIPAL)

I,_____, certify that I am the _____ Secretary of the corporation named as Principal in the foregoing bond; that _____, who signed the said bond on behalf of the Principal, was then _____ of said corporation; that I know his signature, and that his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of its governing body.

_____ Affix Corporate Seal

DIRECTIONS FOR PREPARATION OF PERFORMANCE AND MATERIAL AND LABOR BOND

1. Individual sureties, partnerships, or corporations not in the surety business will not be acceptable.

2. The name of the Principal shall be shown exactly as it appears in the Contract.

3. The penal sum shall not be less than required by the Specifications.

4. If the Principals are partners or joint venturers, each member shall execute the bond as an individual and state his place of residence.

5. If the Principal is a corporation, the bond shall be executed under its corporate seal.
If the corporation has no corporate seal, it shall so state and affix a scroll or adhesive seal following the corporate name.

6. The official character and authority of the person(s) executing the bond for the Principal, if a corporation, shall be certified by the Secretary or Assistant Secretary thereof under the corporate seal, or copies attached to such records of the corporation as will evidence the official character and authority of the officer signing, duly certified by the Secretary or Assistant Secretary, under the corporate seal, to be true copies.

7. The current power-of-attorney of the person signing for the surety company must be attached to the bond.

8. The date of the bond must not be prior to the date of the Contract.

9. The following information must be placed on the bond by the surety company:

    a. The rate of premium in dollars per thousand; and

    b. The total dollar amount of premium charged.

10. The signature of a witness shall appear in the appropriate place attending to the signature of each party of the bond.

11. Type or print the name underneath each signature appearing on the bond.

12. An executed copy of the bond must be attached to each copy of the Contract (original counterpart) intended for signing.

CITY OF UKIAH
Mendocino County, California

DEFECTIVE MATERIAL AND WORKMANSHIP (MAINTENANCE) BOND

KNOW ALL MEN BY THESE PRESENTS,

That we, _____

_____, as **PRINCIPAL**

and_____

_____, as **SURETY**,

are held and firmly bound unto the **City of Ukiah** as Obligee, in the penal sum of

_____

_____($_____),
(5 PERCENT OF THE FINAL CONTRACT AMOUNT)

to which payment well and truly to be made, we do bind ourselves, our and each of our heirs, executors, administrators successors and assigns jointly and severally, firmly by these presents.

WHEREAS, the said Principal entered into a Contract with the City Of Ukiah
dated_____
for _____
_____

WHEREAS, said Contract has been completed, and was approved on the _____ day of _____, _____,

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal shall guarantee that the work will be free of any defective materials or workmanship which become apparent during the period of one (1) year following completion of the Contract, then this obligation shall be void, otherwise to remain in full force and effect, provided however, any additional warranty or guarantee whether expressed or implied is extended by the Principal or Manufacturer only, and the surety assumes no liability for such a guarantee.

Signed, sealed, and dated this _____ day of _____, 20_____.

_____(Seal)

BY:_____(Seal)

_____(Seal)
Principal

_____(Seal)

BY:_____(Seal)

_____(Seal)
Surety

PLAN MANUAL

specifications for construction of:

CITY OF UKIAH – ELECTRIC UTILITY

FIELD OPERATIONS CENTER

SITE WORK, RE-ROOF & SOLAR SYSTEM

1350 Hasting Avenue
Ukiah, California

for

City Ukiah
Owner

3000 Seminary Avenue
Ukiah, CA 95482

24 May 2019

Prepared by:

L.S. Mitchell, Architect, Inc.
Architects/Planners

1400 Madrone Drive
Ukiah, California 95482
707/489-3337

Lawrence S. Mitchell, AIA C-13860 (11.30.21)

LIST OF CONTRACT DOCUMENTS

THE FOLLOWING IS THE LIST OF CONTRACT DOCUMENTS AS DEFINED IN ARTICLE 1.1.1 OF THE GENERAL CONDITIONS HERETO. THE SEPARATIONS OF THE SPECIFICATIONS IN THE VARIOUS SECTIONS AS LISTED BELOW IS ONLY TO FACILITATE THE USE OF THE DOCUMENTS AND SHALL NOT OBLIGE THE OWNER TO ESTABLISH THE LIMITS OF ANY AGREEMENTS SUBORDINATE TO THE CONTRACT FOR THE PROVISION OF ALL THE PROPERTY IMPROVEMENTS DESCRIBED HEREIN.

CONTRACT DOCUMENTS

GENERAL SHEET	TITLE
TP100	TITLE PAGE, INDEX, LEGENDS & VICINITY MAP
CG1.0	CAL GREEN BUILDING STANDARDS CODE
CG1.1	CAL GREEN BUILDING STANDARDS CODE
CG1.2	CAL GREEN BUILDING STANDARDS CODE
ADA.1	SITE ACCESSIBILITY FEATURES
ADA.2	BUILDING ACCESSIBILITY FEATURES
COA10	CONDITIONS OF APPROVAL
CIVIL	
C-1	TOPO MAP (EXISTING CONDITIONS) AND DEMO PLAN
C-2	GRADING AND DRAINAGE PLAN
C-3	PARKING/RAMP PLAN AND DETAILS
LANDSCAPE	
L101	PLANTING CONCEPT PLAN
L102	IRRIGATION CONCEPT PLAN
L103	Not Used
L104	Not Used
ARCHITECTURAL	
AS100	ARCHITECTURAL SITE PLAN, NOTES & DETAILS
AS110	COURTYARD PARTIAL PLAN, NOTES & DETAILS
AS111	TRASH & RECYCLE STORAGE ENCLOSURE, NOTES & DETAILS
AS200	VEHICLE GATE PLAN, NOTES & DETAILS
AS201	MAN GATE & FENCE NOTES & DETAILS
A100	ARCHITECTURAL FLOOR PLAN (EXISTING – NO WORK)
A200	NOT USED
A300	COURTYARD INTERIOR ELEVATIONS
A400	EXTERIOR ELEVATIONS, NOTES & DETAILS
A500	ROOF PLAN NOTES & DETAILS
A501	ROOF DETAILS
ELECTRICAL	
ES001	ELECTRICAL COVER SHEET
ES100	ELECTRICAL SITE PLAN
ES200	DETAILS
ES700	SPECIFICATIONS
ES701	SPECIFICATIONS

BIDDING REQUIREMENTS

INFORMATION TO BIDDERS		
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	TECHNICAL MEMORANDUM #6883.17	56
	LOW IMPACT DEVELOPMENT REQUIREMENTS	26

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TEST & INSPECTION AGREEMENT ##

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01010 SUMMARY OF THE WORK 3
01015 CONTRACTOR'S USE OF THE PREMISES 4
01060 REGULATORY REQUIREMENTS 2
01100 PROJECT MANAGEMENT & COORDINATION 9
01200 PROJECT MEETINGS 4
01311 CONSTRUCTION SCHEDULE 6
01340 SUBMITTAL PROCEEDURES 11
01450 STRUCTURAL TESTING LABORATORY SERVICES 21
01700 PROJECT CLOSEOUT 7
01710 CLEANING 3
01731 CUTTING AND PATCHING 5
01732 SELECTIVE DEMOLITION 7
01742 CONSTRUCTION WASTE MANAGEMENT.....3
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DIVISION 2

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END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS
SECTION 01000 – GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 ABBREVIATIONS

ADA	Americans with Disabilities Act
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
AQMD	Air Quality Management District
CAL/ABL	State of California/Architectural Barriers Laws
CAL/OSHA	State of California/Occupational Safety and Health Administration
CBC	California Building Code
CCR	California Code of Regulations
CITY	City of Ukiah
EPA	Environmental Protection Agency
FIA	Factory Insurance Association
FM	Factory Mutual Association
FS	Federal Specifications
GA	Gypsum Association
IEEE	Institute of Electrical and Electronic Engineers
NEMA	National Electrical Manufacturer's Association
NEC	National Electrical Code
NFC	National Fire Code
NFPA	National Fire Protection Association
NWWDA	National Wood Window and Door Association
OSHA	Occupational Safety and Health Association
UBC	Uniform Building Code
UL	Underwriters' Laboratories

1.2 DETAILED REQUIREMENTS

A. Non-Interference With Others: Contractor's operations shall be confined to the job-site understood to be the work areas indicated on the Contract Drawings.

B. Site Regulations: Fully cooperate with all authorities on the job-site and other Contractors who might be at the job-site and comply with all regulations presently enforce at the job-site.

C. Job Safety: Observe all safety rules and regulations of the California Building Code with and CAL/OSHA as applicable to the safety of the Contractor, Contractor's personnel and City employees during work operations of this Contract especially during asbestos removal operations.

D. Storage of Materials and Equipment: To be located on the job site where space permits.
All vehicle and equipment sheds shall be kept in a safe condition and locked at all times while located on the premises.

E. Site Survey:

1. Before submitting proposals for this work, Bidder shall become familiar with plans and specifications and shall have examined the premises and understood the conditions under which Contractor will be obliged to operate in performing this Contract.

2. No allowance will be made subsequently in this connection, on behalf of the Contractor, for any error through negligence on his part.

1.3 SECURITY

A. The Contractor shall be responsible for the security of the construction site on a 24-hour basis as necessary to curb vandalism and theft, including but not limited to all fencing and barriers.

-- End of Section --

DIVISION 1 GENERAL REQUIREMENTS
SECTION 01010 - SUMMARY OF THE WORK

GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply shall be a part of this specification.

PART 1 GENERAL

1.1 SUMMARY

A. The work to be done under this Contract includes the furnishing of Contractor Administration, labor, materials, tools and equipment for the construction of the various site improvements including shaping, grading, and paving all in accordance with the Contract Documents, including the GENERAL CONDITIONS, Supplementary Conditions and other Sections of Division 01 GENERAL REQUIREMENTS of the Specification.

B. Related Work:

1. Documents affecting work of this Contract include, but are not necessarily limited to the GENERAL CONDITIONS, Supplementary Conditions and Sections in Division 01of this Specification.

2. The work of other Contracts is described in the various Contract Documents prepared therefor, some of which are in the possession of the City and are available for inspection by interested parties.

1.2 PROJECT IDENTIFICATION

A. General:

1. The project Name is: SITE WORK, RE-ROOF, AND SOLAR
For: CITY OF UKIAH, CALIFORNIA.

2. Contract Documents have been prepared by:
L.S. MITCHELL ARCHITECT, INC.
1400 MADRONE DRIVE
UKIAH, CA 95482
Phone: 707-489-3337

B. The Work: The extent of Contracted Work is indicated on the contract Drawings and in the Project Specification.

1.3 CITY OCCUPATION OF THE PREMISES

A. The Contractor shall limit his use of the premises to the work areas that will be dedicated to his use as directed by the City Project Manager to allow limited City occupancy and use.

1. Use of the Site: Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is to be performed are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.

1.4 SUMMARY OF REFERENCES

A. Contracted Work can be summarized by references to the Contract General Conditions, Project Specifications Technical Sections of the Project Specifications, Contract Drawings, Addenda, Notice to Bidders and Modifications to the Contract Documents.

B. It is recognized that the Contracted Work is also unavoidably affected or influenced by governing Codes and Regulations, natural phenomena, including weather conditions and other forces outside the Contract Documents.

1.5 SUPPLEMENTAL INFORMATION:

A. Emergency Information: The name, addresses and telephone numbers of the Contractor, Subcontractors or their representatives shall be filed with the City Project Manager prior start of Contracted Work.

1.6 PERMITS

A. Contractor shall obtain and pay for all permits, licenses and fees required by the City of Ukiah, County of Mendocino, and the State of California Laws except the building permit as defined in the City Municipal Code which will be furnished by the City Project Manager or defined in the Technical specifications "Sections."

B. The Contractor shall obtain and pay for all permits, including the following:

1. Electrical Permit

2. Fire Protection Permit. (IF ANY)

3. Encroachment Permits, both City of Ukiah and County of Mendocino, Department of Transportation.

4. Storm Water Management Permit(s) (IF ANY)

5. Grading Permit.

6. Building Permit.

7. Construction waste management plan and supporting documentation.

C. After the award of the contract, the Contractor shall be required to provide Contractor information, such as Worker's Compensation Insurance to the City.

D. If the Contractor is delayed during the inspections by local authorized agencies or work by utility companies, not the fault of the Contractor and a critical path is impacted; Contractor shall be entitled to time extension and shall have no claim for any other compensation for such delay.

1.7 ADMINISTRATION OF CONSTRUCTION

A. All work of this Contract will be administered by the City Project Manager.

-- End of Section --

DIVISION 1 GENERAL REQUIREMENTS
SECTION 01015 - CONTRACTOR'S USE OF THE PREMISES

GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply, shall be part of this Specification.

PART 1 GENERAL

1.1 SUMMARY

A. This Section applies to all situations in which the Contractor or his representatives including, but not necessarily limited to, suppliers, subcontractors, employees, and field engineers, who enter upon the City's property.

B. Contractor shall commence the contract work and provide security and protection to existing facility and job site within 15 days from the issuance of Notice-To-Proceed.

C. Related Work:

1. Documents affecting work of this Contract include, but are not necessarily limited to the GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, and Sections in Division 01 of these Specifications.

2. Section 01450 – Testing.

3. Project Manual

1.2 SUBMITTALS

A. Refer to Section 01340 - SUBMITTALS in Division 1.

B. Maintain an accurate record of the names and identification of all persons entering upon the City's property in connection with the Work of this Contract, including times of entering and times of leaving, and submit a copy of the record to the City daily.

1.3 QUALITY ASSURANCE

A. Promptly upon award of the Contract, notify all pertinent personnel regarding requirements of this Section.

B. Require that all personnel who will enter upon the City's property certify their awareness of and familiarity with the requirements of this Section.

1.4 SITE INVESTIGATION

A. Contractor shall investigate the job site to ascertain all conditions affecting necessary procedures and sequencing of the work operations in the execution of the Contracted Work.

1. Contractor shall report to the City Project Manager any adverse condition(s) which would affect the proper execution of the Contracted Work and shall not proceed until instructed by the City Project Manager.

2. Start of Contracted Work at the jobsite shall imply Contractor's acceptance of job conditions.

B. Work Determination: Contractor shall satisfy himself regarding job conditions, the nature and types of work to be performed and shall be responsible for the determination of all classes of work to be accomplished at the “job-site” or at the manufacturer's plant.

C. Allotted Working Space: Contractor shall limit work operations to the "working site" or "job-site" and areas immediately adjacent thereto as specified or authorized by the City Project Manager.

1.5 ACCESS TO THE JOB-SITE

A. As instructed by the City Project Manager, Contractor shall restrict Contractor's employees to the immediate work areas on the jobsite and in no way go beyond the work limits noted on the Contract Drawings or as otherwise directed by the City Project Manager.

B. Contractor shall in no way block such entrance(s) to the jobsite or the frontage roads, public or private.

C. Use of such accesses to the jobsite will only be for the purpose of parking, delivery and/or removal of materials equipment, tools, vehicles and removal of rubbish and debris, and shall be kept free of obstructions and in a safe condition at all times during extent of Contracted Work.

1.6 SECURITY

A. Restrict the access of all persons entering upon the City's property in connection with the work to the Access Route and to the actual site of the work.

B. All employees of the Contractor who will be engaged in the construction of this project will be screened by the City for proper identification and good behavior. Candidates of good standing will be issued a temporary pass. Contractor shall furnish the City, a list of employees for approval prior to start of this project.

C. Contractor shall furnish and maintain approved type site security protection between the work areas and other areas, as directed by the City Project Manager or other authorities having jurisdiction. All such site security protections shall remain for the duration of this Contract or as otherwise directed by the City Project Manager.

1.7 REPAIR OF DAMAGES

A. Methods: Repair or replace damaged work with new materials as necessary to restore the damaged areas or surfaces to a condition equal to and matching such conditions existing prior to damage or start of work of this Contract, to the full satisfaction of the City Project Manager, at no cost to the City.

B. Matching or Existing Work:

1. Finish of all existing wood, plaster, masonry and concrete work to be altered, repaired or patched to match and be flush with adjoining surfaces, subject to the approval of the City Project Manager.

2. Finish of all new masonry and/or concrete work (to adjoin remaining work) to match and be flush with adjoining surfaces, unless otherwise noted on the Drawings, subject to the approval of the City Project Manager.

1.8 INTERRUPTION OF SERVICES

A. Contractor shall make all provisions to accomplish Contracted Work without undue interference with the daily operations of the existing facilities in the vicinity of the jobsite.

1.9 NON-INTERFERENCE WITH OTHERS

A. Contractor shall confine Contracted Work operations to the immediate boundaries of the jobsite and shall execute work operations in a manner to minimize interference with City operations and/or work operations of other Contractor working on the premises; as directed by the City Project Manager.

B. Contractor shall obtain approval of City Project Manager and local authorities having jurisdiction such as Public Works Departments, both County and City, Police and Sheriff's Departments, etc. prior to any street closure.

1.10 UNDERGROUND SERVICE ALERT

A. Before commencing any excavation, the Contractor shall obtain an underground service alert inquiry I.D. Number by calling 1 (800) 422-4133. Two working days shall be allowed

after the I.D. Number is obtained and before the excavation work is started so that utility owners can be notified.

1.11 JOB SAFETY

A. Contractor shall observe all safety rules and regulations of the most current City of Ukiah and CAL/OSHA as applicable to the safety of the Contractor, Contractor's personnel and City employees during Contracted Work operations especially during hazardous removal operations.

1.12 JOB CONDITIONS

A. Graffiti Control: During the Contracted Work period up to the final acceptance of the Project by the City, the Contractor shall maintain the job-site perimeter construction fencing and temporary construction sheds free of graffiti. All graffiti and handbills (posters, etc.) shall be promptly removed within 24-hours after discovery at no added cost to the City. Conform to applicable provisions of the GENERAL CONDITIONS.

1.13 HAZARDOUS WORK CONDITIONS

A. Contractor shall provide adequate fire extinguishers on the premises during the Contract period. Type and sizes as recommended by the National Board of Fire Underwriters as necessary to control a particular kind of fire and instruct his employees as to the use of such fire extinguishers.

B. Place all such fire extinguishers ready for use in the immediate area where the hazardous work operations will occur.

C. Contractor shall take special precautions in the use of acetylene torches, welding equipment, tar pots and kettles when working in a hazardous area.

-- End of Section --

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01060 - REGLATORY REQUIREMENTS

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The CONTRACTOR is responsible to obtain all local, state and federal permits and licenses required to perform the work. Payment for obtaining and complying with permits and licenses including, but not limited to, general construction permits, building permits, encroachment permits, haul route permits, excavation permits, drilling permits, water discharge permits, temporary easements, licenses, inspection fees, and Federal, State and local taxes shall be borne by the CONTRACTOR and shall be included in prices bid for work for which such costs are appurtenant.

B. The CONTRACTOR shall provide a copy of the permit or license to the AGENCY prior to performing the work requiring the permit or license.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Record Drawings and Submittals

B. Section 02270 – Temporary Soil Erosion and Sediment Control

1.3 GENERAL

A. The CONTRACTOR shall obtain, pay for, and comply with required permits, licenses, work permits, and authorizations from appropriate agencies, including the following:

1. Licenses
   a. Before submitting for permits, CONTRACTORs shall be licensed in accordance with provisions of Chapter 9, Division 3, of the Business and Professions Code of the State of California.
   b. City of Oceanside Business License.
2. State and Federal permits
   a. Excavation and Dirt Moving Permit from Cal OSHA
   b. Safety permit from California Division of Industrial Safety
   c. NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (LUP Type 2)
   d. NPDES Permit for discharge of hydrostatic test water and potable water
3. Other permits
   a. City Haul Route Permit
   b. Traffic Control Plan Permit
   c. City Encroachment Permit
   d. Written authorization from private property owners for property utilized for staging
   e. Air Pollution Control Permit

B. CONTRACTOR shall pay for all fees applicable to CONTRACTOR's operations

1.4 HAUL ROUTE PERMIT

A. The CONTRACTOR shall prepare a project specific haul route plan, as required by the City of Oceanside Development Services Department, detailing the streets intended for use in delivery of materials and import and export of soil. CONTRACTOR will be limited to the routes approved by the City of Oceanside Development Services Department according to the approved haul route plan contained in the permit.

1.5 TRAFFIC CONTROL PLANS

A. The CONTRACTOR shall prepare project specific traffic control plans and haul route plan as required by the City of Oceanside Development Services Department.

1.6 STORM WATER POLLUTION PREVENTION PLAN (SWPPP) / CONSTRUCTION GENERAL PERMIT

A. The CONTRACTOR shall develop a site-specific Storm Water Pollution Prevention Plan (SWPPP), as required the City of Oceanside Development Services Department. The SWPPP shall be written, amended, and certified by a Qualified SWPPP Developer (QSD) in accordance with the General Permit. Within seven (7) calendar days of project completion, the project specific SWPPP shall be relinquished to the City of Oceanside Development Services Department. In addition, the CONTRACTOR shall submit the Notice of Termination (NOT) to the SWRCB. The NOT shall be submitted to the City of Oceanside Development Services Department at the same time it is submitted to the SWRCB. The CONTRACTOR shall only submit the NOT once the project has been accepted by the City of Oceanside Development Services Department. If the CONTRACTOR fails to submit the NOT to the SWRCB, the CONTRACTOR shall continue to be responsible for paying the annual fee associated with the “General Permit” until the NOT is submitted and accepted by the SWRCB.

PART 2 – MATERIALS (NOT USED)

PART 3 – EXECUTION

3.1 STORM WATER POLLUTION PREVENTION PLAN (SWPPP) / CONSTRUCTION GENERAL PERMIT

A. The CONTRACTOR shall ensure all storm water and erosion control measures required by the General Permit and the SWPPP are implemented by a Qualified SWPPP Practitioner (QSP) in accordance with the General Permit.

****END OF SECTION****

DIVISIONT 1 - GENERAL REQUIREMENTS
SECTION 01100 - PROJECT MANAGEMENT AND COORDINATION

GENERAL CONDITIONS

The forgoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply, shall be a part of this specification.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
   1. The *General Conditions for Construction Contracts* -
   2. The *Supplemental General Conditions and Special Conditions for Construction.*

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

   1. General coordination procedures.
   2. Coordination drawings.
   3. Requests for Information (RFIs).
   4. Project meetings.

B. Related Requirements:
   1. Section 01110 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   2. Section 01700 "Closeout Procedures" for coordinating closeout of the Contract.
   ~~3. Section 01650 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.~~

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

   1. Name, address, and telephone number of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.

3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.

b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
e. Indicate required installation sequences.
f. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches (31.5 mm) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
3. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.

   a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.

4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

   a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
   b. Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
3. Submit RFI electronically using the Project Web Site.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.

2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Use software log that is part of Project Web site.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT WEB SITE

A. Provide, administer, and use Project Web site for purposes of hosting and managing project communication and documentation until Final Completion. Project Web site shall include the following functions:

1. Project directory.
2. Project correspondence.
3. Meeting minutes.
4. Contract modifications forms and logs.
5. RFI forms and logs.
6. Task and issue management.
7. Photo documentation.
8. Schedule and calendar management.
9. Submittals forms and logs.
10. Payment application forms.
11. Drawing and specification document hosting, viewing, and updating.
12. Reminder and tracking functions.
13. Archiving functions.

B. Provide up to seven Project Web site user licenses for use of the Owner, Owner's Commissioning Authority, Architect, and Architect's consultants. Provide eight hours of software training at Architect's office for Project Web site users.

C. On completion of Project, provide one complete archive copy(ies) of Project Web site files to Owner and to Architect in a digital storage format acceptable to Architect.

D. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.

1.9 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Sustainable design requirements.
    m. Preparation of record documents.
    n. Use of the premises.
    o. Work restrictions.
    p. Working hours.
    q. Owner's occupancy requirements.
    r. Responsibility for temporary facilities and controls.
    s. Procedures for moisture and mold control.
    t. Procedures for disruptions and shutdowns.
    u. Construction waste management and recycling.
    v. Parking availability.
    w. Office, work, and storage areas.
    x. Equipment deliveries and priorities.
    y. First aid.
    z. Security.
    aa. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect , and Owner's Commissioning Authority of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Sustainable design requirements.
    i. Review of mockups.
    j. Possible conflicts.
    k. Compatibility requirements.
    l. Time schedules.
    m. Weather limitations.
    n. Manufacturer's written instructions.
    o. Warranty requirements.
    p. Compatibility of materials.
    q. Acceptability of substrates.
    r. Temporary facilities and controls.
    s. Space and access limitations.
    t. Regulations of authorities having jurisdiction.
    u. Testing and inspecting requirements.
    v. Installation procedures.
    w. Coordination with other work.
    x. Required performance results.
    y. Protection of adjacent work.
    z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at regular intervals.
1. Coordinate dates of meetings with preparation of payment requests.

2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Resolution of component conflicts.
        4) Status of submittals.
        5) Status of sustainable design documentation.
        6) Deliveries.
        7) Off-site fabrication.
        8) Access.
        9) Site utilization.
        10) Temporary facilities and controls.
        11) Progress cleaning.
        12) Quality and work standards.
        13) Status of correction of deficient items.
        14) Field observations.
        15) Status of RFIs.
        16) Status of proposal requests.
        17) Pending changes.
        18) Status of Change Orders.
        19) Pending claims and disputes.
        20) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS
SECTION 01200 - PROJECT MEETINGS

GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply, shall be a part of this Specification.

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Included: As required to enable orderly review during progress of Contracted Work, and to provide for systematic discussion of problems, the Contractor and City Project Manager will conduct project meetings throughout the construction period.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, GENERAL CONDITIONS, and Sections in DIVISIONS of the Specification.

2. The Contractor's relations with his Subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

1.2 SUBMITTALS

A. Agenda Items: To the maximum extent practicable, advise the City Project Manager at least 24 hours in advance of project meetings regarding items to be added to the agenda.

B. Minutes:

1. The City Project Manager will compile minutes of each project meeting and will furnish one copy to the Contractor and required copies to the City.

2. Recipients of copies may make and distribute such other copies as they wish.

1.3 QUALITY ASSURANCE

A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 MEETING SCHEDULE

A. Except as noted below for Preconstruction Meeting, project meetings will be held weekly or as otherwise directed by the City Project Manager or called by the Contractor(s).

B. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION

A. The City Project Manager will establish meeting location. To the maximum extent practicable, meetings will be held at the jobsite in the construction field office.

3.3 PRECONSTRUCTION MEETING

A. Preconstruction Meeting will be scheduled to be held within 15 working days after the City has issued the "Notice to Proceed".

1. Provide attendance by authorized representatives of the Contractor and major subcontractors.

2. The City Project Manager will advise other interested parties, including the City and request their attendance.

B. Minimum Agenda: Data will be distributed and discussed on at least the following items.

1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, materials suppliers, and City Project Manager.

2. Channels and procedures for communication.

3. Construction schedule, including sequence of critical work.

4. Contract Documents, including distribution of required copies of original Documents and revisions.

5. Processing of Shop Drawings and other data submitted to the Consultant for review.

6. Processing of Bulletins, Requests for Information (RFI), field decisions, and Change Orders.

7. Rules and regulations governing performance of the Work.

8. Procedures for safety and first aid, security, quality control, housekeeping, and related matters.

9. Review and update "Record Drawings."

3.4 PROJECT MEETINGS

A. Attendance:

1. The Contractor's major Project Manager, and Superintendent shall be present, and they shall represent the major subcontractors at the meetings throughout the progress of the Work.

2. Materials suppliers, and others may be invited to attend those Project Meetings in which their aspect of the Work is involved.

3. Contractor may not cancel or be absent from any meeting without advanced approval from the City Project Manager. The Contractor must submit a written request with reason to the City Project Manager 24-hours before the scheduled meeting. If approved, the Contractor shall notify all parties of the cancellation.

B. Minimum Agenda:

1. Review, revise as necessary, and approve minutes of previous meeting.

2. Review progress of the Work since last meeting. Review actual starts and finish dates of activities.

3. Review status (total complete and outstanding) of submittal for approval, Request-for-Information and Change Orders.

4. Identify old and new problems, which impede planned progress, identify responsible party for the follow-up actions. Mutually agree to a common solution and date of correction.

5. Develop corrective measures and procedures to regain lost time on the planned schedule.

6. Review Weekly Progress Reports including the forecasts indicated in the Construction Schedule.

7. Status of Record drawings and the Record Specification.

8. Job Site Walk-Through. Record all discussion and follow-up actions.

9. Any job site health and/or accident or safety issues.

B. Revisions to Minutes:

1. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.

2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.

3. Challenge to minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.

3.5 SITE MEETINGS

A. Required when necessary to enable orderly review and discussion of site conditions and problems requiring solution during the progress of the contracted work. Notify the City Project Manager the need for additional site meetings as early as possible to resolve the problem without any adverse impact to the Project Schedule.

B. Provide necessary labor, tools, and equipment such as shoring, scaffolding, ladder, etc. to gain access to the site.

-- End of Section --

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01340 - SUBMITTAL PROCEDURES

GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply, shall be a part of this specification.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
   1. The *General Conditions for Construction Contracts*.
   2. The *Supplemental General Conditions and Special Conditions for Construction.*

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

   1. Section 01290 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
   2. Section 01780 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   3. Section 01790 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled date of fabrication.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

    a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    b. Digital Drawing Software Program: The Contract Drawings are available in .DWG format. Other BIM formats may be made available on request if BIM has been utilized in the preparation of the Contract Documents.
    c. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.
    d. The following digital data files will be furnished for each appropriate discipline:

1) Floor plans.
2) Reflected ceiling plans.
3) BIM model, if available.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 days for review of each resubmittal.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 10 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.

d. Name of Construction Manager.
e. Name of Contractor.
f. Name of subcontractor.
g. Name of supplier.
h. Name of manufacturer.
i. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

j. Number and title of appropriate Specification Section.
k. Drawing number and detail references, as appropriate.
l. Location(s) where product is to be installed, as appropriate.
m. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

1) Project name.
2) Date.
3) Destination (To:).
4) Source (From:).
5) Name and address of Architect.
6) Name of Construction Manager.
7) Name of Contractor.
8) Name of firm or entity that prepared submittal.
9) Names of subcontractor, manufacturer, and supplier.
10) Category and type of submittal.
11) Submittal purpose and description.
12) Specification Section number and title.
13) Specification paragraph number or drawing designation and generic name for each of multiple items.
14) Drawing number and detail references, as appropriate.
15) Indication of full or partial submittal.
16) Transmittal number.
17) Submittal and transmittal distribution record.
18) Remarks.

19) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner**,** containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of firm or entity that prepared submittal.
    g. Names of subcontractor.
    h. Category and type of submittal.
    i. Submittal purpose and description.
    j. Specification Section number and title.
    k. Specification paragraph number or drawing designation and generic name for each of multiple items.
    l. Drawing number and detail references, as appropriate.
    m. Location(s) where product is to be installed, as appropriate.
    n. Related physical samples submitted directly.
    o. Indication of full or partial submittal.
    p. Transmittal number.
    q. Submittal and transmittal distribution record.
    r. Other necessary identification.
    s. Remarks.

F. Options: Identify options requiring selection by Architect.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to Project Web site specifically established for Project.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return one copy.
3. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.

f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

6. Submit Product Data in the following format:

a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 36 by 24 inches.
3. Submit Shop Drawings in the following format:

a. PDF electronic file.
1) If it is impracticable to submit a Shop Drawing in PDF format, paper format will be allowed. Submit three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.
e. Specification paragraph number and generic name of each item.

3. Provide corresponding electronic submittal of Sample transmittal on the Project Web Site, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

    a. PDF electronic file.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."

G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01290 "Payment Procedures."

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01450 "Quality Requirements."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01700 "Closeout Procedures."

J. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

K. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

L. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

M. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

N. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

O. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

P. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

Q. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on

evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

R. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

S. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

U. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

V. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file or one paper copy of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the

Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, or the action may be recorded in a separate transmittal or equivalent function of the Project Web Site.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01340

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01450 - STRUCTURAL TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-01 Specification Sections apply to work specified in this Section.

1.2 SCOPE OF WORK

A. The City's Testing Laboratory: An independent testing laboratory will sample and test materials as they are being installed for compliance with acceptance criteria as specified and report and interpret the results. The laboratory shall monitor and report on the installation of constructed work and shall perform tests on the completed construction as required to indicate Contractor's compliance with the various material specifications governing this work. The City shall be responsible for paying the testing laboratory for these services.

B. The Contractor shall not engage the same testing laboratory for construction services as the City has for quality assurance testing, unless agreed to by the City.

1.3 SPECIAL INSPECTIONS

A. The City's Testing Laboratory or a separate agency shall serve as a Special Inspector to provide Special Inspection services for the items listed below. The scope of such services for each item shall be as defined in the California Building Code or as defined in the local building code of the jurisdiction wherein the project is located. These inspections are mandatory for conformance to the legal requirements of the building code and shall be in addition to the inspections and tests otherwise defined in this specification.

1. Reinforcing Steel Placement

2. Concrete Work

3. Bolts to be Installed in Concrete and Their Installation to allow for higher allowable tension values

4. Inspection of Structural Steel, Bolting, and Welding Material

5. Welding of Structural Steel

6. High-Strength Bolting

7. Compacted Earth Fill

8. Pier Foundations

9. Masonry Work

B. Qualifications of Special Inspector: The special inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the Building Official, for inspection of the particular type of construction or operation being inspected. The Special Inspector shall meet the legal qualifications of the building code having jurisdiction.

C. Duties and Responsibilities of the Special Inspector:

1. The special inspector shall observe the work assigned to ascertain that, to the best of his/her knowledge, it is in conformance with the approved design drawings and specifications.

2. The special inspector shall furnish inspection reports to the Building Official, the Architect/Engineer, and the City. All discrepancies shall be brought to the immediate attention of the Architect/Engineer, Contractor, and City. A report that the corrected work has been inspected shall be sent to the Building Official, the Architect/Engineer, and the City.

3. The special inspector shall submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of the building code.

1.4 QUALIFICATIONS OF TESTING LABORATORY

A. The Testing Laboratory shall meet the basic requirements of ASTM E329 and shall submit to the City, Architect, and Engineer evidence of current accreditation from the American Association for Laboratory Accreditation, the AASHTO Accreditation Program or the "NIST" National Voluntary Laboratory Accreditation Program.

B. The Testing Laboratory shall be an Approved Agency by the Building Official of the city wherein the project is located to perform Special Inspections and other tests and inspections as outlined in the applicable building code.

C. Tests and inspections shall be conducted in accordance with specified requirements, and if not specified, in accordance with the applicable standards of the American Society for Testing and Materials or other recognized and accepted authorities in the field.

D. Qualifications of Welding Inspectors

1. Inspectors performing visual weld inspection shall meet the requirements of AWS D1.1 Section 6.1.4. Welding inspection shall be supervised and the inspection reports signed by an inspector with current certification as an AWS Certified Welding Inspector (CWI)

2. Inspectors performing nondestructive examinations of welds other than visual inspection (MT, PT, UT, RT) shall meet the requirements of AWS D1.1, Section 6.14.6.

E. Qualifications for Post-Tensioning Inspector - The technician for the City's Testing Laboratory performing the field inspections required for post-tensioned concrete shall possess a currently valid Level 2 Post-Tensioning Inspector Certification issued by the Post-Tensioning Institute. A copy of such certification for each such technician shall be submitted for Engineer review and approval.

1.5 AUTHORITIES AND DUTIES OF THE LABORATORY

A. Attending Preconstruction Conferences: The CITY's Testing Laboratory shall receive from the CITY and review the project plans and specifications with the Architect and Engineer immediately upon receipt and prior to the start of construction. The Laboratory shall attend preconstruction conferences with the Architect, Engineer, Project Manager, General Contractor, and Material Suppliers as required to coordinate materials inspection and testing requirements with the planned construction schedule and shall participate in such conferences throughout the course of the project.

B. Cost Proposal: The Testing Laboratory's proposal to the CITY shall contain unit price stipulations for specified tests and inspections and on an hourly basis for personnel. A total estimated price shall also be submitted.

C. Cooperation with Design Team: The Laboratory shall cooperate with the Architect, Engineer, and Contractor and provide qualified personnel promptly on notice.

D. The Laboratory shall perform the required inspections, sampling, and testing of materials as specified under each section and observe methods of construction for compliance with the requirements of the Contract Documents and the applicable building code.

E. Inspections Required by Government Agencies: The Testing Laboratory shall perform inspections and submit reports and certifications as required by government agencies having jurisdiction over the aspects of the project covered by this specification.

F. Notification of Deficiencies in the Work: The Laboratory shall notify the Architect, Engineer, and Contractor within 24 hours of discovery by telephone or e-mail, and then in writing of observed irregularities and deficiencies of the work and other conditions not in compliance with the requirements of the Contract Documents.

G. Reports:

1. Information on Reports: The Laboratory shall submit copies of reports of inspections and tests promptly and directly to the parties named below. The reports shall contain at least the following information:

a. Project Name
b. Date report issued
c. Testing Laboratory name and address
d. Name and signature of inspector
e. Date of inspection and sampling
f. Date of test
g. Identification of product and Specification section
h. Location in the project
i. Identification of inspection or test

j. Record of weather conditions and temperature (if applicable)
k. Results of test regarding compliance with Contract Documents

2. Copies: The Laboratory shall send signed copies of test and inspection reports to the following parties:

a. 2 copies to the CITY or its representative
b. 2 copies to the General Contractor
c. 1 copy to the Architect
d. 1 copy to the Engineer of responsibility

3. Certification: Upon completion of the job, the Laboratory shall furnish to the City, Architect, and Engineer of Record, a statement signed by a licensed professional engineer that, to the best of their knowledge, required tests and inspections were made in accordance with the requirements of the Contract Documents.

H. Accounting: The Testing Laboratory shall be responsible for separating and billing costs attributed to the City and costs attributed to the Contractor.

I. Monitoring Product and Material Certifications: The Testing Laboratory shall be responsible for monitoring the submittals of product and material certifications from manufacturers and suppliers as specified in the Specifications and shall report to the City, Architect, and Engineer when those submittals are not made in a timely manner.

J. Limitations of Authority: The Testing Laboratory is not authorized to revoke, alter, relax, enlarge upon, or release any requirements of the Specifications or to approve or accept any portion of the work or to perform any duties of the General Contractor and his Subcontractors.

1.6 CONTRACTOR'S RESPONSIBILITY

A. Cooperation with Design Team: The Contractor shall cooperate with laboratory personnel, provide access to the work, and to manufacturer's operations.

B. Furnishing Samples and Certificates: The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.

C. Furnishing Casual Labor, Equipment and Facilities: The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.

D. Advance Notice: The Contractor shall be responsible for notifying the Testing Laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests. Failure to sufficiently notify may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the City.

E. Payment for Substitution Testing: The Contractor shall arrange for and pay for any additional samples and tests above those required by the Contract Documents as requested by the Contractor for his convenience in performing the work.

F. Payment for Retesting: The Contractor shall be liable to the City for the cost for any additional inspections, sampling, testing, and retesting done by the City's Testing

Laboratory as required when initial tests indicate work does not comply with the requirements of the Contract Documents.

G. Payment by Contractor: The Contractor shall furnish and pay for the following items if required:

1. Soil survey of the location of borrow soil materials, samples of existing soil materials, and delivery to the Contractor's Testing Laboratory.

2. Samples of concrete aggregates and delivery to the Contractor's Testing Laboratory.

3. Concrete mix designs as prepared by his concrete supplier.

4. Site-situated storage boxes for concrete cylinders

5. Concrete coring, tests of below strength concrete, and load tests, if ordered by the City, Architect, or Engineer.

6. Certification of reinforcing steel and prestressing steel mill order.

7. Certification of structural steel mill order.

8. Certification of portland cement, lime, fly ash.

9. Certification of welders and preparation of Welding Procedure Specifications.

10. Tests, samples, and mock-ups of substitute material where the substitution is requested by the Contractor and the tests are necessary in the opinion of the City, Architect or Engineer to establish equality with specified items.

11. The making and testing of concrete cylinders for the purpose of evaluating strength at time of form stripping or for post-tensioning or the time spent evaluating the in situ strength of concrete using the Maturity Method.

12. Any other tests when such costs are required by the Contract Documents to be paid by the Contractor.

H. Notification of Source Change: The Contractor shall be responsible for notifying the City, Architect, Engineer, and City's Testing Laboratory when the source of any material is changed after the original tests or inspections have been made.

I. Tests for Suspected Deficient Work: If in the opinion of the City, Architect, or Engineer any of the work of the Contractor is not satisfactory, the Contractor shall furnish and pay for all tests that the City, Architect, or Engineer deem advisable to determine its proper construction. The City shall pay all costs if the tests prove the questioned work to be satisfactory.

1.7 PAYMENT OF TESTING LABORATORY

A. The City will pay for the initial Laboratory services for testing of materials for compliance with the requirements of the Contract Documents. The Contractor will be liable to the City for the cost for testing and retesting of materials that do not comply with the requirements of the Contract Documents and shall furnish and pay for the testing and inspection of other items as specified in these Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCOPE OF WORK

A. The work to be performed by the Testing Laboratory shall be as specified in this Section of the Specification and as determined in meetings with the City, Architect, and Engineer.

3.2 EARTHWORK

A. Compacted Fill Inspection and Testing:

1. Inspection of Subgrade Below Compacted Fill: The City's Testing Laboratory shall observe and verify that the subgrade below compacted fill has been properly prepared before compact fill construction begins.

2. Verification of Fill Material: Perform classification and testing to verify that the fill material to be used complies with the project specifications.

3. During placement and compaction of fill, determine that the material being used and the maximum lift thickness comply with the specifications.

4. Field Density Testing: Perform field density testing as described below

a. Paved Areas and Building Slab Subgrade:
(1) Make at least one field density test of the natural subgrade for every 2500 square feet of paved area or building slab but in no case less than three tests.
(2) In each compacted fill layer or lift, make one field density test for every 2500 square feet of building slab or paved area but in no case less than three tests.

b. Foundation Wall Backfill: Make at least one field density test for each 200 lineal feet of wall with a minimum of 4 tests for the basement walls around the perimeter of each building and a minimum of one test for every other type of foundation wall on the site. Tests shall be performed in random lifts along each wall.

c. Compacted Fill Beneath Column and Wall Footings and Mat Foundations: Make at least one field density test in each compacted fill layer or lift for each column footing, one for each twenty-five lineal feet of wall and one for each 2500 sq. ft of mat foundation area or fraction thereof.

5. Field Density Tests: Field Density Tests shall be run according to ASTM D2937, or ASTM D2922 as applicable.

6. Acceptance Criteria: The results of field density tests by the Laboratory will be considered satisfactory if the average of any three consecutive tests has a value not less than the required density with no single test falling more than 2 percent below the required density and the moisture content conforms to the requirements of the specification.

7. Report Copies: Moisture-density curves and results of field density tests shall be submitted to the parties specified earlier in this section.

8. Additional Testing: If reports by the Laboratory indicate field densities lower than specified, additional tests will be run by the Laboratory with at least the frequencies scheduled above on recompacted fill and/or natural subgrade. The Testing Laboratory shall notify the Contractor on a timely basis for any required retesting so as not to delay the work. The costs of such tests shall be liable to the City for repayment by the Contractor.

B. Foundation Inspection by the Testing Laboratory:

1. Material Testing: The City's Testing Laboratory shall provide testing and inspection of materials used in foundation elements as described below.

2. Drilled Piers and Underreamed Footings (Cast-in-place Drilled Holes (CIDH)):

   a. Concrete Cylinders: Make and test concrete cylinders as specified for Cast-in-Place Concrete.
   b. Reinforcing Steel: Inspect reinforcing steel for proper number and size of bars and confirm dowel or anchor bolt placement into top of pier.

3. Spread (Excavated) Footings

   a. Concrete Cylinders: Make and test concrete cylinders as specified for Poured-in-Place Concrete.
   b. Reinforcing Steel: Inspect reinforcing steel size, number of bars, and placement and confirm dowel or anchor bolt placement into footing.

4. Mat Footings

   a. Concrete Cylinders: Make and test concrete cylinders as specified for Poured-in-Place Concrete.
   b. Reinforcing Steel: Inspect reinforcing steel size, number of bars, and placement and confirm dowel or anchor bolt placement into footing.
   c. Temperature Monitoring: Monitor the temperature of the concrete in the mat at different levels as it cures.

Record shall provide inspection service for the following items before and during foundation installation as appropriate for the foundation type. The Geotechnical Engineer shall submit written field inspection reports promptly after inspection to the parties listed above and report his findings after each inspection by telephone or e-mail to the Engineer.

1. Spread (Excavated) Footing:

    a. Subgrade: Verify that foundation bearing conditions are consistent with soil report tests and that the footing is being installed in the proper soil strata at the proper elevation. Make recommendations regarding adjustment to subgrade or bearing elevation if subgrade is not adequate to support footing.

2. Mat Footing:

    a. Subgrade: Verify that foundation bearing conditions are consistent with soil report tests and that the footing is being installed in the proper soil strata at the proper elevation. Make recommendations regarding adjustment to subgrade or bearing elevation if subgrade is not adequate to support footing.

3. Drilled Piers and Underreamed Footings:

    a. Bearing Elevation: Observe that piers are founded in proper bearing strata as defined in the Geotechnical Report and that bottom of hole is clean and properly formed. Recommend appropriate action if specified bearing elevation does not provide proper strength.
    b. Bell and Shaft Sizes: Verify that the shaft and bell diameters are within specified tolerances.
    c. Shaft Stability: Observe the shaft sides as drilling proceeds and recommend appropriate action if sloughing becomes excessive.
    d. Concrete Quantities: Record quantity of concrete placed in each pier and compare against theoretical quantity required. Report discrepancies to Engineer.
    e. Placement Method: Observe that piers are placed by approved methods as defined in the Geotechnical Report and in the specifications. Confirm that casings are being used as recommended in the Geotechnical Report. Confirm that concrete is not being contaminated by soil encroachment into pier.
    f. Report: For each drilled shaft installed, prepare and submit a report indicating the following information: pier number and location, pier shaft diameter, pier underream diameter (if applicable), bottom elevation, top elevation, pier length, theoretical volume of concrete in pier, estimate of actual volume of concrete placed, reinforcing steel size and depth actually placed, drilling start and finish time, concreting start and finish time, variation from specified tolerances including surveyed location and plumbness, construction method (dry method, casing method, or slurry displacement method), groundwater conditions (rate of water infiltration and depth of water in hole prior to concreting for dry piers; water elevation in hole for wet piers), elevation of top and bottom of any casing left in place, description of temporary or permanent casing (including purpose, diameter, wall thickness and length), description and elevation of any obstructions encountered and whether removal was obtained, description of pier bottom including amount and extent of loose material, method of concrete placement, any difficulties encountered in drilling or concreting operations, and any deviations from specifications. The report shall include the name of the project, the name of the drilling

contractor and the name of the field superintendent. The report shall be signed by a licensed engineer in the state where the project is located.

D. Pile Load Test: The Geotechnical Engineer shall supervise a pile load test(s) as specified on the drawings according to ASTM D1143-74. He shall submit a written report of his findings to the parties listed above and report by telephone or e-mail to the Engineer, the results of the pile load tests. Refer to the Pile Specification for additional requirements of the test.

3.3 REINFORCING STEEL

A. Mechanical Tension Splices: The City's Testing Laboratory shall provide 100% visual inspection of mechanical tension splices on the project. Inspection shall verify compliance with specifications and conformance with the manufacturer's recommendations for installation after consulting with the manufacturer, who is to be present for the first installation of the splice on the project. The Laboratory shall additionally conduct monotonic tension tests in accordance with ASTM A1034 of mechanical tension splices of the type as specified on the structural drawings. It is not necessary that the specimens to be tested are production splices, however, the specimens to be tested shall have been made by the Contractor's personnel under field conditions. The rate of testing shall be as follows:

1. Two specimens for the first 50 splices (or fraction thereof for small jobs) at the beginning of the job. Splices not meeting tension requirements shall be retested at Contractor's expense until all splices meet the tension requirements.

2. One specimen for every 100 (or fraction thereof) additional splices occurring on the job. Any splices not meeting tension requirements shall be retested at Contractors expense until all splices have passed the test.

3. A minimum of one test specimen shall also be selected from transition splices (splices of one bar size to another bar size), if any.

B. Compression Butt Splices: The City's Testing Laboratory shall provide 100% visual inspection of compression butt splices on the job. Inspection shall verify splice conformance with the requirements for end bearing splices as set forth in ACI 318 Building Code Requirements for Reinforced Concrete as well as the manufacturer's instructions.

C. Reinforcing Steel Field Inspection: The City's Testing Laboratory or designated Special Inspector shall inspect 100 % of reinforcement before each concrete pour to verify the information noted below. Inspection reports shall be prepared and distributed in accordance with the local building code and as specified in this specification.

1. Primary and secondary, longitudinal reinforcement has correct size and number in proper layers.

2. Longitudinal reinforcement has correct length and lap.

3. Ties and stirrups are of correct size, spacing, and number and have the proper termination-hook geometry.

4. Unscheduled face reinforcement in beams are provided and are of correct size, number and spacing and have the proper end terminations.

5. Proper hooks are provided at bar ends as detailed.

6. Reinforcement is properly supported and braced to formwork to prevent movement during concreting operation.

7. Reinforcement has proper cover.

8. Sufficient spacing between reinforcement for concrete placement.

9. Dowel reinforcement is of proper size, at proper spacing, and has proper lap length and embedment length.

10. Welded wire reinforcement is composed of flat sheets, has proper wire gage and spacing, is properly supported, and is properly lapped with a length of one square plus two inches.

11. Proper Construction/Control/Expansion joint spacing and reinforcement.

12. Reinforcement around embedded items is erected according to details.

13. Welded reinforcement has been done according to AWS requirements. Review the Welding Procedure Specification (WPS) submitted by the contractor for any reinforcing steel other than ASTM A 706 that is proposed to be welded for consistency with acceptable welding practices and the AWS.

14. Proper installation of flat-slab shear-head reinforcement

3.4 CONCRETE MATERIALS AND POURED IN PLACE CONCRETE

A. Concrete Mix Designs: The City's Testing Laboratory shall review the submitted mix designs for conformance to the specifications and for suitability for use in the project. The Testing Laboratory shall attend the Mix Design Conference and the Pre-Concrete Conference as noted in the Cast-in-Place Concrete Specification.

B. Concrete Batch Plant Inspection: An initial batch plant inspection shall be made by the City's Testing Laboratory prior to the start of concrete work. The scope of batch plant inspection shall include the following:

1. Inspection of Batch Plant Facilities: The Laboratory shall inspect batch plant facilities proposed for use in the work and report in writing inspection results to the Architect, Engineer, and City for approval. The inspection shall confirm the batch plant conforms to the standards set forth in ASTM C94 and can show proof of certification by the National Concrete Ready Mix Association. Inspection shall include:

a. Batch Plant operations and equipment
b. Truck mixers
c. Scales
d. Stockpile placement
e. Material storage
f. Admixture dispensers

2. Multiple Batch Plants: The Contractor shall reimburse the City for the costs accrued to the City's Testing Laboratory for visits to more than 1 batch plant.

C. Job Site Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:

1. Prior to Concrete Placing

a. Spread Footings
(1) Verify footing dimension.
(2) Verify top of footing elevation.
(3) Verify that forms are plumb and straight, braced against movement, and lubricated for removal.
(4) Inspect reinforcement per REINFORCING STEEL section.
c. Slab-on-Grade
(1) Verify that moisture retarder is provided, is lapped properly, and is not torn or punctured.
(2) Verify formwork at turndowns and slab edges is plumb and straight, braced against movement and lubricated for removal.
(3) Inspect reinforcement per REINFORCING STEEL section.
(4) Verify there is no standing water or debris in pour area.

2. On-Site Concrete Material Testing and Inspection

a. Verify that the Contractor is following appropriate concreting practices consistent with any extreme environmental conditions at the point of placement in the structure as defined below.
b. Inspect concrete upon arrival to verify that the proper concrete mix number, type of concrete, concrete strength, and that it is meeting job specifications, is being placed at the proper location. Report concrete not meeting the specified requirements and immediately notify the Contractor, Batch Plant Inspector, Architect, Engineer, and City.
c. Inspect plastic concrete upon arrival at the jobsite to verify proper batching. Observe mix consistency and adding of water as required to achieve target slumps in mix designs. Record the amount of water added and note if it exceeds that allowed in the mix design. The responsibility for adding water to trucks at the job site shall rest only with the Contractor's designated representative. The Contractor is responsible that all concrete placed in the field is in conformance to the Contract Documents.
d. Obtain concrete test cylinders as specified below.
e. Perform tests to determine slump, concrete temperature, unit weight, and air entrainment as specified below. The slump tests shall be made on concrete taken from the same location from which the concrete for the test cylinders is obtained.
f. Record information for concrete test reports as specified below.
g. Pick up and transport to Laboratory, cylinders cast the previous day.

3. During concrete placing, provide continuous monitoring to:

a. Verify that the concrete is not over 90 minutes old at the time of placement.
b. Verify that Hot-Weather or Cold-Weather techniques are being applied as required.
c. Verify that concrete deposited is uniform and that vertical drop does not exceed six feet and is not permitted to drop freely over reinforcement causing segregation.

d. Verify that there are no cold joints.
e. Verify that the concrete is properly vibrated.
f. Verify that the finishing of the concrete surface is done according to specifications.
g. Verify that sawcut control joints on slab-on-grades are cut within 12 hours of placement.
h. Verify that the formwork has remained stable during the concreting operation.
i. Inspect bolts embedded in concrete prior to and during concrete placement for proper grade, size and length and verification they have been properly installed to the specified embedment.

4. The job site inspector shall report any irregularities that occur in the concrete at the job site or test results to the Contractor, Architect, City, and Engineer.

D. Concrete Test Cylinders: The City's Testing Laboratory shall mold and test concrete test cylinders as described below.

1. Cylinder Molding and Testing: Cylinders for strength tests shall be molded and Laboratory cured in accordance with ASTM C31 and tested in accordance with ASTM C39. Cylinders may be either 6" in diameter by 12" or 4" in diameter by 8", however, the diameter of the cylinder shall be at least three times the nominal maximum size of the coarse aggregate in the mix tested. All of the cylinders for each class of concrete shall be of the same dimension for all sets of that class.

2. Field Samples: Field samples for strength tests shall be taken in accordance with ASTM C172.

3. Frequency of Testing: Each set of test cylinders shall consist of a minimum of four standard test cylinders. A set of test cylinders shall be made according to the following minimum frequency guidelines:

a. One set for each class of concrete taken not less than once a day.
b. Mat Foundation: One set for each 250 cubic yards or fraction thereof.
c. Piers, Piles, Underreamed Footings: One set for each 50 cubic yards or fraction thereof.
d. Pressure-injected Footings: One set for each 50 cubic yards or fraction thereof.
e. Spread Footings: One set for each 50 cubic yards or fraction thereof
f. Floors: One set for each 150 cubic yards or fraction thereof but not less than one set for each 5000 square foot of floor area.
n. If the total volume of concrete is such that the frequency of testing as specified above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
o. The above frequencies assume that one batch plant will be used for each pour. If more than one batch plant is used, the frequencies cited above shall apply for each plant used.

4. The cylinders shall be numbered, dated, and the point of concrete placement in the building recorded.

5. For concrete specified on the drawings to reach the required strength at 28 days, break one cylinder of the set at seven days, two 6" by 12" cylinders or three 4" by 8" cylinders at 28 days, and one kept in reserve for testing at the Engineers direction.

6. For concrete specified on the drawings to reach the required strength at 56 days, break one cylinder of the set at seven days, one cylinder at 28 days, two 6" by 12" cylinders or three 4" by 8" cylinders at 56 days, and one kept in reserve for testing at the Engineers direction.

7. For concrete specified on the drawings to reach the required strength at 90 days, break one cylinder of the set at seven days, one cylinder at 28 days, one cylinder at 56 days, two 6" by 12" cylinders or three 4" by 8" cylinders at 90 days, and one kept in reserve for testing at the Engineers direction.

8. Cylinder Storage Box: The Contractor shall be responsible for providing a protected concrete cylinder wooden storage box at a point on the job site mutually agreeable with the Testing Laboratory for the purpose of storing concrete cylinders until they are transported to the Laboratory. The box shall be constructed and equipped to maintain the environment specified for initial curing in ASTM C31.

9. Transporting Cylinders: The City's Testing Laboratory shall be responsible for transporting the cylinders to the Laboratory in a protected environment such that no damage or ill effect will occur to the concrete cylinders including loss of moisture, freezing temperatures or jarring.

10. Information on Concrete Test Reports: The City's Testing Laboratory shall make and distribute concrete test reports after each job cylinder is broken. Such reports shall contain the following information:
    a. Truck number and ticket number
    b. Concrete Batch Plant
    c. Mix design number
    d. Accurate location of pour in the structure
    e. Strength requirement
    f. Date cylinders made and broken
    g. Technician making cylinders
    h. Concrete temperature at placing
    i. Air temperature at point of placement in the structure
    j. Amount of water added to the truck at the batch plant and at the site and whether or not it exceeds the amount allowed by the mix design
    k. Slump
    l. Unit weight
    m. Air content
    n. Cylinder compressive strengths with type of failure if concrete does not meet Specification requirements. Seven day breaks are to be flagged if they are less than 60% of the required 28 day strength. 28 day breaks are to be flagged if either cylinder fails to meet Specification requirements.

11. Standards for Tests of Concrete :

    a. Slump Tests: Slump Tests (ASTM C143) shall be made at the beginning of concrete placement for each batch plant and for each set of test cylinders made. The slump test shall be made from concrete taken from the end of the concrete truck chute. The concrete shall be considered acceptable if the slump is within plus or minus 1 inch of the slump noted on the mix design submittal form for that class of concrete.
    b. Air Entrainment: Air entrainment tests (ASTM C231 or C173, C173 only for lightweight concrete) shall be made at the same time slump tests are made as cited above.
    c. Concrete Temperature: Concrete temperature at placement shall be measured (ASTM C1064) at the same time slump tests are made as

cited above.

d. Unit Weight Test: ASTM C138

12. Evaluation and Acceptance of Concrete:

a. Strength Test: A strength test shall be defined as the average strength of two cylinder breaks from each set of cylinders tested at the time indicated above.

b. Quality Control Charts and Logs: The City's Testing Laboratory shall keep the following quality control logs and charts for each class of concrete containing more than 2,000 cubic yards. The records shall be kept for each batch plant and submitted on a weekly basis with cylinder test reports:

(1) Number of strength tests made to date.

(2) Strength test results containing the average of all strength tests to date, the high test result, the low test result, the standard deviation, and the coefficient of variation.

(3) Number of tests under specified strength.

(4) A histogram plotting the number of strength test cylinders versus compressive strength.

(5) Quality control chart plotting compressive strength test results for each test.
results.

(7) Quality control chart plotting moving average for range where each point plotted is the average of 10 previous ranges.

c. Acceptance Criteria: The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:

(1) The average of all sets of three consecutive strength tests equal or exceed the required f'c.

(2) No individual strength test falls below the required f'c by more than the greater of 10% of f'c or 500 PSI.

d. If either of the above requirements is not met, the Testing Laboratory shall immediately notify the Engineer by telephone. Steps shall immediately be taken to increase the average of subsequent strength tests.

E. Investigation of Low Strength Concrete Test Results:

1. Cost of Investigations for Low Strength Concrete: The Contractor shall reimburse the City for the costs of investigations of low strength concrete, as defined above.

2. Scope of Investigations: See Specification Section 03300, Cast-In-Place Concrete, for the investigations that may be required by the Engineer. The City's Testing Laboratory will conduct these investigations.

F. Causes for Rejection of Concrete: The Contractor shall reject concrete delivered to the site for any of the following reasons:

1. Wrong class of concrete (incorrect mix design number).

2. Environmental Conditions: Environmental condition limits shall be as follows unless appropriate provisions in concreting practices have been made for cold or hot weather:

a. Cold Weather: Air temperature must be 40°F and rising or the average daily temperature cannot have been lower than 40°F for 3 consecutive days unless the temperature rose above 50°F for at least one-half of any of those 24 hour periods.

b. Hot Weather: Environmental conditions must be such that cause an evaporation rate from the concrete surface of 0.2 lb./sq. ft./hr. or less as determined by Figure 2.1.5 in ACI 305R-91.

Concrete may be placed at other environmental condition ranges only with approval of the job inspector for the City's Testing Laboratory or other duly appointed representative.

3. Concrete with temperatures exceeding 95°F shall not be placed in the structure.

4. Air contents outside the limits specified in the mix designs.

5. Slumps outside the limits specified.
the Laboratory job inspector or other duly appointed representative.

G. Concrete Batch Trip Tickets: Concrete batch trip tickets shall be collected and retained by the Contractor. Compressive strength, slump, air, and temperature tests shall be identified by reference to a particular trip ticket. Tickets shall contain the information specified in ASTM C94. Each ticket shall also show the amount of water that may be added in the field for the entire batch that will not exceed the specified water cement ratio for the design mix. The Contractor and City's Testing Laboratory shall immediately notify the Architect/Engineer and each other of tickets not meeting the criteria specified.

3.9 STRUCTURAL STEEL

A. Contract Obligations:

1. City Responsibility: The City shall pay for initial shop and field inspections and tests as required during the fabrication and erection of the structural steel. Laboratory of the Fabricator's work shall be in sequence, timely, and performed in such a manner so that corrections can be made without delaying the progress of the work. Inspections shall be performed by qualified technicians with a minimum of two years experience in structural steel testing and inspection. See "Qualifications of Testing Laboratory" section for special requirements for welding inspectors. The Testing Laboratory shall provide test reports of inspections. All test reports shall indicate types and locations of defects found during inspection, the measures required and performed to correct such defects, statements of final approval of welding and bolting of shop and field connections, and other fabrication and erection data pertinent to the safe and proper welding and bolting of shop and field connections. In addition to the parties listed in this Specification the Fabricator and Erector shall receive copies of the test reports.

2. Rejection of Material or Workmanship: The City, Architect, Engineer, and Testing Laboratory reserve the right to reject any material or workmanship not in conformance with the Contract Documents at any time during the progress of the work. However, this provision does not allow waiving the obligation for timely, in sequence inspections.

B. Shop Inspection and Testing: The City's Testing Laboratory shall provide the following inspections at the designated fabrication shops:

1. Shop Inspection Waiver: The requirement to perform fabricating shop inspection may be waived if the Fabricator produces evidence from the Building Official of being a registered, approved fabricating shop and if allowed by the Engineer.

2. An initial shop inspection prior to the start of any fabricating work shall be made to accomplish the following:

   a. Verify the fabrication shop's certification from AISC.
   b. Verify that the fabricator's fabrication and quality control procedures provide a sound basis for inspection control of workmanship and of the ability to conform to construction documents and industry standards. Review the procedures for completeness and adequacy relative to code requirements for the fabricator's finished product.
   c. Perform steps 1, 2 and 3 of welding inspection duties described below in "Weld Inspection and Process Monitoring" when shop welding is to be performed.
   d. Perform step 1 of bolt inspection duties described below in "High-Strength Bolting Inspection and Testing" when shop bolting involves joints that are designated on the plans as "Pretensioned" or "Slip-Critical".

3. Process Monitoring:

   a. Provide continuous monitoring of welding for all CJP,PJP, Multipass fillet welds and Single-pass fillet welds greater than 5/16 inch as described below in the Weld Inspection and Testing section.
   b. Periodically monitor welding of single-pass fillet welds that are less than or equal to 5/16 inch.
   c. Provide continuous monitoring of high-strength bolt installation in pre-tensioned or slip-critical joints using turn-of-the-nut without matchmarking or calibrated wrench method of bolt installation.
   d. Provide periodic verification of specified camber of steel beams.

G. Field Inspection: The City's Testing Laboratory shall provide the following inspections in the field:

1. Obtain the planned erection procedure, and review with the Erectors supervisory personnel.

2. Check the installation of base plates for proper leveling, grout type, and grout application.

3. Check structural steel and cold-formed steel deck as received in the field for possible shipping damage, workmanship, and identification marking to conform to AISC 360 for structural steel and as specified ASTM standards for other steel and steel deck.

4. Verify that surveys are occurring as specified to check plumbness and frame alignment as erection progresses. Review the submitted survey report.

5. Periodically inspect the steel frame for such items as bracing and stiffening details, member locations, and joint details at each connection for compliance with approved construction documents.

6. Inspect 100% of the column compression and base joints for verification that gaps in contact bearing do not exceed 1/16 inch. Gaps greater than 1/16 inch but less than 1/4 inch shall be reported to the City and Engineer for assessment. All gaps greater than 1/4 inch shall be shimmed with non-tapered mild steel shims.

7. Endeavor to guard the City against the Contractor cutting, grinding, reaming, or making any other field modification to structural steel without the prior approval of the Engineer. Report any noted unauthorized modifications to the City and Engineer.

D. Weld Inspection and Process Monitoring: The City's Testing Laboratory shall make the following inspections of the welds and welding processes. Welds performed in the fabricating shop may be inspected in the field unless continuous monitoring of the welding process is herein specified or if access in the field due to other work or shop finishes makes field inspection impractical:

1. Approve Welding Procedure Specifications submitted by the Contractor. Approve any changes submitted by the Contractor to any WPS that has already been approved. Obtain the Welding Procedure Qualification Record (WPQR) for each successful WPS qualification.

3. Verify welder qualifications either by certification and/or by retesting. Obtain welder certificates.

4. Verify welding electrodes to be used and other welding consumables as the job progresses.

5. Periodically observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders with sufficient frequency to assure compliance with code and contract document requirements. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
moment connections and column splices.

6. Periodically provide visual inspection of the root pass of partial and complete joint penetration welds.

7. Visually inspect 100 % of welds for proper size, length, location, and weld quality in accordance with AWS D1.1 requirements. Unless specifically noted otherwise, all welding shall be considered statically loaded nontubular connections

8. Visually inspect 100% of the welding or other attachment method of steel deck to the structure and at sidelaps.

9. Visually inspect 100% of completed shear connectors in each beam and perform bend tests as required according to inspection procedures outlined in AWS D1.1. In addition, perform field bend tests on an additional 2% of completed shear connectors in each beam but not less than one connector per beam

10. Visually inspect 100% of the welds of anchors to embedded plates that are to be cast into concrete elements.

11. In addition to the inspections above, perform the following:

    a. Continuously monitor and observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders for 100% of complete and partial joint penetration welds, multipass fillet welds, and single-pass fillet welds greater than 5/16 inch. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
    b. Periodically monitor welding of single-pass fillet welds that are less than or equal to 5/16 inch.

c. Periodically monitor the method of attaching the steel floor and roof decking to the structural frame.
d. Periodically monitor the welding of headed studs to floor beams.

12. Weld Verification Testing Scope:

a. Perform nondestructive examination services using a qualified technician with the necessary equipment to perform the following:
   (1) Nondestructive examination conducted in accordance with the specific requirements for the item being examined including radiographic (RT), ultrasonic (UT), magnetic particle (MT), or dye-penetrant inspection (PT). Nondestructive inspection procedures shall conform to AWS D1.1.
   (2) Interpret, record, and report results of the nondestructive tests.
   (3) Mark for repair, any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with AWS D1.1.
   (4) Re-examine repair areas and interpret, record, and report the results of examinations of repair welds.
   (5) Verify that quality of welds meet the requirements of AWS D1.1..
b. Fillet welds. provide the following:
   (1) MT test a minimum of 10% of the length of each fillet weld exceeding 5/16". but need not exceed 10% of all such welds, except as provided in (3) below.
   (3) Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
c. Partial joint penetration welds, including flare-bevel groove welds. provide the following:
   (1) MT test a minimum of 25% of the length of each PJP weld exceeding 5/16" effective throat.
   (2) Periodic MT testing of representative PJP welds 5/16” and less but need not exceed 10% of all such welds, except as provided in (3) below.
   (3) Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
d. Complete joint penetration welds. provide the following:
   (1) All CJP welds exceeding 5/16" thickness shall be 100% UT tested per AWS D1.1 Chapter 6 Part F. The testing laboratory shall review the CJP joints to determine where geometry or accessibility precludes the use of standard scanning patterns per AWS D1.1 Chapter 6 Part F. At these locations the testing laboratory shall develop and submit for approval a written testing procedure in accordance with AWS D1.1 Annex K.
   (2) Periodic MT testing of representative CJP welds 5/16” and less not to exceed 10% of all such welds, except as provided in (3) below.
   (3) Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
e. Acceptance Criteria
   (1) Visual, MT, PT shall be per AWS D1.1 Table 6.1.
   (2) UT testing shall be per AWS D1.1 6.13.1 and Table 6.2.
f. Base metal thicker than 1.5 inches, where subjected to through-thickness weld shrinkage strains, shall be UT tested for discontinuities behind and adjacent to such welds. UT testing shall occur no sooner than 24 hours after the weld has cooled to ambient temperatures. Any material discontinuities shall be recorded on the basis of ASTM A435 or ASTM A898 (Level 1 criteria) and reported for Engineer disposition.
g. Welds of Anchors to Embedded Plates:

(1) Headed Studs: Perform field bend tests according to AWS D1.1 on 2% of the studs welded to plates, but not less than one stud per plate.

(2) Deformed Bar Anchors: Perform MT testing on 10% of deformed bar anchors larger than #5 bar.

h. The costs of repairing defective welds and the costs of retesting by the Testing Laboratory providing services for the City shall be borne by the Contractor. If removal of a backing strip is required by the Testing Laboratory to investigate a suspected weld defect, such cost shall be borne by the Contractor.

E. High-Strength Bolting Inspection and Testing: The City's Testing Laboratory shall perform the following inspections and test for connections joined with high-strength bolting. Bolting performed in the shop may be inspected in the field unless continuous monitoring of the bolting operation is herein specified:

1. Observe preinstallation verification testing of the pretensioning method to be used in accordance with the requirements of the "Specification for Structural Joints Using ASTM A325 and A490 Bolts".

3. Inspect bolt installation for 100% of high strength bolted connections according to inspection procedures outlined in the "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

4. Perform Arbitration Testing and Inspection according to procedures outlined in the "Specification for Structural Joints using ASTM A325 or A490 Bolts" when a disagreement exists between the Testing Laboratory and the Fabricator as to the minimum tension of installed bolts that have been inspected according to paragraph above.

5. Monitoring of Bolting Installation:

a. Continuous Monitoring: The City's Testing Laboratory shall be continuously present and monitor the bolting installation for compliance with the selected procedure for installation as specified in the "Specification for Structural Joints Using ASTM A325 and A490 Bolts" for joints using high-strength bolts that are designated on the plans as Pretensioned (PT) or Slip-Critical (SC) type joints and that are being installed using the calibrated wrench method or the turn-of-nut without matchmarking method of installation.

b. Periodic Monitoring: All other joint types and bolt installation methods may be monitored on a periodic basis.

3.12 MASONRY

A. Verification Testing Frequency: Verification of masonry strength (f'_m) will be performed at the beginning of masonry construction and during construction for each 5000 square feet of wall area or portion thereof.

B. Concrete Masonry Unit: For each type of concrete masonry unit indicated, verify compliance with ASTM C90 and the strength required by design. Verification may be by reviewing certification from unit producer showing compliance.

C. Mortar:

1. Throughout construction, verify the proportions of the site-prepared mortar mix comply with the requirements of ASTM C270 for the type specified.

2. Verify the proportions of materials in premixed or preblended mortar comply with

the requirements of ASTM C270 for the type specified as delivered to the site.

D. Grout:

1. Prior to grouting, verify the proportions of site-prepared grout mix comply with the requirements of ASTM C476 for each type of grout used.

2. Verify the proportions of materials in premixed or preblended grout comply with the requirements of ASTM C476 as delivered to the site.

E. Prism Test Method:

1. Compression Test: For each type of wall construction indicated for testing, test representative masonry prisms by methods of sampling and testing of ASTM C1314, and as follows:

   a. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.
   b. For concrete masonry prisms adhere to requirements as specified under preconstruction testing. Build prisms on job using same materials and methods as for wall construction. Store prisms in air at temperature not less than 65°F in a facility supplied by the contractor where they will be undisturbed for seven (7) days. After seven (7) days, transport to laboratory in a manner which will not disturb mortar bond.
   c. Cap each prism with suitable material to provide bearing surfaces on each end.
      (1) Plane within 0.003 inch
      (2) Approximately perpendicular to the axis of the prism.
   d. The preparation of prisms shall be observed by the testing agency that will test the prisms.

2. Report test results in writing and in form specified under each test method, to Architect and Contractor, on same day tests are made.

3. Retests: Where prism tests indicate non-compliance with specified requirements, additional testing shall be performed at the frequency of two additional tests for each unsatisfactory test. The cost of such additional testing shall be the responsibility of the Contractor. Where retesting fails to indicate conformance with specified requirements, any masonry construction represented by unsatisfactory tests shall be removed and replaced with acceptable masonry construction.

F. Mortar Joints: Throughout construction, verify that mortar joints are being prepared in accordance with these specifications and ACI 530.1/ASCE 6/TMS 602.

G. Reinforcement and Connectors: Prior to grouting, verify the size, grade, type and placement of reinforcement and connectors is in compliance with specified requirements.

H. Grouting: Prior to any grouting procedure, the grout space shall be inspected to verify that it is clean and that cleanouts, if required, are in place and conform to requirements. Verify through continuous inspection that the placement of grout is in compliance with the requirements of the contract specifications and ACI 530.1/ASCE 6/TMS 602.

I. Anchors: Continuously inspect the installation of anchors including anchors of masonry to other structural members, frames, or construction verifying their type, size, location, and installation.

J. Anchors: Periodically verify the type, size and location of anchors including anchors of masonry to other structural members, frames, or construction is in compliance with specified requirements.

K. Welding of Reinforcing Bars: Continuously observe the welding of reinforcing bars.

L. Installed items: Verify that installed flashing, weep holes, construction joints, control joints and wall vents are installed in accordance with specifications.

M. Prestressed Unit Masonry: The following inspections and test shall be made for unit masonry that is shown on the drawings to be prestressed:

1. Reinforcment: Prior to grouting, verify the grade, size, and location of prestressing tendons.

2. Prestressing: Continuously observe the application of prestressing force and verify the proper force was applied to tendons.

3. Grout for Bonded Tendons: Prior to grouting, verify the proportion of site-prepared prestressing grout is in compliance.

4. Grouting: Through continuous observation, verify that the grouting of bonded tendons complies with the requirements of ACI 530.1/ASCE 6/TMS 602.

END OF SECTION 01450

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01700 - PROJECT CLOSEOUT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including GENERAL and SUPPLEMENTARY CONDITIONS and other DIVISION 01Specification Sections, apply to this Section.

1. Cleaning in Section 01710.
2. Submittals in Section 01340.
3. Contractor's Use of the Premises in Section 01015.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Inspection procedures.
2. Project record document submittals.
3. Operating and Maintenance Manual submittal.
4. Submittal of warranties.
5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Technical Sections in Divisions 2 through 16.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the "Request for Payment" that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Contracted Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

b. Include a list of incomplete or outstanding works established during a Pre-final walk-thru as required in Section 32 - INSPECTION AND FINAL

INSPECTION of the General Conditions, and all supporting evidence or documentation for completion.

2. Advise City of pending insurance change-over requirements.

3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents. Obtain all Building and Safety's sign-offs and submit duplicate copy of the Building and Safety's Inspection Record to the City.

4. Obtain and submit releases from local authorized agencies enabling the City unrestricted use of the Work and access to services and utilities; include the certificate of occupancy, permits or operating certificates and similar releases. Return all Building and Safety's sign-off sheet and Inspection Records to the City.

5. Submit Record Drawings and Record Specification, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.

6. Deliver tools, spare parts, extra stock, and similar items.

7. Make final change-over of permanent locks and transmit keys to the City. Advise the City's personnel of change-over in security provisions.

8. Complete start-up testing of systems, and instruction of the City's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the job-site, along with construction tools, mock-ups, and similar elements.

9. Complete final clean-up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

10. Complete all required testing including balancing test, bacteriological analysis, etc. Submit all test reports.

11. Return all original permits and manifests to the City Project Manager.

12. Advise the City of pending changeover of the utility services upon start-up testing of the systems and completion of final inspection, if required.

13. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

14. Make ready to proceed with landscape establishment period Submit the maintenance schedules and logs.

B. Inspection Procedures: The Inspector, with cooperation from the City Project Manager will prepare a Final Inspection Correction list to that effect following inspection, or advise the Contractor of construction that must be completed or corrected before the construction work can be considered complete. The Contract time shall continue to be assessed.

1. The Inspector, and City Project Manager will repeat the inspection when requested and assured that the Contracted Work has been satisfactorily completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance. The Contract time shall stop when all corrections are considered complete by the City.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Inspector's (combined with City Project Manager's) final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Inspector, the City Project Manager.

4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the City took possession of and responsibility for corresponding elements of the Work.

5. Submit consent of surety to final payment.

6. Submit a final liquidated damages settlement statement.

7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

8. Return all original permits documents to the City.

9. Submit all required certified weekly payroll records, ethnic composition of work force reports.

B. Reinspection Procedure: The Inspector and City Project Manager will re-inspect the Contracted Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the City Project Manager.

1. Upon completion of reinspection, the Project Manager will prepare a "Certificate of Final Acceptance", or advise the Contractor of Contracted Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, reinspection will be repeated.

1.5 RECORD DOCUMENTS SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the City Project Manager's reference during normal working hours. All record documents shall be maintained with current status during construction and submitted monthly for City Project Manager's approval as required in the Contract Documents. All new information shall be recorded as soon as they are made or approved by the City regardless that the work is completed or not. Any change to this information shall be again recorded at no cost to the City.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Contracted Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Upon completion of the work, submit record drawings, and record Specification to the City Project Manager for review and for the City’s records.

1. Record drawings shall be updated and submitted prior to each monthly request for payment and if not so submitted the payment will be denied.

2. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

3. Mark new information that is important to the City, including detail from "Request-for-Information" but was not shown on Contract Drawings or Shop Drawings as soon as it is made available. Any subsequent revision or changes, to the details from an earlier "Request-for-Information", shall also be marked immediately on the Record Drawings.

4. Note related finalized or pending "Change Order" numbers where applicable.

5. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

6. Update drawing index to reflect any additional drawings or shop drawings added to the record drawing package.

7. Note all addenda, drawing modification, etc. on record drawings.

8. Where Shop Drawings are used for actual performance of the contract work and are most capable of showing actual details, conditions, and dimensions fully and accurately, record all the Shop Drawings and place them in good order with the record drawings. Properly identified and bound of field, and ready for continued use and reference.

9. After all correction works are completed and inspected, City Project Manager shall establish the construction completion date.

10. As a condition precedent to the City's release of retained funds, final record drawings shall be submitted in complete and comprehensive form satisfactory to the City.

C. Record Specifications: Maintain one complete copy of the Specification, including addenda, and one copy of other written construction documents such as "Change Orders" and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Contracted Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related Record Drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the City Project Manager for the City's records.

D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations

in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work, which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of Record Drawings and Specifications.

1. Upon completion of mark-up, submit complete set of Record Product Data to the City Project Manager for the City's records.

E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the job-site with the City Project Manager and the City's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the City for record purposes. Comply with delivery to the City's Sample storage area.

F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Contract Work. Immediately, prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound of filed, ready for continued use and reference. Submit to the City Project Manager for the City's records.

G. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Provide a Table of Contents with page numbers for each manuals. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Drawings will not be accepted unless they are folded and placed in the pocket. Mark appropriate identification on front and spine of each binder (such as Field Operations Center Contact Number, Name of Product/ item, Volume Number, etc.). Include the following types of information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties and permit.
4. Wiring diagrams.
5. Recommended "turn around" cycles.
6. Inspection procedures.
7. Shop Drawings and Product Data.
8. Fixture lamping schedule.
9. Small scale of As-Built drawing of such operating equipment.

H. Record Schedule: Provide one copy, of a computer diskette, of the Construction Schedule. Record this document to show

the actual schedules and sequences the actual works were performed in comparison with Baseline Construction Schedule approval in accordance with Section 01311- PROGRESS SCHEDULE AND REPORTS.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the City's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance Manuals.
2. Serial Numbers
3. Record Documents.
4. Spare parts and materials.
5. Tools.
6. Lubricants.
7. Fuels.
8. Identification systems.
9. Control sequences.
10. Hazards.
11. Cleaning.
12. Warranties and bonds.
13. Maintenance agreements and similar continuing commitments.
14. Permit and Record Documents.

B. As Part of Instruction for Operating Equipment, Demonstrate the Following Procedures:

1. Start-up.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

3.2 FINAL CLEANING

A. General: General cleaning during construction is required by the General Conditions and included in Section, "Contractor's Use of the Premises".

-- End of Section --

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01710 - CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:

1. Summary of Work: Section 01010.

1.02 RELATED WORK

A. Each Specification Section: Cleaning for specific equipment, products, or elements of the work.

1.03 WORK DESCRIPTION

A. Execute cleaning, during the course of the Work, and at completion of the Work, as required by General Conditions, and as described in Part 3 of this Section.

B. Nothing in this Section or elsewhere in the Contract Documents shall be construed as relieving the Subcontractors of their individual responsibility to perform periodic clean-up of their portion of the Work. Subcontractors shall cooperate with the Contractor to assist in both periodic and final clean up. The Contractor shall enforce this requirement and shall notify each subcontractor of his responsibility for any damage caused by his operations during such cleanups.

C. If the Contractor fails to clean up, the Owner may do so and the cost there of shall be deducted from the Contract Sum.

1.04 DISPOSAL REQUIREMENTS

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Use only those cleaning materials that will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 – EXECUTION

3.01 CLEANING DURING CONSTRUCTION

A. Execute daily cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

B. Provide on-site containers for the collection of waste materials, debris and rubbish. Remove containers from the site at project completion.

C. Remove waste materials, debris and rubbish from the site as necessary and dispose of at legal disposal areas away from the site.

D. Where work is performed adjacent to occupied areas, contractor shall utilize HEPA vacuums to minimize and control dust levels. Use of other types of vacuums shall not be acceptable.

E. During the course of construction, the building and premises shall present a neat, orderly and workmanlike appearance.

3.02 DUST CONTROL

A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-need basis until painting is finished.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

3.03 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Besides the general broom cleaning and refuse removal, the Contractor shall do the following special cleaning for all trades before the final completion and acceptance of the work.

1. Remove putty stains, soil and paint from all glass and wash and polish same.

2. Clean and polish all finishing hardware.

3. Remove all spots, soil and paint from all ceramic tile work, glazing and mirrors.

4. Clean all plumbing fixtures, accessories and equipment, including all mechanical equipment.

5. Clean all tile, terrazzo, wood, and other finished floors.

6. Clean and vacuum all carpet.

7. Clean premises of all debris and dirt.

8. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.

9. Polish glossy surfaces to a clear shine.

10. Clean window frames, entrance frames, hollow metal work and all ornamental iron work.

C. Ventilating Systems:

1. Clean permanent filters and replace disposable filters if units were operated during construction.

2. Clean ducts, blower, and coils if units were operated without filters during construction.

D. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

E. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that the entire Work is clean.

- END OF SECTION -

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01710 - CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:

1. Summary of Work: Section 01010.

1.02 RELATED WORK

A. Each Specification Section: Cleaning for specific equipment, products, or elements of the work.

1.03 WORK DESCRIPTION

A. Execute cleaning, during the course of the Work, and at completion of the Work, as required by General Conditions, and as described in Part 3 of this Section.

B. Nothing in this Section or elsewhere in the Contract Documents shall be construed as relieving the Subcontractors of their individual responsibility to perform periodic clean-up of their portion of the Work. Subcontractors shall cooperate with the Contractor to assist in both periodic and final clean up. The Contractor shall enforce this requirement and shall notify each subcontractor of his responsibility for any damage caused by his operations during such cleanups.

C. If the Contractor fails to clean up, the Owner may do so and the cost there of shall be deducted from the Contract Sum.

1.04 DISPOSAL REQUIREMENTS

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Use only those cleaning materials that will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 – EXECUTION

3.01 CLEANING DURING CONSTRUCTION

A. Execute daily cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

B. Provide on-site containers for the collection of waste materials, debris and rubbish. Remove containers from the site at project completion.

C. Remove waste materials, debris and rubbish from the site as necessary and dispose of at legal disposal areas away from the site.

D. Where work is performed adjacent to occupied areas, contractor shall utilize HEPA vacuums to minimize and control dust levels. Use of other types of vacuums shall not be acceptable.

E. During the course of construction, the building and premises shall present a neat, orderly and workmanlike appearance.

3.02 DUST CONTROL

A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-need basis until painting is finished.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

3.03 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Besides the general broom cleaning and refuse removal, the Contractor shall do the following special cleaning for all trades before the final completion and acceptance of the work.

1. Remove putty stains, soil and paint from all glass and wash and polish same.

2. Clean and polish all finishing hardware.

3. Remove all spots, soil and paint from all ceramic tile work, glazing and mirrors.

4. Clean all plumbing fixtures, accessories and equipment, including all mechanical equipment.

5. Clean all tile, terrazzo, wood, and other finished floors.

6. Clean and vacuum all carpet.

7. Clean premises of all debris and dirt.

8. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.

9. Polish glossy surfaces to a clear shine.

10. Clean window frames, entrance frames, hollow metal work and all ornamental iron work.

C. Ventilating Systems:

1. Clean permanent filters and replace disposable filters if units were operated during construction.

2. Clean ducts, blower, and coils if units were operated without filters during construction.

D. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

E. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that the entire Work is clean.

- END OF SECTION -

SECTION 01731 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Division 01, Section 01732 "Selective Demolition" for demolition of selected portions of the site and built improvements.
2. Divisions 02 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least **10** days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.

6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

1. <**Insert list of elements that might otherwise be overlooked as structural elements and that require Architect's or Construction Manager's approval of a cutting and patching proposal.**>

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.[**Operating elements include the following:**]

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections.
10. <**Insert operating system.**>

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.[**Miscellaneous elements include the following:**]

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.
7. <**Insert miscellaneous element.**>

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to [**minimize**] [**prevent**] interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

b. At penetrations of fire rated walls, partitions, ceilings or floor construction, completely seal void with fire rated materials to full thickness of the penetrated element.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Sections include the following:

1. Division 01 Section "Summary" for use of premises and Owner- occupancy requirements.
2. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
3. Division 01 Section "Construction Waste Management" for disposal of demolished materials.
4. Division 02 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.
5. Division 02 Section for demolishing, cutting, patching, or relocating mechanical and electrical items.
6. Division 02 Section "Cutting and Patching" for cutting and patching procedures.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1. Coordinate with Owner's architect, who will establish special procedures for removal and salvage.

1.5 SUBMITTALS

A. Qualification Data: For demolition firm; professional engineer if required.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted. Note site is currently vacant and no on-site operations are planned.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of stairs.
5. Locations of proposed dust- and noise-control temporary partitions and means of egress.
6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
7. Means of protection for items to remain and items in path of waste removal from building.

C. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA and MCAQMD notification regulations before beginning selective demolition if so required. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.

3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS

A. Owner will not occupy building or site. Conduct selective demolition so neighboring business operations will not be disrupted.

1. Comply with requirements specified in Division 1 Section "Summary."
2. Provide not less than 72 hours notice to Owner of activities that will affect Owner operations.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove the following items:

a. T-rails driveway barriers.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will not be encountered in the Work.

1. Contaminated soil materials will be moved by contractor under the supervision of the Owner's Environmental consultant and deposited in an approved manner and location.
2. If other materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will advise contractor on what how to hazardous materials under a separate contract.

E. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of measured drawings.

1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

    a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.

2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain[**fire watch and**] portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management."

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

1. Building Structure and Shell: 15 percent [Existing metal roofing].
2. Non-shell Elements: 85 percent .

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish existing concrete curb.

B. Concrete Slabs-on-Grade: Concrete sidewalk.

C. Air-Conditioning Equipment: Do-not remove equipment without releasing refrigerants.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled**,** reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Division 01 Section "Construction Waste Management."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

B. Existing Items to Be Removed and Reinstalled: <**Insert description of items to be removed and reinstalled.**>

C. Existing Items to Remain: <**Insert description of items to remain.**>

END OF SECTION 01732

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01742 - CONSTRUCTION WASTE MANAGEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
   1. Special requirements for waste management during deconstruction construction operations.
      a. Protect the environment, both on-site and off-site, during deconstruction and construction operations.
      b. Prevent environmental pollution and damage.
      c. Maximize source reduction, reuse and recycling of solid waste.

B. Related Sections:
   1. 01300 - Administrative Requirements: Environmental Manager and Contractor training requirements.
   2. 01400 – Quality Requirements: Meetings and project coordination.
   3. 02220 – Selective Site Demolition

1.2 DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E2114.

B. Deconstruction: Disassembly of buildings for the purpose of recovering materials.

1.3 QUALITY ASSURANCE

A. Maximize use of source reduction and recycling procedures.
B. Diversion Goals: A minimum 50 percent by weight of total project solid waste to be diverted from landfill.

1.4 PRECONSTRUCTION MEETING

A. After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Owner and Architect to discuss the proposed Waste Management Plan and to develop mutual understanding relative to details of environmental protection.
   1. Coordinate deconstruction with work of Section 02220.

1.5 SUBMITTALS

A. Progress Documentation: Document solid waste disposal and diversion. Include the quantity by weight of waste generated; waste diverted through sale, reuse, or recycling; and waste disposed by landfill or incineration. Identify landfills, recycling centers, waste processors, and other organizations that process or receive the solid waste.
   1. Document on form in Appendix A of this Section, or similar form as approved by Owner.
   2. With each Application for Payment, submit updated Documentation for solid waste disposal and diversion.
   3. With each Application for Payment, submit manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material.

B. Record Submittals: With Record Submittals as specified in Section 01780, submit the following:
   1. Summary of solid waste disposal and diversion. Submit on forms in Appendix A Worksheet & B Acknowledgement of this Section, or similar form as approved by Owner and the City of Willows.

PART 2 - PRODUCTS

PART 3 EXECUTION

3.1 SOLID WASTE MANAGEMENT

A. Develop and implement a waste management program in accordance with ASTM E1609 and as specified herein.

B. Collection: Implement a recycling/reuse program that includes separate collection of waste materials of the following types as appropriate to the project waste and to the available recycling and reuse programs in the project area:
   1. Land clearing debris.
   2. Asphalt.
   3. Concrete and Masonry.
   4. Metal.
      a. Ferrous.
      b. Non-ferrous.
   5. Wood, nails and staples allowed.
   6. Debris.
   7. Glass.
   8. Paper.
      a. Bond.
      b. Newsprint.
      c. Cardboard and paper packaging materials.
   9. Plastic.
      a. Type 1: Polyethylene Terephthalate (PET, PETE).
      b. Type 2: High Density Polyethylene (HDPE).
      c. Type 3: Vinyl (Polyvinyl Chloride or PVC).
      d. Type 4: Low Density Polyethylene (LDPE).
      e. Type 5: Polypropylene (PP).
      f. Type 6: Polystyrene (PS).
      g. Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.
   10. Gypsum.
   11. Non-hazardous paint and paint cans.
   12. Carpet.
   13. Insulation.
   14. Others as appropriate.

C. Recycling/Reuse: Maximize recycling and reuse of materials.
   1. Recycling/Reuse on project site: Coordinate with Architect.
   2. Recycling/Reuse off project site: The following is a partial list for Contractor's information only. For more information, contact the State Department of Environmental Quality and the local Integrated Solid Waste Management Office.
      a. Habitat for Humanity, a non-profit housing organization that rehabilitates and builds housing for low-income families. Sites requiring donated materials vary. Contact the national hotline (800) HABITAT.
      b. Materials For The Arts (MFA) sponsored by the Department of Cultural Affairs. MFA is a materials exchange that accepts waste and excess materials from private donors and distributes them to various non-profit art organizations throughout the City. Contact: See Green Page 11 in Glenn & Tehama Counties telephone directory.
      c. California Materials Exchange (CAL-MAX) Program sponsored by the California Integrated Waste Management Board; (916) 255-2369.

D. Handling:
   1. Clean materials that are contaminated prior to placing in collection containers. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process).
   2. Arrange for collection by or delivery to the appropriate recycling or reuse facility.
   3. Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations. Coordinate with Section 01411.

E. Composting: In accordance with State Extension Service recommendations and as follows:
   1. Moisture content: Maintain between 35 percent and 60 percent.
   2. Carbon to nitrogen (C/N) ratio: Maintain at approximately 30 to 1 by weight.
   3. Do not compost meat or dairy products on site.
   4. Where the proposed Waste Management Plan incorporates composting of plastics, assess the potential effect of each type of plastic to be included on the composting process in accordance with ASTM D6002.

END OF SECTION

SECTION 01742A

CONSTRUCTION WASTE AND RECYCLING PLAN

(Submit After Award of Contract and Prior to Start of Work)

Project Title:		
Contract:		
Name:		
Street Address:		
City:	State:	Zip:
Phone: ( )	Fax: ( )	
E-Mail Address:		
Prepared by: (Print Name)		

Date Submitted:		
Project Period:	From:	TO:

Reuse, Recycling or Disposal Processes To Be Used

Describe the types of recycling processes or disposal activities that will be used for material generated in the project. Indicate the type of process or activity by number, types of materials, and estimated quantities that will be recycled or disposed in the sections below:

01 - Reuse of building materials or salvage items on site (i.e. crushed base or red clay brick)
02 - Salvaging building materials or salvage items at an off site salvage or re-use center (i.e. lighting, fixtures)
03 - Recycling source separated materials on site (i.e. crushing asphalt/concrete for reuse or grinding for mulch)
04 - Recycling source separated materials at an off site recycling center (i.e. scrap metal or green matls)
05 - Recycling commingled loads of C&D matls at an off site mixed debris recycling center or transfer station
06 - Recycling material as Alternative Daily Cover at landfills
07 - Delivery of soils or mixed inerts to an inert landfill for disposal (inert fill).
08 - Disposal at a landfill or transfer station.
09 - Other (please describe) _____

Types of Material To Be Generated

Use these codes to indicate the types of material that will be generated on the project

A = Asphalt	C = Concrete	M = Metals	I = Mixed Inert	G = Green Matls
D = Drywall	P/C=Paper/Cardboard	W/C = Wire/Cable	S= Soils (Non Hazardous)	
M/C = Miscellaneous Construction Debris		R = Reuse/Salvage	W = Wood	O = Other (describe)

Facilities Used: Provide Name of Facility and Location (City)

Total Truck Loads: Provide Number of Trucks Hauled from Site During Reporting Period

Total Quantities: If scales are available at sites, report in tons. If not, quantify by cubic yards. For salvage/reuse items, quantify by estimated weight (or units).

SECTION I - RE-USED/RECYCLED MATERIALS

Include all recycling activities for source separated or mixed material recycling centers where recycling will occur.

Type of Material	Type of Activity	Facility to be Used/Location	Total Truck Loads	Total Quantities Tons	Cubic YD	Other Wt.
(ex.) M	04	ABC Metals, Los Angeles	24	355		
a. Total Diversion			0	0	0	0

SECTION 01742A

CONTRACTOR'S CONSTRUCTION WASTE AND RECYCLING PLAN

Continued

SECTION II - DISPOSED MATERIALS								
Include all disposal activities for landfills, transfer stations, or inert landfills where no recycling will occur.								
Type of Material	Type of Activity	Facility to be Used/Location			Total Truck Loads	Total Quantities		
						Tons	Cubic YD	Other Wt.
(ex.) D	08	DEF Landfill, Los Angeles			2	35		
b. Total Disposal						0	0	0

SECTION III - TOTAL MATERIALS GENERATED						
This section calculates the total materials to be generated during the project period (Reuse/Recycle + Disposal = Generation						
				Tons	Cubic YD	Other Wt.
a. Total Reused/Recycled				0	0	0
b. Total Disposed				0	0	0
c. Total Generated				0	0	0

SECTION IV - CONTRACTOR'S LANDFILL DIVERSION RATE CALCULATION					
Add totals from Section I + Section II					
	Tons	Cubic Yards	Other Wt.		
a. Materials Re-Used and Recycled	0				
b. Materials Disposed	0				
c. Total Materials Generated (a. + b. = c.)	0	0	0		
d. Landfill Diversion Rate (Tons Only)*	#DIV/0!				

** Use tons only to calculate recycling percentages: Tons Reused/Recycled/Tons Generated = % Recycled*

Contractor's Comments (Provide any additional information pertinent to planned reuse, recycling, or disposal activities):

Notes:

1. Section 01151A is a Division 01 General Requirement under CSI MasterFormat 1998 Edition.
   For CSI MasterFormat 2004 Edition, this Section may be renumbered as follows:
   Under Division 00, Procurement and Contracting Requirements, Project Forms 00 60 00
   Use: Section 00 62 22 Construction Waste Diversion Plan

2. Suggested Conversion Factors: From Cubic Yards to Tons (Use when scales are not available)
   Asphalt: .61 (ex. 1000 CY Asphalt = 610 tons. Applies to broken chunks of asphalt)
   Concrete: .93 (ex. 1000 CY Concrete = 930 tons. Applies to broken chunks of concrete)
   Ferrous Metals: .22 (ex. 1000 CY Ferrous Metal = 220 tons)
   Non-Ferrous Metals: .10 (ex. 1000 CY Non-Ferrous Metals = 100 tons)
   Drywall Scrap: .20
   Wood Scrap: .16

SECTION 01742B

REUSE, RECYCLING, AND DISPOSAL REPORT

(Submit With Each Progress Payment)

Project Title:		
Contract:		
Name:		
Street Address:		
City:	State:	Zip:
Phone: ( )	Fax: ( )	
E-Mail Address:		
Prepared by: (Print Name)		

Date Submitted:		
Period Covered:	From:	To:

Reuse, Recycling or Disposal Processes Used

Describe the types of recycling processes or disposal activities used for material generated in the project. Indicate the type of process or activity by number, types of materials, and quantities that were recycled or disposed in the sections below:

01 - Reuse of building materials or salvage items on site (i.e. crushed base or red clay brick)

02 - Salvaging building materials or salvage items at an off site salvage or re-use center (i.e. lighting, fixtures)

03 - Recycling source separated materials on site (i.e. crushing asphalt/concrete for reuse or grinding for mulch)

04 - Recycling source separated materials at an off site recycling center (i.e. scrap metal or green matls)

05 - Recycling commingled loads of C&D matls at an off site mixed debris recycling center or transfer station

06 - Recycling material as Alternative Daily Cover at landfills

07 - Delivery of soils or mixed inerts to an inert landfill for disposal (inert fill).

08 - Disposal at a landfill or transfer station.

09 - Other (please describe) _____

Types of Material Generated

Use these codes to indicate the types of material that were generated on the project

A = Asphalt	C = Concrete	M = Metals	I = Mixed Inert	G = Green Matls
D = Drywall	P/C=Paper/Cardboard	W/C = Wire/Cable	S= Soils (Non Hazardous)	
M/C = Miscellaneous Construction Debris		R = Reuse/Salvage	W = Wood	O = Other (describe)

Facilities Used: Provide Name of Facility and Location (City)

Total Truck Loads: Provide Number of Trucks Hauled from Site During Reporting Period

Total Quantities: If scales are available at sites, report in tons. If not, quantify by cubic yards. For salvage/reuse items, quantify by estimated weight (or units).

SECTION I - RE-USED/RECYCLED MATERIALS

Include all recycling activities for source separated or mixed material recycling centers where recycling occurred.

Type of Material	Type of Activity	Facilities Used/Location			Total Truck Loads	Total Quantities Tons	Cubic YD	Other Wt.
(ex.) M	04	ABC Metals, Los Angeles			24	355		
a. Total Diversion					0	0	0	0

SECTION 01742B

CONTRACTOR'S REUSE, RECYCLING, AND DISPOSAL REPORT

Continued

SECTION II - DISPOSED MATERIALS								
Include all disposal activities for landfills, transfer stations, or inert landfills where no recycling occurred.								
Type of Material	Type of Activity	Facilities Used/Location			Total Truck Loads	Total Quantities Tons	Cubic YD	Other Wt.
(ex.) D	08	DEF Landfill, Los Angeles			2	35		
b. Total Disposal						0	0	0

SECTION III - TOTAL MATERIALS GENERATED						
This section calculates the total materials generated during the project period (Reuse/Recycle + Disposal = Generation						
				Tons	Cubic YD	Other Wt.
a. Total Reused/Recycled				0	0	0
b. Total Disposed				0	0	0
c. Total Generated				0	0	0

SECTION IV - CONTRACTOR'S LANDFILL DIVERSION RATE CALCULATION					
Add totals from Section I + Section II					
	Tons	Cubic Yards	Other Wt.		
a. Materials Re-Used and Recycled	0				
b. Materials Disposed	0				
c. Total Materials Generated (a. + b. = c.)	0	0	0		
d. Landfill Diversion Rate (Tons Only)*	#DIV/0!				

** Use tons only to calculate recycling percentages: Tons Reused/Recycled/Tons Generated = % Recycled*

Contractor's Comments (*Provide any additional information pertinent to planned reuse, recycling, or disposal activities*):

Notes:

1. Section 01151A is a Division 01 General Requirement under CSI MasterFormat 1998 Edition.
   For CSI MasterFormat 2004 Edition, this Section may be renumbered as follows:
   Under Division 00, Procurement and Contracting Requirements, Project Forms 00 60 00
   Use: Section 00 62 22 Construction Waste Diversion Plan

2. Suggested Conversion Factors: From Cubic Yards to Tons (Use when scales are not available)
   Asphalt: .61 (ex. 1000 CY Asphalt = 610 tons. Applies to broken chunks of asphalt)
   Concrete: .93 (ex. 1000 CY Concrete = 930 tons. Applies to broken chunks of concrete)
   Ferrous Metals: .22 (ex. 1000 CY Ferrous Metal = 220 tons)
   Non-Ferrous Metals: .10 (ex. 1000 CY Non-Ferrous Metals = 100 tons)
   Drywall Scrap: .20
   Wood Scrap: .16

DIVISION 2 SITE WORK

SECTION 02200 EARTHWORK

1. GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply, shall be a part of this Specification.

2. SCOPE

The work done under these Specifications shall include stripping, over-excavation, preparation of natural soils and placement and compaction of on-site and imported fill material.

3. GEOTECHNICAL ENGINEER

The work covered by these Specifications shall be performed under the observation of the Geotechnical Engineer – LACO & Associates, Inc. – 311 S. Main Street, Ukiah, CA, 707-462-0222, who shall be retained and paid by the Owner. The cost of the Geotechnical Engineers services for testing and observation shall be deducted from the contract price in accordance with the Article "Laboratory Tests and Inspections" in the Supplementary General Conditions. Bidders may contact LACO and Associates, Inc., to obtain cost of their services. The Geotechnical Engineer will be present at the site to observe the work and perform field and laboratory tests to evaluate material quality and compaction. The Contractor shall cooperate with the Geotechnical Engineer in performing the observations and tests. At the completion of his services, the Geotechnical Engineer shall submit a report to the Owner, including a tabulation of all tests performed. **The Geotechnical Engineer's costs for observing and testing the repair of unsatisfactory work performed by the Contractor shall be billed to the Owner. The Owner shall pay them and then shall deduct the amount from monies due to the Contractor.**

4. DEFINITIONS

a. Standard Specifications: Where referred to in these Specifications, "Standard Specifications" shall mean the California CalTrans Standard Specifications, dated January 1981. All work shall be carried out in conformance with the Standard Specifications unless otherwise specified herein.

b. Percent Compaction: As referred to in these Specifications, percent compaction or relative compaction is the required in-place, dry density of fill expressed as a percentage of the maximum dry density of the same material determined by the Geotechnical Engineer in accordance with the ASTM Test Method #D1557-02. Optimum moisture content is the moisture content corresponding to the maximum dry density determined by the ASTM Test Method #D1557-02.

c. Select Fill Areas: Where used in these Specifications, select fill areas shall mean within building and adjacent exterior slab areas and for a distance of 5' beyond perimeter footing lines or 3' beyond the edges of exterior slabs, which ever is greater.

5. SPILLAGE, DUST & EROSION CONTROL

Prevent spillage when hauling on or adjacent to any public street or highway. In the event that such occurs, remove all spillage and sweep, wash or otherwise clean such streets or highways as required by local City and County authorities and/or the State of California.

Take all precautions needed to prevent a dust nuisance to adjacent private properties and to prevent erosion and transportation of soil to downstream properties due to work under this Contract. Any damage so caused shall be corrected or repaired by the Contractor at no cost to the Owner.

5. SPILLAGE, DUST & EROSION CONTROL (continued)

In the event the Contractor fails to take such precautions or make such corrections or repairs promptly, the Owner may take such steps as they may deem necessary and deduct the cost of the same from the monies due to the Contractor. Any such action or lack of action on the part of the Owner in no way alters or relieves the Contractor for the proper protection of the work.

6. SITE PREPARATION

a. Location Service Survey: As appropriate, notify Underground Service Alert (1-800-642-2444) prior to commencing site work, and use this location service and other methods to avoid injury or risk to life from underground and overhead utilities, and to avoid damaging them.

b. Stripping: Remove existing surface soils contain grass, roots and other vegetation, existing utilities, septic system components, structures including foundations, trees and associated root systems, rubble, rubbish and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 6", or until all organics in excess of 3 percent by volume are removed. Deeper stripping may be required in localized areas. These materials **will not** be suitable for use as select fill. Stockpile these materials on-site in a location approved by the Owner for later use in landscaped areas as topsoil, as needed. Stripping activities shall extend 3' outside of area designated to receive structural fill or improvements.

b. Excavation: Within select fill areas defined above, excavate as required to accommodate design grades and planned minimum fill or pavement section thicknesses and excavate to a minimum of 18" below base of floor slab and for 12" beyond the slab perimeter. The 18" stripping depth provides for 12" of compacted gravelly fill, a 0" capillary break layer, and a 0" sand layer beneath the slab.

Also, over-excavate beneath isolated (column) and continuous foundation locations such that a minimum of 12" of compacted gravelly fill can be constructed immediately beneath these paved surfaces.

Where existing gravelly, sandy fill is removed, it can be separated for re-use as fill provided it remains relatively free of cohesive silty and clayey soils. If stripping to 6" below the base of the planned paving section(s) exposes a competent, gravelly, sub-grade surface comprised of existing fill, this surface may be approved, without further removal and replacement, following a review by the Geotechnical engineer.

The resulting stripped subgrade surface is anticipated to consist of stiff to hard, undisturbed clayey soils, or competent, gravelly soils. The Geotechnical engineer shall, immediately, upon completion of the stripping operation conduct a review of the exposed sub-grade surfaces, assist in the identification of unsuitable soils (overly weak, compressible, or disturbed soils), and recommend additional unsuitable soils to be stripped.

Do not allow the clayey subgrade to dry out and crack prior to placing fill, either beneath the paving, slab or beneath foundations. Maintain it in a moist (not wet or dry) condition until the paving, slab or foundations are poured.

6. SITE PREPARATION (continued)

Following the acceptance of the sub-grade as suitable by the Geotechnical Engineer the exposed surface the upper 6" shall be scarified, moisture conditioned and compacted prior to receiving structural fills. Alternatively, the sub-grade surface may be proof-rolled using a 10 wheel, 10 cubic yard dump truck loaded with gravel, or equivalent. The proof-rolling shall be accomplished under the observation of the Geotechnical Engineer with the soil damp or moist (not wet or dry), and a firm, non-yielding surface should be evident during the proof-rolling. If a yielding surface is observed (pumping, weaving under wheel loads), additionally excavated the yielding area, and replace the over-excavated material with CalTrans specification Class 2 base rock, in a manner that will result in a stable sub-grade surface under the proof-rolling, following the over-excavation and replacement.

c. Moisture Conditioning & Re-Compacting: Where dry or cracked soils are exposed by excavation, they shall be moisture conditioned to near optimum moisture content; exposed soils shall then be scarified to a depth of at least 6" and re-compacted to at least 90 percent relative compaction. If excavation and re-compaction operations encounter isolated zones of very weak or saturated soils, they shall be removed by deeper excavation to expose firmer natural soils; as determined in the field by the Geotechnical engineer.

d. Approval: After moisture conditioning and compaction and before placing fill, the Geotechnical engineer shall evaluate the site preparation in each area.

7. FILL MATERIAL

a. General: All fill material shall be free of perishable matter, clay or silt, and shall not contain rocks or lumps larger than 4" in greatest dimension. All fill shall be approved by the Geotechnical Engineer prior to use. The Contractor shall give at least 5 work days notice prior to using any imported material to enable the Geotechnical Engineer time to evaluated the proposed material by sampling and testing.

The preferred materials specified for select fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the site preparation phase shall be the sole responsibility of the Site Work Contractor.

b. Imported Granular Fill: A 12" layer of structural fill, from 10.8" (in planned parking areas) to 15.6" (in planned isles & driveways) beneath areas to be paved and planned new building slabs, and from 0" to 12" beneath foundations (described above), should consist of approved soil (a durable, well graded, sand and gravel mixture, containing no clay, silt, or organic material or debris, and no individual particles over 4" across, such as river-run gravel or base rock). All imported material shall be evaluated and approved by the Architect and the Geotechnical Engineer prior to use.

c. Select Fill Material: Only select fill material shall be used in select fill areas. Select fill material shall have a low expansion potential and shall conform, in general, to the following requirements:

Sieve Size	Percent Passing (by dry weight)
6"	100
#200	15-60

Liquid Limit:	40 Maximum
Plasticity Index:	15 Maximum
UBC Expansion Index:	15 Maximum

Material not conforming to these requirements may be suitable for use as select fill; however, it shall be the Contractor's responsibility to demonstrate that the proposed material will perform in an equivalent manner.

8. COMPACTED FILL

a. Placement & Compaction: Fill material shall be placed in layers 6" to 8" or less in loose thickness, moisture conditioned to near optimum moisture content and compacted with sheep's-foot roller or other approved equipment to achieve at least 90 percent of maximum dry density as determined by ASTM Test Method D1557. Additional lifts shall not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable in the opinion of the Geotechnical Engineer.

Any buried structures encountered during construction shall be properly removed and backfilled. In general, any septic tanks, debris pits, cesspools or similar structures should be entirely removed. Concrete footings should be removed to an equivalent depth of a least 3' below proposed footing elevations or as recommended by the Geotechnical Engineer. Any other buried structures should be removed in accordance with the recommendations of the Geotechnical Engineer. Resulting excavations should be backfilled with Select Fill or Granular Imported Fill.

The Geotechnical Engineer or his appointed representative shall be present during all site clearing and grading operations to test and observe earthwork construction. The Geotechnical Engineer may reject any material that does not meet compaction and stability requirements of the Geotechnical Exploration Report.

Where the field density tests indicate that the required compaction has not been attained, the fill shall be re-conditioned as necessary and re-compacted to the required density prior to placing additional material. The Site Work Contractor shall be responsible for placement; moisture conditioning, and compacting approved material in accordance with these Specifications. Should the Site Work Contractor fail to meet these requirements, he shall reduce his rate of haul or furnish additional spreading, moisture conditioning and/or compaction equipment or make any other adjustments required until a satisfactory fill is obtained.

b. Fill Slopes: Fill slopes shall be compacted by overfilling and trimming back to plan grade to expose a smooth, compacted and unyielding surface. Any depression shall be filled and compacted and all loose material shall be removed.

c. Finish: The completed fill shall be finished true to line and grade and present a smooth, compacted and unyielding surface. Any depression shall be filled and compacted and all loose material shall be removed.

d. Stockpiled Residual: Any stripped material not used during the pad construction for this project shall be graded and spread uniformly about the site as directed by the Architect at the completion of the work.

END OF SECTION

DIVISION 2 SITE WORK

SECTION 02221 TRENCHING, BACKFILLING AND COMPACTION

1. GENERAL

1.1.
Scope. Work to be performed under this section shall include all labor, materials, equipment, tools and accessories required to perform all excavation, backfilling and compaction of underground pipelines, conduits, cables and appurtenances shown on the Drawings and specified herein.

1.2.
Related Work Specified Elsewhere:

Section 01000 – General Requirements
Section 01010 Summary of the Work
Section 01060 – Regulatory Requirements
Section 01015 – Contractor's Use of the Premises
Section 01200 – Project Meetings
Section 01311 – Construction Schedule
Section 01340 – Submittals
Section 01700 – Project Closeout
Section 02200 – Earthwork

1.3.
Field Conditions.

1.3.1.
Existing Utilities. Underground utilities, except service lines, known to the Engineer have been shown on the Drawings. Locations are approximate only and may prove to be inaccurate. The Contractor is responsible for verification of the existence, location, and protection of all utilities within the construction area.

1.3.1.1.
Before commencing with work, the Contractor shall notify all public and private companies who may have utilities within the project limits. The Contractor shall coordinate with these entities all excavation performed. The Contractor shall obtain all permits required by utility owners.

1.3.1.2.
In the event of damage to any existing utility, the Contractor shall be solely responsible for the repair and payment for repair of all such damage.

1.3.1.3.
The Contractor shall make arrangements for and pay all costs for relocation of utilities requiring relocation as indicated on the Drawings unless noted. Should utility obstructions, not shown on the Drawings, be encountered and require relocation, the Contractor shall notify the Owner and the Architect and shall make arrangements necessary for such relocation. The Owner shall pay the costs for such relocation.

1.3.2.
Existing Improvements. The Contractor shall restore or protect from damage all existing improvements encountered in performance of the work. Improvements damaged as a result of this work shall be restored to original condition or better, as determined by the Architect.

1.3.2.1.
Adjacent property shall be protected by the Contractor from any damage. The Contractor shall be held solely liable for any damage to adjacent property and shall be responsible for all costs resulting from repair of such damage.

1.3.3.
Soil Conditions. It shall be the responsibility of the Contractor to examine soil conditions and characteristics, including the presence of groundwater that will be encountered within the limits of construction.

1.4.
Protection of Work
1.4.1.
Safety. All excavation shall be protected by barricades, lights, signs, etc., as required by governing federal, state, and local safety codes and regulations.
1.4.2.
Sheeting, Shoring and Bracing. Where trench walls are not excavated at a stable slope, the Contractor shall provide and maintain support sufficient to prevent caving, sliding or failure and property or bodily damage. Any damage due to inadequate support shall be repaired at the sole expense of the Contractor.
1.4.3.
Under normal construction conditions, support shall be removed as work progresses. Support shall remain installed if directed by the Engineer or if pipe does not have sufficient strength to support backfill based on trench width as defined by the sheeting. Sheeting shall not be removed after the start of backfilling.
1.4.4.
Use of a movable trench shield or coffin box will not be allowed where pipe strength is insufficient to support backfill as defined by the trench width after the trench shield is removed.
1.4.5.
The Contractor shall be held solely responsible for any violation of applicable safety standards. Particular attention is called to minimum requirements of OSHA.
1.4.6.
Site Drainage. Excavation to be protected from any source of surface water and storm water runoff at all times. At no time shall excavated area be allowed to fill with storm water runoff. Contractor shall provide proper, Temporary drainage structures at their cost to detour runoff from excavated areas.
1.6.
Construction in Streets: When construction operations are located within streets make provisions at cross streets and walks for free passage of vehicles and pedestrians. Do not block streets or walks without prior approval.
1.7.
Submittals.

1.7.1.	Bedding Material
1.7.1.1.	Submit sieve analysis
1.7.2.	Select Fill
1.7.2.1.	Submit sieve analysis

2.
MATERIALS
2.1.
Embedment Material Pipe line embedment material shall comply with the appropriate classes as listed below and as illustrated in the Construction Drawings:
2.1.1.
Class A - Use where improper trenching or unexpected trench conditions require its use as determined by the Engineer.
2.1.1.1.
Characteristics - Concrete cradle foundation with densely compacted Class 6 aggregate base backfill to 12 inches above top of pipe, or densely compacted Class 6 aggregate granular foundation with concrete arch cover to 6 inches above top of pipe.
2.1.2.
Class B - Use for all PVC, DIP, CMP and concrete pipe under normal construction conditions.
2.1.2.1.
Characteristics - Densely compacted Class 6 aggregate granular foundation of depth shown on Typical Details with densely compacted Class 6 aggregate 12 inches above top of pipe. 3/4" screened rock shall not be used unless approved by the Engineer.

2.2.
Select Material. Subject to approval by the Engineer, select material shall be allowed in place of the aggregate backfill for Class B when excavation and soil conditions allow, but only if approved by Engineer. Contractors shall bid project based upon Class B. If Class A or select material is used, price adjustments shall be made.
2.2.1.
Characteristics - Soil materials free from rocks, clods, and organic material.
2.3.
Concrete for Embedment. Shall be 2000-psi concrete (28- day compressive strength).
2.4.
Backfill Material
2.4.1.
Characteristics - Native materials free from debris, organic matter, and frozen material. Uniformly graded sufficient to allow proper compaction.
2.4.2.
Gradation - No boulders greater than 4 inch diameter in top or bottom 12 inches of backfill.
2.4.3.
Generally no boulders greater than 12-inch diameter in remainder of trench. Limited number of boulders not exceeding 24-inch diameter to be allowed at discretion of Engineer provided boulders can be uniformly dispersed and will not interfere in compaction effort.
3.
METHODS AND PROCEDURES
3.1.
Site Preparation
3.1.1.
Clearing: Remove all vegetation, stumps, roots, organic matter, debris and other miscellaneous structures and materials from project site. Dispose of off site.
3.1.2.
Topsoil Removal**:** Strip existing topsoil from all areas to be disturbed by construction. Topsoil to be stockpiled separately from excavated materials.
3.1.3.
Pavement Removal: See Section 02101 - Removal of Structures and Obstructions.
3.2.
Trench Excavation
3.2.1.
Limits of Excavation. Trenches to be excavated along lines and grades shown on the Drawings, or as modified in the field by the Engineer. Trench widths for pipe loading to be measured 12 inches above top of pipe.
3.2.1.1.
Minimum trench width to be the outside diameter of the pipe or conduit plus 16 inches.
3.2.1.2.
Maximum trench width to be the outside diameter of the pipe or conduit plus 24 inches for all pipes or conduits with outside diameter of 24 inches or less, and plus 30 inches for all pipes or conduits with outside diameters greater than 24 inches.
3.2.1.3.
If maximum trench width is exceeded, Contractor will provide at his expense, higher strength pipe, or special bedding including concrete at the direction of the Engineer.
3.2.1.4.
Trench excavation not to be completed more than 100 feet in advance of pipe installation. Backfill to be completed within 100 feet of pipe installation.
3.2.2.
Asphalt/Concrete removal: Cuts in asphalt or concrete pavement or sidewalks shall be not larger than necessary to provide adequate working space for proper installation of pipe and appurtenances. Cutting shall be started with a

concrete saw in a manner which will provide a clean groove at least 1½ inches deep along each side of the trench and along the perimeter of cuts for structures. Pavement over trenches excavated for pipelines shall be removed so that a shoulder not less than 12 inches in width at any point is left between the cut edge of the pavement and the top edge of the trench. Where necessary, trench banks may be sloped back as needed, and the width of pavement removed shall be adjusted accordingly. Trench width at the bottom shall not be greater than at the top and no undercutting will be permitted. Pavement cuts shall be made to and between straight and accurately marked curbed lines which, unless otherwise required, shall be parallel to the centerline of the trench. Temporary pavement patches shall contain a minim of 3 inches of cold mix as noted in the standard details-typical pavement section.

3.2.3.

Groundwater Control: Contractor to maintain facilities on-site to remove all groundwater from trench and keep water at least 12 inches below the trench bottom to a point such that a firm base for pipe or conduit installation exists. Facilities shall be maintained until all concrete is cured and backfilling is in place at least 24 inches above anticipated water levels before water removal is discontinued; all water removal shall be subject to approval by the Engineer.

3.2.4.

Stockpile Excavated Material: Excavated material to be stockpiled so as not to endanger the work or public safety. Maintain existing vehicular and pedestrian traffic with minimum disruption. Maintain emergency access and access to existing fire hydrants and water valves. Maintain natural drainage courses and street gutters.

3.2.4.1.

Backfill material to be segregated from stockpiled topsoil and unusable backfill materials.

3.2.5.

Excavation for Appurtenances: Excavation to be done in accordance with these Specifications and as shown on the Drawings. Adequate working clearances to be maintained around appurtenances. Provisions for base and bottom preparations shall apply to all appurtenances.

3.2.5.1.

Precautions to be taken to maintain trench widths in the vicinity of adjacent pipelines and conduits.

3.3.

Creek, stream, river crossings: At each crossing where indicated on plans a one foot high and four foot wide berm shall be constructed adjacent and parallel to the top of each bank, so runoff will flow along the berm and be deflected to undisturbed vegetated area before entering the water way.

3.3.1.

Vegetation removal: To prevent erosion of waterway banks at points were the excavation crosses, the removal of trees and vegetation along the banks shall be minimized. A tree removal plan shall be approved by the Engineer prior to any trees being removed.

3.3.2.

Crossing restoration: Restoration of waterway crossings shall begin within a minimum of three (3) days after back fill of trench is complete. Exposed disturbed areas in the waterway crossing shall not remain unprotected for more than seven (7) days.

3.4.

Bottom Preparation:

3.4.1.

Undisturbed Foundation: Where soils are suitable and have adequate strength, bottom to be graded and hand-shaped such that pipe barrel rests uniformly on undisturbed soil. All rocks or stones which may result in a point bearing on the pipe shall be removed.

3.4.1.1.

Undisturbed grades shall be within 0.1 feet ± tolerance. Soils for final pipe grade placed within these limits shall be fine granular (100% passing No. 4 sieve) or may be native materials, hand compacted to 95% maximum density.

3.4.2.
Bell Holes: Material to be removed to allow installation of all fitting and joint projections without affecting placement of pipe.
3.4.3.
Over excavation: Whenever trench is over excavated to eliminate point bearing by rocks or stones or when undisturbed grade tolerances of 0.1 feet are exceeded, the Contractor is to re-establish grade using Class 6 aggregate bedding material. Compaction shall be 95% maximum density. All work to re-establish grade shall be at the Contractor's expense.
3.4.4.
Unstable Materials: Materials which are not capable of supporting superimposed loadings are defined as unstable materials. Should unstable materials be encountered during excavation, immediately notify Engineer. If, in the opinion of the Engineer, unstable soil excavation is required and the Contractor could not have reasonably been expected to discover the existence of such materials during his site investigation, then a contract price for Unstable Soil Excavation shall be negotiated between Owner and Contractor. No payment shall be made for materials excavated prior to notification of the Engineer and negotiation of payment for extra work.
3.4.4.1.
Inclusion of a bid item for unstable soil excavation indicates such excavation is anticipated. The Contractor is to notify the Engineer prior to any unstable soil excavation; no payment shall be made for excavation prior to authorization of Engineer.
3.4.5.
Rock Excavation: Rock excavation shall be defined as removal of boulders in excess of three (3) cubic yards of solid or fractured rock, which makes hand shaping of the bottom impossible and which requires techniques, such as blasting or jacking for removal, other than those which are being employed by the Contractor or are normally used in trench excavation, such as use of backhoes, trenchers, draglines, etc. Should unanticipated rock conditions be encountered, immediately notify the Engineer. If in the opinion of the Engineer, rock excavation is required and the Contractor has in fact made a diligent and determined effort to remove the material using normal excavation procedures as stated above, and the Contractor could not have reasonably been expected to determine the existence of such material during his site investigation, then a contract price for rock excavation shall be negotiated between the Contractor and the Owner. No payment shall be made for excavation performed prior to determination of a negotiated price.
3.4.5.1.
Rock shall be removed to a 4 inch depth below grade. Additionally, all rock loosened during jacking, blasting, etc., shall be removed from the trench. For payment purposes, maximum trench width to be paid for shall be as defined in Subsection 3.2.1. Maximum depth to be paid for shall be 12 inches below required grade. All over excavation shall be replaced as specified in Subsection 3.3.3.
3.4.5.2.
Inclusion of a bid item for rock excavation indicates such excavation is anticipated.and the Contractor is to notify Engineer prior to any rock excavating; no payment shall be made for excavation prior to notification.
3.5.
Backfilling:
3.5.1.
Tamping Equipment: Except immediately next to the pipe, mechanical or air operated tamping equipment is to be used. Hand equipment such as a T-bar is to be used next to the pipe if necessary. Care to be taken when compacting under, along side, and immediately above pipe to prevent crushing, fracturing or shifting of the pipe. The Contractor is to note densities required for materials being backfilled and shall use appropriate approved equipment to obtain those densities.
3.5.1.1.
Wheel rolling is not considered to be an adequate compaction technique to meet these Specifications and will not be allowed. Where 85% compaction is required, wheel rolling may be considered. Before acceptance, the Contractor shall backfill a portion of the trench and pays for density testing to verify adequacy of the proposed backfill techniques.

3.5.1.2.
A hydro hammer may be allowed to obtain the specified density up to 4 feet in depth. The Contractor will be required to re-excavate those areas that have been tamped so that density tests can be taken to insure that the specified density is being obtained full depth.
3.5.2.
Moisture Control: Generally maintain moisture of backfill material with ± 2% of optimum moisture content as determined by ASTM D698. Maintain closer tolerances as needed to obtain densities required.
3.5.3.
Compaction: Maximum density (100%) based on ASTM D698 or AASHTO T99.
3.5.3.1.
Bedding Material: including material used for over-excavation of any kind: 95%
3.5.3.2.
Select Material: 95%
3.5.3.3.
Backfill beneath existing or proposed pavement, roadways, sidewalks, curbs, utility lines and other improvements or within 5 feet horizontally of such improvements, or within a 1:1 prism from such improvements: 95%
3.5.3.4.
Backfill within public or designated right-of-way: 90% or as shown on the Drawings.
3.5.3.5.
Backfill within undeveloped, green or undesignated area: 85%
3.5.3.6.
Backfill for any fill over over-cut grading in areas of lot/home construction: 95%.
3.5.4.
Placing Backfill: The maximum loose lifts of backfill material to be as follows: use smaller lifts where necessary to obtain required densities:
3.5.4.1.
Bedding and select material: 6 inches (or see Section 3.3.1).
3.5.4.2.
Backfill Material: 12 inches where 95% compaction required. 24 inches where less than 95% compaction required.
3.5.5.
Backfilling Appurtenances: Backfilling to be done generally at the same time as adjacent pipelines. Backfilling procedure to conform to this section. Use special techniques or materials as shown on drawings.
3.5.6.
Disposal of Excess Excavation: Contractor to dispose of excess excavation off-site. The Owner shall have the right to elect to have the excess excavation disposed of at a designated site within the project limits. Excavation may be wasted on-site only if approved by the Engineer. Disposal in any case shall be the sole responsibility of the Contractor.
3.5.7.
Jetting: Jetting and water inundation are generally not permitted methods of compaction. The Engineer may allow jetting under certain field conditions. Techniques including depth of lifts, amount of water to be used, penetration of hose jet, etc., shall be at the direction of the Engineer. No jetting will be allowed on materials with a 200 minus gradation of greater than 15%. Contractor shall pay cost of all water used, soil classification testing and a retesting or recompaction required. No jetting shall be done prior to written approval and direction of the Engineer.

3.5.8.
Maintenance of Backfill: Contractor to maintain all backfill in a satisfactory condition during the extent of the contract and warranty period. All surface deterioration determined to be the responsibility of the Contractor and all settlement shall be repaired at once by the Contractor upon notice by the Owner. All costs for repair and all liability as a result of surface deterioration or settlement shall be the responsibility of the Contractor.

3.5.9.
Clay Barrier Water Stops: Because of the presence of ground water, a clay barrier may be required to be installed full depth in trench in place of all bedding material and backfill. This barrier shall be full depth and two feet thick and installed every 500 lineal feet of trench. Clay barrier installation shall be considered incidental to the pipe installation and not paid for separately.

3.6.
Surface Restoration. All existing surface improvements and site conditions disturbed or damaged during construction to be restored to a condition equal to pre-construction condition. All restoration costs are considered incidental to excavation and backfill. The Contractor shall provide sufficient labor forces and equipment to maintain cleanup operations closely behind pipe laying operations. Every advantage shall be taken of periods of good weather for general cleanup, grading, top-soiling, seeding, sodding etc. Items of work such as manhole construction, road cuts, pavement replacement, and all other restoration work shall not be allowed to lag behind the pipe installation. Special attention shall be given to maintaining road crossings.

3.6.1.
Temporary pavement patches: Patches must be kept flush with adjacent paved surfaces between asphalt paving seasons. Ruts and other depressions caused by settling, vehicular traffic etc. shall be continuously filled and graded for maintenance of smooth traveled surface and minimum inconvenience to the public.

3.6.2.
Improvements: Replace, repair, or reconstruct all improvements as required. Work will not be accepted until restoration is accepted by Engineer and all affected property owners. Improvements include, by example, other utilities, culverts, structures, curb and gutter, mailboxes, signs, sprinkler systems, etc.

3.6.3.
Final Grading: The Contractor is to re-establish existing final grade or finish final grades as modified and shown on the Drawings. The Contractor is to backfill to proper sub grade elevation with backfill material to allow placement of surface improvements or materials.

3.6.4.1.
Minimum base course material on gravel roadways or minimum depth gravel on hard surface roadways to be 8 inches, unless shown otherwise on Drawings.

3.6.4.2.
Minimum bituminous surfacing to be 3 inches unless shown otherwise on Drawings.

3.6.4.3.
Minimum concrete pavement surfacing to be 6 inches, unless shown otherwise on Drawings.

3.6.5.
Restoration Monitoring: If in the opinion of the Engineer, cleanup and miscellaneous items of work and construction are lagging, the Contractor will be required to stop pipe installation until such work is caught up. A percentage of the unit and lump sum prices will be withheld from payments for pipe installation, manhole construction etc. in areas where cleanup and restoration have not been completed. This percentage will be in excess of the specified 10% retainage for completed work.

4. QUALITY CONTROL - FIELD

4.1.
Compaction. It should be fully understood that it will be the sole responsibility of the Contractor to achieve the specified densities for all embedment and backfill material placed. The Contractor will be responsible for ensuring that correct methods are being used for the placement and compaction of said materials. Correct backfill methods include, but are not limited to:

4.1.1.
Use of proper equipment for existing soil condition encountered.

4.1.2.
Moisture content of existing soils; determination if water should be added or if soil should be air dried to reduce moisture content.

4.1.3.
Thickness of backfill lift.
4.1.4.
Contractor may, at his own expense, have an approved geotechnical engineer monitor the methods of backfill and compaction used to ensure that the desired densities are being obtained.
4.1.5.
Inspection and testing will be performed as directed by the Engineer. Testing will be conducted as a quality assurance check to verify the Contractor's compliance with the standards indicated in the Specifications.
4.2.
Inspection and Testing. Inspection and testing to be performed at the direction of the Engineer. The Contractor shall cooperate fully with all persons engaged in testing. The Contractor shall excavate as required allowing testing. The Contractor shall backfill all test excavations in accordance with these Specifications. Any areas which require a specified density, including fill, backfill, trenches, embankments, road base, hot bituminous pavement, backfill for structures, shall be tested.
4.3.
Density Testing and Control:
4.3.1.
Reference Standards: Density/moisture relationships to be developed for all soil types encountered according to ASTM D698 or AASHTO T99.
4.3.2.
Field Testing: Testing for density during compaction operations to be done in accordance with ASTM D2922 using nuclear density methods.
4.3.3.
Frequency of Testing: Minimum of one (1) test every 250 feet of trench per lift or as directed by Engineer. The Contractor to excavate to depths required by Engineer for testing and backfill test holes to density specified. Testing to be paid for by Owner.
4.3.4.
Retesting: In the event of failure to meet compaction criteria, the Contractor shall re-excavate and re-backfill at direction of Engineer. All retesting to be paid for by Contractor and to be performed by soils testing firm approved by the Engineer.
4.4.
Payment for Testing: Owner responsible for all costs of initial testing of backfill. Contractor to pay all costs of any retesting required.
5.
MEASUREMENT AND BASIS OF PAYMENT
5.1.
Measurement: Separate measurement for payment will not be made for trenching, backfilling, and compaction specified in this Section.
5.2.
Payment: Separate payment will not be made for trenching, backfilling, and compaction in this Section. All costs for such work will be considered to be included in the prices quoted for the applicable related items of work.

END OF SECTION

SECTION 02829

ELECTRIC GATE OPERATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electric Gate Operators:
   1. Commercial High Traffic DC Slide Gate Operator (LiftMaster Model CSL24UL).

B. Monitored Photo Eyes
   1. Monitored Retro-Reflective Photo Eyes (LiftMaster Model LMRRUL)
   2. Monitored Through-Beam Photo Eyes (LiftMaster Model LMTBUL)

1.2 RELATED SECTIONS

A. Section 02820 - Fences and Gates: Adjoining fences and gates.

B. Section 03300 - Cast-in-Place Concrete: Concrete mounting pads.

C. Section 11150 - Parking control equipment.

D. Division 16 - Requirements for electrical connections.

1.3 REFERENCES

A. National Electrical Manufacturers Association (NEMA): NEMA ICS 6 - Industrial Control and Systems: Enclosures.

B. Underwriters Laboratories (UL): UL 325 - Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.

C. Underwriters Laboratories (UL): UL 991 - Standard for Tests for Safety-Related Controls Employing Solid-State Devices.

D. International Organization for Standardization: ISO 9001 - Quality Management Systems.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Equipment list, system description, electrical wiring diagrams for installation, and manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, edge conditions, and accessories.
   1. Operation, installation, and maintenance manuals including wiring diagrams.
   2. Risers, layouts, and special wiring diagrams showing any changes to standard drawings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials and products in strict compliance with manufacturer's instructions and industry standards.

B. Store products indoors in manufacturer's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 Certified Manufacturer.

B. Installer Qualifications: Installation performed by factory authorized contractor specifically trained in gate operation systems of the type found within this section.
   1. Provide documentation of maintenance and repair service availability for emergency conditions.
   2. Provide quarterly maintenance for one year following Substantial Completion of the Project.

1.7 WARRANTY

A. Manufacturer's Standard Limited Warranty:
   1. Warranty Period: 5 years for commercial applications, 7 years for residential applications.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: LiftMaster; 300 Windsor Drive; Oak Brook, IL 60523. ASD. Toll-Free: 800.282.6225. Email: specs@LiftMaster.com. Web: LiftMaster.com.

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 GATE OPERATORS

A. Gate Operators: LiftMaster CSL24UL Commercial High Traffic DC Slide Gate Operator.
   1. LiftMaster CSL24UL Slide Gate Operator.
   2. Compliance: UL Listed. Compliant to the UL 325, UL 991 and CSA C22.2 No. 247 standards.
      a. This model is intended for use in Class I, II, III and IV vehicular slide gate applications.
   3. Monitored Safety Inputs: 3 inputs per board (main board and expansion board) totaling 6 inputs with any combination of up to:
      a. Main Board:
         1) 1 Monitored Close Photo Eye input
         2) 1 Monitored Open Photo Eye input
         3) 1 Monitored Open Safety Edge or Open Photo Eye input
      b. Expansion Board
         1) 2 Monitored Safety Edge or Photo Eye inputs (selectable for Open or Close).
         2) 1 Monitored Photo Eye input (selectable for Open or Close).

c. 8 Monitored edges available when Transceiver is added.

4. Electrical Power Requirements:
   a. 115V AC, single phase
   b. 230V AC, single phase.
5. Motor: 24V DC, with soft start/stop operation.
   a. Duty cycle: Continuous duty.
6. Capacity: 50-foot (15200 mm) gate at 1,500 pounds (680 kg).
7. Recommended Cycles per Day: Continuous duty.
8. Gate Travel Speed: 12 inches (304 mm) per second.
9. Warranty: 5 years for commercial applications, 7 years for single-home applications.
10. Wormgear Reduction: Commercial oil bath gearbox with 10:1 wormgear reduction running in synthetic oil bath.
11. Battery Backup: Power Management system draws 14.8 mA when gate is idle with remote controls programmed. Provides 208 cycles on Battery Backup with two 7 Ah batteries or 1179 cycles with two 33 Ah batteries.
12. Standby Time: Provides up to 24 days of standby power in the event of a power loss with two 7 Ah batteries or 105 days with two 33 Ah batteries (excluding accessories).
13. Solar Capable: See daily solar cycle chart.
14. Accessory Electrical Power Requirements: 24V DC 500 mA output, switched and unswitched power.
15. Chassis: Constructed with 1/4 inch (6mm) gold zinc-plated steel for rust prevention.
16. Cover: High-density, UV-resistant polycarbonate two-piece cover.
17. Internet Connectivity: MyQ Technology
    a. 902 to 928 MHz
    b. 50-channel FHSS (Frequency Hopping Spread Spectrum).
    c. LiftMaster 828LM Internet Gateway enables monitoring and control of gate operators via internet-enabled smartphone, tablet or computer.
    d. Provides two-way communication between gate operator and MyQ accessories to enable remote open, close and monitoring of gate.
18. Receiver:
    a. Security+ 2.0 3-channel on-board receiver, holds up to 50 remote controls (unlimited with use of 811LM/813LM), HomeLink compatible
    b. Transmits 310 MHz, 315 MHz, 390 MHz.
19. Inherent Reversing Sensor: Detects obstructions or increased loads. Reverses gate when closing or stops/reverses the gate when opening.
20. Electronic Limits: Maintains accurate limit position throughout travel, even after using the manual disconnect.
21. Dual-gate operation capabilities to allow 2 separate gate operators to operate in unison at a single entrance.
22. Wireless Dual-Gate Operation:
    a. Built-in wireless communication will operate primary and secondary operator without having to run a communication wire.
    b. Support for Through-beam photo eye in the wireless dual-gate setup. Can attach emitter and receiver to each operator, eliminating the communication wire between them.
23. PosiLock: Automatically powers the operator and returns a gate to the closed position when gate is pushed off of its closed limits.
24. Bi-Part Delay: Selectable feature for dual-gate applications. Firmware monitors speed and position of each gate and adjusts speed as necessary to ensure both the gates close at the same time.
25. Synchronized Close: Selectable feature for dual-gate applications. Monitors the speed and position of each gate and adjusts speed as necessary to ensure both the gates close at the same time.

26. LED Diagnostic Display: Simplifies installation and troubleshooting.
27. Colored Terminal Blocks: Provides easy identification of safety and fire department inputs.
28. Programmable Auxiliary Relays: 2 programmable relays with 6 settings each
    a. Pre-warning or gate-in-motion sounder.
    b. Switch on/off devices at open or Close Limits or while gate is in motion..
    c. Tamper detection if gate is pushed off Close Limit.
    d. Cycle quantity feedback.
    e. Red/Green light to control gate traffic.
29. Quick Close, Anti-Tailgate: Quickly secures property, preventing unauthorized access.
30. Sequenced Access Management: Capable of sequentially controlling the operator in tandem with barrier gate.
31. Plug-in Loop Detector Inputs: Programmed inputs for shadow, interrupt and exit.
32. Alarm Reset Button: Instantly resets the built-in safety alarm siren.
33. Fire Department Compliant: Selectable settings allow gate to auto open on power failure or battery depletion.
34. Surge Suppression: Industrial strength on high and low voltage outputs. Protects against lightning strikes at a 50-foot (15240 mm) radius.
35. Keyed Manual Disconnect: Simple-to-use disconnect allows gate to be operated manually and maintain limit position once re-engaged.
36. Operating Temperature Range:
    a. Without Heater: -4 degrees F (-20 degrees C) to 140 degrees F (60 degrees C)
    b. With Optional Heater: -40 degrees F (-40 degrees C) to 140 degrees F (60 degrees C)
37. MyQ enabled Accessories:
    a. LiftMaster 828LM Internet Gateway: Allows remote monitoring from internet-enabled computer or smartphone.
    b. LiftMaster 829LM Garage and Gate Monitor: Allows remote monitoring and operation.
    c. LiftMaster 823LM Remote Light Switch: Controls light remotely.
    d. LiftMaster 825LM Remote Light Control: Allows remote monitoring and operation.
38. Accessories: Safety Monitoring Devices:
    a. Monitored Photo Eyes and Wireless Edge Kits.
        1) LiftMaster LMRRUL Reflective Photo Eyes.
        2) LiftMaster LMTBUL Thru-Beam Photo Eyes.
        3) LiftMaster LMWEKITU Wireless Edge Kith with Transmitter and Receiver.
        4) LiftMaster LMWETXU Wireless Edge Transceiver
    b. Wired Monitored Edges (all require use of LMWEKITU)
        1) LiftMaster S50 Small Profile Monitored Edge
        2) LiftMaster L50 Large Profile Monitored Edge
        3) LiftMaster WS4 Wrap-Around 4 foot (1219 mm) square monitored edge
        4) LiftMaster WS5 Wrap-Around 5 foot (1524 mm) square monitored edge
        5) LiftMaster WS6 Wrap-Around 6 foot (1829 mm) square monitored edge
        6) LiftMaster WR4 Wrap-Around 4 foot (1219 mm) square monitored edge
        7) LiftMaster WR5 Wrap-Around 5 foot (1524 mm) square monitored edge
        8) LiftMaster WR6 Wrap-Around 6 foot (1829 mm) square monitored edge
39. Accessories: Provide the optional accessories listed below.
    a. LiftMaster LOOPDETLM Plug-in Loop Detector
    b. LiftMaster KPW250 – Wireless Commercial Keypad
    c. LiftMaster 892LT 2-Button Security+ 2.0 Learning Remote Control
    d. LiftMaster 894LT 4-Button Security+ 2.0 Learning Remote Control
    e. LiftMaster 811LM 1-Button Encrypted DIP Remote Control
    f. LiftMaster 813LM 3-Button Encrypted DIP Remote Control

g. LiftMaster IPAC – Internet Protocol Access Control Entry System
h. LiftMaster EL2000SS Stainless Steel Commercial and Gated Community Telephone Entry System.
i. LiftMaster Star1000 Commercial Access Control Receiver
j. LiftMaster PPWR Passport Receiver with Security+ 2.0 Technology
k. LiftMaster PPV1 Passport 1-Button Remote
l. LiftMaster PPK1 Passport 1-Button Mini Remote
m. LiftMaster KPR2000 Single Access Remote Control Keypad and Proximity Reader
n. LiftMaster MG1300 Maglock. 1,300 pound (590 kg) holding force
o. LiftMaster MPEL: Mounting plate for post mount
p. LiftMaster HTR Heater Kit

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Inspect and prepare substrates using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions.

B. Do not proceed with installation until substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions. Test for proper operation and adjust until satisfactory results are obtained.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

DIVISION 3 CONCRETE

SECTION 03150 CONCRETE FORMWORK

GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply, shall be a part of this Specification.

PART 1 - GENERAL

1.1 SCOPE

A. Work Specified

1. Furnish all labor, materials and equipment and perform all operations required to complete all formwork as indicated on the drawings and specified herein.

1.2 DESCRIPTION

A. Work Included: Forms, shores, bracing, removal and other operations as necessary for all cast in place concrete placed.

1. Setting and securing into forms anchor bolts and other metal items embedded in concrete, using materials and layouts furnished and delivered to jobsite as specified under other sections.

B. Related Work Specified Elsewhere

1. Section 03200: Concrete Reinforcement

2. Section 03300: Cast-in-Place Concrete

1.3 QUALITY ASSURANCE

A. Reference Standards

1. ACI 347 "Recommended Practice for Concrete Formwork."

2. American Plywood Association (APA).

3. West Coast Lumberman's Association (WCLA).

4. California Building Code, 2007 edition, Chapter 19.

B. Submittals: Form interface to concrete elevations, see Section 3.01.A.6, prior to placement of concrete and see 3.03D after removal of forms

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: All form materials shall be new at start of job. Intent is to produce high quality concrete construction with minimum defects due to joints, deflection of forms, roughness of forms, or other concrete or poor form materials or workmanship.

B. Reuse of Forms: Plywood forms may be reused, provided they are thoroughly cleaned of all dirt, mortar, and foreign materials, and are undamaged at edges and contact face. Reuse in all cases shall be subject to permission from the Architect. Reuse of any panel, which will produce a blemish on exposed concrete, will not be permitted.

2.1 MATERIALS (continued)

C. Form Materials:

1. Non-Exposed Surface Formwork Facing:

a. Forms for concrete which is not exposed to view, may be of plywood as specified for exposed surfaces, or square edge 1" x nominal Douglas Fir, Construction Grade, S4S.

2. Exposed Surface Formwork Facing:

a. Forms for all exterior and interior concrete flat surfaces unless otherwise specified as board formed shall be new Douglas Fir Plywood (APA)5-ply, ⅝″, B-B Plyform, Class 1, Exterior Type, oiled and edged and edge-sealed conforming to U.S. Product Standard PS 1-83 in large sheet sizes to achieve joint patterns shown.

b. All exposed concrete edges shall be chamfered ½" minimum or as noted on the drawings.

D. Earth Forms: Earth trench forms will be allowed if soil will stand in excavations and not ravel or cave.

E. Form Coating:

1. Form Sealer: "Nox-crete Form Coating", or an approved equal for wood forms only.

2. Spray-on compounds shall not affect color, bond or subsequent treatment of concrete surfaces.

PART 3 - EXECUTION

3.1 CONSTRUCTION OF FORMS

A. General:

1. All concrete work shall be formed to the shapes, sizes, lines and dimensions shown on the plans. Cambers specified in concrete members and slabs shall be provided in the formwork

2. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the Contractor.

3. Schedule the work and notify other trades in ample time so that provisions for their work in the formwork can be made without delaying progress of the project. Verify that all sleeves, pipes, etc. for electrical, plumbing, heating and ventilation, or other work, are installed; and secure information about and provide for all openings, offsets, recessed nailing blocks, channel chases, anchors, ties, inserts, etc. in the formwork before concrete is poured.

4. The Architect/Engineer shall be notified for and conduct a review of the formwork prior to placing reinforcing steel.

5. Excessive deflection of forms after concrete is poured shall be sufficient cause for rejection of that portion of concrete and formwork. Excessive deflection will be considered to be that which will produce visible and noticeable waves in the finished concrete.

3.1 CONSTRUCTION OF FORMS (continued)

B. Arrangements of formwork shall be uniform and workmanlike. Forms shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly tied, braced, shored, and supported to insure stability against pressures from any source, without failure of any component part and without excessive deflection.

C. Proper provisions shall be made for all openings, offsets, inserts, anchorages, blocking, and other features of the work as shown or required.

D. Warped, checked or scuffed forms shall be rejected.

E. Membranes, reinforcing and other work shall be protected with plywood runway boards, etc. as necessary.

3.2 SURFACE TREATMENT OF FORMS

A. Contact surface of all plywood and board forms shall be treated with a form sealer. Treatment shall be in strict conformance with the manufacturer's specifications. The sealer to be used shall leave no residue or stain upon the face of the concrete, nor have the effect in any way of preventing bonding of subsequent paint or plaster coats.

3.3 FORM REMOVAL

A. Forms shall not be loosened or removed before minimum curing period has elapsed without appropriate, approved, alternate curing methods being employed.

B. Forms shall be removed without damage to the concrete and in such a manner that will insure complete safety of the structure and without damaging exposed beam, column, and wall edges and chamfers and inserts. In no case shall they be removed until the concrete has hardened sufficiently to permit their removal with safety, and the members have attained sufficient strength to safely support the imposed loads. The minimum time for removal of forms after concrete has been poured shall be as follows:

1. Columns and Walls: 7 days, provided members are not subjected to overhead loads.

2. Footings: Side forms may be removed 24-hours after concrete is poured, if backfilled immediately, otherwise 7 days minimum.

C. The times listed above are minimum. These time periods may be extended if deemed necessary by the Architect/Engineer.

D. Provide measured elevations in writing at the same locations as provided for formwork within 7 days of removing forms.

E. Concrete shall not be subjected to superimposed loads (structure or construction) until it has attained its full design strength and not for a period of at least 14 days after placing. Concrete systems shall not be subjected to construction loads in excess of design loads.

END OF SECTION

DIVISION 3 CONCRETE

SECTION 03200 CONCRETE REINFORCEMENT

GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply, shall be a part of this Specification.

PART 1 - GENERAL

1.1 SCOPE

A. Work Specified

1. Furnish all labor, materials and equipment and perform all operations required to complete all reinforcing steel work as indicated on the drawings and specified herein.

1.2 DESCRIPTION

A. Complete steel reinforcing for all concrete and masonry work shown or specified to be reinforced, as indicated on the drawings, as described. Coordinate this work with the other work affected by these operations, such as forms, electrical work, mechanical work, structural steel, and concrete.

B. Related Work Specified Elsewhere

1. Section 03150: Concrete Formwork
2. Section 03300: Cast-In-Place Concrete

1.3 QUALITY ASSURANCE

A. Reference Standards: Unless otherwise noted, the latest adopted edition of the following standards shall govern the work.

1. California Building Code, 2016 edition, Chapter 19.
2. CRSI - Manual of Standard Practice and Recommended Practice for Placing Reinforcing Bars. MSP, latest edition.
3. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete.
4. AWS - American Welding Society
5. ASTM - American Society for Testing and Materials

B. Submittals: Contractor Supplied Identification and Verification of Materials and Uses:

1. Provide to the Owner's Testing Laboratory all material identification/test information as required below.

a. The Fabricator shall provide manufacturer's mill test reports for the materials to be used on the job. These reports are to include chemical and physical properties of the reinforcing for each heat number manufactured. All fabricated materials to be tagged with heat number.

b. Fabricator shall provide a letter of certification stating that materials supplied are from heat numbers covered by supplied mill certificates. Include in this letter of certification the physical location of each grade of reinforcing and/or heat number in the project (i.e. foundations, walls, etc.).

1.3 QUALITY ASSURANCE (continued)

c. Material Tests: Where identification of materials by heat number to mill tests cannot be made, the Contractor shall have the materials tested at his expense, make one series of tension and bend tests for each 10tons or fraction thereof each size and type of reinforcing steel. Tests shall be performed by a qualified Testing Laboratory.

2. Provide to the Architect/Engineer:

a. Shop drawings showing complete fabrication and placing details of all reinforcing steel for review prior to start of fabrication. Drawings shall also show bar sizes and layout and shall refer to design drawings and details. The Architect/Engineer's review is of a general nature only. An effort will be made to discover any errors but all responsibility or conformance with the drawings and specifications shall remain with the Contractor. The General Contractor shall review and approve shop drawings prior to submittal to the Architect.

b. Samples or vendor data on reinforcement supports and locations.

1.4 TESTING & INSPECTION BY THE OWNER'S TESTING LABORATORY

A. Review all Contractor submittals for material identification of materials. Verify adequacy at fabricator shop and on site where testing of materials has been done by the Contractor's testing laboratory. Review for adequacy.

B. For all structural classes of concrete with specified strengths of 2500 psi or more, inspect reinforcement size, placement, clearances, etc. All inspections to be done 48 hours prior to placement of concrete and shall be done using contractor documents, not shop drawings. Report any discrepancies to Architect/Engineer immediately so that corrective measures may be taken by the Contractor.

C. Continuous inspection of all welding of reinforcement and pre-heat operations.

D. Provide reports to the Architect/Engineer on above items.

1.5 PRODUCT DELIVERY, STORAGE & HANDLING

A. Reinforcing steel shall be delivered to job site in bundles, tagged identifying location on the job. Store reinforcement above the ground on platforms or skids to prevent damage or accumulation of dirt or rust.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Steel: The reinforcing bars shall conform to ASTM A706; or to ASTM 615, Grade 60, except (1) the maximum yield strength shall be 78,000 psi, and (2) the tensile strength shall not be less than 1.25 times the actual yield strength. Bars used as column ties, stirrups, and field bent dowels shall be Grade 40 minimum, unless otherwise noted on the drawings.
All reinforcement to be welded shall be or shall meet the requirements for ASTM A706 reinforcement.

B. Welded Wire Fabric: ASTM A-185

C. Tie Wire: No. 16 AWG or heavier, black annealed.

2.1 MATERIALS (continued)

D. Supports for Reinforcing Bars:

1. Supports for reinforcing on ground shall be blocks of concrete of sufficient strength and size to support the bars in proper locations.

2. Supports for reinforcing over formwork, concrete, or metal shall be plastic or galvanized steel chairs of type reviewed by the Architect/Engineer and of sufficient strength and spacing to support the bars and any construction loads imposed on them. Metal bar supports shall conform to current ACI and CRSI Standards. Metal bar supports shall have plastic tips where exposed to weather and/or to view after removal of forms.

PART 3 - EXECUTION

3.1 FABRICATION

A. All steel bars, wire and fabric shall be of size, gauge and length indicated, accurately bent or formed to shapes detailed or scheduled by experienced shops using methods that will not injure the materials. Bending and placing of bars shall be in accordance with the Manual of Standard Practice and Recommended Practice for Placing Reinforcing Bars (CRSI MSP-Latest Edition) unless otherwise shown, noted or specified. Unless otherwise allowed, all reinforcing bars shall be shop fabricated to lengths and bends shown on drawings.

B. Steel reinforcing shall not be bent in a manner that will injure the material or the embedding concrete. Bars with kinks or bends not shown on the plans shall not be used. Heating of reinforcement for bending will not be permitted. Bars shall be bent once only (no re-bending or straightening allowed) unless shown as such on the drawings.

C. All details of reinforcement not shown or indicated on the drawings or specifically called for in the specifications shall conform to ACI 315.

D. Reinforcement shall be tagged with suitable identification to facilitate sorting and placing.

3.2 PLACING

A. General

1. Reinforcing bars shall be of size shown on the drawings, schedules and details; accurately placed as to spacing and clearance; and securely tied at all intersections and supports with wire in such manner as will preclude displacement during placement of concrete.

2. Place and secure reinforcement to maintain the proper distance and clearance between parallel bars and from the forms or ground. Provide additional steel as metal spreaders and separators to maintain steel properly positioned in forms. Support additional reinforcement upon concrete pads, bars, or form hangers. All clearance requirements shall be met.

3. Supports for reinforcing in walls, columns and slabs shall be the correct size and at the proper spacing to adequately position and support the reinforcing until concrete has been placed.

4. Before placing, clean bars free from rust, scale, dirt, grease, dried coatings of concrete or other foreign substances, which are, in the Architect/Engineer's opinion, detrimental to the bond. After placing, maintain bars in a clean condition until completely embedded in concrete.

3.2 PLACING (continued)

5. All reinforcing shall be kept separate from soil, pipe, conduit, ducts, etc. by non-metallic separators that have been accepted for use.

B. Reinforcing Spacing and Coverage:

1. Bars shall not be spaced closer than four (4) diameters of the largest of two adjacent bars, except at bar laps, which shall be placed such that a minimum of 2 bar diameters is clear between bars. Where reinforcing in members is placed in two layers, the distance between layers shall not be less than four bar diameters of the largest bar and the bars in the upper layers shall be placed directly above those in the bottom layer, unless otherwise detailed or dimensioned.

2. Coverage of bars (including stirrups and columns ties) shall, unless otherwise shown, be as follows:

Footings & Mat Foundation: ..... 3" any soil face, 2" top

Slabs (on grade): ..... 2" grade face, 1½" top face

Slabs (elevated): ..... 1½" top and bottom

Beam & Column: ..... 1½"

Walls: ..... 1½" clear to form

C. Obstructions:

1. Where obstructions (block outs, pipes, conduit, ducts, etc.) prevent the intended placement of reinforcing, provide additional reinforcing, as directed by the details for such obstructions and as directed by the Engineer, around the obstruction to match that reinforcing interrupted.

2. Provide additional stirrups, ties, trim bars, etc. as directed around all openings, sleeves, pipes, and conduit, which pass through structural elements.

3. Provide for clearances and block-outs as required in other sections.

D. Welded Wire Fabric: Welded wire fabric reinforcement shall be rolled out, straightened, cut to required size, and laid out flat in place. Securely wire to fabric and other reinforcement at frequent intervals. Extend fabric over supporting beams and walls. At edges of slabs, construction joints, and expansion joints, extend fabric to within 1” of pour. As concrete for slabs is placed, lift fabric reinforcement at intervals to insure proper embedment. Support fabric in mid-depth of slab. Slabs shall be reinforced with 6"x 6"-W1.4 x W1.4 welded wire fabric reinforcing, unless otherwise noted on drawings.

3.3 DOWELS, SPLICES, OFFSETS & BENDS

A. Lap all bars at splices, corners, and intersections as shown on structural drawings. Laps of welded wire fabric shall be at least two times the spacing of the members in the direction lapped but not less than twelve inches.

B. Splices of reinforcement shall not be made at points of maximum stress. Splice lengths are as noted on the structural drawings and shall provide sufficient lap to transfer the stress between bars by bond and shear.

3.3 DOWELS, SPLICES, OFFSETS & BENDS (continued)

Bars shall be spaced the minimum distance specified and all lapped bars shall be 2 bar diameter (minimum) clear of the next bar. Stagger splices of adjacent bars where possible and where required to maintain bar clearance. Beam or slab top bars shall be spliced mid-span of column support and bottom bars spliced at column supports. All splices not shown on the drawings shall be reviewed by Architect/Engineer prior to placement. All splices and laps at corners and intersections shall be tied with wire at each end.

C. Bends: Reinforcing bars are not to be re-bent on the job. All job site bending to be in accordance with section 3.01

D. Bar lock couplers by MBT coupler systems, 1-800-755-4888,(ICBO 5069, Nov, 1994) are to be used where shown on the drawings and may be used as an alternate to lap splices in general. Installation to be in accordance with manufacturer's recommendations.

3.4 WELDING

A. Reinforcing bars shall not have welded joints unless indicated on the drawings or unless prior approval has been given by the Architect/Engineer. Welding shall conform to the requirements of the American Welding Society Structural Welding Code for reinforcing steel D1.4. Field welding shall be performed by AWS certified welders. All reinforcement requires preheat prior to welding. Preheat operations must be inspected and certified by the Testing Laboratory. Preheat operations and welding must be inspected by a Testing Laboratory. If A706 reinforcement is not used and if mill test reports are not available, chemical analysis shall be made of bars representative of the bars to be welded. Bars with a carbon equivalent (CE) above 0.75 shall not be used for welded connections.

3.5 MISPLACED REINFORCING

A. If any reinforcing bars are found to be misplaced after concrete has been placed, the Architect/Engineer shall be notified immediately and no correction or cutting shall be made without his direction. Misplaced bars shall not be bent or kinked. Any redesign and/or reinforcing required because of misplaced bars shall be at the Contractor's expense.

3.6 SEPARATION

A. All reinforcing shall be kept separate from soil, pipe, conduit ducts, etc. by approved non-metallic separators. Steel stakes or reinforcement used as stakes shall not be used to support reinforcement.

3.7 CLEANING

A. The sub-contractor shall be responsible for removing excess material and debris associated with his work from the job site.

END OF SECTION

DIVISION 3 CONCRETE

SECTION 03300 CAST-IN-PLACE CONCRETE

GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions, and Instructions to Bidders, insofar as they apply, shall be a part of this Specification.

PART 1 - GENERAL

1.01 SCOPE

A. Work Specified

1. Provide all labor, materials, equipment and services to complete all concrete work required.

1.02 DESCRIPTION

A. The work shall include, but not necessarily be limited to, the following:

1. Foundations, slabs, walls, and retaining walls.
2. Installation of all bolts, inserts, sleeves, connections, etc. in the concrete.
3. Coordination with other trades:
   a. Make all preparations and do all work necessary to receive or adjoin the other work. Except where otherwise specified, the various trades will furnish bolts, anchors, etc. required for anchoring their work to the concrete. Installation of the bolts and anchors into the forms and the furnishing and installation of necessary blocking shall be done as a part of this work.
   b. The Contractor shall be responsible for the installation of all accessories embedded in the concrete and for the provision of holes, etc. necessary for the execution of the work of other trades. Any patching or cutting made necessary by failure or delay in complying with this requirement shall be at the Contractor's expense.
   c. Other trades shall be responsible for the accurate location of their accessories. Any cutting and patching which may be necessary because of inaccurate location shall be at their expense.

B. Related Work Specified Elsewhere

1. Section 03150: Concrete Formwork
2. Section 03200: Concrete Reinforcement

1.03 QUALITY ASSURANCE

A. Reference Standards: Unless otherwise noted, the following standards shall govern the work:

1. American Society for Testing and Materials (ASTM), latest revision.
2. California Building Code, Chapter 19 - Concrete and CBC Standards, latest adopted edition.

3. ACI 302 - Guide for Concrete Floor and Slab Construction.
4. ACI 301, ACI 304 - Recommended Practice for measuring, mixing and placing concrete.
5. ACI 305 - Recommended Practice for hot weather concreting.
6. ACI 306 - Recommended Practice for cold weather concreting.
7. ACI 211.1 - Standard practices for selecting proportions for normal, heavyweight and mass concrete.

B. Contractor submittals to the Architect/Engineer and the Owner's Testing Laboratory (unless noted otherwise).

1. Concrete Mix Designs:

   a. The mix design(s) for all structural classes of concrete is to be prepared by a qualified source, such as a testing laboratory. Contractor to allow for time required to do trial batch testing when required.
   b. The preparer shall submit with the mix design, a certification, in writing, that the mix design meets the requirements of the specifications; that the mix design meets the requirements of the California Building Code and these specifications for concrete durability and quality including a historical background as a pre-qualified mix; that the mix is over designed if the mix is not pre-qualified, or that trial batches will be made and tested (at the expense of the supplier).
   c. For concrete classes that indicate a minimum modulus of rupture (MOR),"beam" test results performed in accordance with ASTM C-78 shall be submitted as a part of pre-qualification requirements.
   d. Concrete mix designs with specified maximum WCR shall be designed to allow water added on site, or shall have clearly identified, on the mix design, that no water to be added on site.
   e. If a deviation of these specifications is desired, the preparer shall submit those deviations, along with a written explanation indicating the submitted mix design(s) will provide an equivalent or better concrete product than as specified.

2. Manufacturer's instructions and specifications for other concrete related materials such as: bond breakers, cure/sealer, admixtures, etc. (Architect/Engineer only).

3. Adjustments to reviewed mix designs to account for weather conditions, etc.

4. Proposed location of construction and cold joints when different or in addition to those shown on the drawings (Architect/Engineer only).

5. Batch plant certificates shall be provided upon delivery of each load of concrete. Certificates shall be provided to the owner's testing laboratory and the Architect/Engineer. Failure of the supplier to provide a batch plant certificate with each truckload of concrete is cause for rejection of the load. Certificates to include information per C4 below.

6. Engineering analysis prepared by a California licensed Civil or Structural Engineer to justify construction imposed loads on slabs, beams, and walls, when those loads are in excess of those required by the CBC for the specified use.

C. Testing and Inspection by the Owners Testing Laboratory (includes "Special" Inspections):

1. Review mix designs and certifications. Provide letter authored by a civil engineer licensed in California that recommends acceptance or rejection based upon conformance to specifications, and suitability of mix design for proposed use. Submit to engineer for review and final distribution.

2. Review of: Contractor submittals, batch plant certificates; admixtures, etc.

3. Batch plant inspection: At automated plants to occur at commencement of concrete work each day (first truck). Batch plant inspection at non-automated plants and when accuracy is questionable shall be continuous. Additionally, water cement ratio (WCR) is to be verified where a WCR is specified herein. The computed WCR is to be written on the batch plant certificate to be taken to the job site prior to the truck leaving the plant.

4. Batch plant certificates: Obtain a batch plant weigh master's certificate at the site. If no batch plant certificate is provided, recommend to the General Contractor that the truckload of concrete be rejected. So note in daily log, along with the location of the load of concrete in the structure if the load is not rejected.

   a. To verify mix design quantities and condition upon delivery to the site, the laboratory's inspector shall obtain for each transit mixer Batch Plant Certificates. Certificates to include: Date, time, ingredient quantities, water added at plant and on job, total mixer revolutions at time of placement, and time of departure. For concrete with specified water cement ratio, no water is to be added on site unless batch records show additional water may be added.

5. Construction Testing and Inspection: Provide continuous inspection during placement of structural class concrete with design strength of more than 2500 psi. Structural and non-structural class concrete with a design strength of 2500 psi or less to have periodic inspection on a 100 cubic yard basis as required to assure conformance. See 2.02 for concrete classifications.

   a. Flooring areas will be tested for water vapor transmission prior to installation of flooring systems. Refer to flooring specifications for conditions and timing for testing.

   b. Review and/or propose adjustments to reviewed mix designs to account for site, weather conditions, etc.

   c. Structural Concrete: Provide Engineer, Architect, Contractor and Building Official with written reports for Testing and Inspection of the following items:

      1) Concrete Cylinder Tests: Take a set of four specimens at the job of each class of concrete for each 100 cubic yards or fraction thereof placed each day for standard 6" x 12" cylinder tests in accordance with ASTM C-31. A record of the location in the building of each concrete batch will be kept and noted on the specimen. Standard compression test of cylinders will be made, one at 7 days and two at 28 days in accordance with ASTM C-39. The fourth cylinder is to be held until the specified concrete strengths have been attained.

2) For concrete classes with a specified minimum modulus for rupture (MOR) sample concrete and conduct "beam" tests per Section ASTM C-78 for each 1000 cubic yards of concrete per concrete supplier to be placed.

3) Slump test and air tests will be made at the time of taking test cylinders, and/or at one-hour intervals during placing concrete in accordance with ASTM-D-143.

4) Measure and record concrete temperature upon arrival of transit mixers and when taking specimens note weather conditions and temperature.

6. Rejection of Concrete Materials: The laboratory's inspector will report to the contractor when batch plant certificates are not provided and when material does not meet the requirements of these specifications. The contractor shall disallow use of such material unless prior approval for use is given by the engineer.

D. Should the concrete fail tests indicating conformance to the specifications, the Contractor shall bear the entire cost of remedial work or removal, redesign and replacing of defective concrete.

1.04 PRODUCT DELIVERY, STORAGE & HANDLING

A. Cement: Store in weather tight enclosures and protect against dampness, contamination, and warehouse set. All cement to be from the same source.

B. Aggregates:

1. Stock pile to prevent excessive segregation, or contamination with other materials or other sizes of aggregates.

2. Use only one supply source for each aggregate stock pile.

C. Admixtures:

1. Store to prevent contamination, evaporation, or damage.

2. Protect liquid admixtures from freezing and extreme temperature ranges.

3. Agitate emulsions prior to use.

1.05 COLD & HOT WEATHER REQUIREMENTS

A. Allowable Concrete Temperatures:

1. Cold Weather: When depositing concrete at freezing or near freezing temperatures, the concrete shall have a temperature of at least fifty (50) degrees F but not more than ninety (90) degrees F. The concrete shall be protected from freezing and maintained at a temperature of at least fifty (50) degrees F for not less than seven days after placing. When necessary, concrete materials shall be heated before mixing. Special precautions shall be taken for the protection of transit-mixed concrete. The use of salts or chemicals either as protection or as an admixture will not be permitted unless approved by the Architect/Engineer in writing. During near freezing weather an air temperature log shall be kept by the contractor for the first 7 days after placement. Intervals shall not exceed 8 hours. Do not place concrete during sub or near freezing weather, snow, rain or sleet unless protection from moisture and/or cold is provided.

1.05 COLD & HOT WEATER REQUIREMENTS (continued)

2. Hot Weather: Concrete shall be below 85 degrees F. when placed (add ice, cool aggregates as necessary). Do not place concrete in hot/windy weather without review of procedures by the Engineer. Generally, erect sunshades and/or wind breakers to protect flat work during finishing and immediate curing operations. Do not place concrete for flatwork when the air temperature exceeds 90 degrees F. Retarders shall be added to improve initial set times and evaporative retardants utilized during hot/windy weather. Modified mix designs to be reviewed by Owner's Testing Laboratory prior to use.

B. Do not place concrete during sub or near freezing weather, snow, rain or sleet unless protection from moisture and/or cold is provided.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall be new and best of their class or kind. The materials if found defective, unsuitable, or not as specified, will be condemned and must be promptly removed from the premises. Materials specified by brand name shall be delivered in unbroken packages bearing manufacturer's label and shall be brand specified or an approved equal. Other materials shall conform to the applicable sections of the current editions of the various standard specifications quoted herein. Materials must be properly protected from the weather or other damage, and shall be sorted to prevent inclusion of foreign materials.

B. Cementious Materials:

1. Portland Cement: ASTM 150, Type II, low alkali conforming to CBC 1903 A.2.

2. Fly Ash (Pozzolan): ASTM 618 Class F:

a. Fly Ash is a cementious material (Pozzolan) and is not Portland cement. Fly Ash may not be substituted for Portland cement on an equivalent weight basis without being required as part of the mix design, or when not specified as a part of the mix design, without written request by the preparer of the mix design indicating the purpose of the substitution. As a substitution, this request may be denied by the Engineer.

C. Concrete Aggregates:

1. ASTM C-33, stone aggregate and sand. Specific source aggregate and/or sand or shrinkage characteristics as required by classes of concrete.

2. ASTM C-330 and C-332, lightweight aggregate

3. Source shall remain constant throughout the duration of the job. The exact portions of the fine aggregates and coarse aggregates to be used in the mix shall be determined by the mix design.

D. Water: Potable, clean and from domestic source.

E. Admixtures: All admixtures shall be used in strict accordance with the manufacturer's recommendations. Admixtures containing calcium chlorides or other accelerators shall not be used without the approval of the Architect/Engineer and the Owner's Testing Laboratory.

1. Mid Range Water Reducing Admixtures: ASTM C-494, Type A, Polyheed 997 by Master Builders, WRDA 79 by W.R. Grace or acceptable equivalent.
2. High range water-reducing admixtures: (Super Plasticizer) Rheobuild 1000 by Master Builders or acceptable equivalent. The use of high range water reducing admixtures in large quantity requires water reduction in accordance with the manufacturer's recommendations.
3. Water Reducing Admixture and Retarder: ASTM C-494, Type D, "Pozzolith 300R", Master Builders; "Plastiflow-R" by Nox-crete; or acceptable equivalent.
4. Air Entrainment - MBAE - 10 (Master Builders Air Entrainment).
5. The use of water reducing admixtures to increase slump required reduction of total water content per manufacturer's recommendations.

F. Slurry

1. Slurry shall consist of the same proportions of cement to fine aggregates used in the regular concrete mix (coarse aggregate only omitted) and shall be well mixed with such amount of water as will produce a thick consistency.

G. Grout

1. Grout for Base Plates: Non-shrink, high-strength grout shall be used for all grouting; conform to ASTM C-1107. Acceptable manufacturers include The Burke Company, Master Builders, and W.R. Meadows, Inc. Grout shall attain 7500 psi in 28 days minimum when placed in a "fluid" state. Grout brands to meet or exceed the properties of Master Flow at 928 at fluid consistency.

H. Dry Pack: Dry pack for cosmetic concrete repairs only shall consist of one part cement to 2½ parts fine aggregate (screen out all materials retained on No.4 sieve), mixed with a minimum amount of water, in small amounts. The consistency shall be such that when a ball of the mixture is compressed in the hand it will maintain its shape, showing finger marks, but without showing any surface water.

I. Concrete Joint Material: Expansion joints shall be formed by premolded bituminous joint material, non-extruding, ⅜" thick, conforming to ASTM D-1751, as manufactured by "Servicised Products", W.R. Meadows, Inc., or "National Expansion Joint Company", or "Celotex Corporation" or acceptable equivalent.

J. Slab Curing Paper: Fortifiber Corporation's "Orange Label Sisalkraft" reinforced waterproof building paper, "Pabcotite" paper, acceptable equivalent, conforming to ASTM C-171, Type I.

K. Curing Compounds: ASTM C-309, Type I, Class B 20% min. solids, water base acrylic cure/sealer which will not discolor concrete or affect bonding of other finishes. Products may be "Vocomp 25" or "Vocomp 30" by W.R. Meadows Co., or acceptable equivalent. See "Curing and Protection" Section 3.06.

L. Water Stop: Seal tight PVC Water Stop by W. R. Meadows Co.

M. Chemical Floor Hardener: "Techkote #1080" by National Expansion Joint Co., "Pena-lith" by W.R. Meadows Co. or approved equivalent.

N. Evaporation Retardant: "Con-film", by Master Builders.

O. Concrete Bonding Agent: "Concresive" Liquid LPL, Masters Builders Inc. or equal; "Top Bond #40", Nox-Chem, "Rezi-Weld 1000" by W.R. Meadows or acceptable equivalent.

P. Under Slab Water Vapor Barrier:

2.01 MATERIALS (continued)

1. Vapor barrier sheet be either “a.” or “b.”. See 3.4 B for additional requirements.

   a. Rounded Free Draining Compacted Rock Slab Base: ASTM E 1745, performance classification A, B and C; 10 mil, single ply extruded polyolefin; 0.036 U.S. perm water vapor permeance per ASTM E154 or E96 procedure B; tensile strength 52.0 lb/in.; minimum puncture resistance 2600 grams per ASTM D1709, Method B.

      1) Raven Industries, Inc. Sioux Falls SD, www.ravenind.com, 605-335-0174; Product: "Vapor Block 10."
      2) Stego Industries, LLC, San Juan Capistrano, CA www.stegoindustries.com, 1-877-GO-4-STEGO; Product: “Stego Wrap Class A Vapor Retarder (10 mil).”
      3) Approved equal.

   b. Compacted Crushed Rock Slab Base: ASTM E 1745, performance classification A, B and C; 15 mil, single ply extruded polyolefin; .025 U. S. perm water vapor permeance per ASTM E154 or E96 procedure B; Tensile strength 77 lb/in/; minimum puncture resistance 4000 grams per ASTM D1709, Method B.

      1) Raven Industries, Inc. Sioux Falls SD, www.ravenind.com, 605-335-0174; Product: “Vapor Block 15”.
      2) Stego Industries, LLC, San Juan Capistrano, CA - www.stegoindustries.com, 1-877-GO-4-STEGO; Product: “Stego Wrap Class A Vapor Retarder (15mil).”
      3) Approved Equal.

Q. Slab Joint Sealant: Gardox Horizontal Joint Sealant by Seal Tight or equal, to conform with CRD 525 and 526, Type H.

R. Permeability Reducing Admixture: Xypex Admix C-2000, or Xypex C-2000 NF, both manufactured by Xypex Chemical Corporation or proven equivalent with a gas permeability reduction of 50% or more.

S. Surface-Applied Permeability reducer: Xypex Concentrate C-2000 by Xypex Chemical Corporation or proven equivalent with a gas permeability reduction of 50% or more.

2.02 CONCRETE MIXES

A. General

1. Contractor submittals shall be supplied to the Architect and the Owner’s Testing Laboratory at least 15 days before placing concrete. Prior to submittal of mix designs the contractor shall review them, for compatibility with his placing requirements to insure that the concrete as designed can be placed in accordance with the drawings and specifications.

2. The proportions of the concrete mixes shall be such as to produce concrete of required average strength (as defined by California Building Code Section 1905), slumps, aggregate sizes, shrinkage, and of a consistency that will allow thorough compaction without excessive puddling, spading, or vibration, and without permitting the materials to segregate, or free water to collect on the surface. The size and type of aggregates shall be such that it will produce low to moderate shrinkage, dense

and uniform concrete free from rock pockets, honeycomb and other irregularities. All concrete mixes shall have entrained air for workability (4% maximum). Mix designs may include adequate water reducing and retarding admixtures to meet or exceed minimum set times (time required to place and finish) and to minimize water cement ratios. Minimum and maximum criteria presented herein is a guideline and does not represent a specific mix design. Minimum cement content indicates minimum sacks of cement, not cementious material. An acceptable equivalent weight of cementious material ("Fly Ash") to cement is 1.1 lbs. of cementious material for 1.0 lbs of cement. Increasing cement content to increase early strengths or to achieve specified WCR while maintaining water content is discouraged in order to minimize effects of shrinkage.

Concrete for floor slabs on grade with floor coverings over are to be proportioned to meet the requirements noted in item #6 below.

3. Concrete may, at the Contractor's option, be designed for either pump or conventional placement with aggregate size, slumps, etc. to be maintained as specified herein.

4. Variations in mix design including changing type and or quantity of admixtures are to be re-submitted to the Owner's testing laboratory and the Architect/Engineer for review prior to use.

5. Mix designs with a specified maximum water cement ratio may be designed with a lower WCR than specified in order to allow addition of water at the site.

6. Mix designs for interior concrete floor slabs on grade with floor coverings over. Concrete mixes shall be proportioned per this specification, ACI 211.1, and the requirements below:

   a. Minimum strength at 28 days to be 3000 psi; minimum strength at 56 days to be 4000 psi.
   b. Fly Ash Type F shall be substituted for cement on a 1 lb. per 1 lb. basis, with a minimum replacement of 25% and a maximum of 35%.
   c. Total cementious materials to exceed 6.1 sacks of cementious material per 27 cubic feet (1 cubic yard).
   d. Maximum on site water cement ratio (WCR) to be .45.
   e. Coarse aggregates to be 1" x #4, per ACI 211.1, with the addition of 200 lbs. of ⅜(-) aggregate which shall be added to reduce total sand.
   f. Total sand and blend sand to be reduced as much as practical. Blend sand limited to 100 lb. maximum.
   g. All mixes shall have entrapped and/or entrained air (4% maximum).
   h. Water reducing and high slump water reducing, admixtures are to be based on cement content only, not total cementious materials. Dosage may be increased for workability as long as set times are not excessive for placement and finishing.
   i. Trial batch testing may be required per Section 1.3 B.

B. Classes of Concrete: for Minimum Requirements

2.02 CONCRETE MIXES (continued)

Class	Coarse Aggregate Size (Inches) & Fine Aggregate***	Minimum WCR & Maximum Nominal Slump & Tolerance (Inches)*, **	Minimum 28-Day Design Strength ****	Minimum Cement Sacks/C.Y ***
NON-STRUCTURAL				
1) Lean Concrete for Backfill	1" x #4	---	---	3.0
2) Slab on Grade Exterior (Walks & Patios)	1" x #4	4" ± 1"	2,000	4.5
STRUCTURAL				
3) Interior Slab on Grade w/floor coverings*****	1" x #4	WCR = .45	3,000 (design based on 2,500)	
4) Interior Slab on Grade w/o floor coverings	1" x #4	3" ± 1/2"	2,500	5.0
5) Foundation	1" x #4	3½" ± ½"	3,000	5.00

* The tolerance is the maximum deviation allowable without rejection. The mix design shall be based on the nominal value specified and is without water reducing mixtures. Slump to be measured at the end of the hose.

** The maximum water cement ratio (WCR) is limited at time of placement as noted. No water is to be added on site such that the specified WCR or maximum slump is exceeded without approval of the testing laboratory and the Architect/Engineer. Workability is to be achieved utilizing an acceptable mid range to high range water reducing admixture.

*** Gradation of aggregate is per California Building Code (CBC), Chapter 19 Section 1903.3 ASTM C33.

**** Minimum cement content is based on a pre-qualified mix design as defined by California Building Code (CBC) Section 1905.

***** Slabs on grade with floor covering to be proportioned in accordance with Section 2.2 item 6.

PART 3 - EXECUTION

3.01 MIXING CONCRETE

A. Final proportions shall be in accordance with approved mix designs. Adjustments to approved proportions, for whatever reason, shall be reviewed by the Engineer prior to use.

B. Batch and mix concrete per ASTM C-94 at an established plant.

C. Batch and transit equipment shall be adequate for the work and operated as necessary to provide concrete complying with specified requirements.

D. Mixed concrete shall be placed in the forms within 1½ hours from the time of introduction of cement and water into mixer. Use of or re-mixing and tempering mixed concrete older than 1 hour will not be permitted.

E. Concrete mixes with a maximum WCR specified shall not have water added at the site unless the water content at batch time provides for a WCR less than specified.

3.02 PLACING CONCRETE

A. Inspection and Testing:

1. Review by Architect/Engineer: Notice shall be given 48-hours (2 working days) before each concrete placement in order that review of reinforcing, forms, etc. can be made prior to placing concrete.
2. Owner's Testing Laboratory: Contractor shall notify 24 hours before each pour date.

B. Records: The contractor shall keep a record of the time, temperature and date of placing the concrete in each portion of the structure. Such reports shall be kept until the completion of the structure and shall be available for review by the Owner's Testing Laboratory/Architect/Engineer.

C. Preparation:

1. Remove loose dirt, mud, standing water, and foreign matter from excavations or from cavities.
2. For concrete on metal decking, thoroughly clean decking. Do not wet deck surface just prior to placement of concrete.
3. For concrete slabs on base rock, dampen rock.
4. For concrete slabs on vapor barrier, do not wet vapor barrier.
5. Thoroughly clean reinforcement and other embedded items free from loose rust and other matter. Assure reinforcing is held securely in place. Do not place any concrete on hot reinforcing.
6. Thoroughly wet wood forms (except coated plywood), bottom and sides of trenches, base under slab, adjacent concrete or masonry and reinforcement at least 1-hour in advance of placing concrete; securely close cleanout and inspection ports; repeat wetting as necessary to keep forms damp.
7. Equipment shall be maintained clean and of sufficient quantity and capacity to efficiently execute the work required.
8. Check all embedded items for location, position and inclusion.
9. Care shall be taken to prepare for the prevention of penetration of vapor barrier and/or waterproofing membranes.
10. Dampen materials on which concrete is to be placed. Do not saturate. Do not place concrete on saturated material. Do not wet vapor barrier, or membranes.

D. Transporting:

1. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods, which shall prevent the separation or loss of the ingredients.
2. Prevent penetration of vapor barriers and/or waterproofing membranes.

E. Placing:

1. Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed. Construction joints must be as detailed on the drawings or as otherwise approved.
2. When structural concrete is to be placed on elevated structural systems, such as structural steel beams and metal decking, that are not to be shored, screed lines shall be located on primary structural members such that deflections of intermediate structural members and decking is compensated for by placement of additional

concrete. The Contractor shall provide for up to 1" of adjustment in electric trench duct and other surface flush items. The Contractor shall review proposed screed line locations and expected structural deflections with the Architect/Engineer prior to placement of concrete. Screed lines shall be placed to match any camber of primary girders that are other than concrete shall be placed such that at least the minimum thickness of concrete specified is provided at all locations.

3. Concrete shall be so deposited as to maintain, until the completion of the unit, a plastic surface approximately horizontal. It shall be deposited as neatly as practicable in its final position to avoid re-handling or flowing. No concrete shall be deposited that has started to set or stiffen. The remixing of concrete or grout that has begun to set will not be permitted. No water shall be added on site to concrete, which has a specified water cement ratio (WCR).

4. Concrete, when placed in columns and walls, shall not be placed in layers exceeding ten feet in depth. Schedule of pouring shall be such that no concrete shall take initial set before next layer is poured. No horizontal cold joints will be allowed in columns or walls. Concrete in walls shall be placed in 32" horizontal lifts, minimum.

5. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped more than 4'. Spouts, elephant trunks or other approved means shall be used to prevent segregation as necessary.

6. Any concrete spilled on forms or reinforcing steel, in portions of structure not immediately concreted, shall be completely removed before concrete sets.

7. Any interruption in placing of more than 60-minutes will be cause for shutting down the work and the wasting of any remaining mixed concrete and concrete in hoppers or mixers. In case such interruption occurs, the Contractor shall provide construction joints where and as directed, and cut concrete back to such line, cleaning forms and reinforcing as herein specified.

F. Consolidation:

1. Concrete shall be thoroughly compacted by puddling with suitable tools during placing, and thoroughly worked around the reinforcement, around embedded fixtures, and into corners of the forms. In addition to manual spading and tamping, all concrete shall be internally vibrated with high-speed mechanical vibrators.

   a. Vibrators shall have sufficient amplitude for adequate consolidation.

   b. Vibrators shall be used at each point of concrete placement. Spare vibrators, not in use, shall be kept at the site for standby service.

2. Consolidate each layer of concrete as placed. Insert vibrators vertically at points 18" to 30" apart; work into top area of previously placed layer to reconsolidate, slowly withdraw vibrator to surface. Keep vibrator heads free from form surfaces.

3. Systematically double back to consolidate concrete to maximum density and reconsolidate wherever possible.

4. Vibration shall be sufficient to minimize honeycombs and accomplish compaction of concrete.

3.03 CONCRETE JOINTS

A. Structural Joints (Construction/Cold Joints)

1. Joint locations shall be where shown or approved. Joints not indicated on the plans shall be made and located so as not to impair the strength of the structure, shall be located to meet the minimum requirements below, and shall be submitted to Architect/Engineer for review, prior to placement of concrete.

2. All surfaces of previously placed concrete at construction joints shall be cleaned, washed, and roughened by sandblasting. Horizontal construction joints at the bottom of walls shall have a 2" slurry (specified concrete mix less course aggregate) placed at beginning of pour unless it can be demonstrated with a “test” section that segregation of aggregate will not occur.

3. Length of continuous placement for slabs on grade shall not exceed a length (feet) equal to three times the slab thickness (inches) unless reviewed by the Architect/Engineer. Pour sections shall be alternated or staggered. Submit proposed location of construction/cold/expansion joints for review prior to placing concrete. Length of continuous placement of beams, elevated slabs, joists, and foundations shall not exceed 200’ increments. Shut off locations shall be “keyed” with form boards and reinforcing extended through one lap length or more.

4. All reinforcement shall be continuous through unless lap splices are provided each side of joint.

5. Construction joints in elevated slab and slabs on metal decking shall not be located within 24” of the face of columns or beams. Other locations may be shown on the plans

B. Expansion/Construction Joints (Dowel Joints and Control Joints)

1. Exterior walkways, patios and other non-structural concrete flatwork at grade shall have expansion/ construction joints formed by a 2" deep trowelled groove or by asphalt impregnated joint material embedded 50% of the slab depth at 12' on center maximum. No section shall be placed with a length larger than two times its width. Additionally, place joints at all inside corners and intersections with other work.

2. Interior and Exterior Floor/work Area Slabs at Grade.

a. Provide dowel joints or control joints at a maximum dimension (in feet) of three times the slab thickness (in inches) in each direction unless noted otherwise. Install joints to match slab level and in straight lines.

C. Joint Types:

1. Dowel Joint: A keyed joint with smooth dowels passing through to allow unrestricted movement due to contraction and expansion. Joints are as shown on the drawings. Joint shall have a ⅜" wide by ¾" deep void at top for flexible sealant.

2. Control Joint(s): Shrinkage crack control joints may be of the following types when shown on the drawings. Joints to be installed in a straight line between end points and joint edges to be finished appropriate to type. Joints are as shown on the drawings are filled with sealant or as required by other finishes.

a. 2” deep x ¼” wide trowelled joint.

b. A pre-manufactured plastic joint such as "Zip Strip” may be provided where covered by other finishes.

c. ⅛" x 2" masonite strip where covered by other finishes.

d. ⅛" x 2" deep saw cut installed within eight hours of completion of finishing. Saw cuts shall not be made if aggregate separates from cement paste during the saw cut operation. Equipment shall be maintained such that surface finish is not marred. Saw cut joints not covered by other finishes shall be filled with flexible sealant.

3.04 FLATWORK (All Concrete Formed & Finished Flat)

A. General:

1. Edge forms and screeds: Edge forms and intermediate screed strips shall be set accurately to produce the design elevations and contours in the finished surface, and shall be sufficiently strong to support the type of screed to be used.

2. Jointing: Joints shall be located and detailed as indicated on the project drawings and specifications. Flatwork on ground may be cast in checkerboard patterns or in strips.

3. Consolidation: Concrete in slabs shall be thoroughly consolidated.

4. Evaporation retardant shall be placed on tamped and/or floated surface as necessary to retain surface moisture for finishing and to avoid plastic shrinkage cracking.

B. Flatwork on Ground:

1. Sub-base for concrete slabs on grade without floor covering shall consist of 6" minimum thickness of clean free-draining crushed thoroughly compacted base rock.

2. Sub-base for interior floor slabs on grade with floor coverings shall consist of 6" minimum thickness of compacted, clean, free draining, rounded base rock.

3. The mix design for interior floor slabs on grade with floor coverings over shall meet the requirements of Section 2.2, including item 6.

4. Place concrete flatwork directly over base rock material unless noted otherwise herein, on the drawings, or in Architectural specification sections. When so specified then install vapor barrier in widest practicable widths over base rock material. All joints shall be lapped not less than 12" with the top lap in the direction of the pour and sealed with an approved cold plastic cement. Approved tape may be substituted for cement. Patch holes in vapor barrier similar to laps.

C. Finishes

1. Flatwork: All flatwork finishing must be performed by experienced operators. Flatwork shall be brought to grade for sloped slabs or to level grades as shown on drawings, care shall be taken to insure full thickness in all cases. All floor surfaces shall be finished monolithically. Surfaces shall be uniform and level or sloped evenly to drains as they occur. Do not use liquid curing compounds or other coatings that may prevent bonding of tile setting materials to slabs.

a. Flatwork which receives a surface applied membrane, or ceramic tile, or wood frame for raised floors for finish, shall be wood floated.

b. Flatwork requiring a smooth finish surface, are to be steel trowel finished (trowel twice minimum).
c. Broom Texture Finish:

1) For exterior surfaces where shown or not otherwise specified.
2) Finish as for steel trowel finish, except immediately following first trowelling, (depending on conditions of concrete and nature of finish required) texture surfaces to a uniform condition using a medium or coarse fiber broom as directed by the Architect.

2. Lines and Levels:

a. Exterior surfaces not otherwise shown or required shall be transversely sloped to drain ⅛" minimum per foot. Exterior surfaces not required to be sloped shall be level within ¾" overall, tolerance (+⅜", - ⅜").
b. Interior surfaces:

1) Interior flatwork shall be level throughout within ½", tolerance (+¼", - ¼"), as defined by the form work. Optionally, levelness shall meet or exceed the requirements of ACI 302 with F_L greater or equal to 20, unless otherwise noted.

c. Maximum Allowable Deviations in trueness of surfaces. Deviation in elevation of surfaces shall be as shown or approved and deviations shall not exceed the following tolerances.

1) Deviation in trueness of surfaces may be measured using a 10' straight edge and shall not exceed the following tolerances, plus or minus, unless otherwise noted:
¼" for wood float finishes and exterior surfaces.
⅛" for steel trowelled and other interior finishes.

2) Optionally, deviations in trueness shall meet or exceed minimum limits set by ACI 302 with F_F greater or equal to 30, unless otherwise noted.

3. Defective Finishes: For defects in concrete finishes see Section 3.7 Defective Concrete.

3.05 FORMED SURFACES

A. Lines and Levels:

1. General: All concrete members shall be formed level and/or plumb. Maximum deviation is ¼" end to end of any one member, otherwise per ACI 301 Chapter 4 tolerances. All concrete shall be finished to match forms. Cambers specified shall be provided in the forms. All screeds shall be set such that specified cambers are reflected by finished concrete.

B. Finishes:

1. Intermediate joint and score marks and edges shall be tooled smooth where indicated or as directed by the Architect.

3.05 FORMED SURFACES (continued)

2. Use steel radius tools of standard patterns or as required to achieve details shown or specified. All exposed corners not specified to be chamfered shall have radiused edges.

3. All finishes to be as required to achieve appearance specified on structural and architectural drawings and specifications.

C. Permanently Exposed Joints and Surfaces:

1. After removal of forms inspect all exposed surfaces for defects and repair of defective concrete per paragraph 3.7.

2. Maximum differential height within two feet of, and across construction joints is 1/16 inch.

3. For curled edges at cracks and joints see Section 3.7 Defective Concrete.

3.06 CURING & PROTECTION

A. General

1. Curing is intended to maintain water content for proper hydration and minimize temperature ranges. Procedures shall be consistent therewith as far as practical and within scope of work specified.
2. Wheeling, working and walking on concrete shall be avoided for at least 24-hours after placement. Protect concrete from sun and rain.
3. All concrete shall be kept at or above 50 degrees F. during and for the first seven (7) days after placement. See paragraph 1.5 Cold and Hot Weather Requirements.
4. Concrete shall not be subjected to any design loads until concrete is completely cured, and until concrete has attained its 28-day strength (21-days minimum).
5. Protect concrete during and after curing from damage during subsequent building construction operations. The General Contractor is responsible for the protection of the finished slab from damage due to construction loads. Submit engineering analysis for point or wheel loads in excess of 10,000 lbs for slabs on grade and 5,000 lbs for slabs above grade, and 2,000 lbs for slabs above grade on metal deck.
6. Keep finished areas free from all traffic 4 days minimum or as necessary until surfaces have set sufficiently to prevent damage, or cover traffic areas with plywood sheets or other protective devices; maintain paper and plywood in place and in good repair for as long as necessary to protect against damage by any or all other construction operations.

B. Curing: Curing shall immediately follow finishing.

1. Flatwork on Grade: Cure by one of the following methods:

a. Waterproof curing paper: While in thoroughly damp condition, cover with curing paper; lap seams 6" minimum and extend beyond slab or paving perimeters 6" minimum; seal all laps and edges with continuous reinforcing plastic tape.

Do not remove for 14 days minimum.

b. Cure/Sealer: Immediately upon completion of finishing, apply an approved cure/sealer to flatwork. Additionally, during hot and/or windy weather, flatwork shall be kept wet by a continuous fog spray, or wetted and covered with Polyethylene similar to B.1.a, for a minimum of forty-eight (48) hours after application of cure/sealer. Curing shall continue beyond the minimum for forty-eight (48) hours as necessary to insure proper curing. This method may be employed only when other concrete treatment or finish will not be affected by the cure/sealer applied, unless product is removed prior to installation of other finishes. Cure shall be applied at the maximum recommended application rate.

c. Water Curing: Flatwork may be continuously water cured with a fog spray or flooded, for a period of seven (7) days minimum (including holidays and weekends). Alternatively cover with non-staining water retaining materials and keep saturated for same period.

2. Elevated Flatwork

a. Waterproof curing paper per (1a) above or water cure per (1c) above for (14) days period minimum.

b. Apply cure sealer per (1b) above after initial curing period.

3. Flatwork on metal decking cure per (1b) above.

4. Formed Concrete Members

a. Beams, walls, columns etc. shall be adequately protected from cold and hot weather.

b. Forms shall be kept tight for a minimum of 7 days unless exposed surfaces are kept continuously damp utilizing cloth materials as a complete cover.

c. Shoring to remain in place per Section 03150 “Formwork”.

5. Foundations

a. Wet trenches prior to placing concrete. Apply approved cure/sealer immediately after floating.

C. Hardener: Apply hardener to all floor slabs not receiving other finishes after 30 days minimum curing. Apply to clean, residue free (cleaned of non-compatible cure/sealers or other foreign material(s)) surface in strict accordance with the manufacturer's directions.

3.07 DEFECTIVE CONCRETE & DEFECTIVE FINISHES

A. Defective materials and execution of construction:

1. Concrete that does not meet specifications may be required to be removed and replaced by the Owner.

a. Low strength concrete: Test remaining cylinder(s), with less than 25% Fly Ash as cementious material at 56 days. Concrete with 25% or more Fly Ash, test remaining cylinder(s) at 70 days. If strength requirements are met, concrete strength is acceptable.

b. Excessive shrinkage, cracking, crazing or curling: Removal and replacement may be required by the Owner if repairs acceptable to the Owner can not be made.

B. Defective concrete shall be repaired or replaced as directed by the Architect/Engineer, at no added expense to the Owner. Repair materials shall include all reinforcement grouts, dry pack, admixtures, epoxy and aggregates as may be necessary.

1. In general, with the permission of the Architect, minor defective work may be repaired by use of dry pack and surface grinding of high spots. If defective work is serious or affects the strength of the structure or the appearance, the Architect may require the removal and replacement of that portion of the concrete.
2. Immediately after removing forms, all concrete surfaces shall be inspected and any pour joints, voids, rock pockets, tie holes, except as specified, etc. shall be patched after review by the Architect/Engineer. Submit patching mixture and method proposed for use, to Engineer for approval prior to commencing work.
3. Slabs-on-grade and on metal deck shall be reviewed by Contractor for "curled" slab edges at joints and at shrinkage cracks just prior to installation of other floor finishes. Curled edges shall be ground flush and cracks of $\frac{1}{16}$" and more filled with cementious grout.
4. High spots or protrusions caused by formwork, etc. shall be ground flush with surrounding concrete.
5. Slab sections not meeting trueness/flatness or lines/levels/levelness shall be removed and replaced unless otherwise directed by the Architect/Engineer. The minimum section for removal is a 15' square area unless directed otherwise by the Architect/Engineer.

3.08 GROUTING & DRY PACK

A. Provide for setting steel plates on concrete or masonry. Prepare using approved non-shrink grout aggregate to produce mortar 5,000 psi minimum at 28-days. Use non-ferrous grout materials where exposed to view; completely fill all voids and thoroughly compact in place.

B. Bolts or inserts which have been dry packed or grouted in place, shall not be tensioned sooner than 7 days after packing.

3.09 CONDUIT & PIPES IN CONCRETE

A. Slabs on grade: No conduit shall be embedded within the depth of the slab. No pipe, etc. exceeding 1" o.d. shall be embedded within the slab. All pipe within slab shall be laid on grade. Do not stack, separate pipe lines 6" minimum. If it is required to embed larger pipe, thicken slab to meet that requirement.

B. All individual pipes through concrete shall be sleeved with 1" minimum clear all around from sleeve to reinforcing. Wrapped pipes shall have 1½" clear to reinforcing all around. Pipe wrap shall be from ⅛" ± sheet foam with three wraps minimum.

C. Groups of pipes and conduits shall be spaced at least 3 sleeve diameters apart such that concrete and reinforcement as specified is uninterrupted. When grouping of pipe and conduit is such that spacing is not possible, block outs in the foundation or other structural member shall be installed. The reinforcement specified shall be provided both top and bottom of the block out. Foundation

depth each side of block out shall match the specified footing depth, unless otherwise noted on the structural drawings. Other structural members affected by block outs shall be sized and reinforced as directed by the Architect/Engineer. Pipes and conduits embedded in foundations, beams, columns, elevated slabs, and walls shall be centered through the depth and/or thickness. Maximum size to be imbedded shall not exceed the least dimension divided by 3. No conduit or pipes shall be imbedded in slab on metal deck.

D. Where plumbing passes directly beneath foundations, thicken foundation as shown on the drawings and meet requirements of "B" above.

E. When pipe/conduit is specified to be embedded in a concrete beam, wall or column, the following is required:

1. Place as near as possible to center of member with reinforcing as specified on each side.

2. Where reinforcing is located near or at center of member, place ¾" clear from reinforcing and provide #3 at 12" o.c. perpendicular to the pipe/conduit. Reinforcing to extend 1'-0" minimum past pipe/conduit e.s.

3. Maintain ¾" clear minimum from added reinforcing face of concrete where not exposed to weather and 1½" clear where exposed to weather.

4. Where groups of pipe/conduit and associated "boxes" occur, space pipe/conduit as required (2½ x max aggregate size and 3x pipe/conduit outside diameter minimum).

5. Where groups of pipe/conduit occur, provide reinforcing in walls, beams, columns, as required for openings in walls. At a minimum, provide replacement reinforcement of same size and number for interrupted or ineffective reinforcement for the full height, length, width of the wall, beam, column on each side of the "effective opening."

3.10 PROTECTION OF DRAINAGE SYSTEMS

A. Care shall be taken not to introduce any foreign material into any specified drainage, piping or duct systems. Cost of work required to repair or clean the drainage system as a result of failure to comply with this requirement will be back charged to the Contractor.

3.11 CLEANING

A. Contractor shall keep the buildings as free of debris and rubbish as possible at all times. At the completion of his work, he shall remove all materials and apparatus from the premises and streets, scrape up all drippings, and leave the entire work clean and free of debris.

END OF SECTION

DIVISION 4 - MASONRY

SECTION 04200 – CONCRETE MASONRY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
   1. 2016 CALIFORNIA BUILDING CODE, CHAPTER 21 SPECIFICALLY AND OTHER SECTIONS IN THE SERIES AS THEY MAY RELATE.

1.2 SUMMARY

A. Section Includes:

   1. Concrete masonry units.
   2. Stone trim units.
   3. Mortar and grout.
   4. Steel reinforcing bars.
   5. Masonry joint reinforcement.
   6. Ties and anchors.
   7. Miscellaneous masonry accessories.

B. Related Sections:

   1. Section 03300 "Cast-in-Place Concrete" for installing dovetail slots for masonry anchors.
   2. Section 04720 "Cast Stone Masonry" for furnishing cast stone trim.
   3. Section 05500 "Metal Fabrications" for furnishing steel lintels, opening surrounds, and shelf angles for unit masonry.
   4. Section 07620 "Flashing and Sheet Metal" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Clay Masonry Unit Test: For each type of unit required, according to ASTM C 67 for compressive strength.
2. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Verification: For each type and color of the following:

1. Exposed Decorative CMUs.
2. Pre-faced CMUs.
3. Face brick, in the form of straps of five or more bricks.
4. Special brick shapes.
5. Stone trim.
6. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
7. Weep holes and vents.
8. Accessories embedded in masonry.

1.7 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such

deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence according to ASTM C 67.
d. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing per ASTM C 67.
e. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01310 "Project Management and Coordination."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Regional Materials: CMUs shall be manufactured within 500 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide bullnose units for outside corners and edges unless otherwise indicated.
3. Size: Standard units with nominal face dimensions of 16 x 8 inches (400 x 200 mm) and nominal depths as indicated on the drawings for specific locations.
4. Provide CMUs for elevator shafts, mechanical, pump rooms, and service dock locations.
5. Load-Bearing Units: ASTM C 90, normal weight.
    a. Hollow block, as indicated.
    b. Exposed faces: Manufacturer's standard color and texture where indicated.

6. Non-Loadbearing Units: ASTM C 129.
   a. Hollow block, as indicated.
   b. Lightweight.

C. Integral Water Repellent: Provide units made with integral water repellent for exposed units.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.

   a. Products: Subject to compliance with requirements, provide one of the following:

      1) ACM Chemistries, www.acmchem.com; RainBloc.
      2) BASF Aktiengesellschaft, *https://www.**master-builders**-solutions.**basf**.us/* RheopelPlus
      3) Grace Construction Products, W. R. Grace & Co. - Conn., www.na.graceconstruction.com; Dry-Block.

D. CMUs: ASTM C 90.
1. Density Classification: Normal weight unless otherwise indicated.
2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
3. Size (Width): Manufactured to the following dimensions:

   a. 16 x 8 inches (400 x 200 mm) and nominal depths as indicated on the drawings for specific locations

4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

E. Concrete Building Brick: ASTM C 55.
1. Density Classification: Normal weight.

2.3 CONCRETE AND MASONRY LINTELS

A. General: Provide one of the following:

B. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than CMUs.

C. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section 03300 "Cast-in-Place Concrete," and with reinforcing bars indicated.

D. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 STONE TRIM UNITS

A. Limestone: ASTM C 568

a. Variety and Sources: Grade and Color: Cordova Cream Texas Limestone, according to grade and color classification established by ILI.

B. Provide stone units accurately shaped, with exposed faces dressed true, and with beds and joints at right angles to faces.

1. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."

2.5 MORTAR AND GROUT MATERIALS

A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

E. Mortar Pigments: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, provide one of the following :

a. Davis Colors, www.daviscolors.com; True Tone Mortar Colors.
b. Lanxess Corporation, www.bayferrox.com; Bayferrox Iron Oxide Pigments.
c. Solomon Colors, Inc., www.solomoncolors.com; SGS Mortar Colors.
d. Substitutions: See Section 01 25 00 – Substitution Procedures.

F. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Aggregate for Grout: ASTM C 404.

H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent by same manufacturer.

1. Products: Subject to compliance with requirements, provide one of the following :

   a. ACM Chemistries, www.acmchem.com; RainBloc for Mortar.
   b. BASF Aktiengesellschaft, *https://www.**master-builders**-solutions.**basf**.us/*; Hohmann & BarnardGrace Construction Products, W. R. Grace & Co. - Conn., www.na.graceconstruction.com; Dry-Block Mortar Admixture.
   c. Substitutions: See Section 01 25 00 – Substitution Procedures.

I. Water: Potable and clean.

2.6 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Mill- galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

D. Masonry Joint Reinforcement for Multiwythe Masonry:

1. Ladder type with 1 side rod at each face shell of hollow masonry units more than 4 inches wide, plus 1 side rod at each wythe of masonry 4 inches wide or less.
2. Tab type, either ladder or truss design, with 1 side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
3. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face. Ties have hooks or clips to engage a continuous horizontal wire in the facing wythe.

E. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, hot-dip galvanized, carbon -steel continuous wire.

2.7 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
   1. Stainless-Steel Sheet: ASTM A 666, Type 304 .
   2. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
   3. Stainless-Steel Bars: ASTM A 276 or ASTM a 666, Type 304.

B. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of and an amplitude of 0.06 to 0.10 inch made from 0.030-inch- thick, steel sheet, galvanized after fabrication .

C. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

D. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.

1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units.
2. Where wythes do not align , use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
3. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire ties may be used in interior walls unless wall is located in an area that exceeds 75 percent humidity.

E. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless wall is located in an area that exceeds 75 percent humidity.

F. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch- thick, steel sheet, galvanized after fabrication .

    a. 0.064-inch- thick, galvanized sheet may be used at interior walls unless wall is located in an area that exceeds 75 percent humidity.

2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless wall is located in an area that exceeds 75 percent humidity.
3. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch- thick, steel sheet, galvanized after fabrication with dovetail tabs for

inserting into dovetail slots in concrete and sized to extend to within 1 inch of masonry face.

a. 0.064-inch- thick, galvanized sheet may be used at interior walls unless otherwise indicated.

G. Partition Top anchors: 0.105-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

H. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated .

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M Epoxy coating 0.020 inch thick .

I. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Contractor's Option: Unless otherwise indicated, provide any of the following types of anchors:
3. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Dayton Superior Corporation, Hohmann & Barnard ; D/A 210 with D/A 700-708.
2) Heckmann Building Products Inc.; 315-D with 316 .
3) Hohmann & Barnard, Inc.; DW-10 DW-10HS .
4) Wire-Bond; 1004, Type III .
5) Substitutions: See Section 01 25 00 – Substitution Procedures.

b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.
c. Anchor Section: Sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom and with raised rib-stiffened strap, 5/8 inch wide by 3-5/8 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie.

d. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.

e. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- thick, steel sheet, galvanized after fabrication .

f. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-inch- diameter, hot-dip galvanized steel wire.

4. Slip-in, Masonry-Veneer Anchors: Units consisting of a wire tie section and an anchor section designed to interlock with metal studs and be slipped into place as sheathing is installed.

a. Products: Subject to compliance with requirements, provide the following :

1) Hohmann & Barnard, Inc.; AA308.
2) Substitutions: See Section 01 25 00 – Substitution Procedures.

b. Wire-Type Anchor: Bent wire anchor section with an eye to receive the wire tie. Wire tie has a vertical leg that slips into the eye of anchor section and allows vertical adjustment. Both sections are made from 3/16-inch, hot-dip galvanized wire.

c. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1) Dayton Superior Corporation, Hohmann & Barnard; D/A 213S.
2) Hohmann & Barnard, Inc.; DW-10-X-Seismiclip.
3) Wire-Bond; RJ-711 with Wire-Bond clip.
4) Substitutions: See Section 01 25 00 – Substitution Procedures.

d. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical leg of connector section.

e. Connector Section: Rib-stiffened, sheet metal bent plate with down-turned leg designed to fit in anchor section slot and with integral tabs designed to engage continuous wire. Size connector to extend at least halfway through veneer but with at least 5/8-inch cover on outside face.

f. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section. Size wire tie to extend at least 1-1/2 inches into veneer but with at least 5/8-inch cover on outside face.

g. Connector Section: Sheet metal clip welded to wire tie with integral tabs designed to engage continuous wire.

h. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom; top and bottom ends bent to form pronged legs to bridge insulation or sheathing and contact studs; and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.

i. Connector Section: Triangular wire tie and rigid PVC extrusion with snap-in grooves for inserting continuous wire. Size wire tie to extend at least halfway through veneer but with at least 5/8-inch cover on outside face.

j. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- thick, steel sheet, galvanized after fabrication 1.05-inch- thick, steel sheet, galvanized after fabrication 0.078-inch- thick, stainless-steel sheet 0.109-inch-thick, stainless-steel sheet.

k. Fabricate wire connector sections from [**0.187-inch-**] [**0.25-inch-**] diameter, hot-dip galvanized, carbon -steel wire.

5. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Dayton Superior Corporation, Hohmann & Barnard; Stainless Steel SX Fastener.
2) ITW Buildex; Scots long life Teks.
3) Substitutions: See Section 01 25 00 – Substitution Procedures.

2.8 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch, galvanized steel sheet.

C. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.9 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" Section 07 62 00 "Sheet Metal Flashing and Trim" and as follows:

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Cheney Flashing Company; Cheney Flashing (Dovetail) or Cheney 3-Way Flashing (Sawtooth).
2) Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thruwall Flashing.
3) Sandell Manufacturing Co., Inc.; Mechanically Keyed Flashing.
4) Substitutions: See Section 01 25 00 – Substitution Procedures.

2. Fabricate through-wall flashing with drip edge where indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
3. Fabricate through-wall flashing with sealant stop where indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
4. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
5. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
6. Metal Expansion-Joint Strips: Fabricate from copper to shapes indicated.
7. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch (0.76 mm).

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Advanced Building Products Inc.; Peel-N-Seal.
2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
3) Dayton Superior Corporation, Hohmann & Barnard; Dur-O-Barrier Thru-Wall Flashing.
4) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
5) Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
6) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
7) Hohmann & Barnard, Inc.; Textroflash.
8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
9) Polyguard Products, Inc.; Polyguard 300 Polyguard 400.
10) Sandell Manufacturing Co., Inc.; Sando-Seal.
11) Williams Products, Inc.; Everlastic MF-40.

12) Substitutions: See Section 01 25 00 – Substitution Procedures.

b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

B. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge or flexible flashing with a metal drip edge .
4. Where flashing is fully concealed, use metal flashing or flexible flashing.

C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts that are designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.

1. Products: Subject to compliance with requirements, provide the following :

a. Mortar Net USA, Ltd.; Blok-Flash.
b. Substitutions: See Section 01 25 00 – Substitution Procedures.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. Elastomeric Sealant: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene .

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Wicking Material: Absorbent rope, made from cotton or UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity. Use only for weeps.
2. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
3. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.
4. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) Advanced Building Products Inc.; Mortar Maze weep vent.
        2) Blok-Lok Limited; Cell-Vent.
        3) Dayton Superior Corporation, Hohmann & Barnard; Cell Vents.
        4) Heckmann Building Products Inc.; No. 85 Cell Vent.
        5) Hohmann & Barnard, Inc.; Quadro-Vent.
        6) Wire-Bond; Cell Vent.
        7) Substitutions: See Section 01 25 00 – Substitution Procedures.

5. Vinyl Weep Hole/Vent: One-piece, offset, T-shaped units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Architect.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) Hohmann & Barnard, Inc.; #343 Louvered Weep Hole.
        2) Williams Products, Inc.; Williams-Goodco Brick Vent.
        3) Wire-Bond; Louvered Weepholes.
        4) .

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Advanced Building Products Inc.; Mortar Break Mortar Break II.
    b. Archovations, Inc.; CavClear Masonry Mat.
    c. Dayton Superior Corporation, Hohmann & Barnard; Polytite MortarStop.
    d. Mortar Net USA, Ltd.; Mortar Net.
    e. Substitutions: See Section 01 25 00 – Substitution Procedures.

2. Provide one of the following configurations:

a. Strips, full-depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep that prevent clogging with mortar droppings.
b. Strips, not less than 3/4 inch thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.
c. Sheets or strips full depth of cavity and installed to full height of cavity.
d. Sheets or strips not less than 3/4 inch thick and installed to full height of cavity with additional strips 4 inches high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from clogging with mortar.

F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dayton Superior Corporation, Hohmann & Barnard; D/A 810, D/A 812 or D/A 817.
b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.
e. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.11 MASONRY-CELL INSULATION

A. Loose-Granular Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).

B. Molded-Polystyrene Insulation Units: Rigid, cellular thermal insulation formed by the expansion of polystyrene-resin beads or granules in a closed mold to comply with ASTM C 578, Type I. Provide specially shaped units designed for installing in cores of masonry units.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Concrete Block Insulating Systems; Korfil.
b. Shelter Enterprises Inc.; Omni Core.
c. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.12 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Diedrich Technologies, Inc.
    b. EaCo Chem, Inc.
    c. ProSoCo, Inc.
    d. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.13 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime masonry cement or mortar cement mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime masonry cement or mortar cement mortar.
4. For reinforced masonry, use portland cement-lime masonry cement or mortar cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type N.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
4. For interior non-load-bearing partitions, Type O may be used instead of Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight. If pigments containing carbon black are used, carbon black must be limited to 2 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight. If pigments containing carbon black are used, carbon black must be limited to 1 percent of masonry or mortar cement by weight.

3. Mix to match Architect's sample.
4. Application: Use pigmented mortar for exposed mortar joints with the following units:

    a. Decorative CMUs.
    b. Pre-faced CMUs.
    c. Face brick.
    d. Stone trim units.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Architect's sample.
2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:

    a. Decorative CMUs.
    b. Pre-faced CMUs.
    c. Face brick.
    d. Stone trim units.

F. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, Table 1 .
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

G. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.

1. Application: Use epoxy pointing mortar for exposed mortar joints with the following units:

    a. Pre-faced CMUs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond ; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches . Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 07 84 46 "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 COMPOSITE MASONRY

A. Bond wythes of composite masonry together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for [**4.5 sq. ft.**] [**2.67 sq. ft.**] [**1.77 sq. ft.**] of wall area spaced not to exceed [**36 inches**] [**24 inches**] [**16 inches**] o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.

2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes .
b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.

3. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not over 8 inches clear horizontally and 16 inches clear vertically.

B. Bond wythes of composite masonry together using bonding system indicated on Drawings.

C. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

D. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.

1. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

E. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide individual metal ties not more than 8 inches o.c.
2. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.
3. Provide rigid metal anchors not more than 24 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

3.7 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 4.5 sq. ft. of wall area spaced not to exceed 36 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

    a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.
    b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type ties to allow for differential movement regardless of whether bed joints align.

2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

    a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes .
    b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
    c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.

3. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not over 8 inches clear horizontally and 16 inches clear vertically.
4. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Bond wythes of cavity walls together using bonding system indicated on Drawings.

C. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

D. Parge cavity face of backup wythe in a single coat approximately 3/8 inch thick. Trowel face of parge coat smooth.

E. Apply air barrier to face of backup wythe to comply with Section 07 27 13 "Modified Bituminous Sheet Air Barriers."and Section 07 27 26 "Fluid-Applied Membrane Air Barriers."

F. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.8 MASONRY-CELL INSULATION

A. Pour granular insulation into cavities to fill void spaces. Maintain inspection ports to show presence of insulation at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of insulation to 1 story high, but not more than 20 feet.

B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.9 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.10 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.11 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Insert slip-in anchors in metal studs as sheathing is installed. Provide one anchor at each stud in each horizontal joint between sheathing boards.
3. Embed connector sections and continuous wire in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
5. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.

3.12 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick as follows:

1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2. Build flanges of factory-fabricated, expansion-joint units into masonry.
3. Build in compressible joint fillers where indicated.
4. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 07 92 00 "Joint Sealants."

D. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 "Joint Sealants," but not less than 3/8 inch .

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.13 LINTELS

A. Install steel lintels where indicated.

B. Provide concrete or masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.14 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. As indicated on Drawings.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

E. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products or open head joints to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c. unless otherwise indicated.
4. Space weep holes formed from plastic tubing or wicking material 16 inches o.c.
5. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
6. Trim wicking material flush with outside face of wall after mortar has set.

F. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.15 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches .

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

D. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

E. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.17 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.18 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
5. Clean stone trim to comply with stone supplier's written instructions.
6. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.19 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04200

DIVISION 4 - MASONRY
SECTION 04220 – CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents:
   1. Drawings and general provisions of the Subcontract apply to this Section.
   2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes:
   1. Concrete units.
   2. Reinforcement, anchorages, embedment's and accessories.

C. Related Sections:
   1. Division 01 Section "General Requirements."
   2. Division 01 Section "Special Procedures."
   3. Division 04 Section "Masonry Mortar".

1.2 REFERENCES

A. General:
   1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
   2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
   3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.

B. ACI – American Concrete Institute:
   1. ACI 315 Details and Detailing of Concrete Reinforcement

C. ASTM International:
   1. ASTM A615 / A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
   2. ASTM C 90 Standard Specification for Loadbearing Concrete Masonry Units

D. AWS D12.1 Reinforcing Steel Welding Code

1.3 SUBMITTALS

A. Submit under provisions of Division 01 Section "General Requirements."
B. Submit Shop Drawings for reinforcement, anchorages and embedment's. Indicate bar sizes, spacings, locations, and quantities of reinforcing steel bending and cutting schedules, supporting and spacing.
C. Submit Manufacturer's certified mill test reports on each heat of reinforcing steel to be used in the work before placement.
D. Submit two 12 inch (300 mm) long samples of expansion and control joint materials.
E. Submit manufacturer's certificates.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to at least 50 deg F(10 deg C) prior to, during, and 48 hours after completion of masonry work.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Hollow Load Bearing Units: conforming to **[UBC Standard 21-4, Grade N]**[1]; light weight, plain smooth face in the manufacturer's standard color. Strength of units shall be [as indicated on the Drawings f`m = 1500 psi.
B. Masonry Units: Modular sized to 8x8x16 and 8x12x16 inch as shown on the Drawings; provide special units for 90° corners, open ended, double open ended, bond beams and lintels. The use of LCC blocks is not permitted.

2.2 REINFORCEMENT AND ANCHORAGES

A. Single Wythe Joint Reinforcement: Truss and Seismic Comb type, galvanized steel construction; as manufactured by Dur-o-wall, or equal.
B. Reinforcing Steel: Type specified and grade as specified in Division 03 Section "Concrete Reinforcing".

2.3 ACCESSORIES

A. Control Joints: Preformed neoprene or polyvinyl chloride material.
B. Nailing Strips: Western softwood, preservative treated, sized to masonry joints.

2.4 LINTELS

A. Constructed from concrete masonry lintel blocks.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify items provided by other sections of work are properly sized and located.
B. Establish lines, levels, and coursing. Protect from disturbance.
C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.

3.2 COURSING

A. Place masonry to lines and levels indicated.
B. Maintain masonry courses to uniform width. Vertical and horizontal mortar joints shall be installed between blocks, shall be equal and of uniform thickness. Exposed joints shall be tooled to a slightly concave profile; unexposed surfaces may be struck smooth. Walls and parapet surfaces which will receive membrane sheet flashing and counter-flashing, and shall be constructed to permit the installation of base flashing materials as specified in Division 07 Section "Thermoplastic Membrane Roofing".
C. Lay concrete masonry units in running bond. Course one block unit and one mortar joint to equal eight (8") inches. Alternate open ended and double open ended blocks in each course. Bond beams shall consist of alternately placed open ended and double open ended bond beam block.

3.3 PLACING AND BONDING

A. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.
B. Fully bond intersections, and external and internal corners.
C. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove the mortar and replace.
D. Remove excess mortar.
E. Perform jobsite cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.

3.4 REINFORCEMENT AND ANCHORAGES

A. Install horizontal joint reinforcement 16 inches on center and seismic comb reinforcement where indicated on the drawings.
B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend at least 16 inches on each side of opening.
C. Place joint reinforcement continuous in first and second joint below top of walls.
D. Lap joint reinforcement ends at least 6 inches (150 mm). Extend at least 16 inches (400 mm) on each side of opening.
E. Reinforce joint corners and intersections with strap anchors 16 inches (400 mm) on center.

3.5 REINFORCING STEEL

A. Place reinforcement in accordance with ACI 315.
B. Locate reinforcing splices at points of minimum stress. Splice locations shall be as shown on the Shop Drawings unless alternative locations of splices are approved by the Engineer-of-Record.
C. Where welding is approved by the University, weld reinforcement in accordance with AWS D12.1.
D. Place reinforcing bars supported and secured against displacement. Maintain position within 1/2-inch (13 mm) of true dimension.
E. Verify that reinforcement is clean, free of scale, dirt, or other foreign coatings that would reduce bond to grout.

3.6 TOLERANCES

A. Alignment of Pilasters: Maximum 1/4-inch (7 mm) from true line.
B. Variation from Unit to Adjacent Unit: 1/32-inch (1 mm) maximum.
C. Variation from Plane of Wall: 1/4-inch (7mm) in 10 feet and 1/2-inch (13 mm) in 20 feet (6 m) or more.
D. Variation from Plumb: 1/4-inch (7mm) per story noncumulative; 1/2-inch (13 mm) in two stories or more.
E. Variation from Level Coursing: 1/8-inch (3 mm)in 3 feet; 1/4-inch (7 mm) in 10 feet (3 m); 1/2-inch (13mm) maximum.
F. Variation of Joint Thickness: 1/8-inch (3 mm) in 3 feet.
G. Maximum Variation from Cross Sectional Thickness of Walls: +/- 1/4-inch (7 mm).

3.7 MASONRY FLASHINGS

A. Lap end joints at least [6 inches (150 mm)] <**Insert option Here**> inches and seal watertight.

3.8 LINTELS

A. Construct lintels using grout fill and reinforcing specified. Place reinforcing bars as shown on the drawings.]

B. Install reinforced unit masonry lintels over openings. Construct lintels using grout fill and reinforcing. Maintain at least 8-inch bearing on each side of opening.
C. Use reinforcing bars of one-piece lengths only.
D. Place and consolidate grout fill without disturbing reinforcing.
E. Allow lintels constructed in place to reach strength before removing temporary supports.

3.9 GROUTED COMPONENTS

A. Reinforce masonry units as shown on the drawings.
B. Lap splices at least 24 bar diameters.
C. Place and consolidate grout fill without disturbing reinforcing.
D. Solid grout concrete masonry units in accordance with California Building Code section 2104A.6.1.2.2.

3.10 CONTROL JOINTS

A. Do not continue horizontal joint reinforcing across control joints.
B. Form control joint by use of sheet building paper bond breaker one side fitted to hollow contour of block unit end. Fill created core with grout fill. Rake joint at exposed faces for rod and sealant.
C. Install resilient control joint in continuous lengths. Heat solvent weld butt and corner joints in accordance with manufacturer's instructions.
D. Size joint in accordance with Division 07 Section "Joint Sealants" for sealant performance.

3.11 BUILT-IN WORK

A. As work progresses, build-in [metal door frames,] [fabricated metal frames,] [window frames,] [wood nailing strips,] [anchor bolts,] [plates,] and other items to be built in the work supplied by other sections.
B. Build-in items plumb and level.
C. C. Bed anchors of metal door [and glazed] frames in mortar joints. Fill frame voids solid with mortar. [Fill masonry cores with grout at least [12 inches (300 mm)] <**Insert option Here**> from framed openings.]
D. Do not build-in organic materials subject to deterioration.

3.12 CUTTING AND FITTING

A. A. Cut and fit for [chases] [pipes] [conduit] [sleeves] [grounds] [and] <**Insert option Here**>. Cooperate with other sections of work to provide correct size, shape, and location.
B. Obtain approval from the University prior to cutting or fitting areas not indicated or where appearance or strength of masonry work may be impaired.

3.13 CLEANING

A. Remove excess mortar and smears.
B. Replace defective mortar. Match adjacent work.
C. Clean soiled surfaces with a nonacidic solution that will not harm masonry or adjacent materials. Consult masonry manufacturer for acceptable cleaners.
D. Use nonmetallic tools in cleaning operations.

3.14 PROTECTION

A. Protect finished installation under provisions of Division 01 Section "General Requirements".
B. Maintain protective boards at exposed external corners which may be damaged by construction activities.
C. Provide protection without damaging completed work.
D. At day's end, cover unfinished walls to prevent moisture infiltration.

END OF SECTION 042200

DIVISION 7 THERMAL & MOISTURE CONTROL

SECTION 07450 - METAL ROOF PANEL SYSTEM

GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, Insofar as they apply, shall be a part of this Specification.

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Snap joint-seamed, standing seam metal roof panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

A. Division 06 Section "Sheathing" for sheathing substrate for metal roof panels.

B. Division 07 Section "Roof Insulation" for thermal insulation installed under existing under plywood roof deck panels.

C. Division 07 Section "Sheet Metal Flashing and Trim" for formed sheet metal copings, flashings, reglets, and roof drainage items in addition to items specified in this Section.

D. Division 07 Section "Manufactured Roof Specialties" for manufactured copings, reglets, and roof drainage items in addition to items specified in this Section.

E. Division 07 Section "Joint Sealants" for field-applied joint sealants.

1.3 REFERENCES

A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:

1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
2. AAMA 809.2 - Voluntary Specification Non-Drying Sealants.

B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

C. ASTM International (ASTM): www.astm.org:

1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
3. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

4. ASTM A 980 - Standard Specification for Steel, Sheet, Carbon, Ultra High Strength Cold Rolled.
5. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
6. ASTM C 920 - Specification for Elastomeric Joint Sealants.
7. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
8. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
9. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
10. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
11. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

D. Cool Roof Rating Council (CRRC): www.coolroofs.org/productratingprogram.html:

1. CRRC-1-2008 - CRRC Product Rating Program.

E. International Accreditation Service (IAS):

1. IAS AC 472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.

F. Underwriters Laboratories, Inc. (UL): www.ul.com:

1. UL 580 - Tests for Uplift Resistance of Roof Assemblies

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, inspection agency and related trade contractors.

1. Coordinate building framing in relation to metal panel system.
2. Coordinate openings and penetrations of metal panel system.
3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal panels.

1.5 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal roof panel assembly and accessories from a single manufacturer providing fixed-base roll forming, and accredited under IAS AC 472 Part B.

B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years experience in manufacture of similar products in successful use in similar applications.

C. Installer Qualifications: Experienced Installer certified by metal panel manufacturer with minimum of five years experience with successfully completed projects of a similar nature and scope.

1. Installer's Field Supervisor: Experienced mechanic certified by metal panel manufacturer supervising work on site whenever work is underway.

D. **Buy American Compliance**: Materials provided under work of this Section shall comply with the following requirements:

1. Buy American Act of 1933 BAA-41 U.S.C §§ 10a – 10d.
2. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA).

1.6 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets for specified products.

B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot showing edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, roof accessories, lightning arresting equipment, and special details. Make distinctions between factory and field assembled work.

1. Indicate points of supporting structure that must coordinate with metal panel system installation.
2. Include data indicating compliance with performance requirements.
3. Include structural data indicating compliance with requirements of authorities having jurisdiction.

C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.

D. Samples for Verification: Provide 12-inch- (305 mm-) long section of each metal panel profile. Provide color chip verifying color selection.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Indicating compliance of products with requirements, witnessed by a professional engineer.

B. Qualification Information: For Installer firm and Installer's field supervisor.

C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC 472.

D. **Buy American Certification**: Manufacturers' letters of compliance acceptable to authorities having jurisdiction, indicating that products comply with requirements.

E. **Florida State Building Code Certificate**.

F. Manufacturer's Warranty: Sample copy of manufacturer's standard warranty.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacturer's Warranty: Executed copy of manufacturer's standard warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.

1. Deliver, unload, store, and erect metal panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
2. Store in accordance with Manufacturer's written instructions. Provide wood collars for stacking and handling in the field.

1.10 COORDINATION

A. Coordinate sizes, profiles, and locations of roof curbs and other roof-mounted equipment and roof penetrations, based upon sizes of actual selected equipment.

1.11 WARRANTY

A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.

B. **Special Weathertightness Warranty**: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail to remain weathertight, including leaks, without monetary limitation up to cost limitation up to cost limitation of fourteen dollars ($14.00) per square foot of covered area within 20 years from date of Substantial Completion.

C. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within 20 years from date of Substantial Completion, including:

1. **Fluoropolymer Two- Coat System**:

a. Color fading in excess of 10 Hunter units per ASTM D 2244.
b. Chalking in excess of No.6 rating per ASTM D 4214.
c. Failure of adhesion, peeling, checking, or cracking.

2. **Modified Silicone-Polyester Two-Coat System**:

a. Color fading in excess of 7 Hunter units per ASTM D 2244, for vertical applications.
b. Color fading in excess of 10 Hunter units per ASTM D 2244, for non-vertical applications.
c. Chalking in excess of No.8 rating per ASTM D 4214, for vertical applications.
d. Chalking in excess of No.6 rating per ASTM D 4214, for non-vertical applications.
e. Failure of adhesion, peeling, checking, or cracking.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: **MBCI Metal Roof Systems, Division of NCI Group, Inc.**; Houston TX. Tel: (877) 713-6224; Email: info@mbci.com; Web: www.mbci.com.

Basis of Design Manufacturer: AEP SPAN
2141 Milwaukee Way, Tacoma, WA 98421, 800-733-4955
10905 Beech Avenue, Fontana, CA 92337

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.

B. Recycled Content: For Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. Radiative Property Performance:
1. **Energy Star Qualified**: Listed on USDoE ENERGY STAR Roof Products Qualified Product List.
2. **Energy Performance**: Listed in CRRC Rated Product Directory, with minimum properties as required by applicable Energy efficiency or High-Performance Green Building standard.

D. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:

1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.

a. Wind Uplift Testing: Certify capacity of metal panels by actual testing of proposed assembly per ASTM E 1592.

2. Snow Loads: As indicated.
3. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/240 of the span with no evidence of failure.
4. Seismic Performance: Comply with ASCE 7, Section 9, "Earthquake Loads."

E. Wind Uplift Resistance: Comply with UL 580 for wind-uplift class UL-60.

F. **Florida State Building Code Compliance**: Comply with requirements of Florida State Building Code. www.floridabuilding.org/pr/pr_app_srch.aspx

G. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.

H. **Self-Adhering, High-Temperature Underlayment**: Cold-applied sheet WIP 300 HT underlayment 40 mils thick, consisting of slip-resistant, high tensile-strength rubberized asphalt underlayment, with release-paper backing. Provide primer when recommended by underlayment manufacturer for substrate.

2.3 METAL ROOF PANELS

A. Mechanically-seamed, Concealed Fastener, Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with vertical ribs at panel edges, installed by lapping and

mechanically interlocking edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weathertight installation.

1. Basis of Design: **MBCI, LokSeam,** www.mbci.com/lokseam.html.

Second paragraph below describes Galvalume Plus with clear acrylic coating for use as exposed metallic finish.

2. **Aluminum-Zinc Alloy-Coated Steel Sheet**: ASTM A 792/A 792M, structural quality, Grade 340, Coating Class AZM150, pre-painted by the coil-coating process per ASTM A 755/A 755M.

   a. Nominal Coated Thickness: 22 gage.
   b. Panel Surface: Smooth with striations in pan.
   c. Exterior Finish: Fluoropolymer two-coat system selected by Architect from manufacturer's standard colors.

3. Panel Width: 16 inches (406 mm).
4. Panel Seam Height: 1.75 inch (44.4 mm).
5. Joint Type: Snap joint-seamed.

2.4 METAL ROOF PANEL ACCESSORIES

A. General: Provide complete metal roof panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in manufacturer's standard profiles. Provide required fasteners, closure strips, thermal spacers, splice plates, support plates, and sealants as indicated in manufacturer's written instructions.

B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.

C. Panel Clips: ASTM C 645, with ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.

D. Panel Fasteners: Self-tapping screws and other acceptable corrosion-resistant fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.

E. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:

   1. Factory-Applied Seam Sealant: Manufacturer's standard hot-melt type.
   2. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.
   3. Concealed Joint Sealant: Non-curing butyl, AAMA 809.2.

F. **Roof Accessories**: Approved by metal roof panel manufacturer. "Roof Accessories" for requirements for curbs, equipment supports, roof hatches, heat and smoke vents, ventilators, and preformed flashing sleeves.

2.5 FABRICATION

A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.

B. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.

C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate and finish.

2.6 FINISHES

A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

B. **Modified Silicone-Polyester Two-Coat System**: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat, meeting solar reflectance index requirements.

1. Basis of Design: **MBCI, Signature 200**.

A. **Fluoropolymer Two-Coat System**: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621, meeting solar reflectance index requirements.

1. Basis of Design: **MBCI, Signature 300**.

B. **Fluoropolymer Two-Coat Metallic System**: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF metallic fluoropolymer color coat, AAMA 621, meeting solar reflectance index requirements.

1. Basis of Design: **MBCI, Signature 300 Metallic**.

C. Interior Finish: 0.5 mil total dry film thickness consisting of primer coat and wash coat of manufacturer's standard light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine metal panel system substrate and supports with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panel installation.

1. Inspect metal panel support substrate to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable supports at recommended spacing to match installation requirements of metal panels.
2. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to metal panel system manufacturer but not greater than the following:

a. 1/4 inch (6 mm) in 20 foot (6.1 m) in any direction.
b. 3/8 inch (9 mm) over any single roof plane.

B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal roof panel system installation.

3.2 PREPARATION

A. **Miscellaneous Supports**: Install subframing, girts, furring, and other miscellaneous panel support members according to ASTM C 754 and manufacturer's written instructions.

B. **Self-Adhering Sheet Underlayment**: Apply in accordance with underlayment manufacturer's written instructions; apply primer if required. Apply at locations indicated below. Roll laps with roller.

1. Apply over the entire roof surface.
2. Apply on area of roof not covered by self-adhering sheet underlayment. Lap over edges of self-adhering sheet underlayment not less than 6 inches (150 mm).

C. Flashings: Provide flashings as required to complete metal roof panel system. Install in accordance with Section 07600 "Flashing and Sheet Metal" and approved shop drawings.

3.3 METAL PANEL INSTALLATION

A. Snap-Joint-Seamed, Standing Seam Metal Roof Panels: Install weathertight metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal roof panels in orientation, sizes, and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.

B. Attach panels to supports using clips, screws, fasteners, and sealants recommended by manufacturer and indicated on approved shop drawings.

1. Fasten metal panels to supports with concealed clips at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.
2. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
3. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.
4. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

3.4 ACCESSORY INSTALLATION

A. General: Install metal panel trim, flashing, and accessories using recommended fasteners and joint sealers, with positive anchorage to building, and with weather tight mounting. Provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.
2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
3. Provide concealed fasteners except where noted on approved shop drawings.
4. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.

B. Joint Sealers: Install joint sealers where indicated and where required for weathertight performance of metal panel assemblies, in accordance with manufacturer's written instructions.

1. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

3.5 FIELD QUALITY CONTROL

A. Testing Agency: City will engage an independent testing and inspecting agency acceptable to Architect to perform field tests and inspections and to prepare test reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective films immediately in accordance with metal roof panel manufacturer's instructions. Clean finished surfaces as recommended by metal roof panel manufacturer.

B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

DIVISION 7 - THERMAL & MOISTURE CONTROL

SECTION 07600 - FLASHING & SHEET METAL

1. GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply, shall be a part of this Specification.

2. SCOPE

Furnish all labor, materials, equipment, tools and accessories required to provide flashing and sheet metal and accessories for all roof replacement and repair work shown on the Drawings.

3. APPLICABLE STANDARDS

Flashings and sheet metal work shall be fabricated and installed in accordance with the "Architectural Sheet Metal Manual" of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), Fourth edition, 1987.

4. SHOP DRAWINGS

Submit fully detailed shop drawings of all sheet metalwork to the Architect for review. See General Conditions and Supplementary General Conditions, Article C for submittal requirements.

5. SHEET METAL

Sheet metal work shall be galvanized steel sheet, meeting requirements of ASTM A525, with minimum zinc coating of 1.25 oz./square foot and 0.2% copper bearing. Weights of sheet metal (gauges) are indicated on the Drawings. Where sheet metal gauges are not indicated, use 24-gauge. Galvanized sheet metal shall be mill phosphatized to receive paint finish.

6. SHEET LEAD

Standard 0.062” thick lead sheet weighing 4 pounds per square foot, arsenical-antimonial and pig lead alloy conforming to ASTM B29-79 (1984). Use sheet lead for flashing of vent pipes and other penetrations of the roof.

7. SOLDER

Grade “A” conforming to ASTM B32-87, composed of 50% pig lead and 50% block tin, warranted pure. Flux shall be an approved brand of soldering flux or muriatic acid killed with zinc.

8. FASTENERS & ACCESSORIES

Provide all anchors and fasteners, stiffeners, straps, sealants and accessories required for a complete and finished installation. Fasteners and accessories shall be non-ferrous.

9. REGLETS & COUNTER-FLASHINGS

Reglets and counter-flashings shall be galvanized steel as indicated on the Drawings. Reglets and counter-flashings shall be as manufactured by Fry Reglet Corporation, Alhambra, California, or approved equal, and shall be Fry "Springlok" Flashing System Type as indicated on the Drawings. Counter-flashings shall be 26-gauge galvanized steel. Counter-flashings shall be shop or factory-formed so that the counter-flashings shall lock rigidly into reglets.

END OF SECTION

DIVISION 7 - THERMAL & MOISTURE CONTROL

SECTION 07900 - CAULKING & SEALANTS

1. GENERAL CONDITIONS

The foregoing General Conditions, Supplementary General Conditions and Instructions to Bidders, insofar as they apply, shall be a part of this Specification.

2. SCOPE

Furnish all labor, materials, equipment, tools and accessories required to provide caulking and sealant for all work shown on the Drawings.

3. WORK INCLUDED

Provide caulking and sealing of joints as required to seal the perimeters of all openings in walls and as required to weatherproof the buildings. Provide interior building sealing of joints, penetrations and openings, including acoustical and sanitary sealing, as indicated and required.

4. REFERENCE STANDARDS

Sealants and application/ installation of sealants shall meet or exceed the applicable requirements of "Sealants: The Professionals' Guide", a publication of the Sealant and Waterproofers Institute - 1800 Pickwick Ave. - Glenview, IL 60025.

System Description: Joints around openings in exterior walls and joints of abutting materials shall be sealed continuously with sealant. Caulk and seal any other joints indicated or required to weatherproof and complete the buildings, both exterior and interior.

The full extent of exterior and interior caulking and sealing work is not necessarily completely or individually specified. Caulking and sealing shall be provided wherever required to prevent light leakage and noise penetration as well as moisture intrusion.

5. INTERFACE & COORDINATION

Coordinate the Work of this Section with the Work in other Sections specifying materials, systems and assemblies requiring caulking and sealing.

6. MATERIALS

Sealants: Sealants shall be specially designed for adhesion to the surfaces to which they will be applied and shall be non-staining, non-shrinking and non-sagging, meeting the following requirements:

Exterior Sealant: Sealant for exterior locations shall be polyurethane elastomeric sealant which cures at normal temperature to a flexible firm rubber, tack free, in gun grade consistency, such as Vulkem #116 Polyurethane Sealant; Sika #IA Polyurethane Sealant; or approved equal. Sealant shall meet or exceed the minimum requirements of Fed. Spec. TT-S-227 or TT-S-230. Oil-and-resin based compounds and so-called architectural grade compounds will not be accepted.

Interior Sealant: Sealant for general sealing of interior locations shall be a single-component, gun-grade, paintable, water-base acrylic-latex, "Chem-Calk 600" as manufactured by Woodmont Products, Inc., or approved equal.

Acoustical Sealant: Permanently plastic, non-skinning, paintable, synthetic polymer base, "#579.64 Acoustical Sealant" as manufactured by Presstite Products; "USG Acoustical Sealant"; or approved equal.

6. MATERIALS (continued)

Sanitary Sealant: Single-component, primer less, flexible, mildew-resistant, silicone rubber meeting requirements of Fed. Spec. TT-S-001543: "Dow Corning Silicone Rubber Bathtub Caulk"; GE's "Sanitary Sealant"; or approved equal.

Primer: Primer, when required, shall be a quick-drying, colorless, non-staining sealer of type and consistency as recommended by the manufacturer of the sealant for the particular type of surfaces to be sealed.

Packing: Sealant backup or packing (backer rod) shall be a non-absorbent pre-molded or pre-formed non-staining resilient material, such as polyethylene foam rod or neoprene, butyl, polyurethane or other closed cell foams or extruded rod, compatible with the sealant used. Material shall act as a bond breaker and shall be circular in cross section.

7. APPLICATION & INSTALLATION

Cleaning and surface preparation of joints, application of primers, installation of packing and installation of sealant material shall be in accordance with the sealant manufacturers' installation instructions and recommendations.

Thickness of sealant shall be one-half the joint width with a minimum thickness of ¼". Sealant shall bond the two opposing surfaces of the joint.

Finished sealed surfaces shall be uniformly smooth and free from wrinkles.

Clean surfaces adjacent to caulked and sealed joints of any smears of compound or other soiling due to sealing applications, as the Work progresses.

END OF SECTION

ATTACHMENT 2

CITY OF UKIAH - ELECTRIC SERVICE CENTER
TENANT IMPROVEMENT - SITE WORK

SYMBOL LEGEND

REFERENCE

SECTION LETTER
DRAWING PAGE

DETAIL NUMBER
DRAWING PAGE

1 DOOR MARK

A WINDOW MARK

1 NOTE

1 REVISION MARK

LINES

- PROPERTY LINE
- SD STORM DRAIN
- U SOLID UNDER DRAIN
- U PERF. UNDER DRAIN
- S SEWER
- W WATER SERVICE
- DW DOMESTIC WATER
- IW IRRIGATION WATER
- E ELECTRICAL POWER
- T TELEPHONE
- G GAS
- TV TELEVISION
- SLEEVE

GRADES

- 638 EXISTING CONTOUR
- 638.36 EXISTING GRADE
- 636.25 NEW FINISH GRADE

WALLS

- EXISTING WALL
- NEW WALL
- REMOVE WALL
- INFILL

SITE WORK

- TREE TO REMAIN
- TREE TO BE REMOVED (SEE DEMOLITION NOTES)
- NEW BASE & A/C PAVING
- NEW CONCRETE FLATWORK

SOIL REPORT

GEOTECHNICAL EXPLORATION REPORT
IMPROVEMENTS FOR UTILITY DEPARTMENT RELOCATION
1350 HASTINGS ROAD, UKIAH, CA
APN: 180-070-19-00 DATED: OCTOBER 10, 2016
LACO BY: J. ERICH RAUBER, P.E./G.E.

SPECIAL INSPECTIONS

SPECIAL INSPECTIONS ARE REQUIRED FOR:
SITE WORK: IMPORT SOIL & COMPACTION
GENERAL CONSTRUCTION: NONE REQUIRED.
ELECTRICAL, MECHANICAL & PLUMBING: SEE "EN" SHEETS.

VICINITY MAP



NORTH

BUILDING DATA

JURISDICTION	: CITY OF UKIAH
LAND USE ZONE(S)	: C-2 (GENERAL COMMERCIAL)
NUMBER OF STORIES	: PARTIAL TWO (2) W/ VARIOUS MEZZANINES
BUILDING CONST.	: TYPE V-A BUILDING CONSTRUCTED: 2000
CBC OCCUPANCY	: OFFICE & WAREHOUSE ("B" & "S-1")
	EXISTING: 15,800.0 sf
	ADDITION: 0.00 sf
	TOTAL: 15,800.00
ASSESSOR'S PARCEL#	: 180-070-19-00
LOT AREA	: 2.80 Ac.
CLIMATE ZONE	: 2
SEISMIC DESIGN CAT.	: E
WIND EXPOSURE	: C
FIRE SPRINKLED	: YES
SMOKE ALARM SYS.	: NO
SOIL BEARING	: Assumed 1,000 psf
FLOOR DESIGN LOAD	: LL=50 psf + 2,000 lbs. Concentrated on 2' X 2' Area
ROOF LOAD	: LL = 20 psf
CEILING LOAD	: NO

GOVERNING CODES:

2019 TRIENNIAL EDITION (EFFECTIVE JANUARY 1, 2020)

The 2019 California Building Standards Code (CCR, Title. 24) was published as of July 1, 2019. The effective date of the 2016 Code is January 1, 2020.

Part 1 - California Administrative Code
Part 2 - California Building Code
- Volume 1 of Part 2
- Volume 2 of Part 2

Part 2.5 - California Residential Code
Part 3 - California Electrical Code
Part 4 - California Mechanical Code
Part 5 - California Plumbing Code
Part 6 - California Energy Code
Part 7 - Vacant
Part 8 - California Historical Building Code
Part 9 - California Fire Code
Part 10 - California Existing Building Code
Part 11 - California Green Building Standards Code (also referred to as *CAL Green*)
Part 12 - California Referenced Standards Code

ABBREVIATIONS

A.B.	ANCHOR BOLT	FHSMS	FLAT HEAD SHEET METAL SCREW	PLYWD	PLYWOOD
A.C.	ASPHALTIC CONCRETE	FHWSE	FLAT HEAD WOOD SCREW	P/L	PROPERTY LINE
A/C	AIR CONDITION	FIN.	FINISH	PROP.	PROPERTY
A.F.F.	ABOVE FINISH FLOOR	FLR.	FLOOR	P.T.	PRESSURE TREATED
ALUM.	ALUMINUM	F.o.B.	FACE OF BRICK	R.	RADIUS
APPROX.	APPROXIMATE	F.o.C.	FACE OF CONCRETE	RAG	RETURN AIR GRILLE
ASB	ASBESTOS	F.o.P.	FACE OF PLYWOOD	RD.	ROUND
ASHP.	ASPHALT	F.o.S.	FACE OF STUD	REBAR	REINFORCING ST'L BAR
BLK'G	BLOCKING	FRP FG	FG REINFORCED PLASTIC FOOD GRADE	REINF.	REINFORCING OR REINFORCEMENT ST'L BAR
BTR.	BETTER	F.S.	FLOOR SINK	RHWS	ROUND HEAD WOOD SCREW
C.B.	CATCH BASIN	GA.	GAUGE	RM.	ROOM
CEM.	CEMENT	GALV.	GALVANIZED	R.O.	ROUGH OPENING
CER.	CERAMIC	G.B.	GYPSUM BOARD	RO.	ROUGH
CLG.	CEILING	G.F.I.	GROUND FAULT INTERRUPTER	RDWD.	CALIFORNIA REDWOOD
CLR.	CLEAR	H.C.	HOLLOW CORE	R & S	ROD AND SHELF
C.M.P.	CORRUGATED METAL PIPE	HDWD.	HARDWOOD	R.W.L.	RAIN WATER LEADER
CO	CLEAN-OUT	H't.	HEIGHT	SAD	SEE ARCHITECTURAL DRAWINGS
COTG	CO TO GRADE	HORIZ.	HORIZONTAL	SAN.	SANITARY
COTW	CO TO WALL	HW	HOT WATER	SCRN.	SCREEN
C.I.	CAST IRON	INCL.	INCLUDE	SAR	SUPPLY AIR REGISTER
CKT.	CIRCUIT	INT.	INTERIOR	S.C.	SOLID CORE
C/L	CENTERLINE	INV.	INVERT	S4S	SURFACED FOUR SIDES
CLO.	CLOSET	I.D.	INSIDE DIAMETER	SH'T.	SHEET
CONC.	CONCRETE	I.P.	IRON PIPE	SIM.	SIMILAR
CONT.	CONTINUOUS	J'T	JOINT	SMS	SHEET METAL SCREW
CW	COLD WATER	K.D.	KILN DRIED	S.P.	STRUCTURAL PLYWOOD
DET.	DETAIL	LAM.	LAMINATED	SPEC.	SPECIFICATION(S)
D.F.	DOUGLAS-FIR, OR DRINKING FOUNTAIN	L.P.	LAMINATED PLASTIC	SQ.	SQUARE
DIA. (Ø)	DIAMETER	MAX.	MAXIMUM	SS	STAINLESS STEEL
DIM.	DIMENSION	MIN.	MINIMUM	SSD	SEE STRUCTURAL DRAWINGS
DRWG.	DRAWING	M.B.	MACHINE BOLT	STD.	STANDARD
(E)	EXISTING	MDO	MEDIUM DENSITY OVERLAY	ST'L.	STEEL
EA.	EACH	M.S.	MACHINE SCREW	STRUCT.	STRUCTURAL
EFC	EXHAUST FAN CEILING	MTL.	METAL	T.C.	TOP OF CURB
EFR	EXHAUST FAN ROOF	(N)	NEW	T & G	TONGUE AND GROOVE
EFW	EXHAUST FAN WALL	N.I.C.	NOT IN CONTRACT	TYP.	TYPICAL
E.J.	EXPANSION JOINT	NO.	NUMBER	VERT.	VERTICAL
ELEV.	ELEVATION	O.C.	ON-CENTER	V.G.	VERTICAL GRAIN
E.P.	ELECTRIC PANEL	O.D.	OUTSIDE DIAMETER	VCT	VINYL COMPOSITION TILE
EXP.	EXPOSED OR EXPANSION	OHWS	OVAL HEAD WOOD SCREW		
EXT.	EXTERIOR	PAF	POWDER ACTUATED FASTENER	W/	WITH
F.C.	FRAMING CLIP	P.G.	PAINT GRADE	WIND.	WINDOW
F.B.	FLAT BAR	PHWS	PAN HEAD WOOD SCREW	W.S.	WOOD SCREW
F.B.O.	FURNISHED BY OTHERS			W.P.	WEATHER-PROOF
F.D.	FLOOR DRAIN				
F.E.	FIRE EXTINGUISHER				
FG	FIBERGLASS				

GENERAL NOTES

ELECTRICAL
1. PERMANENTLY MARK & DATE AVAILABLE FAULT CURRENT AND RECALCULATE, MARK AND DATE ANY MODIFICATIONS, EXCEPT FOR DWELLINGS AND INDUSTRIAL INSTALLATIONS.
2. GFIC RECEPTACLES MUST BE READILY ACCESSIBLE.
3. DWELLING CIRCUITS TO BE AFCI PROTECTED AND BE GFIC AT WET LOCATIONS.
4. FOYERS GREATER THAN 60 S.F. SHALL HAVE RECEPTACLES ON WALLS GREATER THAN 3 FEET.
5. SWITCHES CONTROLLING LIGHTING MUST HAVE A NEUTRAL.
6. REPLACEMENT RECEPTACLES ARE TO FOLLOW REQUIREMENTS FOR NEW INSTALLATIONS FOR AFIC, GFIC, TAMPER-RESISTANT AND WEATHER RESISTANT LOCATIONS.
7. TAMPER-RESISTANT RECEPTACLES ARE REQUIRED FOR DWELLINGS, GARAGES AND OUT-BUILDINGS.
8. BATHROOM EXHAUST FANS: ENERGY STAR COMPLIANT & CONTROLLED BY ACCESSIBLE HUMIDISTAT.
9. RECEPTACLES WITH INSULATED GROUNDING TERMINAL ARE NOT ALLOWED IN PATIENT CARE AREAS.

ENVELOPE
1. INSTALLED INSULATION SHALL COMPLY WITH PLANS AND CALIFORNIA QUALITY STANDARDS.
2. CAULK AND/OR SEAL ALL BUILDING MATERIAL JOINTS AND PENETRATIONS AGAINST AIR LEAKAGE.
3. MANUFACTURED DOORS & WINDOWS: HAVE AIR INFILTRATION RATES NOT EXCEEDING CA STANDARDS.
4. WEATHER-STRIP AND GASKET ALL DOORS AND WINDOWS AS REQUIRED TO PREVENT AIR LEAKAGE.
5. RESIDENTIAL BUILDINGS TO HAVE AIR RETARDING WRAP AND WALL & ROOF FOIL RADIANT BARRIERS.

EQUIPMENT
1. ALL KITCHEN APPLIANCES, HEATING/VENTILATING SYSTEMS, SERVICE WATER HEATERS AND AIR CONDITIONING SYSTEMS TO COMPLY W/ CA STANDARDS FOR ENERGY EFFICIENCY AS APPLICABLE.
2. WHERE EQUIPMENT IS SPECIFIED, INSTALL ONLY UNITS THAT MEET OR EXCEED THOSE STANDARDS.

CONSTRUCTION
1. WORK UNDER THE GENERAL CONTRACT SHALL BE COMPLETED IN THE SPECIFIED CONTRACT TIME.
2. OBSERVE ALL PROPERTY LINE SETBACKS AND CLEARANCES FROM ESTABLISHED EASEMENTS, WELLS, UNDERGROUND IMPROVEMENTS AND SEPTIC SYSTEMS.
3. ALL UTILITY SYSTEM MODIFICATIONS, TERMINATIONS, & EXTENSIONS TO SERVE, BOTH UNDERGROUND AND OVERHEAD, SHALL BE PER UTILITY COMPANY REQUIREMENTS AND APPLICABLE CODES. MAINTAIN NEAT & CLEAN, SAFE WORK AREA, AND PROTECT THE PUBLIC DURING THE COURSE OF ON-SITE INSTALLATION. REMOVE ALL DEBRIS FROM SITE DAILY OR STORE IN AN APPROVED LOCATION. ALL CHANGES MADE DURING THE COURSE OF CONSTRUCTION, INCLUDING NEW ROUTINGS AND RE-POSITIONING, SHALL BE NOTED ON AN "AS-BUILT" SET OF CONSTRUCTION DOCUMENTS. NEW RESIDENCES AND ADDITIONS GREATER THAN 1,000 S.F. SHALL PROVIDE WHOLE BUILDING VENTILATION PER ANSI/ASHRAE STANDARD 62.2-2007, SECTION 4.

ALTERATIONS
7. PROTECT ADJACENT FINISHES & ITEMS NOT SCHEDULED FOR WORK AND THOSE ITEMS INTENDED FOR RE-USE FROM DAMAGE DURING THE COURSE OF THE WORK. KEEP THE BUILDING SECURE AND OBSERVE ALL SAFETY PRECAUTIONS DURING THE LIFE OF THE CONSTRUCTION ACTIVITIES.
8. FIXTURES AND OTHER ITEMS SPECIFICALLY SCHEDULED FOR REMOVAL, BUT NOT SCHEDULED FOR REUSE SHALL BECOME THE PROPERTY OF THE GENERAL CONTRACTOR & THE VALUE OF IT (IF ANY) SHALL BE REFLECTED IN THE BID PRICE.
9. REMOVE ALL UNUSED POWER & OTHER UTILITY FEEDS COMPLETELY. NO LIVE POWER CIRCUITS OR GAS OR WATER LINES SHALL BE LEFT CONCEALED IN WALLS OR LEFT DISCONNECTED. ALL SERVICE TERMINATIONS SHALL BE PER CURRENT CODES & UTILITY COMPANY REQUIREMENTS. ANY ABANDONED WATER PIPES IN A WALL SHALL BE CAPPED WITH BOTH A GATE VALVE AND A DEAD-END CAP. THE VALVE SHALL BE ACCESSIBLE & ITS LOCATION SHALL BE SHOWN ON "AS BUILT" RECORD DRAWINGS.
10. RE-USE EXISTING CONDUIT & WIRING WHEREVER POSSIBLE IF IT IS IN USABLE CONDITION, OTHERWISE, REMOVE IT. RE-USE OF EXISTING MATERIAL SHALL BE LIMITED TO THAT WHICH MEETS CURRENT CODES.
11. PATCH & REPAIR ALL STRUCTURE, FLOOR, WALL & CEILING FINISHES INCLUDING BASE & TRIM AS REQUIRED TO MATCH THE ADJACENT "LIKE SURFACES" WHERE REMOVAL OR ALTERATION OCCURS OR WHERE NEW CONSTRUCTION EXISTS, INCLUDING RELOCATION OF HVAC OR ELECTRICAL EQUIPMENT, DUCTING AND/OR PARTITIONS.
12. EXISTING DIMENSIONS AND CONDITIONS SHOWN ARE APPROXIMATE. CONDITIONS NOT SHOWN OR FORESEEN MAY ALTER NEW WORK.

SITE DEVELOPMENT
1. SITE GRADING SHALL BE PERFORMED IN ACCORDANCE WITH THE RECOMMENDATIONS CONTAINED IN THE SOIL REPORT - IF ANY. SHAPE & GRADE SITE TO FORCE DRAINAGE AWAY FROM STRUCTURE.

TELECOMMUNICATIONS
1. PHONE, SIGNAL & DATA LINES SHALL BE INSTALLED IN 3/4" CONDUIT AND UL APPROVED PULL BOXES. CONTRACTOR SHALL PROVIDE CONDUIT TO ATTIC - MIN. 6" ABOVE INSULATION; WIRING SHALL BE FURNISHED & INSTALLED BY OTHERS, U.N.O. ALL COMPONENTS TO MEET C.E.C. & N.E.C..

DEFERRED APPROVALS

ANY ITEM LISTED AS A DEFERRED APPROVAL ITEM SHALL BE THE SUBJECT OF A SUBSEQUENT SUBMITTAL CONTAINING DESIGN DOCUMENTATION CONSISTING OF CALCULATIONS, FLOW CHARTS, DIAGRAMS, PLANS AND/OR DETAILS, AND, IF THE ITEM IS A MANUFACTURED COMPONENT OR SYSTEM, THE MANUFACTURER'S LITERATURE. SAID SUBMITTAL SHALL, IF REQUIRED BY THE ADMINISTRATIVE AUTHORITY HAVING JURISDICTION, BE STAMPED AND SHALL BEAR THE ORIGINAL SIGNATURE OF A CALIFORNIA LICENSED ARCHITECT OR PROFESSIONAL ENGINEER UNDER WHOSE SUPERVISION THE DESIGN WORK WAS ACCOMPLISHED. SAID SUBMITTAL SHALL BE MADE TO AND APPROVED BY THE ADMINISTRATIVE AUTHORITY PRIOR TO COMMENCING WORK ON ANY ASPECT OF THE DEFERRED APPROVAL ITEM, SYSTEM, OR COMPONENT. SAID SUBMITTAL SHALL BE MADE IN SUFFICIENT QUANTITY AND IN A FORM ACCEPTABLE TO THE ADMINISTRATIVE AUTHORITY [USUALLY 5 COPIES].

DEFERRED APPROVAL STATUS IS REQUESTED FOR:

1. CONSTRUCTION WASTE MANAGEMENT PLAN - GENERAL CONTRACTOR TO COMPLY WITH Cal Green SECTIONS 5.408.1 AND 5.408.3.
2. DESIGN & DOCUMENTATION OF MODIFICATIONS TO EXISTING FIRE SPRINKLER SYSTEM.

INDEX

TP100	TITLE PAGE – SYMBOL LEGEND, BUILDING DATA, GENERAL NOTES, INDEX, VICINITY MAP, ABBREVIATIONS, SCOPE OF WORK & DEFERRED APPROVALS
CG1.0	CAL GREEN BUILDING STANDARDS CODE
CG1.1	CAL GREEN BUILDING STANDARDS CODE
CG1.2	CAL GREEN BUILDING STANDARDS CODE
ADA.1	SITE ACCESSIBILITY FEATURE DETAILS
ADA.2	BUILDING ACCESSIBILITY FEATURE DETAILS
COA.1	CONDITIONS OF APPROVAL – CITY OF UKIAH
C1	TOPO MAP (EXISTING CONDITIONS) & DEMO PLAN
C2	GRADING AND DRAINAGE PLAN
C3	PARKING/RAMP PLAN AND DETAILS
L100	PLANTING PLAN
L101	IRRIGATION CONCEPT PLAN
L102	WATER FEATURE PLAN & DETAILS
L103	PLANTING & IRRIGATION DETAILS
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AS111	TRASH & RECYCLING STORAGE ENCLOSURE, NOTES & DETAILS
AS200	FENCE & VEHICLE GATE PLAN, PARTIAL ELEVATIONS, & DETAILS
AS201	FENCE & MAN GATE DETAILS
A100	EXISTING FLOOR PLANS, NOTES & DETAILS
A200	NOT USED
A300	COURTYARD INTERIOR ELEVATIONS
A400	EXTERIOR ELEVATIONS, NOTES & DETAILS
A500	ROOF PLAN NOTES & DETAILS
A501	ROOF DETAILS
S0.1	GENERAL NOTES & SPECIFICATIONS
S1.1	TYPICAL CONCRETE DETAILS
S1.2	TYPICAL WOOD DETAILS
S1.3	TYPICAL CMU DETAILS
S2.1	FOUNDATION & ENTRYWAY FRAMING PLAN
ES001	ELECTRICAL COVER SHEET
ES100	ELECTRICAL SITE PLAN
ES200	DETAILS
ES700	SPECIFICATIONS
ES701	SPECIFICATIONS

THESE DRAWINGS AND/OR SPECIFICATIONS AND/OR CALCULATIONS FOR THE ITEMS LISTED BELOW HAVE BEEN PREPARED BY OTHER DESIGN PROFESSIONALS OR CONSULTANTS WHO ARE LICENSED AND/OR AUTHORIZED TO PREPARE SUCH DRAWINGS IN THIS STATE. THESE DOCUMENTS HAVE BEEN EXAMINED BY ME FOR DESIGN INTENT AND APPEAR TO MEET THE APPROPRIATE REQUIREMENTS OF TITLE 24, CALIFORNIA CODE OF REGULATIONS AND THE PROJECT SPECIFICATIONS PREPARED BY ME.

THE ITEMS LISTED BELOW HAVE BEEN COORDINATED WITH MY PLANS AND SPECIFICATIONS AND ARE ACCEPTABLE FOR INCORPORATION INTO THE CONSTRUCTION OF THIS PROJECT FOR WHICH I AM THE INDIVIDUAL DESIGNATED TO BE IN GENERAL RESPONSIBLE CHARGE.

1. FRANZ ENGINEERING & SURVEYING (LAND SURVEYOR & CIVIL) ENGINEER [RON FRANZ, C.E.] (707) 462-1087_rfranz@comcast.net, 2335 Appolinaris Dr., Ukiah, CA 95482
2. LACO ASSOCIATES ENGINEERING - (GEOTECHNICAL ENGINEER) [J. ERICH RAUBER, P.E./G.E.] (707) 525-1222_raubere@lacoassociates.com 3450 Regional Parkway, Suite B2, Santa Rosa, CA 95403
3. ZFA STRUCTURAL ENGINEERS [DAVID COOPER, S.E.] (707) 526-0992 davidc@zfa.com, 1212 4th St., Santa Rosa, CA 95404-4039
4. 15000, INC. MECHANICAL ENGINEERS, [MATT TORRE, P.E.] (707) 577-0363_Matt@15000inc.com, 2901 Cleveland Ave., Ste. 204, Santa Rosa, CA 95403
5. SONOMA ELECTRICAL ENGINEERING, INC. [MARTIN WOBIG, P.E.] (707) 483-8829_martin@sonomaee.com, 1125 Shady Oak Place, Santa Rosa, CA 95404
6. KELDER ENGINEERING, INC. [KURT T. KELDER, C.E.] (707) 894-0862_kurt@kelderengineering.com, 132 South Cloverdale Blvd., Cloverdale, CA 95425

SCOPE OF WORK

1. ADAPT & MODIFY EXISTING BUILDING SITE CURRENTLY VACANT FOR OFFICES & FIELD SUPPLY STORAGE FOR OPERATIONS OF THE UKIAH ELECTRIC SERVICE CENTER, PLUS ADD 5 NEW SOLAR ARRAYS FOR POWER GENERATION.
2. -

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REVISIONS	BY

SITE: 1350 HASTINGS AVE. UKIAH, CA 95482
APN: 180-070-19-00 - 2.80 AC.

TITLE PAGE
SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
400 WEST CLAY STREET, UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.21
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
135 WEST GOBBI STREET, SUITE 203
UKIAH, CALIFORNIA 95482
(707) 462-2578

DATE 2019
SCALE AS NOTED
DRAWN LSM/BCM
PROJECT 1350 HASTINGS
SHEET TP100

2019 CALIFORNIA GREEN BUILDING STANDARDS CODE
NONRESIDENTIAL MANDATORY MEASURES, SHEET 1 (January 2020, Includes August 2019 Supplement)

Y = YES
N/A = NOT APPLICABLE
RESPON. PARTY = RESPONSIBLE PARTY (ie; ARCHITECT, ENGINEER, OWNER, CONTRACTOR, INSPECTOR ETC.)

Y | N/A | RESPON. PARTY

CHAPTER 3
GREEN BUILDING
SECTION 301 GENERAL

301.1 SCOPE. Buildings shall be designed to include the green building measures specified as mandatory in the application checklists contained in this code. Voluntary green building measures are also included in the application checklists and may be included in the design and construction of structures covered by this code, but are not required unless adopted by a city, county, or city and county as specified in Section 101.7.

301.3 NONRESIDENTIAL ADDITIONS AND ALTERATIONS. [BSC-CG] The provisions of individual sections of Chapter 5 apply to newly constructed buildings, building additions of 1,000 square feet or greater, and/or building alterations with a permit valuation of $200,000 or above (for occupancies within the authority of California Building Standards Commission). Code sections relevant to additions and alterations shall only apply to the portions of the building being added or altered within the scope of the permitted work.

A code section will be designated by a banner to indicate where the code section only applies to newly constructed buildings [N] or to additions and/or alterations [A]. When the code section applies to both, no banner will be used.

301.3.1 Nonresidential additions and alterations that cause updates to plumbing fixtures only:

Note: On and after January 1, 2014, certain commercial real property, as defined in Civil Code Section 1101.3, shall have its noncompliant plumbing fixtures replaced with appropriate water-conserving plumbing fixtures under specific circumstances. See Civil Code Section 1101.1 *et seq.* for definitions, types of commercial real property affected, effective dates, circumstances necessitating replacement of noncompliant plumbing fixtures, and duties and responsibilities for ensuring compliance.

301.3.2 Waste Diversion. The requirements of Section 5.408 shall be required for additions and alterations whenever a permit is required for work.

301.4 PUBLIC SCHOOLS AND COMMUNITY COLLEGES. (see GBSC)
301.5 HEALTH FACILITIES. (see GBSC)

SECTION 302 MIXED OCCUPANCY BUILDINGS

302.1 MIXED OCCUPANCY BUILDINGS. In mixed occupancy buildings, each portion of a building shall comply with the specific green building measures applicable to each specific occupancy.

SECTION 303 PHASED PROJECTS

303.1 PHASED PROJECTS. For shell buildings and others constructed for future tenant improvements, only those code measures relevant to the building components and systems considered to be new construction (or newly constructed) shall apply.

303.1.1 Initial Tenant improvements. The provisions of this code shall apply only to the initial tenant improvements to a project. Subsequent tenant improvements shall comply with the scoping provisions in Section 301.3 non-residential additions and alterations.

ABBREVIATION DEFINITIONS:

HCD	Department of Housing and Community Development
BSC	California Building Standards Commission
DSA-SS	Division of the State Architect, Structural Safety
OSHPD	Office of Statewide Health Planning and Development
LR	Low Rise
HR	High Rise
AA	Additions and Alterations
N	New

CHAPTER 5
NONRESIDENTIAL MANDATORY MEASURES

DIVISION 5.1 PLANNING AND DESIGN

SECTION 5.101 GENERAL
5.101.1 SCOPE
The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

SECTION 5.102 DEFINITIONS
5.102.1 DEFINITIONS
The following terms are defined in Chapter 2 *(and are included here for reference)*

CUTOFF LUMINAIRES. Luminaires whose light distribution is such that the candela per 1000 lamp lumens does not numerically exceed 25 (2.5 percent) at an angle of 90 degrees above nadir, and 100 (10 percent) at a vertical angle of 80 degrees above nadir. This applies to all lateral angles around the luminaire.

LOW-EMITTING AND FUEL EFFICIENT VEHICLES.
Eligible vehicles are limited to the following:

1. Zero emission vehicle (ZEV), including neighborhood electric vehicles (NEV), partial zero emission vehicle (PZEV), advanced technology PZEV (AT ZEV) or CNG fueled (original equipment manufacturer only) regulated under Health and Safety Code section 43800 and CCR, Title 13, Sections 1961 and 1962.
2. High-efficiency vehicles, regulated by U.S. EPA, bearing High-Occupancy Vehicle (HOV) car pool lane stickers issued by the Department of Motor Vehicles.

NEIGHBORHOOD ELECTRIC VEHICLE (NEV). A motor vehicle that meets the definition of "low-speed vehicle" either in Section 385.5 of the Vehicle Code or in 49CFR571.500 (as it existed on July 1, 2000), and is certified to zero-emission vehicle standards.

TENANT-OCCUPANTS. Building occupants who inhabit a building during its normal hours of operation as permanent occupants, such as employees, as distinguished from customers and other transient visitors.

VANPOOL VEHICLE. Eligible vehicles are limited to any motor vehicle, other than a mototruck or truck tractor, designed for carrying more than 10 but not more than 15 persons including the driver, which is maintained and used primarily for the nonprofit work-related transportation of adults for the purpose of ridesharing.

Note: Source: Vehicle Code, Division 1, Section 668

ZEV. Any vehicle certified to zero-emission standards.

SECTION 5.106 SITE DEVELOPMENT
5.106.1 STORM WATER POLLUTION PREVENTION FOR PROJECTS THAT DISTURB LESS THAN ONE ACRE OF LAND. Newly constructed projects and additions which disturb less than one acre of land, and are not part of a larger common plan of development or sale, shall prevent the pollution of storm water runoff from the construction activities through one or more of the following measures:

5.106.1.1 Local ordinance. Comply with a lawfully enacted storm water management and/or erosion control ordinance.

5.106.1.2 Best Management Practices (BMPs). Prevent the loss of soil through wind or water erosion by implementing an effective combination of erosion and sediment control and good housekeeping BMPs.

1. Soil loss BMPs that should be considered for implementation as appropriate for each project include, but are not limited to, the following:
   a. Scheduling construction activity during dry weather, when possible.
   b. Preservation of natural features, vegetation, soil, and buffers around surface waters.
   c. Drainage swales or lined ditches to control stormwater flow.
   d. Mulching or hydroseeding to stabilize disturbed soils.
   e. Erosion control to protect slopes.
   f. Protection of storm drain inlets (gravel bags or catch basin inserts).
   g. Perimeter sediment control (perimeter silt fence, fiber rolls).
   h. Sediment trap or sediment basin to retain sediment on site.
   i. Stabilized construction exits.
   j. Wind erosion control.
   k. Other soil loss BMPs acceptable to the enforcing agency.
2. Good housekeeping BMPs to manage construction equipment, materials, non-stormwater discharges and wastes that should be considered for implementation as appropriate for each project include, but are not limited to, the following:
   a. Dewatering activities.
   b. Material handling and waste management.
   c. Building materials stockpile management.
   d. Management of washout areas (concrete, paints, stucco, etc.).
   e. Control of vehicle/equipment fueling to contractor's staging area.
   f. Vehicle and equipment cleaning performed off site.
   g Spill prevention and control.
   h. Other housekeeping BMPs acceptable to the enforcing agency.

5.106.2 STORMWATER POLLUTION PREVENTION FOR PROJECTS THAT DISTURB ONE OR MORE ACRES OF LAND. Comply with all lawfully enacted stormwater discharge regulations for projects that (1) disturb one acre or more of land, or (2) disturb less than one acre of land but are part of a larger common plan of development sale.

Note: Projects that (1) disturb one acre or more of land, or (2) disturb less than one acre of land but are part of the larger common plan of development or sale must comply with the post-construction requirements detailed in the applicable National Pollutant Discharge Elimination System (NPDES) General permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities issued by the State Water Resources Control Board or the Lahontan Regional Water Quality Control Board (for projects in the Lake Tahoe Hydrologic Unit).

The NPDES permits require postconstruction runoff (post-project hydrology) to match the preconstruction runoff (pre-project hydrology) with the installation of postconstruction stormwater management measures. The NPDES permits emphasize runoff reduction through on-site stormwater use, interception, evapotranspiration, and infiltration through nonstructural controls, such as Low Impact Development (LID) practices, and conversation design measures. Stormwater volume that cannot be addressed using nonstructural practices is required to be captured in structural practices and be approved by the enforcing agency.

Refer to the current applicable permits on the State Water Resources Control Board website at: www.waterboards.ca.gov/constructionstormwater. Consideration to the stormwater runoff management measures should be given during the initial design process for appropriate integration into site development.

5.106.4 BICYCLE PARKING. For buildings within the authority of California Building Standards Commission as specified in Section 103, comply with Section 5.106.4.1. For buildings within the authority of the Division of the State Architect pursuant to Section 105, comply with Section 5.106.4.2

5.106.4.1 Bicycle parking. [BSC-CG] Comply with Sections 5.106.4.1.1 and 5.106.4.1.2; or meet the applicable local ordinance, whichever is stricter.

5.106.4.1.1 Short-term bicycle parking. If the new project or an addition or alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5% of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack.
Exception: Additions or alterations which add nine or less visitor vehicular parking spaces.

5.106.4.1.2 Long-term bicycle parking. For new buildings with tenant spaces that have 10 or more tenant-occupants, provide secure bicycle parking for 5 percent of the tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility.

5.106.4.1.3 For additions or alterations that add 10 or more tenant-occupant vehicular parking spaces, provide secure bicycle parking for 5 percent of the tenant vehicular parking spaces being added, with a minimum of one bicycle parking facility.

5.106.4.1.4 For new shell buildings in phased projects provide secure bicycle parking for 5 percent of the anticipated tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility.

5.106.4.1.5 Acceptable bicycle parking facility for Sections 5.106.4.1.2, 5.106.4.1.3, and 5.106.4.1.4 shall be convenient from the street and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

Note: Additional information on recommended bicycle accommodations may be obtained from Sacramento Area Bicycle Advocates.

5.106.4.2 Bicycle parking. [DSA-SS] For public schools and community colleges, comply with Sections 5.106.4.2.1 and 5.106.4.2.2

5.106.4.2.1 Student bicycle parking. Provide permanently anchored bicycle racks conveniently accessed with a minimum of four two-bike capacity racks per new building.
5.106.4.2.2 Staff bicycle parking. Provide permanent, secure bicycle parking conveniently accessed with a minimum of two staff bicycle parking spaces per new building. Acceptable bicycle parking facilities shall be convenient from the street or staff parking area and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

5.106.5.2 DESIGNATED PARKING FOR CLEAN AIR VEHICLES. In new projects or additions or alterations that add 10 or more vehicular parking spaces, provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as follows:

TABLE 5.106.5.2 - PARKING

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED SPACES
0-9	0
10-25	1
25-50	3
51-75	6
76-100	8
101-150	11
151-200	16
201 AND OVER	AT LEAST 8% OF TOTAL

5.106.5.2.1 - Parking stall marking. Paint, in the paint used for stall striping, the following characters such that the lower edge of the last word aligns with the end of the stall striping and is visible beneath a parked vehicle: CLEAN AIR / VAN POOL / EV

Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces.

5.106.5.3 Electric vehicle (EV) charging. [N] Construction shall comply with Section 5.106.5.3.1 or Section 5.106.5.3.2 to facilitate future installation of electric vehicle supply equipment (EVSE). When EVSE(s) is/are installed, it shall be in accordance with the *California Building Code,* the *California Electrical Code* and as follows:

5.106.5.3.1 Single charging space requirements. [N] When only a single charging space is required per Table 5.106.5.3.3, a raceway is required to be installed at the time of construction and shall be installed in accordance with the *California Electrical Code.* Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. A listed raceway capable of accommodating a 208/240 -volt dedicated branch circuit.
3. The raceway shall not be less than trade size 1".
4. The raceway shall originate at a service panel or a subpanel serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and listed suitable cabinet, box, enclosure or equivalent.
5. The service panel or subpanel shall have sufficient capacity to accommodate a minimum 40-ampere dedicated branch circuit for the future installation of the EVSE.

5.106.5.3.2 Multiple charging space requirements. [N] When multiple charging spaces are required per Table 5.106.5.3.3 raceway(s) is/are required to be installed at the time of construction and shall be installed in accordance with the *California Electrical Code.* Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. The raceway(s) shall originate at a service panel or a subpanel(s) serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into listed suitable cabinet(s), box(es), enclosure(s) or equivalent.
3. Plan design shall be based upon 40-ampere minimum branch circuits.
4. Electrical calculations shall substantiate the design of the electrical system, to include the rating of equipment and any on-site distribution transformers and have sufficient capacity to simultaneously charge all required EVs at its full rated amperage.
5. The service panel or subpanel(s) shall have sufficient capacity to accommodate the required number of dedicated branch circuit(s) for the future installation of the EVSE.

5.106.5.3.3 EV charging space calculations. [N] Table 5.106.5.3.3 shall be used to determine if single or multiple charging space requirements apply for the future installation of EVSE.

Exceptions: On a case-by-case basis where the local enforcing agency has determined EV charging and infrastructure is not feasible based upon one or more of the following conditions:

1. Where there is insufficient electrical supply.
2. Where there is evidence suitable to the local enforcing agency substantiating that additional local utility infrastructure design requirements, directly related to the implementation of Section 5.106.5.3, may adversely impact the construction cost of the project.

TABLE 5.106.5.3.3

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED SPACES
0-9	0
10-25	1
26-50	2
51-75	4
76-100	5
101-150	7
151-200	10
201 AND OVER	6% of total[1]

1. Calculation for spaces shall be rounded up to the nearest whole number.

5.106.5.3.4 [N] Identification. The service panel or subpanel(s) circuit directory shall identify the reserved overcurrent protective device space(s) for future EV charging as "EV CAPABLE". The raceway termination location shall be permanently and visibly marked as "EV CAPABLE".

5.106.5.3.5 [N] Future charging spaces qualify as designated parking as described in Section 5.106.5.2 Designated parking for clean air vehicles.

5.106.8 LIGHT POLLUTION REDUCTION. [N].I Outdoor lighting systems shall be designed and installed to comply with the following:

1. The minimum requirements in the California Energy Code for Lighting Zones 0-4 as defined in Chapter 10, Section 10-114 of the California Administrative Code; and
2. Backlight (B) ratings as defined in IES TM-15-11 (shown in Table A-1 in Chapter 8);
3. Uplight and Glare ratings as defined in California Energy Code (shown in Tables 130.2-A and 130.2-B in Chapter 8) and
4. Allowable BUG ratings not exceeding those shown in Table 5.106.8, [N] or Comply with a local ordinance lawfully enacted pursuant to Section 101.7, whichever is more stringent.

Exceptions: [N]

1. Luminaires that qualify as exceptions in Section 140.7 of the California Energy Code.
2. Emergency lighting.
3. Building facade meeting the requirements in Table 140.7-B of the California Energy Code, Part 6.
4. Custom lighting features as allowed by the local enforcing agency, as permitted by Section 101.8 Alternate materials, designs and methods of construction.

Note: [N]
1. See also California Building Code, Chapter 12, Section 1205.6 for college campus lighting requirements for parking facilities and walkways.
2. Refer to Chapter 8 (Compliance Forms, Worksheets and Reference Material) for IES TM-15-11 Table A-1, California Energy Code Tables 130.2-A and 130.2-B.
3. Refer to the California Building Code for requirements for additions and alterations.

TABLE 5.106.8 [N] MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS[1,2]

ALLOWABLE RATING	LIGHTING ZONE LZ0	LIGHTING ZONE LZ1	LIGHTING ZONE LZ2	LIGHTING ZONE LZ3	LIGHTING ZONE LZ4
MAXIMUM ALLOWABLE BACKLIGHT RATING [3]					
Luminaire greater than 2 mounting heights (MH) from property line	N/A	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1-2 MH from property line	N/A	B2	B3	B4	B4
Luminaire back hemisphere is 0.5-1 MH from property line	N/A	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	N/A	B0	B0	B1	B2
MAXIMUM ALLOWABLE UPLIGHT RATING (U)					
For area lighting [4]	N/A	U0	U0	U0	U0
For all other outdoor lighting,including decorative luminaires	N/A	U1	U2	U3	UR
MAXIMUM ALLOWABLE GLARE RATING [5] **(G)**					
Luminaire greater than 2 MH from property line	N/A	G1	G2	G3	G4
Luminaire front hemisphere is 1-2 MH from property line	N/A	G0	G1	G1	G2
Luminaire front hemisphere is 0.5-1 MH from property line	N/A	G0	G0	G1	G1
Luminaire back hemisphere is less than 0.5 MH from property line	N/A	G0	G0	G0	G1

1. IESNA Lighting Zones 0 and 5 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code.*

2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.

3. If the nearest property line is less than or equal to two mounting heights from the back hemisphere of the luminaire distribution, the applicable reduced Backlight rating shall be met.

4. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet *U*-value limits for "all other outdoor lighting".

5. If the nearest property line is less than or equal to two mounting heights from the front hemisphere of the luminaire distribution, the applicable reduced Glare rating shall be met.

5.106.10 GRADING AND PAVING. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings. Examples of methods to manage surface water include, but are not limited to, the following:

1. Swales.
2. Water collection and disposal systems.
3. French drains.
4. Water retention gardens.
5. Other water measures which keep surface water away from buildings and aid in groundwater recharge.

Exception: Additions and alterations not altering the drainage path.

5.106.12 SHADE TREES [DSA-SS]. Shade Trees shall be planted to comply with Sections 5.106.12.1, 5.106.12.2, and 5.106.12.3. Percentages shown shall be measured at noon on the summer solstice. Landscape irrigation necessary to establish and maintain tree health shall comply with Section 5.304.6.

5.106.12.1 Surface parking areas. Shade tree plantings, minimum #10 container size or equal, shall be installed to provide shade over 50 percent of the parking area within 15 years.

Exceptions: The surface parking area covered by solar photovoltaic shade structures, or shade structures, with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5, are not included in the total area calculations.

5.106.12.2 Landscape areas. Shade tress plantings, minimum #10 container size or equal shall be installed to provide shade of 20% of the landscape area within 15 years.

Exceptions: Playfields for organized sport activity are not included in the total area calculation.

5.106.12.3. Hardscape areas. Shade tree plantings, minimum #10 container size or equal shall be installed to provide shade over 20 percent of the hardscape area within 15 years.

Exceptions: Walks, hardscape areas covered by solar photovoltaic shade structures, and hardscape areas covered by shade structures with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5, are not included in the total area calculation.

DIVISION 5.2 ENERGY EFFICIENCY

SECTION 5.201 GENERAL
5.201.1 Scope [BSC-CG]. ***California Energy Code [DSA-SS].*** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory building standards.

DIVISION 5.3 WATER EFFICIENCY AND CONSERVATION

SECTION 5.301 GENERAL
5.301.1 Scope. The provisions of this chapter shall establish the means of conserving water use indoors, outdoors and in wastewater conveyance.

SECTION 5.302 DEFINITIONS
5.302.1 Definitions. The following terms are defined in Chapter 2 *(and are included here for reference)*

EVAPOTRANSPIRATION ADJUSTMENT FACTOR (ETAF) [DSA-SS]. An adjustment factor when applied to reference evapotranspiration that adjusts for plant factors and irrigation efficiency, which ae two major influences on the amount of water that needs to be applied to the landscape.

FOOTPRINT AREA [DSA-SS]. The total area of the furthest exterior wall of the structure projected to natural grade, not including exterior areas such as stairs, covered walkways, patios and decks.

METERING FAUCET. A self-closing faucet that dispenses a specific volume of water for each actuation cycle. The volume or cycle duration can be fixed or adjustable.

GRAYWATER. Pursuant to Health and Safety Code Section 17922.12, "graywater" means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. "Graywater" includes, but is not limited to wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines and laundry tubs, but does not include waste water from kitchen sinks or dishwashers.

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO). The California ordinance regulating landscape design, installation and maintenance practices that will ensure commercial, multifamily and other developer installed landscapes greater than 2500 square feet meet an irrigation water budget developed based on landscaped area and climatological parameters.

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO), [HCD] The California model ordinance (California Code of Regulations, Title 23, Division 2, Chapter 2.7), regulating landscape design, installation and maintenance practices. Local agencies are required to adopt the updated MWELO, or adopt a local ordinance at least as effective as the MWELO.

POTABLE WATER. Water that is drinkable and meets the U.S. Environmental Protection Agency (EPA) Drinking Water Standards. See definition in the California Plumbing Code, Part 5.

POTABLE WATER. [HCD] Water that is satisfactory for drinking, culinary, and domestic puroses, and meets the U.S. Environmental Protection Agency (EPA) Drinking Water Standards and the requirements of the Health Authority Having Jurisdiction.

RECYCLED WATER. Water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur [Water Code Section 13050 (n)]. Simply put, recycled water is water treated to remove waste matter attaining a quality that is suitable to use the water again.

SUBMETER. A meter installed subordinate to a site meter. Usually used to measure water intended for one purpose, such as landscape irrigation. For the purposes of CALGreen, a dedicated meter may be considered a submeter.

WATER BUDGET. Is the estimated total landscape irrigation water use which shall not exceed the maximum applied water allowance calculated in accordance with the Department of Water Resources Model Efficient Landscape Ordinance (MWELO).

SECTION 5.303 INDOOR WATER USE
5.303.1 METERS. Separate submeters or metering devices shall be installed for the uses described in Sections 503.1.1 and 503.1.2.

5.303.1.1 Buildings in excess of 50,000 square feet. Separate submeters shall be installed as follows:

1. For each individual leased, rented or other tenant space within the building projected to consume more than 100 gal/day (380 L/day), including, but not limited to, spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop.
2. Where separate submeters for individual building tenants are unfeasible, for water supplied to the following subsystems:
   a. Makeup water for cooling towers where flow through is greater than 500 gpm (30 L/s).
   b. Makeup water for evaporative coolers greater than 6 gpm (0.04 L/s).
   c. Steam and hot water boilers with energy input more than 500,000 Btu/h (147 kW).

5.303.1.2 Excess consumption. A separate submeter or metering device shall be provided for any tenant within a new building or within an addition that is projected to consume more than 1,000 gal/day.

5.303.3 WATER CONSERVING PLUMBING FIXTURES AND FITTINGS. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:

5.303.3.1 Water Closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type toilets.

Note: The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

5.303.3.2 Urinals.
5.303.3.2.1 Wall-mounted Urinals. The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush.

5.303.3.2.2 Floor-mounted Urinals. The effective flush volume of floor-mounted or other urinals shall not exceed 0.5 gallons per flush.

5.303.3.3 Showerheads. [BSC-CG]
5.303.3.3.1 Single showerhead. Showerheads shall have a maximum flow rate of not more than 1.8 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

5.303.3.3.2 Multiple showerheads serving one shower. When a shower is served by more than one showerhead, the combined flow rate of all the showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.
Note: A hand-held shower shall be considered a showerhead.

REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482
APN: 180-070-19-00 [2.80 AC.]

2019 CALIFORNIA GREEN BUILDING STANDARDS CODE
TENANT IMPROVEMENT for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
411 W. CLAY ST.
UKIAH, CA. 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.20
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
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1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-1537

DATE 06/14/2019
SCALE AS NOTED
DRAWN LSM/BCM
PROJECT 1350 HASTINGS AVE.
SHEET CG1.0

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2019 CALIFORNIA GREEN BUILDING STANDARDS CODE
NONRESIDENTIAL MANDATORY MEASURES, SHEET 2 (January 2020, Includes August 2019 Supplement)

Y = YES
N/A = NOT APPLICABLE
RESPON. PARTY = RESPONSIBLE PARTY (ie: ARCHITECT, ENGINEER, OWNER, CONTRACTOR, INSPECTOR ETC.)

Y | N/A | RESPON. PARTY

5.303.3.4 Faucets and fountains.

5.303.3.4.1 Nonresidential Lavatory faucets. Lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi.

5.303.3.4.2 Kitchen faucets. Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

5.303.3.4.3 Wash fountains. Wash fountains shall have a maximum flow rate of not more than1.8 gallons per minute/20 [rim space (inches) at 60 psi].

5.303.3.4.4 Metering faucets. Metering faucets shall not deliver more than 0.20 gallons per cycle.

5.303.3.4.5 Metering faucets for wash fountains. Metering faucets for wash fountains shall have a maximum flow rate of not more than 0.20 gallons per minute/20 [rim space (inches) at 60 psi].

Note: Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

5.303.4 COMMERCIAL KITCHEN EQUIPMENT.

5.303.4.1 Food Waste Disposers. Disposers shall either modulate the use of water to no more than 1 gpm when the disposer is not in use (not actively grinding food waste/no-load) or shall automatically shut off after no more than 10 minutes of inactivity. Disposers shall use no more than 8 gpm of water.
Note: This code section does not affect local jurisdiction authority to prohibit or require disposer installation.

5.303.5 AREAS OF ADDITION OR ALTERATION. For those occupancies within the authority of the California Building Standards Commission as specified in Section 103, the provisions of Section 5.303.3 and 5.303.4 shall apply to new fixtures in additions or areas of alteration to the building.

5.303.6 STANDARDS FOR PLUMBING FIXTURES AND FITTINGS. Plumbing fixtures and fittings shall be installed in accordance with the *California Plumbing Code*, and shall meet the applicable standards referenced in Table 1701.1 of the *California Plumbing Code* and in Chapter 6 of this code.

SECTION 5.304 OUTDOOR WATER USE

5.304.1 OUTDOOR POTABLE WATER USE IN LANDSCAPE AREAS. Nonresidential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient Landscape Ordinance (MWELO), whichever is more stringent.

Notes:
1. The Model Water Efficient Landscape Ordinance (MWELO) is located in the California Code of Regulations, Title 23, Chapter 2.7, Division 2.
2. MWELO and supporting documents, including a water budget calculator, are available at: https://www.water.ca.gov/.

5.304.6 OUTDOOR POTABLE WATER USE IN LANDSCAPE AREAS. For public schools and community colleges, landscape projects as described in Sections 5.304.6.1 and 5.304.6.2 shall comply with the California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) commencing with Section 490 of Chapter 2.7, Division 2, Title 23, California Code of Regulations, except that the evapotranspiration adjustment factor (ETAF) shall be 0.65 with an additional water allowance for special landscape areas (SLA) of 0.35.

Exception: Any project with an aggregate landscape area of 2,500 square feet or less may comply with the prescriptive measures contained in Appendix D of the MWELO.

5.304.6.1 Newly constructed landscapes. New construction projects with an aggregate landscape area equal to or greater than 500 square feet.

5.304.6.2 Rehabilitated landscapes. Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 1,200 square feet.

DIVISION 5.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

SECTION 5.401 GENERAL

5.401.1 SCOPE. The provisions of this chapter shall outline means of achieving material conservation and resource efficiency through protection of buildings from exterior moisture, construction waste diversion, employment of techniques to reduce pollution through recycling of materials, and building commissioning or testing and adjusting.

SECTION 5.402 DEFINITIONS

5.402.1 DEFINITIONS. The following terms are defined in Chapter 2 *(and are included here for reference)*

ADJUST. To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

BALANCE. To proportion flows within the distribution system, including sub-mains, branches and terminals, according to design quantities.

BUILDING COMMISSIONING. A systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements.

ORGANIC WASTE. Food waste, green waste, landscape and pruning wste, nonhazardous wood waste, and food soiled paper waste that is mixed in with food waste.

TEST. A procedure to determine quantitative performance of a system or equipment

Y | N/A | RESPON. PARTY

SECTION 5.407 WATER RESISTANCE AND MOISTURE MANAGEMENT

5.407.1 WEATHER PROTECTION. Provide a weather-resistant exterior wall and foundation envelope as required by California Building Code Section 1402.2 (Weather Protection), manufacturer's installation instructions or local ordinance, whichever is more stringent.

5.407.2 MOISTURE CONTROL. Employ moisture control measures by the following methods.

5.407.2.1 Sprinklers. Design and maintain landscape irrigation systems to prevent spray on structures.

5.407.2.2 Entries and openings. Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings as follows:

5.407.2.2.1 Exterior door protection. Primary exterior entries shall be covered to prevent water intrusion by using nonabsorbent floor and wall finishes within at least 2 feet around and perpendicular to such openings plus at least one of the following:

1. An installed awning at least 4 feet in depth.
2. The door is protected by a roof overhang at least 4 feet in depth.
3. The door is recessed at least 4 feet.
4. Other methods which provide equivalent protection.

5.407.2.2.2 Flashing. Install flashings integrated with a drainage plane.

SECTION 5.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

5.408.1 CONSTRUCTION WASTE MANAGEMENT. Recycle and/or salvage for reuse a minimum of 65% of the non-hazardous construction and demolition waste in accordance with Section 5.408.1.1, 5.408.1.2 or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

5.408.1.1 Construction waste management plan. Where a local jurisdiction does not have a construction and demolition waste management ordinance, submit a construction waste management plan that:

1. Identifies the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.
2. Determines if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
3. Identifies diversion facilities where construction and demolition waste material collected will be taken.
4. Specifies that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.

5.408.1.2 Waste Management Company. Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with this section.

Note: The owner or contractor shall make the determination if the construction and demolition waste material will be diverted by a waste management company.

Exceptions to Sections 5.408.1.1 and 5.408.1.2:

1. Excavated soil and land-clearing debris.
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.

5.408.1.3 Waste stream reduction alternative. The combined weight of new construction disposal that does not exceed two pounds per square foot of building area may be deemed to meet the 65% minimum requirement as approved by the enforcing agency.

5.408.1.4 Documentation. Documentation shall be provided to the enforcing agency which demonstrates compliance with Sections 5.408.1.1, through 5.408.1.3. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

Notes:

1. Sample forms found in "A Guide to the California Green Building Standards Code (Nonresidential)" located at www.bsc.ca.gov/Home/CALGreen.aspx may be used to assist in documenting compliance with the waste management plan.
2. Mixed construction and demolition debris processors can be located at the California Department of Resources Recycling and Recovery (CalRecycle).

5.408.2 UNIVERSAL WASTE. [A] Additions and alterations to a building or tenant space that meet the scoping provisions in Section 301.3 for nonresidential additions and alterations, shall require verification that Universal Waste items such as fluorescent lamps and ballast and mercury containing thermostats as well as other California prohibited Universal Waste materials are disposed of properly and are diverted from landfills. A list of prohibited Universal Waste materials shall be included in the construction documents.

Note: Refer to the Universal Waste Rule link at:
http://www.dtsc.ca.gov/LawsRegsPolicies/Regs/upload/OEAR-A_REGS_UWR_FinalText.pdf

5.408.3 EXCAVATED SOIL AND LAND CLEARING DEBRIS. 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed.

Exception: Reuse, either on or off-site, of vegetation or soil contaminated by disease or pest infestation.

Notes:

1. If contamination by disease or pest infestation is suspected, contact the County Agricultural Commissioner and follow its direction for recycling or disposal of the material.
2. For a map of know pest and/or disease quarantine zones, consult with the California Department of Food and Agriculture. (www.cdfa.ca.gov)

SECTION 5.410 BUILDING MAINTENANCE AND OPERATIONS

5.410.1 RECYCLING BY OCCUPANTS. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive.

Exception: Rural jurisdictions that meet and apply for the exemption in Public Resources Code 42649.82 (a)(2)(A) et seq. shall also be exempt from the organic waste portion of this section.

5.410.1.1 Additions. All additions conducted within a 12-month period under single or multiple permits, resulting in an increase of 30% or more in floor area, shall provide recycling areas on site.

Exception: Additions within a tenant space resulting in less than a 30% increase in the tenant space floor area.

5.410.1.2 Sample ordinance. Space allocation for recycling areas shall comply with Chapter 18, Part 3, Division 30 of the *Public Resources Code*. Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act).

Note: A sample ordinance for use by local agencies may be found in Appendix A of the document at the CalRecycle's web site.

Y | N/A | RESPON. PARTY

5.410.2 COMMISSIONING. [N] New buildings 10,000 square feet and over. For new buildings 10,000 square feet and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements. Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity. For I-occupancies that are not regulated by OSHPD or for I-occupancies and L-occupancies that are not regulated y the California Energy Code Section 100.0 Scope, all requirements in Sections 5.410.2 through 5.410.2.6 shall apply.

Note: For energy-related systems under the scope (Section 100) of the California Energy Code, including heating, ventilation, air conditioning (HVAC) systems and controls, indoor lighting systems and controls, as well as water heating systems and controls, refer to California Energy Code Section 120.8 for commissioning requirements

Commissioning requirements shall include:

1. Owner's or Owner representative's project requirements.
2. Basis of design.
3. Commissioning measures shown in the construction documents.
4. Commissioning plan.
5. Functional performance testing.
6. Documentation and training.
7. Commissioning report.

Exceptions:

1. Unconditioned warehouses of any size.
2. Areas less than 10,000 square feet used for offices or other conditioned accessory spaces within unconditioned warehouses.
3. Tenant improvements less than 10,000 square feet as described in Section 303.1.1.
4. Open parking garages of any size, or open parking garage areas, of any size, within a structure.

Note: For the purposes of this section, unconditioned shall mean a building, area, or room which does not provide heating and or air conditioning.

Informational Notes:

1. IAS AC 476 is an accreditation criteria for organizations providing training and/or certification of commissioning personnel. AC 476 is available to the Authority Having Jurisdiction as a reference for qualifications of commissioning personnel. AC 476 des not certify individuals to conduct functional performance tests or to adjust and balance systems.
2. Functional performance testing for heating, ventilation, air conditioning systems and lighting controls must be performed in compliance with the *California Energy Code*.

5.410.2.1 Owner's or Owner Representative's Project Requirements (OPR). [N] The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. This documentation shall include the following:
1. Environmental and sustainability goals.
2. Building sustainable goals.
3. Indoor environmental quality requirements.
4. Project program, including facility functions and hours of operation, and need for after hours operation.
5. Equipment and systems expectations.
6. Building occupant and operation and maintenance (O&M) personnel expectations.

5.410.2.2 Basis of Design (BOD). [N] A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project. The Basis of Design document shall cover the following systems:

1. Renewable energy systems.
2. Landscape irrigation systems.
3. Water reuse system.

5.410.2.3 Commissioning plan. [N] Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned. The commissioning plan shall include the following:
1. General project information.
2. Commissioning goals.
3. Systems to be commissioned. Plans to test systems and components shall include:
   a. An explanation of the original design intent.
   b. Equipment and systems to be tested, including the extent of tests.
   c. Functions to be tested.
   d. Conditions under which the test shall be performed.
   e. Measurable criteria for acceptable performance.
4. Commissioning team information.
5. Commissioning process activities, schedules and responsibilities. Plans for the completion of commissioning shall be included.

5.410.2.4 Functional performance testing. [N] Functional performance tests shall demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made.

5.410.2.5 Documentation and training. [N] A Systems Manual and Systems Operations Training are required, including Occupational Safety and Health Act (OSHA) requirements in *California Code of Regulations* (CCR), Title 8, Section 5142, and other related regulations.

5.410.2.5.1 Systems manual. [N] Documentation of the operational aspects of the building shall be completed within the systems manual and delivered to the building owner or representative. The systems manual shall include the following:
1. Site information, including facility description, history and current requirements.
2. Site contact information.
3. Basic operations and maintenance, including general site operating procedures, basic troubleshooting, recommended maintenance requirements, site events log.
4. Major systems.
5. Site equipment inventory and maintenance notes.
6. A copy of verifications required by the enforcing agency or this code.
7. Other resources and documentation, if applicable.

5.410.2.5.2 Systems operations training. [N] A program for training of the appropriate maintenance staff for each equipment type and/or system shall be developed and documented in the commissioning report and shall include the following:
1. System/equipment overview (what it is, what it does and with what other systems and/or equipment it interfaces).
2. Review and demonstration of servicing/preventive maintenance.
3. Review of the information in the Systems Manual.
4. Review of the record drawings on the system/equipment.

5.410.2.6 Commissioning report. [N] A report of commissioning process activities undertaken through the design and construction phases of the building project shall be completed and provided to the owner or representative.

5.410.4 TESTING AND ADJUSTING. New buildings less than 10,000 square feet. Testing and adjusting of systems shall be required for new buildings less than 10,000 square feet or new systems to serve an addition or alteration subject to Section 303.1.

5.410.4.2 (Reserved)

Note: For energy-related systems under the scope (Section 100) of the California Energy Code, including heating, ventilation, air conditioning (HVAC) systems and controls, indoor lighting system and controls, as well as water heating systems and controls, refer to California Energy Code Section 120.8 for commissioning requirements and Sections 120.5, 120.6, 130.4, and 140.9(b)3 for additional testing requirements of specific systems.

5.410.4.2 Systems. Develop a written plan of procedures for testing and adjusting systems. Systems to be included for testing and adjusting shall include at a minimum, as applicable to the project:

1. Renewable energy systems.
2. Landscape irrigation systems.
3. Water reuse systems.

5.410.4.3 Procedures. Perform testing and adjusting procedures in accordance with manufacturer's specifications and applicable standards on each system.

5.410.4.3.1 HVAC balancing. In addition to testing and adjusting, before a new space-conditioning system serving a building or space is operated for normal use, the system shall be balanced in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards; the National Environmental Balancing Bureau Procedural Standards; Associated Air Balance Council National Standards or as approved by the enforcing agency.

Y | N/A | RESPON. PARTY

5.410.4.4 Reporting. After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.

5.410.4.5 Operation and maintenance (O & M) manual. Provide the building owner or representative with detailed operating and maintenance instructions and copies of guaranties/warranties for each system. O & M instructions shall be consistent with OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.

5.410.4.5.1 Inspections and reports. Include a copy of all inspection verifications and reports required by the enforcing agency.

DIVISION 5.5 ENVIRONMENTAL QUALITY

SECTION 5.501 GENERAL

5.501.1 SCOPE. The provisions of this chapter shall outline means of reducing the quantity of air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of a building's installers, occupants and neighbors.

SECTION 5.502 DEFINITIONS

5.502.1 DEFINITIONS. The following terms are defined in Chapter 2 *(and are included here for reference)*

ARTERIAL HIGHWAY. A general term denoting a highway primarily for through traffic usually on a continuous route.

A-WEIGHTED SOUND LEVEL (dBA). The sound pressure level in decibels as measured on a sound level meter using the internationally standardized A-weighting filter or as computed from sound spectral data to which A-weighting adjustments have been made.

1 BTU/HOUR. British thermal units per hour, also referred to as Btu, The amount of heat required to raise one pound of water one degree Fahrenheit per hour, a common measure of heat transfer rate. A ton of refrigeration is 12,000 Btu, the amount of heat required to melt a ton (2,000 pounds) of ice at 32^{0} Fahrenheit.

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL). A metric similar to the day-night average sound level (Ldn), except that a 5 decibel adjustment is added to the equivalent continuous sound exposure level for evening hours (7pm to 10pm) in addition to the 10 dB nighttime adjustment used in the Ldn.

COMPOSITE WOOD PRODUCTS. Composite wood products include hardwood plywood, particleboard and medium density fiberboard. "Composite wood products" does not include hardboard, structural plywood, structural panels, structural composite lumber, oriented strand board, glued laminated timber, timber, prefabricated wood I–joists or finger–jointed lumber, all as specified in California Code of Regulations (CCR), Title 17, Section 93120.1(a).

Note: See CCR, Title 17, Section 93120.1.

DAY-NIGHT AVERAGE SOUND LEVEL (Ldn). The A-weighted equivalent continuous sound exposure level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during nighttime hours (10p.m. to 7 a.m.).

DECIBEL (db). A measure on a logarithmic scale of the magnitude of a particular quantity (such as sound pressure, sound power, sound intensity) with respect to a reference quantity.

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are considered electric vehicles. For purposes of the *California Electrical Code*, off-road, self-propelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

ELECTRIC VEHICLE CHARGING STATION(S) (EVCS). One or more spaces intended for charging electric vehicles.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

ENERGY EQUIVALENT (NOISE) LEVEL (Leq). The level of a steady noise which would have the same energy as the fluctuating noise level integrated over the time of period of interest.

EXPRESSWAY. An arterial highway for through traffic which may have partial control of access, but which may or may not be divided or have grade separations at intersections.

FREEWAY. A divided arterial highway with full control of access and with grade separations at intersections.

GLOBAL WARMING POTENTIAL (GWP). The radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time. Carbon dioxide is the reference compound with a GWP of one.

GLOBAL WARMING POTENTIAL VALUE (GWP VALUE). A 100-year GWP value published by the Intergovernmental Panel on Climate Change (IPCC) in either its Second Assessment Report (SAR) (IPCC, 1995); or its Fourth Assessment A-3 Report (AR4) (IPCC, 2007). The SAR GWP values are found in column "SAR (100-yr)" of Table 2.14.; the AR4 GWP values are found in column "100 yr" of Table 2.14.

HIGH-GWP REFRIGERANT. A compound used as a heat transfer fluid or gas that is: (a) a chlorofluorocarbon, a hdrochlorofluorocarbon, a hydrofluorocarbon, a perfluorocarbon, or any compound or blend of compounds, with a GWP value equal to or greater than 150, or (B) any ozone depleting substance as defined in Title 40 of the Code of Federal Regulations, Part 82, sec.82.3 (as amended March 10, 2009).

LONG RADIUS ELBOW. Pipe fitting installed between two lengths of pipe or tubing to allow a change of direction, with a radius 1.5 times the pipe diameter.

LOW-GWP REFRIGERANT. A compound used as a heat transfer fluid or gas that: (A) has a GWP value less than 150, and (B) is not an ozone depleting substance as defined in Title 40 of the Code of Federal Regulations, Part 82, sec.82.3 (as amended March 10, 2009).

MERV. Filter minimum efficiency reporting value, based on ASHRAE 52.2–1999.

MAXIMUM INCREMENTAL REACTIVITY (MIR). The maximum change in weight of ozone formed by adding a compound to the "Base REactive Organic Gas (ROG) Mixture" per weight of compound added, expressed to hundreths of a gram (g O^{3}/g ROC).

PRODUCT-WEIGHTED MIR (PWMIR). The sum of all weighted-MIR for all ingredients in a product subject to this article. The PWMIR is the total product reactivity expressed to hundredths of a gram of ozone formed per gram of product (excluding container and packaging).

PSIG. Pounds per square inch, guage.

REACTIVE ORGANIC COMPOUND (ROC). Any compound that has the potential, once emitted, to contribute to ozone formation in the troposphere.

SCHRADER ACCESS VALVES. Access fittings with a valve core installed.

SHORT RADIUS ELBOW. Pipe fitting installed between two lengths of pipe or tubing to allow a change of direction, with a radius 1.0 times the pipe diameter.

SUPERMARKET. For the purposes of Section 5.508.2, a supermarket is any retail food facility with 8,000 square feet or more conditioned area, and that utilizes either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units.

VOC. A volatile organic compound broadly defined as a chemical compound based on carbon chains or rings with vapor pressures greater than 0.1 millimeters of mercury at room temperature. These compounds typically contain hydrogen and may contain oxygen, nitrogen and other elements. See CCR Title 17, Section 94508(a)

Note: Where specific regulations are cited from different agencies such as SCAQMD, ARB, etc., the VOC definition included in that specific regulation is the one that prevails for the specific measure in question.

SECTION 5.503 FIREPLACES

5.503.1 FIREPLACES. Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed woodstove or pellet stove, and refer to residential requirements in the California Energy Code, Title 24, Part 6, Subchapter 7, Section 150. Woodstoves, pellet stoves and fireplaces shall comply with applicable local ordinances.

5.503.1.1 Woodstoves. Woodstoves and pellet stoves shall comply with U.S. EPA New Source Performance Standards (NSPS) emission limits as applicable, and shall have a permanent label indicating they are certified to meet the emission limits.

SECTION 5.504 POLLUTANT CONTROL

5.504.1 TEMPORARY VENTILATION. The permanent HVAC system shall only be used during construction if necessary to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999, or an average efficiency of 30% based on ASHRAE 52.1-1992 Replace all filters immediately prior to occupancy, or, if the building is occupied during alteration, at the conclusion of construction.

5.504.3 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilation equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.

REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482
APN: 180-070-19-00 [2.80 AC.]

2016 CALIFORNIA GREEN BUILDING STANDARDS CODE
TENANT IMPROVEMENT for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
411 W. CLAY ST.
UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.20
STATE OF CALIFORNIA

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DATE 06/14/2019
SCALE AS NOTED
DRAWN LSM/BCM
PROJECT 1350 HASTINGS AVE.
SHEET CG1.1

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2019 CALIFORNIA GREEN BUILDING STANDARDS CODE

NONRESIDENTIAL MANDATORY MEASURES, SHEET 1 (January 2020, Includes August 2019 Supplement)

Y = YES
N/A = NOT APPLICABLE
RESPON. PARTY = RESPONSIBLE PARTY (ie: ARCHITECT, ENGINEER, OWNER, CONTRACTOR, INSPECTOR ETC.)

Y | N/A | RESPON. PARTY

5.504.4 FINISH MATERIAL POLLUTANT CONTROL. Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.6.

5.504.4.1 Adhesives, sealants and caulks. Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards:

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection 2, below.

2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with Section 94507.

TABLE 5.504.4.1 - ADHESIVE VOC LIMIT[1,2]

Less Water and Less Exempt Compounds in Grams per Liter

ARCHITECTURAL APPLICATIONS	CURRENT VOC LIMIT
INDOOR CARPET ADHESIVES	50
CARPET PAD ADHESIVES	50
OUTDOOR CARPET ADHESIVES	150
WOOD FLOORING ADHESIVES	100
RUBBER FLOOR ADHESIVES	60
SUBFLOOR ADHESIVES	50
CERAMIC TILE ADHESIVES	65
VCT & ASPHALT TILE ADHESIVES	50
DRYWALL & PANEL ADHESIVES	50
COVE BASE ADHESIVES	50
MULTIPURPOSE CONSTRUCTION ADHESIVES	70
STRUCTURAL GLAZING ADHESIVES	100
SINGLE-PLY ROOF MEMBRANE ADHESIVES	250
OTHER ADHESIVES NOT SPECIFICALLY LISTED	50
SPECIALTY APPLICATIONS	
PVC WELDING	510
CPVC WELDING	490
ABS WELDING	325
PLASTIC CEMENT WELDING	250
ADHESIVE PRIMER FOR PLASTIC	550
CONTACT ADHESIVE	80
SPECIAL PURPOSE CONTACT ADHESIVE	250
STRUCTURAL WOOD MEMBER ADHESIVE	140
TOP & TRIM ADHESIVE	250
SUBSTRATE SPECIFIC APPLICATIONS	
METAL TO METAL	30
PLASTIC FOAMS	50
POROUS MATERIAL (EXCEPT WOOD)	50
WOOD	30
FIBERGLASS	80

1. IF AN ADHESIVE IS USED TO BOND DISSIMILAR SUBSTRATES TOGETHER, THE ADHESIVE WITH THE HIGHEST VOC CONTENT SHALL BE ALLOWED.

2. FOR ADDITIONAL INFORMATION REGARDING METHODS TO MEASURE THE VOC CONTENT SPECIFIED IN THIS TABLE, SEE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 1168, www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF

TABLE 5.504.4.2 - SEALANT VOC LIMIT

Less Water and Less Exempt Compounds in Grams per Liter

SEALANTS	CURRENT VOC LIMIT
ARCHITECTURAL	250
MARINE DECK	760
NONMEMBRANE ROOF	300
ROADWAY	250
SINGLE-PLY ROOF MEMBRANE	450
OTHER	420
SEALANT PRIMERS	
ARCHITECTURAL	
NONPOROUS	250
POROUS	775
MODIFIED BITUMINOUS	500
MARINE DECK	760
OTHER	750

NOTE: FOR ADDITIONAL INFORMATION REGARDING METHODS TO MEASURE THE VOC CONTENT SPECIFIED IN THESE TABLES, SEE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 1168.

5.504.4.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3 shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.

5.504.4.3.1 Aerosol Paints and coatings. Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

Y | N/A | RESPON. PARTY

TABLE 5.504.4.3 - VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS[2,3]

GRAMS OF VOC PER LITER OF COATING, LESS WATER & LESS EXEMPT COMPOUNDS

COATING CATEGORY	CURRENT VOC LIMIT
FLAT COATINGS	50
NONFLAT COATINGS	100
NONFLAT HIGH GLOSS COATINGS	150
SPECIALTY COATINGS	
ALUMINUM ROOF COATINGS	400
BASEMENT SPECIALTY COATINGS	400
BITUMINOUS ROOF COATINGS	50
BITUMINOUS ROOF PRIMERS	350
BOND BREAKERS	350
CONCRETE CURING COMPOUNDS	350
CONCRETE/MASONRY SEALERS	100
DRIVEWAY SEALERS	50
DRY FOG COATINGS	150
FAUX FINISHING COATINGS	350
FIRE RESISTIVE COATINGS	350
FLOOR COATINGS	100
FORM-RELEASE COMPOUNDS	250
GRAPHIC ARTS COATINGS (SIGN PAINTS)	500
HIGH-TEMPERATURE COATINGS	420
INDUSTRIAL MAINTENANCE COATINGS	250
LOW SOLIDS COATINGS[1]	120
MAGNESITE CEMENT COATINGS	450
MASTIC TEXTURE COATINGS	100
METALLIC PIGMENTED COATINGS	500
MULTICOLOR COATINGS	250
PRETREATMENT WASH PRIMERS	420
PRIMERS, SEALERS, & UNDERCOATERS	100
REACTIVE PENETRATING SEALERS	350
RECYCLED COATINGS	250
ROOF COATINGS	50
RUST PREVENTATIVE COATINGS	250
SHELLACS:	
CLEAR	730
OPAQUE	550
SPECIALTY PRIMERS, SEALERS & UNDERCOATERS	100
STAINS	250
STONE CONSOLIDANTS	450
SWIMMING POOL COATINGS	340
TRAFFIC MARKING COATINGS	100
TUB & TILE REFINISH COATINGS	420
WATERPROOFING MEMBRANES	250
WOOD COATINGS	275
WOOD PRESERVATIVES	350
ZINC-RICH PRIMERS	340

1. GRAMS OF VOC PER LITER OF COATING, INCLUDING WATER & EXEMPT COMPOUNDS

2. THE SPECIFIED LIMITS REMAIN IN EFFECT UNLESS REVISED LIMITS ARE LISTED IN SUBSEQUENT COLUMNS IN THE TABLE.

3. VALUES IN THIS TABLE ARE DERIVED FROM THOSE SPECIFIED BY THE CALIFORNIA AIR RESOURCES BOARD, ARCHITECTURAL COATINGS SUGGESTED CONTROL MEASURE, FEB. 1, 2008. MORE INFORMATION IS AVAILABLE FROM THE AIR RESOURCES BOARD.

5.504.4.3.2 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturer's product specification
2. Field verification of on-site product containers

5.504.4.4 Carpet Systems. All carpet installed in the building interior shall meet at least one of the testing and product requirements:

1. Carpet and Rug Institute's Green Label Plus Program.
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CDPH Standard Method V1.1 or Specification 01350).
3. NSF/ANSI 140 at the Gold level or higher;
4. Scientific Certifications Systems Sustainable Choice; or
5. Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria listed in the CHPS High Performance Product Database.

5.504.4.4.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.

5.504.4.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 5.504.4.1.

5.504.4.5 Composite wood products. Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the buildings shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.). Those materials not exempted under the ATCM must meet the specified emission limits, as shown in Table 5.504.4.5.

5.504.4.5.3 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, et seq.).
4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.
5. Other methods acceptable to the enforcing agency.

Y | N/A | RESPON. PARTY

TABLE 5.504.4.5 - FORMALDEHYDE LIMITS[1]

MAXIMUM FORMALDEHYDE EMISSIONS IN PARTS PER MILLION

PRODUCT	CURRENT LIMIT
HARDWOOD PLYWOOD VENEER CORE	0.05
HARDWOOD PLYWOOD COMPOSITE CORE	0.05
PARTICLE BOARD	0.09
MEDIUM DENSITY FIBERBOARD	0.11
THIN MEDIUM DENSITY FIBERBOARD[2]	0.13

1. VALUES IN THIS TABLE ARE DERIVED FROM THOSE SPECIFIED BY THE CALIFORNIA AIR RESOURCES BOARD, AIR TOXICS CONTROL MEASURE FOR COMPOSITE WOOD AS TESTED IN ACCORDANCE WITH ASTM E 1333. FOR ADDITIONAL INFORMATION, SEE CALIFORNIA CODE OF REGULATIONS, TITLE 17, SECTIONS 93120 THROUGH 93120.12.

2. THIN MEDIUM DENSITY FIBERBOARD HAS A MAXIMUM THICKNESS OF 5/16 INCHES (8 MM).

5.504.4.6 Resilient flooring systems. For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria and listed in the CHPS High Performance Product Database; or
4. Products certified under UL GREENGUARD Gold (formerly the Greenguard Children's & Schools Program).

5.504.4.6.1 Verification of compliance. Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

5.504.5.3 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provides at least a Minimum Efficiency Reporting Value (MERV) of 13. MERV 13 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exceptions: Existing mechanical equipment.

5.504.5.3.1 Labeling. Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.

5.504.7 ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; or as enforced by ordinances, regulations or policies of any city, county, city and county, California Community College, campus of the California State University, or campus of the University of California, whichever are more stringent. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions.

SECTION 5.505 INDOOR MOISTURE CONTROL

5.505.1 INDOOR MOISTURE CONTROL. Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1202 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures, see Section 5.407.2 of this code.

SECTION 5.506 INDOOR AIR QUALITY

5.506.1 OUTSIDE AIR DELIVERY. For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements For Ventilation) of the *California Energy Code*, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.

5.506.2 CARBON DIOXIDE (CO_2) MONITORING. For buildings or additions equipped with demand control ventilation, CO_2 sensors and ventilation controls shall be specified and installed in accordance with the requirements of the California Energy Code, Section 120(c)(4).

SECTION 5.507 ENVIRONMENTAL COMFORT

5.507.4 ACOUSTICAL CONTROL. Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E 90 and ASTM E 413, or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E 1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.

Exception: Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.

Exception: [DSA-SS] For public schools and community colleges, the requirements of this section and all subsections apply only to new construction.

5.507.4.1 Exterior noise transmission, prescriptive method. Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

1. Within the 65 CNEL noise contour of an airport.

   Exceptions:

   1. L_{dn} or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
   2. L_{dn} or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.

2. Within the 65 CNEL or L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.

5.507.4.1.1. Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dB L_{eq} 1-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

5.507.4.2 Performance Method. For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (Leq-1Hr) of 50 dBA in occupied areas during any hour of operation.

5.507.4.2.1 Site Features. Exterior features such as sound walls or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

5.507.4.2.2 Documentation of Compliance. An acoustical analysis documenting complying interior soundlevels shall be prepared by personnel approved by the architect or engineer of record.

5.507.4.3 Interior sound transmission. Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

Note: Examples of assemblies and their various STC ratings may be found at the California Office of Noise Control: www.toolbase.org/PDF/CaseStudies/stc_icc_ratings.pdf.

SECTION 5.508 OUTDOOR AIR QUALITY

5.508.1 Ozone depletion and greenhouse gas reductions. Installations of HVAC, refrigeration and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.

5.508.1.1 Chlorofluorocarbons (CFCs). Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.

5.508.1.2 Halons. Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.

5.508.2 Supermarket refrigerant leak reduction. New commercial refrigeration systems shall comply with the provisions of this section when installed in retail food stores 8,000 square feet or more conditioned area, and that utilize either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units. The leak reduction measures apply to refrigeration systems containing high-global-warming potential (high-GWP) refrigerants with a GWP of 150 or greater. New refrigeration systems include both new facilities and the replacement of existing refrigeration systems in existing facilities.

Exception: Refrigeration systems containing low-global warming potential (low-GWP) refrigerant with a GWP value less than 150 are not subject to this section. Low-GWP refrigerants are nonozone-depleting refrigerants that include ammonia, carbon dioxide (CO_2), and potentially other refrigerants.

Y | N/A | RESPON. PARTY

5.508.2.1 Refrigerant piping. Piping compliant with the California Mechanical Code shall be installed to be accessible for leak protection and repairs. Piping runs using threaded pipe, copper tubing with an outside diameter (OD) less than 1/4 inch, flared tubing connections and short radius elbows shall not be used in refrigerant systems except as noted below.

5.508.2.1.1 Threaded pipe. Threaded connections are permitted at the compressor rack.

5.508.2.1.2 Copper pipe. Copper tubing with an OD less than 1/4 inch may be used in systems with a refrigerant charge of 5 pounds or less.

5.508.2.1.2.1 Anchorage. One-fouth-inch OD tubing shall be securely clamped to a rigid base to keep vibration levels below 8 mils.

5.508.2.1.3 Flared tubing connections. Double-flared tubing connections may be used for pressure controls, valve pilot lines and oil.

Exception: Single-flared tubing connections may be used with a multiring seal coated with industrial sealant suitable for use with refrigerants and tightened in accordance with manufacturer's recommendations.

5.508.2.1.4 Elbows. Short radius elbows are only permitted where space limitations prohibit use of long radius elbows.

5.508.2.2 Valves. Valves Valves and fittings shall comply with the *California Mechanical Code* and as follows.

5.508.2.2.1 Pressure relief valves. For vessels containing high-GWP refrigerant, a rupture disc shall be installed between the outlet of the vessel and the inlet of the pressure relief valve.

5.508.2.2.1.1 Pressure detection. A pressure gauge, pressure transducer or other device shall be installed in the space between the rupture disc and the relief valve inlet to indicate a disc rupture or discharge of the relief valve.

5.508.2.2.2 Access valves. Only Schrader access valves with a brass or steel body are permitted for use.

5.508.2.2.2.1 Valve caps. For systems with a refrigerant charge of 5 pounds or more, valve caps shall be brass or steel and not plastic.

5.508.2.2.2.2 Seal caps. If designed for it, the cap shall have a neoprene O-ring in place.

5.508.2.2.2.2.1 Chain tethers. Chain tethers to fit ovr the stem are required for valves designed to have seal caps.

Exception: Valves with seal caps that are not removed from the valve during stem operation.

5.508.2.3 Refrigerated service cases. Refrigerated service cases holding food products containing vinegar and salt shall have evaporator coils of corrosion-resistant material, such as stainless steel; or be coated to prevent corrosion from these substances.

5.508.2.3.1 Coil coating. Consideration shall be given to the heat transfer efficiency of coil coating to maximize energy efficiency.

5.508.2.4 Refrigerant receivers. Refrigerant receivers with capacities greater than 200 pounds shall be fitted with a device tha indicates the level of refrigerant in the receiver.

5.508.2.5 Pressure testing. The system shall be pressure tested during installation prior to evacuation and charging.

5.508.2.5.1 Minimum pressure. The system shall be charged with regulated dry nitrogen and appropriate tracer gas to bring system pressure up to 300 psig minimum.

5.508.2.5.2 Leaks. Check the system for leaks, repair any leaks, and retest for pressure using the same gauge.

5.508.2.5.3 Allowable pressure change. The system shall stand, unaltered, for 24 hours with no more than a +/- one pound pressure change from 300 psig, measured with the same gauge.

5.508.2.6 Evacuation. The system shall be evacuated after pressure testing and prior to charging.

5.508.2.6.1 First vacuum. Pull a system vacuum down to at least 1000 microns (+/- 50 microns), and hold for 30 minutes.

5.508.2.6.2 Second vacuum. Pull a second system vacuum to a minimum of 500 microns and hold for 30 minutes.

5.508.2.6.3 Third vacuum. Pull a third vacuum down to a minimum of 300 microns, and hold for 24 hours with a maximum drift of 100 microns over a 24-hour period.

CHAPTER 7
INSTALLER & SPECIAL INSPECTOR QUALIFICATIONS

702 QUALIFICATIONS

702.1 INSTALLER TRAINING. HVAC system installers shall be trained and certified in the proper installation of HVAC systems including ducts and equipment by a nationally or regionally recognized training or certification program. Uncertified persons may perform HVAC installations when under the direct supervision and responsibility of a person trained and certified to install HVAC systems or contractor licensed to install HVAC systems. Examples of acceptable HVAC training and certification programs include but are not limited to the following:

1. State certified apprenticeship programs.
2. Public utility training programs.
3. Training programs sponsored by trade, labor or statewide energy consulting or verification organizations.
4. Programs sponsored by manufacturing organizations.
5. Other programs acceptable to the enforcing agency.

702.2 SPECIAL INSPECTION [HCD]. When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition to other certifications or qualifications acceptable to the enforcing agency, the following certifications or education may be considered by the enforcing agency when evaluating the qualifications of a special inspector:

1. Certification by a national or regional green building program or standard publisher.
2. Certification by a statewide energy consulting or verification organization, such as HERS raters, building performance contractors, and home energy auditors.
3. Successful completion of a third party apprentice training program in the appropriate trade.
4. Other programs acceptable to the enforcing agency.

Notes:

1. Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.
2. HERS raters are special inspectors certified by the California Energy Commission (CEC) to rate homes in California according to the Home Energy Rating System (HERS).

[BSC-CG] When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition, the special inspector shall have a certification from a recognized state, national or international association, as determined by the local agency. The area of certification shall be closely related to the primary job function, as determined by the local agency.

Note: Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.

703 VERIFICATIONS

703.1 DOCUMENTATION. Documentation used to show compliance with this code shall include but is not limited to, construction documents, plans, specifications, builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which demonstrate substantial conformance. When specific documentation or special inspection is necessary to verify compliance, that method of compliance will be specified in the appropriate section or identified applicable checklist.

REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482
APN: 180-070-19-00 [2.80 AC.]

2016 CALIFORNIA GREEN BUILDING STANDARDS CODE
TENANT IMPROVEMENT for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
411 W. CLAY ST.
UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.20
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-8537

DATE 06/14/2019
SCALE AS NOTED
DRAWN LSM/BCM
PROJECT 1350 HASTINGS AVE.
SHEET CG1.2

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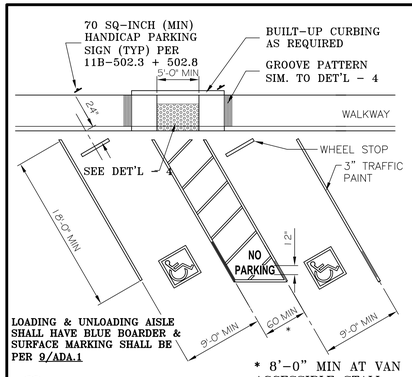
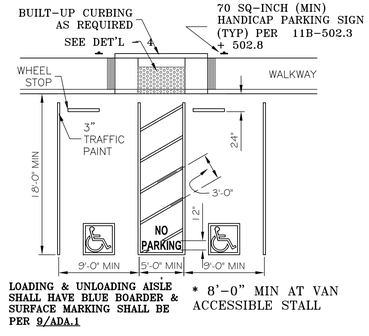


LOADING & UNLOADING AISLE SHALL HAVE BLUE BOARDER & SURFACE MARKING SHALL BE PER 9/ADA.1

* 8'-0" MIN AT VAN ACCESSIBLE STALL

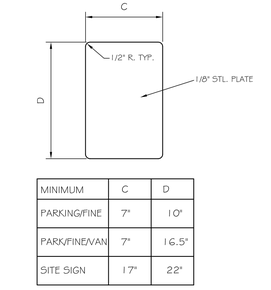
1 PARKING AT AN ANGLE
SCALE: 1/8" = 1'-0"



LOADING & UNLOADING AISLE SHALL HAVE BLUE BOARDER & SURFACE MARKING SHALL BE PER 9/ADA.1

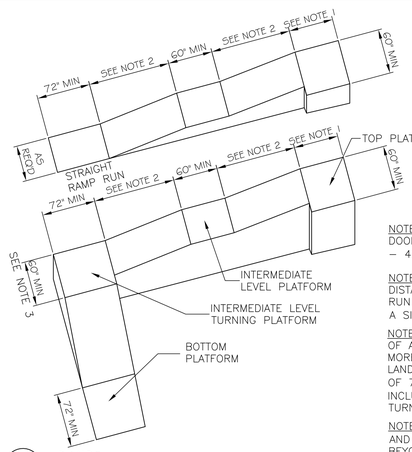
* 8'-0" MIN AT VAN ACCESSIBLE STALL

2 90 ° PARKING
SCALE: 1/8" = 1'-0"

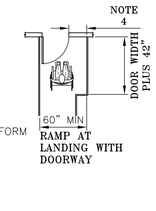


MINIMUM	C	D
PARKING/FINE	7"	10"
PARK/FINE/VAN	7"	16.5"
SITE SIGN	17"	22"

12 SIGN BACK PLATE
SCALE: 3/8" = 1'-0"



3 RAMPS
SCALE: N.T.S.



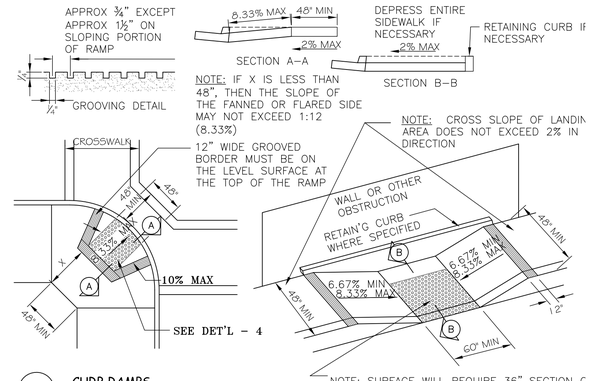
RAMP AT LANDING WITH DOORWAY

NOTE 1: 60" MINIMUM; WHEN DOOR SWINGS ONTO LANDING – 42" MIN PLUS DOOR WIDTH

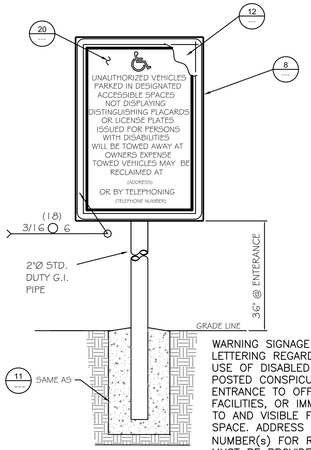
NOTE 2: MAXIMUM HORIZONTAL DISTANCE OF EACH RAMP AND RUN VARY. MAXIMUM RISE IN A SINGLE RUN IS 30".

NOTE 3: WHEN THE DIRECTION OF A RAMP CHANGES 30° OR MORE AT LANDING, THEN THE LANDING MUST BE A MINIMUM OF 72" IN LENGTH AND INCLUDE A MINIMUM 60"x60" TURNING PLATFORM

NOTE 4: 24" MIN EXTERIOR AND 18" MIN INTERIOR BEYOND THE STRIKE EDGE OF A GATE OR DOOR ON THE SIDE TOWARD WHICH IT SWINGS

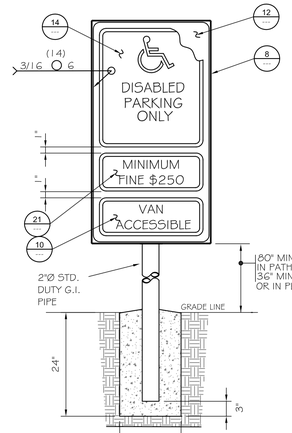


4 CURB RAMPS
SCALE: N.T.S.

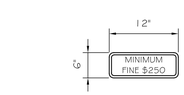


WARNING SIGNAGE WITH 1" HIGH LETTERING REGARDING UNAUTHORIZED USE OF DISABLED PARKING SPACES IS POSTED CONSPICUOUSLY AT EACH ENTRANCE TO OFF-STREET PARKING FACILITIES, OR IMMEDIATELY ADJACENT TO AND VISIBLE FROM EACH STALL OR SPACE. ADDRESS AND TELEPHONE NUMBER(s) FOR RECLAIMING VEHICLES MUST BE PROVIDED. 1129B.4

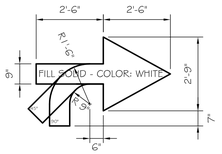
7 SITE SIGN
SCALE: N.T.S.



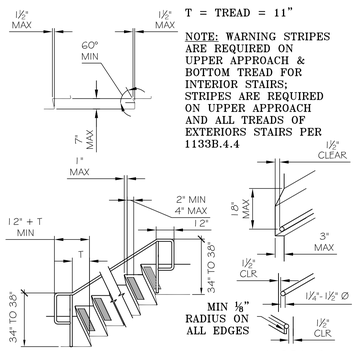
11 PARKING SIGN & FOUNDATION
SCALE: 3/8" = 1'-0"



21 FINE SIGN
SCALE: 3/8" = 1'-0"



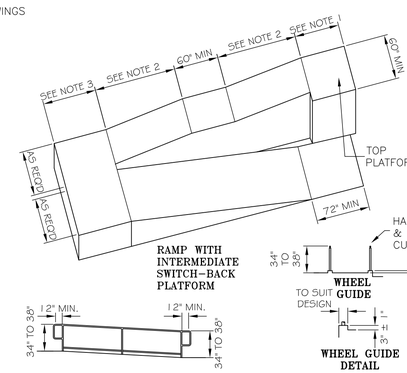
15 TRAFFIC ARROW
SCALE: 3/8" = 1'-0"



T = TREAD = 11"

NOTE: WARNING STRIPES ARE REQUIRED ON UPPER APPROACH & BOTTOM TREAD FOR INTERIOR STAIRS; STRIPES ARE REQUIRED ON UPPER APPROACH AND ALL TREADS OF EXTERIORS STAIRS PER 1133B.4.4

5 STEPS W/ HANDRAIL
SCALE: N.T.S.



NOTE 1: 60" MINIMUM; WHEN DOOR SWINGS ONTO LANDING – 42" MIN PLUS DOOR WIDTH

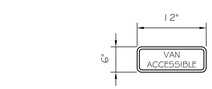
NOTE 2: MAXIMUM HORIZONTAL DISTANCE OF EACH RAMP AND RUN VARY. MAXIMUM RISE IN A SINGLE RUN IS 30".

NOTE 3: WHEN THE DIRECTION OF A RAMP CHANGES 30° OR MORE AT LANDING, THEN THE LANDING MUST BE A MINIMUM OF 72" IN LENGTH AND INCLUDE A MINIMUM 60"x60" TURNING PLATFORM

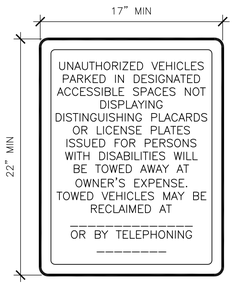
NOTE 4: 48" MIN. SIDEWALK

NOTE 5: 36" MIN. CLEAR

6 RAMPS AND REQUIRED FEATURES
SCALE: N.T.S.

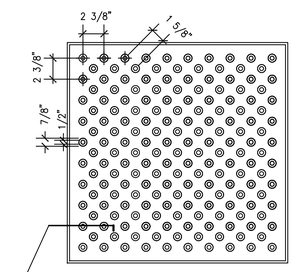


10 VAN PARKING SIGN
SCALE: 3/8" = 1'-0"

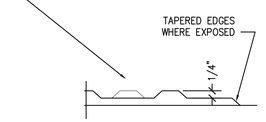


WARNING SIGNAGE WITH 1" HIGH LETTERING REGARDING UNAUTHORIZED USE OF DISABLED PARKING SPACES IS POSTED CONSPICUOUSLY AT EACH ENTRANCE TO OFF-STREET PARKING FACILITIES, OR IMMEDIATELY ADJACENT TO AND VISIBLE FROM EACH STALL OR SPACE. ADDRESS AND TELEPHONE NUMBER(s) FOR RECLAIMING VEHICLES MUST BE PROVIDED. 11B-502.8.2

20 SITE SIGN
SCALE: 1-1/2" = 1'-0"

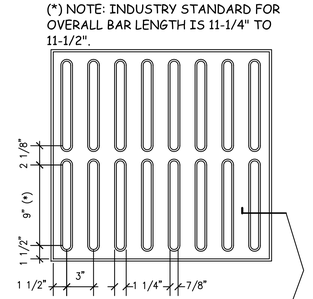


16 TRUNCATED DOMES
SCALE: 1-1/2" = 1'-0"

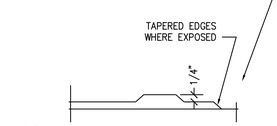


17 TRUNCATED DOMES
SCALE: 6" = 1'-0"

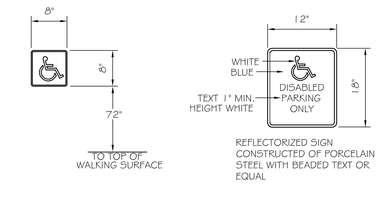
(*) NOTE: INDUSTRY STANDARD FOR OVERALL BAR LENGTH IS 11-1/4" TO 11-1/2".



18 DIRECTIONAL BARS
SCALE: 1-1/2" = 1'-0"



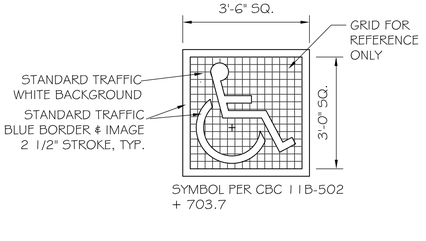
19 DIRECTIONAL BARS
SCALE: 6" = 1'-0"



13 BUILDING SIGN
SCALE: 3/8" = 1'-0"

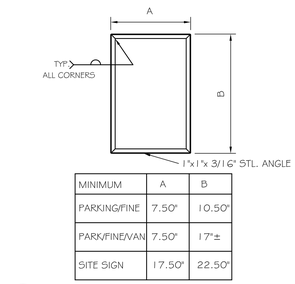
REFLECTORIZED SIGN CONSTRUCTED OF PORCELAIN STEEL WITH BEADED TEXT OR EQUAL

14 PARKING SIGN
SCALE: 3/8" = 1'-0"



SYMBOL PER CBC 11B-502 + 703.7

9 DISABLED PARKING SYMBOL
SCALE: 1-1/2" = 1'-0"



MINIMUM	A	B
PARKING/FINE	7.50"	10.50"
PARK/FINE/VAN	7.50"	17"±
SITE SIGN	17.50"	22.50"

8 SIGN FRAME
SCALE: 3/8" = 1'-0"

GENERAL REQUIREMENTS:

1. PROVIDE SITE WITH EXTERIOR ACCESSIBLE ROUTES OF TRAVEL PER CBC 11B-206:
   - 1.1. TO BLDG. ENTRANCES & EXITS
   - 1.2. BETWEEN BLDG'S ON THE SAME SITE
   - 1.3. FROM PUBLIC TRANSPORTATION STOPS, ACCESSIBLE PARKING & LOADING ZONES, PUBLIC STREETS & SIDEWALKS TO THE ACCESSIBLE ENTRANCES THEY SERVE.
   - 1.4. ALL ROUTES OF TRAVEL SHALL BE ACCESSIBLE.
2. EXTERIOR ROUTES OF TRAVEL SHALL HAVE A CLEAR WIDTH OF 36", EXCEPT AT DOORS COMPLYING WITH SEC. 11B-404.2.3 & 11B-404.2.4 OR OBSTRUCTIONS COMPLYING WITH SEC. 11B-307.
3. IF A PERSON IN A WHEEL CHAIR HAS TO TURN AROUND AN OBSTRUCTION THE MINIMUM CLEAR WIDTH OF 32" FOR 24" MAX. TRAVEL DISTANCE - SEE 5/ADA.2.
4. EACH ACCESSIBLE PARKING STALL SHALL CONFORM WITH 11B-502:
   - 4.1. LABLE 1:6 ACCESSIBLE STALLS "VAN ACCESSIBLE" PER CBC 11B-502.2
   - 4.2. LOADING & UNLOADING AISLE SHALL BE MARKED WITH BLUE BORDER & CROSS HATCHED AT 36" O.C. IN WHITE - SEE DETAIL 1/ADA.1
5. PROVIDE SIGNS & SURFACE MARKINGS PER SEC. 11B-502.6 - SEE 1/ADA.1
   - 5.1. SURFACE MARKING SHALL BE PER CBC 11B-502.6.6 - SEE 9/ADA.1

GENERAL REQUIREMENTS - CONTINUED

6. WALKS & SIDEWALKS IN EXTERIOR ROUTES OF TRAVEL SHALL HAVE AN UNINTERRUPTED SURFACE WITHOUT STEPS OR GRADE CHANGES EXCEEDING 1/2" & MEASURE 48" MINIMUM IN WIDTH. THE CROSS-SLOPE SHALL BE 2% MAXIMUM (1/4" IN 12") & SHALL HAVE A SLIP RESISTANT SURFACE.
7. WHERE A WALK CROSSES A VEHICULAR WAY, OR ADJOINS IT WITHOUT INTERVENING CURBS, RAILS, OR OTHER ELEMENTS, PROVIDE DETECTABLE WARNING STRIP 36" WIDE MINIMUM WITH ALL FEATURES DESCRIBED IN CBC 11B-705.1.1. SEE SITE PLAN FOR LOCATION.
8. ALL EXTERIOR ENTRANCES SHALL BE ACCESSIBLE PER CBC 11B-206.4.1.
9. ALL DOORS WITH CLOSERS SHALL BE ADJUSTABLE SO THAT OPENING EFFORT DOES NOT EXCEED 5 LBS., OR 15 LBS. FOR FIRE DOORS.
10. ALL SANITARY FACILITIES SHALL BE ACCESSIBLE & A WILL BE UNISEX.
11. ALL SANITARY FACILITIES SHALL BE ALL-GENDER WITH APPROPRIATE SIGNAGE.
12. ALL FIXTURES SHALL CLEAR USE AREAS APPROPRIATE FOR WHEEL CHAIR USE- SEE 12/ADA.2.
13. CUSTOMER SERVICE COUNTERS SHALL AT A MINIMUM HAVE A 36" WIDE FINISHED SURFACE THAT MEASURES +34" ABOVE FINISHED FLOOR MAXIMUM.
14. -

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REVISIONS	BY

SITE: 1350 HASTINGS AVE. UKIAH, CA 95482

APN: 180-070-19-00 - 2.80 AC.

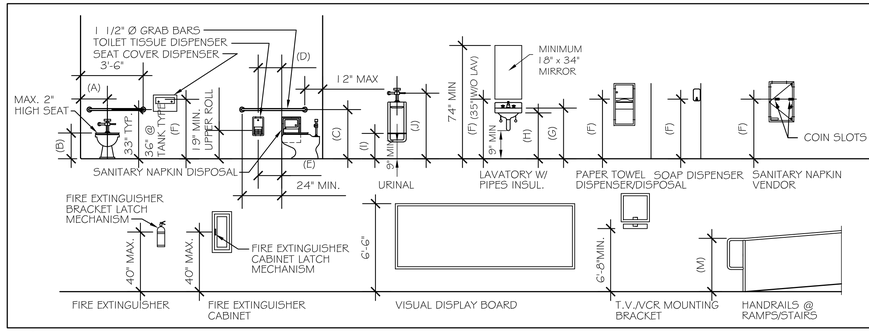
SITE ACCESSIBILITY FEATURES, NOTES & DETAILS

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
400 WEST CLAY STREET, UKIAH, CA 95482

LAWRENCE S. MITCHELL, AIA
LICENSED ARCHITECT
C-13860
11.30.21
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-1357

DATE	06/14/2019
SCALE	AS NOTED
DRAWN	LSM/BCM
PROJECT	1350 HASTINGS
SHEET	ADA.1

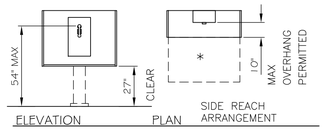


MARK & DESCRIPTION	LOCATION
(A) TOILET CENTERLINE FROM WALL	18"
(B) TOILET SEAT HEIGHT (DIMENSION TO TOP OF SEAT)	17"-19"
(C) GRAB BAR HEIGHT (SIDE)	33"
(D) TOILET PAPER IN FRONT OF TOILET	8" ℄
(E) NAPKIN DISP. IN FRONT OF TOILET	12"MAX
(F) DISPENSER OR MIRROR HEIGHT	40"MAX
(G) LAVATORY/SINK TOP HEIGHT	34"MAX
(H) LAVATORY/SINK KNEE CLEARANCE	27"MIN
(I) URINAL LIP HEIGHT	17"MAX
(J) URINAL FLUSH HANDLE HEIGHT	44"MAX
(K) DRINKING FOUNTAIN BUBBLER HEIGHT	36"MAX
(L) DRINKING FOUNTAIN KNEE CLEARANCE	27"MIN
(M) HAND RAIL HEIGHT	34" MIN-38"MAX

NOTES:
1. NOT ALL FIXTURES/ACCESSORIES NECESSARILY OCCUR IN THIS PROJECT.
2. HEIGHTS NOTED ON INTERIOR ELEVATIONS GOVERN OVER THOSE SHOWN HERE.
3. THE ITEMS IN THIS DETAIL ARE SHOWN AT HEIGHTS ACCESSIBLE TO ADULT PERSONS WITH DISABILITIES.
4. WATER CLOSET FLUSH VALVE SHALL BE ORIENTED TO THE WIDE SIDE OF THE ROOM/STALL.

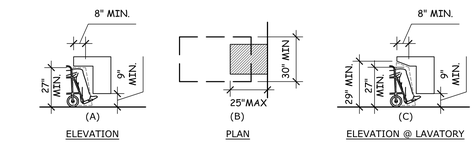
1 LOCATION SCHEDULE
SCALE: N.T.S.

2 LOCATION SCHEDULE KEY & NOTES
SCALE: N.T.S.

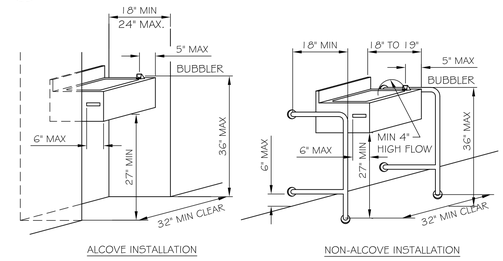


NOTE:
IF Y IS LESS THAN 36-INCHES, THEN X SHALL BE GREATER THAN 17-INCHES. IF Z IS GREATER THAN 12 INCHES, THEN Y SHALL BE GREATER THAN 36-INCHES.

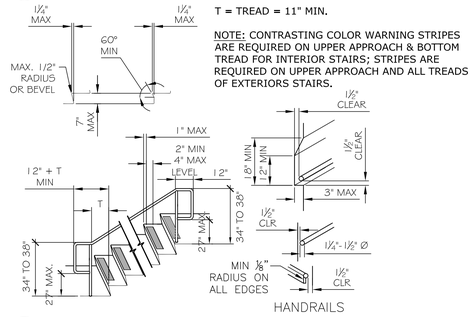
3 PUBLIC TELEPHONE
SCALE: N.T.S.



4a MINIMUM KNEE CLEARANCE
SCALE: N.T.S.

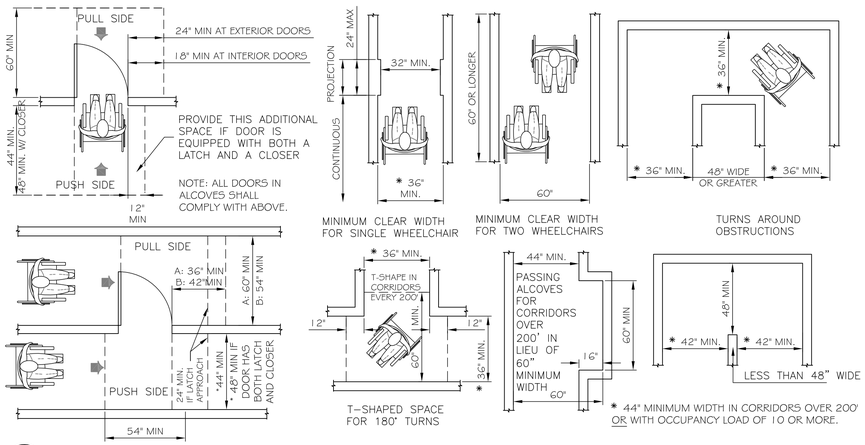


4b DRINKING FOUNTAIN
SCALE: N.T.S.

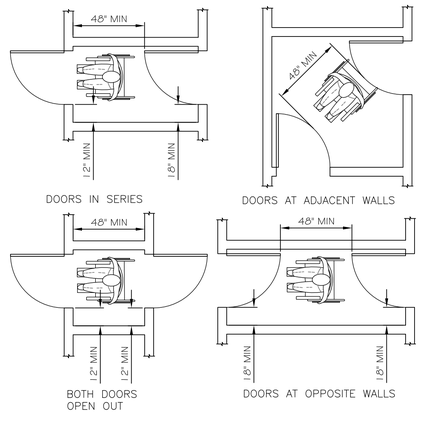


T = TREAD = 11" MIN.

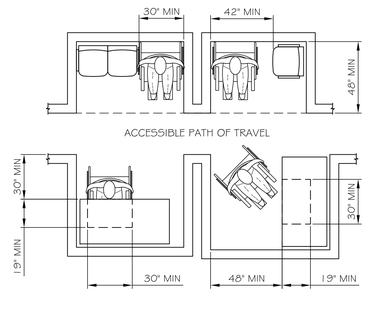
NOTE: CONTRASTING COLOR WARNING STRIPES ARE REQUIRED ON UPPER APPROACH & BOTTOM TREAD FOR INTERIOR STAIRS; STRIPES ARE REQUIRED ON UPPER APPROACH AND ALL TREADS OF EXTERIORS STAIRS.



5 DOORS, LANDINGS, & CORRIDORS
SCALE: N.T.S.



6 DOORS - SET CONFIGURATIONS
SCALE: N.T.S.



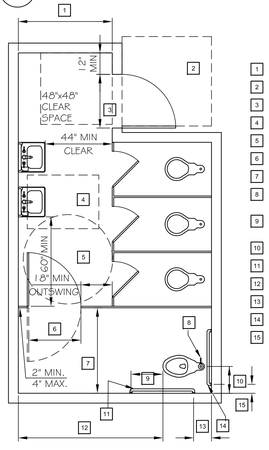
7 WAIT & ACTIVITY ALCOVES
SCALE: N.T.S.

8 STEP & HANDRAIL CONFIGURATIONS
SCALE: N.T.S.

CBC 11B-703.5.5 CHARACTER SIZE

TABLE VISUAL CHARACTER HEIGHT		
HEIGHT TO FINISH FLOOR OR GROUND FROM BASELINE OF CHARACTER	HORIZONTAL VIEWING DISTANCE	MINIMUM CHARACTER HEIGHT
40" TO LESS THAN OR EQUAL TO 70"	LESS THAN 72"	5/8"
	72" AND GREATER	5/8" PLUS 1/8" PER FOOT OF VIEWING DISTANCE ABOVE 72"
GREATER THAN 70" TO LESS THAN OR EQUAL TO 120"	LESS THAN 180"	2"
	180" AND GREATER	2" PLUS 1/8" PER FOOT OF VIEWING DISTANCE ABOVE 180"
GREATER THAN 120"	LESS THAN 21'	3"
	21' AND GREATER	3" PLUS 1/8" PER FOOT OF VIEWING DISTANCE ABOVE 21'

18 INTERIOR SIGNAGE



1. 48" MIN. CLEAR
2. 60"x60" LEVEL & CLEAR
3. 32" MIN. CLEAR
4. 30"x48" CLEAR SPACE
5. 60" Ø MIN. CLEAR
6. 34" MIN. CLEAR
7. 60" MIN. CLEAR
8. FLUSH ACTIVATOR ON WIDE SIDE OF FIXTURE
9. 24" MIN. EDGE OF FIXTURE TO END OF GRAB BAR
10. 18" TO CENTERLINE OF FIXTURE
11. 42" MIN. GRAB BAR
12. 60" MIN.
13. 12" MAX.
14. 36" MIN. GRAB BAR
15. 6" CLEAR

UNISEX

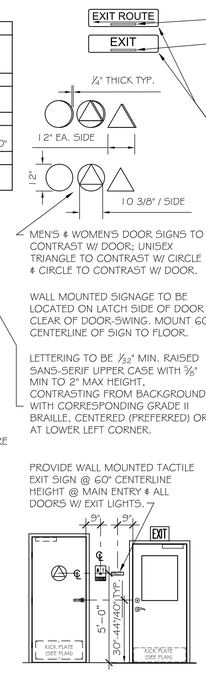
MEN'S & WOMEN'S DOOR SIGNS TO CONTRAST W/ DOOR; UNISEX TRIANGLE TO CONTRAST W/ CIRCLE & CIRCLE TO CONTRAST W/ DOOR.

WALL MOUNTED SIGNAGE TO BE LOCATED ON LATCH SIDE OF DOOR CLEAR OF DOOR-SWING. MOUNT 60" CENTERLINE OF SIGN TO FLOOR.

LETTERING TO BE 1/32" MIN. RAISED SANS-SERIF UPPER CASE WITH 3/16" MIN TO 2" MAX HEIGHT, CONTRASTING FROM BACKGROUND, WITH CORRESPONDING GRADE II BRAILLE, CENTERED (PREFERRED) OR AT LOWER LEFT CORNER.

PROVIDE WALL MOUNTED TACTILE EXIT SIGN @ 60" CENTERLINE HEIGHT @ MAIN ENTRY & ALL DOORS W/ EXIT LIGHTS.

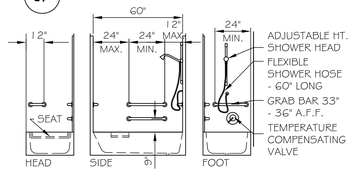
9 MULTIPLE ACCOMMODATION RESTROOM
SCALE: N.T.S.



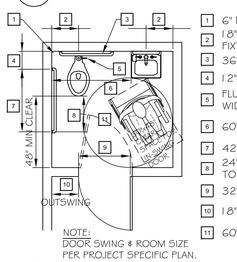
10 TOILET & EXIT DOORS
SCALE: N.T.S.

- ROOM IDENTIFICATION SIGNAGE: DOORS AND SPACES WITHIN THE TENANT SPACE SHALL RECEIVE NON-GLARE SIGNAGE W/ CALIFORNIA BRAILLE IDENTIFICATION (LARGER THAN TYPICAL ADA BRAILLE). THE BRAILLE SHALL BE GRADE 2 W/ 1/10TH-INCH ON CENTER WITHIN EACH CELL W/ 2/10TH-INCH BETWEEN CELLS. DOTS SHALL BE RAISED 1/40TH-INCH MIN. ABOVE BACKGROUND AND BE DOMED OR ROUNDED.
- BRAILLE TO BE 3/8" MIN. TO 1/2" MAX. BELOW TACTILE CHARACTERS AND 3/8" MIN. FROM BORDERS.
- VISUAL AND RAISED CHARACTERS ON SIGNS SHALL BE SELECTED FROM FONTS WHERE THE WIDTH OF UPPERCASE "O" IS 60% TO 110% OF THE HEIGHT OF UPPERCASE "I". STROKE THICKNESS OF UPPERCASE "I" TO BE 10% TO 15% OF THE HEIGHT OF THE CHARACTER. TEXT AND BRAILLE TO BE HORIZONTAL.
- MOUNT SIGN ℄ @ 60" A.F.F. AND W/ EDGE 4"-6" FROM STRIKE SIDE OF DOOR.
- TOILET ROOMS TO HAVE REQUIRED IDENTIFICATION SIGNS; ON DOOR & ADJACENT WALL. WALL SIGNS TO CONTAIN INTERNATIONAL SYMBOLS OF ACCESSIBILITY IN WHITE ON BLUE BACKGROUND (COLOR NUMBER 15090 IN FEDERAL STANDARDS 595B). ENFORCEMENT AGENCY MAY APPROVE OTHER COLORS 1117B.5.8.1.1.
- ROOM ID & PICTOGRAM SIGNS SHALL BE 6"x6"x1/4" MIN. W/ PHOTOPOLYMER HEADER W/ RAISED SYMBOLS & ROOM NAMES / NUMBERS. TEXT AND BRAILLE TO BE IN 6"x2-1/2" FOOTER W/ 1/4" RADIUS OUTSIDE CORNERS.
- TACTILE "EXIT ROUTE" AND "EXIT" SIGNS SHALL BE 6"x2"x1/8" MIN. INTERIOR POLYMER WITH RAISED COPY AND BRAILLE, LAMINATE TO SAME SIZE BACKER, CLEAR ACRYLIC, ONE COLOR BACKGROUND SUBSURFACE AND CONTRASTING COLOR COPY SURFACE. SIGN COLOR TO CONTRAST FROM WALL.

17 INTERIOR SIGNAGE

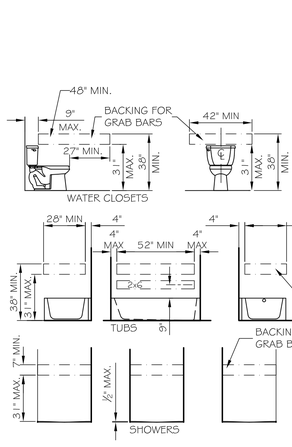


11 ACCESSIBLE TUB-SHOWER
ADA-BATH-04

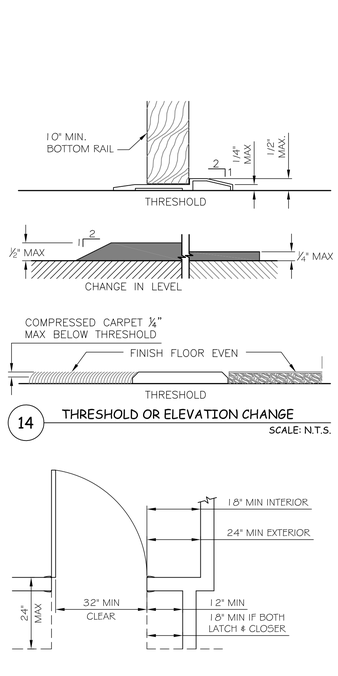


1. 6" MAX.
2. 18" TO CENTERLINE OF FIXTURE
3. 36" MIN. GRAB BAR
4. 12" MAX.
5. FLUSH ACTIVATOR ON WIDE SIDE OF FIXTURE
6. 60" MIN. CLEAR
7. 42" MIN. GRAB BAR
8. 24" MIN. EDGE OF FIXTURE TO END OF GRAB BAR
9. 32" MIN. CLEAR
10. 18" MIN. CLEAR
11. 60" TURNING DIAMETER

12 SINGLE ACCOMMODATION RESTROOM
SCALE: N.T.S.

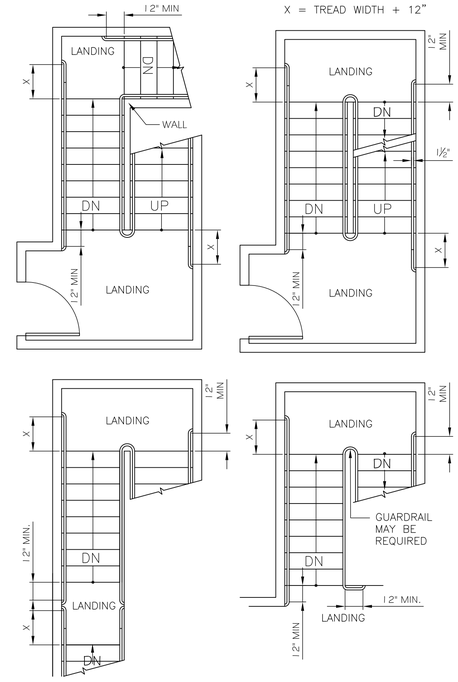


13 ADAPTABLE BATHROOM
SCALE: N.T.S.



14 THRESHOLD OR ELEVATION CHANGE
SCALE: N.T.S.

15 DOOR WIDTH
SCALE: N.T.S.



16 STAIR FLIGHTS & LANDINGS
SCALE: N.T.S.

REVISIONS	BY

SITE: 1350 HASTINGS AVE. UKIAH, CA 95482
APN: 180-070-19-00 - 2.80 AC.

INTERIOR ACCESSIBILITY FEATURES, NOTES & DETAILS

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
400 WEST CLAY STREET, UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.21
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-1357

DATE 03/09/2020
SCALE AS NOTED
DRAWN LSM/BCM
PROJECT 1350 HASTINGS
SHEET ADA.2

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- The site is currently accessed by two existing driveways along the north property line (east and west), which will be reconfigured to allow public access via the northwest driveway, while the southern driveway and northeast driveway will be utilized for service and delivery vehicles (no public access). The Southern driveway will be constructed to County of Mendocino's Transportation Department standards, as it is located within the County's jurisdiction.
- The existing manmade berm (comprising fill) on the east side will be removed and the site will graded to encourage draining to bioswales and a stormwater retention and rain garden area in the northeast corner of the property.

The following Conditions of Approval shall be made a permanent part of the Major Use Permit/Site Development Permit, shall remain in force regardless of property ownership, and shall be implemented in order for this entitlement to remain valid.

City of Ukiah Standard Conditions

1. This approval is not effective until the 10-day appeal period applicable to this Site Development Permit has expired without the filing of a timely appeal. If a timely appeal is filed, the project is subject to the outcome of the appeal and shall be revised as necessary to comply with any modifications, conditions, or requirements that were imposed as part of the appeal.
2. All Conditions of Approval shall be printed on all sets of building permit project plans pertaining to any site preparation work or construction associated with the development of the project and ancillary site improvements approved by the Site Development Permit.
3. All use, construction and the location thereof, or occupancy, shall conform to the application and to any supporting documents submitted therewith, including any maps, sketches, or plot plans accompanying the application or submitted by applicant in support thereof.
4. Any construction shall comply with the "Standard Specifications" for such type of construction now existing or which may hereafter be promulgated by the Engineering Department of the City of Ukiah, except where higher standards are imposed by law, rule, or regulation or by action of the Planning Commission such standards shall be met.
5. Building permits shall be issued within two years after the effective date of the Site Development Permit or same shall be null and void.
6. In addition to any particular condition which might be imposed, any construction shall comply with all building, fire, electric, plumbing, occupancy, and structural laws, rules, regulations, and ordinances in effect at the time the Building Permit is approved and issued.
7. The Applicant shall obtain all required Sign Permits, in compliance with Division 3, Chapter 7, Signs, of the UCC.
8. The Applicant shall submit a Landscape Plan for approval prior to Building Permit issuance.
9. The Applicant shall submit verification of all applicable permits or approvals in compliance with all local, state and federal laws to the Community Development Department prior to issuance of building permits.

Ukiah Valley Fire Authority Conditions

10. A1 warehouse designated rooms shall have One Class 2-A rated fire extinguisher mounted in close proximity to the main exit / entrance to the warehouse / room. Fire Marshall can assist with

- Mailed to property owners within 300 feet of the project parcels on November 18, 2018

ATTACHMENT 2

FINAL CONDITIONS OF APPROVAL FOR A MAJOR USE PERMIT/SITE DEVELOPMENT TO ALLOW RENOVATION OF AN 15,600 SF TOTAL (±14,000 SF GROUND FOOTPRINT) STRUCTURE, AS WELL AS GRADING AND SEVERAL SITE IMPROVEMENTS TO HOUSE THE CITY'S ELECTRIC UTILITY DEPARTMENT ADMINISTRATIVE OPERATIONS, ADMINISTRATION, CONSTRUCTION, AND TECHNICAL SERVICES AT 1350 HASTINGS ROAD; APN 180-070-19. FILE NO: 3308-SDP

Approved Project Description. An application was received from architect Lawrence Mitchell on behalf of the City of Ukiah Electric Utility Department for approval of a Major Use Permit/Site Development Permit to allow for the renovation of the property located at 1359 Hastings Road. Electric Utility will relocate its operations, administration, construction, and technical services to this location. The site will support the warehousing and distribution of materials, the servicing of equipment, parking of specialized utility vehicles, and storage of equipment used for construction and maintenance of the utility's distribution system. Offices and conference rooms will house business support services and allow hosting of education training. The project would also comprise the following:

- The building's interior will be remodeled to support the following uses: administrative, engineering, and technical service; staff lockers, lunchroom, restrooms and showers; inventory purchasing, shipping, and receiving; show room, meeting, and training spaces; and, warehousing and storage of materials and equipment.
- The project site will provide parking and storage for at least 40 Electric Utility service vehicles ranging from pickups to service trucks, diggers, bucket trucks, trailers, and a crane.
- Two new open covered parking structures (up to 20 ft high) would be constructed to accommodate service vehicles; one would be 37' x 178' and the other would be 38' x 90'.
- Solar panels will be placed on the roof of the parking structures (see examples in Attachment 3) and also on the existing building's roof.
- Vehicle maintenance will be performed off site at the City Corp Yard on Airport Road.
- Occasionally, equipment deliveries will be received from vans, straight trucks, and semis. The site will also provide area for a weird lot, or open storage, for utility poles, vaults, transformers, miscellaneous hardware, and brass arms.
- Entry to the facility will be controlled by defined path-of-travel and a new covered entryway in the northwest corner of the property.
- For security purposes, an 8-ft tall steel perimeter fence is proposed.
- Security cameras and lighting (down-shielded) will also be installed (see Photometric Plan in Attachment 3).
- The preliminary concept for signage includes a community monument sign for the proposed facility and adjacent neighbors.
- 24 employee parking spaces within a paved area will be provided along the north side of the facility, external to the security fence, including 2 ADA spaces.
- Three customer parking spaces would be provided in the northwest corner of the site, just west of the employee parking area, also outside of the security fence.
- A paved walkway will provide pedestrian access from the parking areas to the facility.
- 22,900 sf of landscaping will be provided along the perimeter of the site and around a proposed fountain and seating area (courtyard) near the entrance of the facility.

I, _____, the Applicant/Owner, acknowledge receipt of the aforementioned attached documents, and have read and do agree to the attached Conditions of Approval.

Name *Date*

5. Sufficient landscaped areas have been reserved for purposes of separating or screening the proposed structure(s) from the street and adjoining building sites, and breaking up and screening large expanses of paved areas.

   The project proposes landscaping on 20% of the lot, in accordance with the Ukiah City Code. Landscaping will be provided along the perimeter of the site, separating the site from the road and other uses.

6. The proposed development will not restrict or cut out light and air on the property, or on the property in the neighborhood; nor will it hinder the development or use of buildings in the neighborhood, or impair the value thereof.

   Security lighting is proposed for the facility and a photometric Plan has been prepared for the project showing that lighting will be down shielded and not substantially spill over onto adjacent properties. The site contains existing development and the project would not cut out light or air on the property or neighborhood, nor would it hinder development or use of buildings within the neighborhood.

7. The improvement of any commercial or industrial structure will not have a substantial detrimental impact on the character or value of an adjacent residential zoning district.

   There are no residentially zoned districts adjacent to the site. In addition, the project was reviewed by the Design Review Board and no design modifications were recommended.

8. The proposed development will not excessively damage or destroy natural features, including trees, shrubs, creeks, and the natural grade of the site.

   The project site consists of a gravel lot with a manmade berm that would be graded to match the natural grade of the site. No significant trees would be removed and the project would not excessively damage natural features.

9. There is sufficient variety, creativity, and articulation to the architecture and design of the structure(s) and grounds to avoid monotony and/or a box-like uninteresting external appearance.

   The project would renovate an existing building and has been designed by a professional architect to add architectural interest and compatibility with the surrounding area. In addition, the project was reviewed by the Design Review Board and no design modifications were recommended.

Based on the above analysis, the findings required for the Major Use Permit/Site Development Permit can be made.

Notice of Public Hearing

Notice of the Public Hearing was provided in the following manner, in accordance with UCC §9202(C):

- Published in the Ukiah Daily Journal on November 17, 2018
- Posted on the Project site on November 16, 2018
- Posted at the Civic Center (glass case) 72 hours prior to the public hearing

b. Portable diesel powered equipment that may be used during the proposed project are required to be registered with the state Portable Equipment Registration Program (PERP) or obtain permits from the District.
c. Projects located adjacent to sensitive receptors (schools, child care facilities, health care facilities, senior facilities, businesses, and residences, etc.) during the construction phase of this project have the potential for exposure to diesel particulate.
d. Heavy duty truck idling and off-road diesel equipment or other diesel engine idling is limited to less than 5 minutes.

37. Grading Projects-During Construction-All grading activities must comply with the following fugitive dust mitigation measures in accordance with District Regulation 1, Rule 1-430:
    a. All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions.
    b. All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 mph.
    c. Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed.
    d. Asphalt, oil, water, or suitable chemicals shall be applied on materials stockpiles, and other surfaces that can give rise airborne dusts.
    e. All earthmoving activities shall cease when sustained winds exceed 15 mph.
    f. The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours.
    g. The operator shall keep a daily log of activities to control fugitive dust.

38. Property Development-Prior to starting any construction the applicant is required to:
    a. Obtain a Property Development Permit from the District for any open outdoor burning.
    b. Obtain a Large Area Grading Permit, if applicable.
    c. The District recommends that the applicant consider alternate means of disposal other than open burning, such as cutting the majority of the larger material up as firewood, and chipping smaller material, if feasible to mitigate impacts from open outdoor burning.

39. New Commercial Development Mitigation Recommendations:
    a. New Road Construction: The District recommends that all new bare minimum all roads be covered with a sealant or rocked to prevent fugitive dust emissions.
    b. Parking Lot Tree Planting: The District recommends that commercial parking lot tree planting be defined as no less than 1 tree per 4 parking spaces to provide a beneficial reduction in summer heat gain.
    c. Mass Transit: The District recommends that applicant work in conjunction with the local Transit Authority (MTA) to provide a shelter in addition to the concrete pad so that the benefits and incentives to use mass transit would be immediately available.
    d. Electric Vehicle Charging: To further mitigate impacts to local air quality, it is recommended that applicant encourage the use of low emission vehicles by providing a minimum of 2, AC Level 2, electric vehicle charging stations.

ATTACHMENT 1

FINAL FINDINGS TO ADOPT A MAJOR USE PERMIT/SITE DEVELOPMENT TO ALLOW RENOVATION OF AN 15,600 SF TOTAL (±14,000 SF GROUND FOOTPRINT) STRUCTURE, AS WELL AS GRADING AND SEVERAL SITE IMPROVEMENTS TO HOUSE THE CITY'S ELECTRIC UTILITY DEPARTMENT ADMINISTRATIVE OPERATIONS, ADMINISTRATION, CONSTRUCTION, AND TECHNICAL SERVICES AT 1350 HASTINGS ROAD; APN 180-070-19. FILE NO: 3308-SDP

Recommendation for the Approval of the Major Use Permit/Site Development Permit and Findings: The Community Development Department's recommendation for conditional approval of a Major Use Permit/Site Development Permit is based in part on the following findings, in accordance with UCC §9262 and §263.

1. The proposed land use is consistent with the provisions of this Title as well as the goals and policies of the General Plan.

   With approval of the Site Development Permit and Use Permit, the project is consistent with all applicable General Plan and Zoning regulations.

2. The proposed land use is compatible with surrounding land uses and shall not be detrimental to the public's health, safety and general welfare.

   The proposed project is similar to the uses, specifically the industrial/commercial storage yards adjacent to the site. The project would not result in a detrimental effect to the public's health safety and general welfare.

3. The location, size, and intensity of the proposed project will not create a hazardous or inconvenient vehicular or pedestrian traffic pattern.

   The project site is currently served by two driveways located on the north side of the parcel. A driveway on the southern portion of the site driveway will be constructed to County of Mendocino's Department of Transportation requirements, as it is located within the County's jurisdiction. Access through the site for deliveries would be maintained with one-way circulation. The project also proposes pedestrian access from the parking areas to the facility. The project would provide adequate vehicular and pedestrian access that would not create hazardous traffic patterns.

4. The accessibility of off-street parking areas and the relation of parking areas with respect to traffic on adjacent streets will not create a hazardous or inconvenient condition to adjacent or surrounding uses.

   Parking for the proposed project will be located on-site with adequate access to them, in accordance with the Ukiah City Code and Public Works requirements. Parking facilities will not create a hazardous or inconvenient condition to adjacent or surrounding area.

parking areas. If heavy truck traffic is anticipated from the solid waste company, delivery trucks, or other heavy vehicles, the pavement section shall be calculated appropriately to ensure that it can withstand the loading.

24. Applicable Ukiah Valley Sanitation District sewer connection fees shall be paid at the time of building permit issuance.
25. Existing sewer laterals planned to be utilized as part of this project shall be cleaned and tested, and repaired or replaced if required.
26. Capital Improvement fees for water service are based on the water meter size. A fee schedule for water meter sizes is available upon request. Additionally, there is a cost for City crews to construct the water main taps for the proposed water services to serve the project.
27. Irrigation services shall have approved backflow devices.

Building Division Conditions

28. Submit plans and building permit application. Please submit three complete plan sets, two wet stamped and signed.
29. The design and construction of all site alterations shall comply with the 2016 California Building Code, 2016 Plumbing Code, 2016 Electrical Code, 2016 California Mechanical Code, 2016 California Fire Code, 2016 California Energy Code, 2016 Title 24 California Energy Efficiency Standards, 2016 California Green Building Standards Code and City of Ukiah Ordinances and Amendments.
30. Proposed building is in the Zone AE 100-year flood zone, 1612 and appendix G of the 2016 CBC will apply to your project.

Mendocino County Department of Transportation

31. A standard commercial road approach shall be constructed in compliance with County Department of Transportation Standard Nos. A51 B & A51 C, to a minimum width of eighteen (18) feet, with improved approach extending a min num of twenty (20) feet from the edge of the County road, to be paved with asphalt concrete or comparable surfacing to the adjacent road. Concrete driveways shall not be permitted.
32. Sight distance shall be established and maintained in accordance with Mendocino County
33. Department of Transportation Standard No. A53.
34. Any proposed work within County rights-of-way requires obtaining an encroachment permit from the Mendocino County Department of Transportation.

Mendocino County Air Quality Management District Conditions.
The following are standards Best Management Practices and Conditions provided by the Air Quality Management District.

35. The applicant may be required to obtain an Authority to Construct permit from the District prior to beginning construction and demolition.

36. Diesel Engines – Stationary and Portable Equipment and Mobile Vehicles:
    a. Any stationary onsite diesel IC engines 50 horsepower or greater (i.e. large power generators or pumps) or any propane or natural gas engines 250 horsepower or greater may require a permit from the District.

location selection. 6 to 7 extinguishers required for the first floor areas. Can be surface mounted, cabinets are not necessary. T19 567 / 568

11. One additional Class 2-A rated fire extinguisher shall also be located in the 2nd floor office space. T19 567 / 568
12. Suggested Exterior Fire Extinguishers: Four exterior mounted fire extinguishers is recommended. Two on the westerly building and two on the southern building.
13. It appears that there will be security fencing and two gates install ed on the property. A Knox box key box shall be required to be installed on the public side of the main gate to afford for emergency entrance. Key(s) within Knox Box shall be supplied by occupant and shall open all doors. A common Master key is highly recommended. Knox Box application can be attained through the Fire Marshal's office. CFC 506.
14. This building has a fire sprinkler system already installed. It shall be tested by a licensed contractor.
15. Any tenant improvements that require replacement or movement of any sprinkler head locations shall be accomplished by a licensed contractor, to include the submission of sprinkler plans both the correct layout and location and proposed.
16. Exit signs shall be internally or externally illuminated at all times, and connected to an emergency back-up power supply. CFC 1013.3 & 1013.6.3
17. Building address shall be clearly placed on a contrasting background so that it can be easily read from the road or street fronting the building. Placement of the address on a monument sign is acceptable. CFC 505.1
18. Fire alarm systems shall be monitored by an approved supervising station in accordance with this section and NFPA 72. CFC 907.6.5

Department of Public Works Conditions

19. Prior to construction of site improvements, a final grading and drainage plan, and an erosion and sediment control plan, prepared by a Civil Engineer, shall be submitted for review and approval by the Department of Public Works. The plans shall include the detailed design of the proposed storm water best management practices (BMPs). Drainage improvements shall be in compliance with the City of Ukiah's Phase I Storm Water Permit and the Low Impact Development Technical Design Manual (LID Manual). A final Storm Water LID Submittal shall be provided to support the design of the proposed drainage system.
20. The project engineer shall provide direct oversight and inspection during project construction, with special attention to implementation of best management practices for sediment and erosion control, and the proper grading, installation, and landscaping of the stormwater BMPs. Upon completion of the work, a report shall be submitted by the project engineer to the Department of Public Works stating that the improvements have been completed in accordance with the approved plans and conditions of approval, shall function as intended, and all areas have been permanently stabilized to prevent sediment and erosion.
21. Maintenance and inspection of all post-construction best management practices (BMPs) shall be in accordance with the LID Manual.
22. All work within the public right-of-way shall be performed by a licensed and properly insured contractor. The proposed driveway approach on Hastings Road may require encroachment permits from both the City of Ukiah and County of Mendocino.
23. All areas of circulation shall be paved with a minimum of 2" of AC on 6" of Base or other suitable all-weather surface approved by the City Engineer. This includes the proposed driveways and

City of Ukiah
COMMUNITY DEVELOPMENT DEPARTMENT

December 5, 2018

Lawrence Mitchell
135 W. Gobbi Street, Suite 203
Ukiah, CA 95482

EMAIL: ukiaharch001@sbcglobal.net

Subject: Approval Letter: Request for review and recommendation for a Major Use Permit/Site Development to allow renovation of an existing 15,600 sf total (±14,000 sf ground footprint) structure, as well as grading and several site improvements to house the City's Electric Utility Department administrative operations, administration, construction, and technical services at 1350 Hastings Road. APN 180-070-19; File No: 3308-SDP.

Dear Mr. Mitchell:

On November 28, 2018, the Planning Commission reviewed your request and recommendation regarding a Major Use Permit/Site Development Permit to allow renovation of an existing 15,600 sf total (±14,000 sf footprint) structure, as well as grading and several site improvements to house the City's Electric Utility Department administrative operations, administration, construction, and technical services at 1350 Hastings Road. At the conclusion of the public hearing, the Planning Commission approved the project subject to the attached Findings and Conditions of Approval.

Please sign and return a copy of this letter (see pg. 4) as acknowledgement of receipt of the attached documents, and as agreement to comply with the Conditions of Approval.

If you have any questions, please feel free to contact me at (707) 463-6207, or mtrace@cityofukiah.com.

Sincerely,

Michelle Trace, Planning Manager

Cc: Project File

Attachments: 1. Final Findings – Minor Site Development Permit
2. Final Conditions of Approval

REVISIONS	BY

SITE: 1350 HASTINGS AVE. UKIAH, CA 95482
APN: 180-070-19-00 - 2.80 AC.

CONDITIONS OF APPROVAL

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
400 WEST CLAY STREET, UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.21
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707)468-9337

DATE 06/14/2019
SCALE AS NOTED
DRAWN LSM/BCM
PROJECT 1350 HASTINGS
SHEET COA10

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Wipf Construction

Rents

REMOVE & REPLACE EXISTING ROOF & GUTTER. INSPECT DECK & NAILING NOTIFY CITY'S CONSTRUCT-ION MANAGER OF FINDINGS AND RECOMMENDATIONS. NEW ROOFING SHALL BE AEP OR BHP 22 GA. DESIGN SPAN - COLOR PER ARCHITECT WITH KYNAR COATING. INSTALL PER MANUFACTURERS REQUIREMENT & STANDARD DETAILS FOR FULL AND COMPLETE WARRANTEE. NEW GUTTER TO MATCH ROOFING. SIZE PER CPC, 2016 CODE SERIES & SLOPE TO DRAIN TYPICAL. DISCHARGE DOWNSPOUTS IN TO SUB-DRAIN SYSTEM SHOWN ON DRWG. C1. PROVIDE SHOP DRAWINGS OF COMPLETE SYSTEM FROM RIDGE TO SIDEWALK, FOR REVIEW & APPROVAL PRIOR TO ORDERING MATERIALS.

Hastings Road

Pear Orchard

Field survey work done on Sept 14, 2014

Horizontal datum is per found monuments as shown on the Parcel Map recorded in Map Case 2, Drawer 34, Page 2, Mendocino County Records.

Vertical datum is NAVD88 and FEMA FIRM.

Easements shown per Title Report prepared by Redwood Empire Title Company dated August 1, 2014.

This parcel is in the FEMA 100 year floodplain per FIRM Panel 06045C1514F, dated June 2, 2011 The Base Flood Elevation at the building is 586.6

PROVIDE ALLOWANCE FOR TWO ADDITIONAL MAN GATES TO BE POSITIONED IN FENCE LINE, IN FIELD IN ADDITION TO THE TWO MAN GATES SHOWN ON THE PLAN.

-- Preliminary --
Site & Grading Plan
1350 Hastings Road, Ukiah
Mar 1, 2016 -- AP 180-070-19

Scale: 1"=20'

Prepared By

Ron W. Franz RCE, PLS
2335 Appolinaris Drive
Ukiah, Ca 95482
707-462-1087

REGISTERED PROFESSIONAL ENGINEER
RON W. FRANZ
NO. 43938
EXP. 6-30-17
CIVIL
STATE OF CALIFORNIA

REVISIONS	BY

SITE: 1350 HASTINGS AVE. UKIAH, CA 95482

APN: 180-070-19-00 - 2.80 AC.

SITE PLAN NOTES & DETAILS [SOLAR + PARKING]

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
400 WEST CLAY STREET, UKIAH, CA 95482

LAWRENCE S. MITCHELL, AIA
C-13860
11.30.21
STATE OF CALIFORNIA

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DATE	06/14/2019
SCALE	AS NOTED
DRAWN	LSM/BCM
PROJECT	1350 HASTINGS
SHEET	AS100

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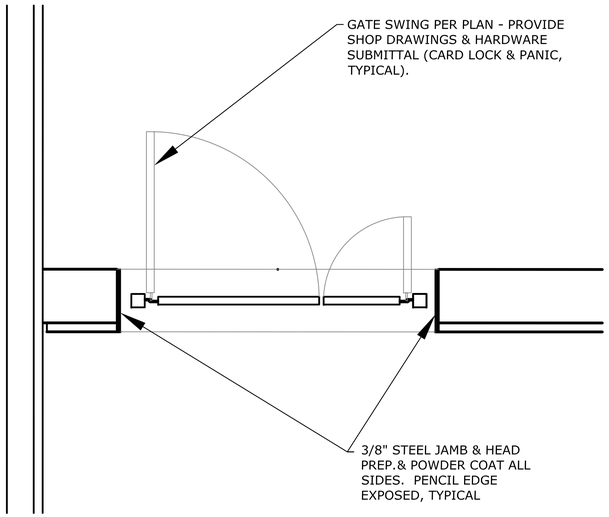
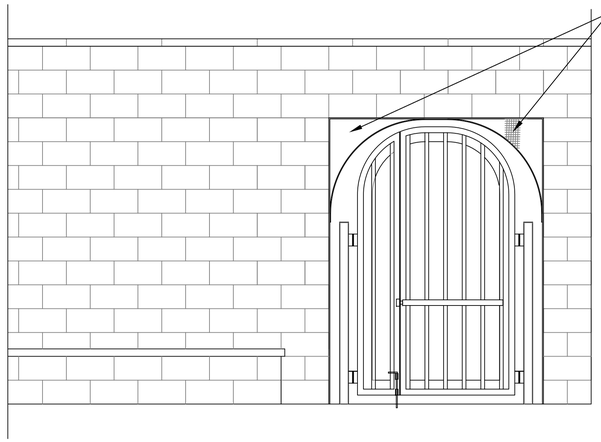


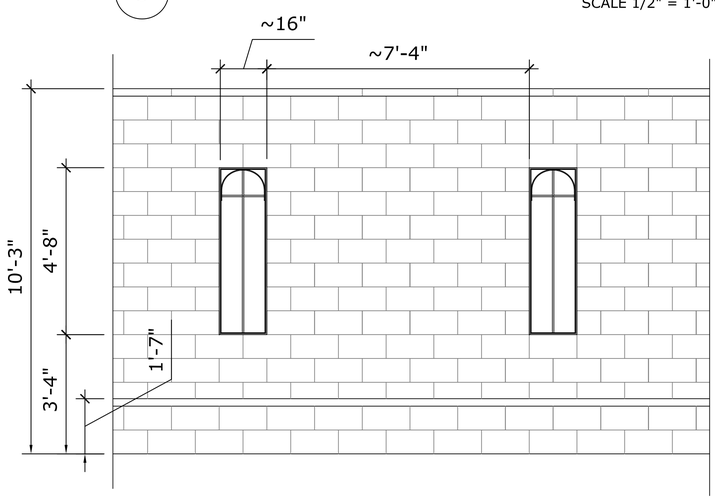
2 TYPICAL PLAN VIEW AT MAN GATE

SCALE 3/4" = 1'-0"



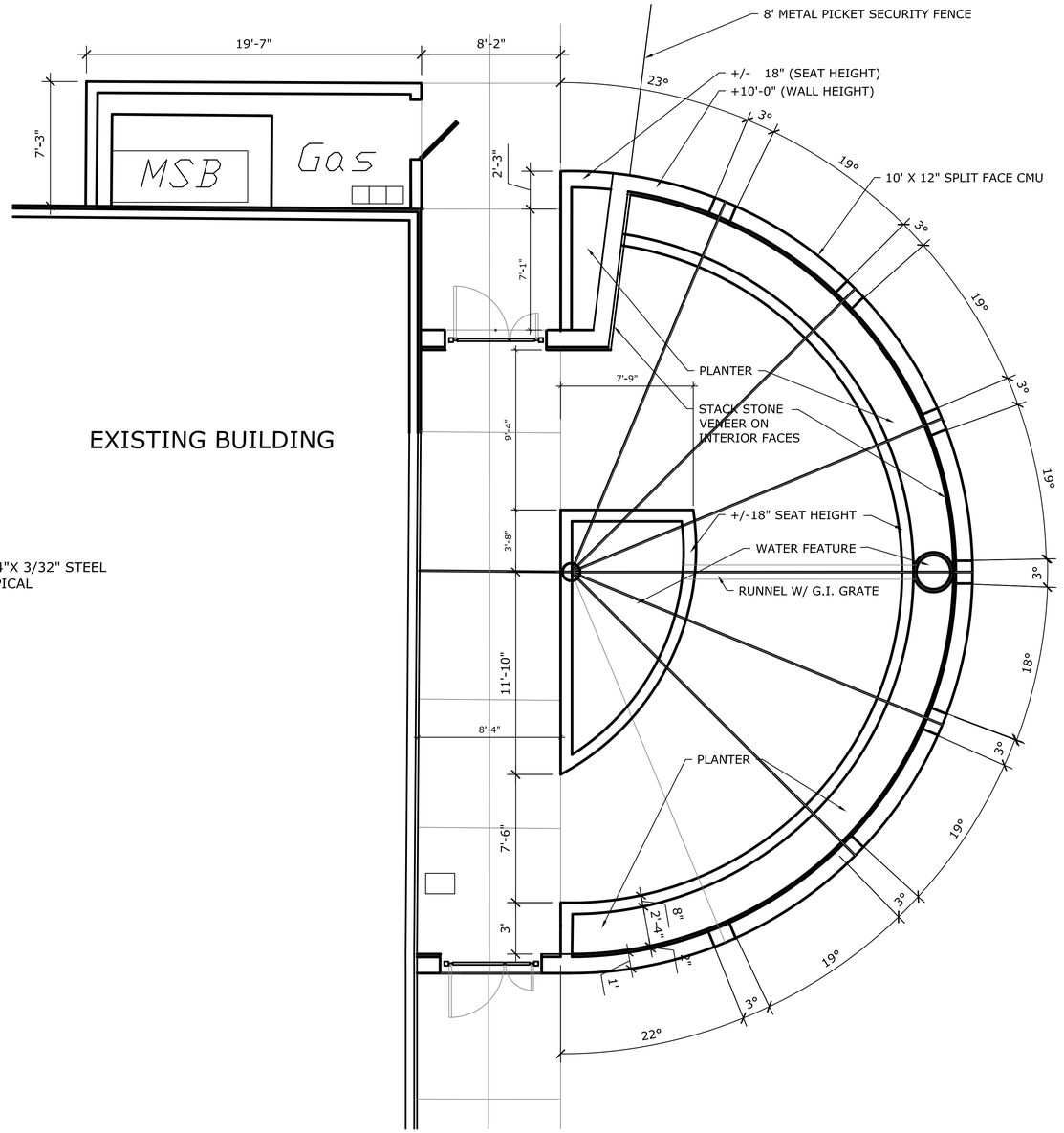
3 TYPICAL ELEVATION VIEW AT GATE PORTALS

SCALE 1/2" = 1'-0"



4 TYPICAL ELEVATION VIEW AT PORTALS

SCALE 1/2" = 1'-0"



1 DETAIL PLAN AT COURTYARD

SCALE 1/4" = 1'-0"

REVISIONS	BY

SITE: 1350 HASTINGS AVE. UKIAH, CA 95482

APN: 180-070-19-00 - 2.80 AC.

PLAN VIEW NOTES & DETAILS

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
400 WEST CLAY STREET, UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL AIA
C-13860
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STATE OF CALIFORNIA

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(707) 468-9537

DATE 03/09/2020
SCALE AS NOTED
DRAWN LSM/BCM
PROJECT 1350 HASTINGS
SHEET AS110

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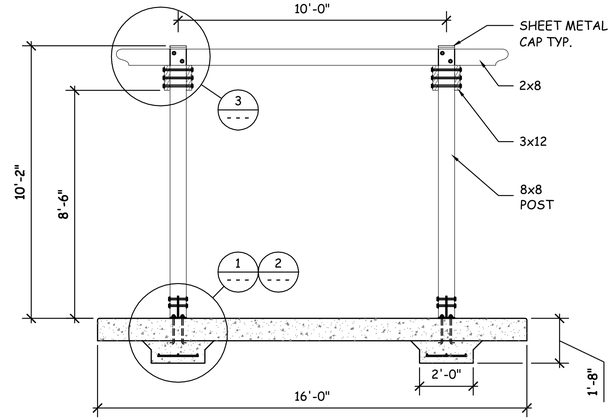
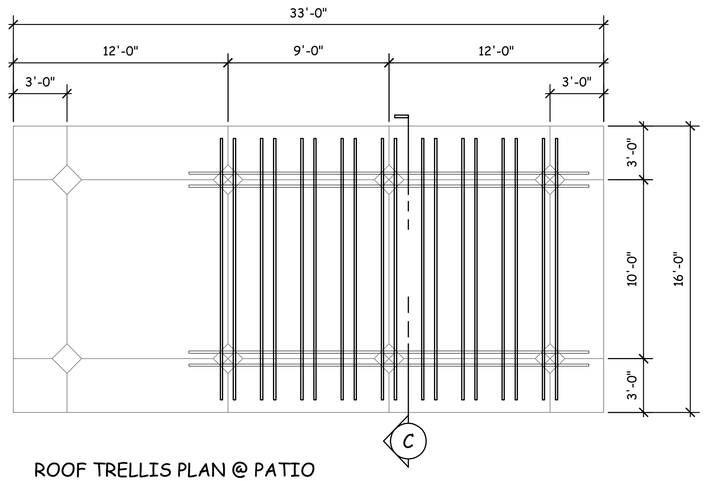


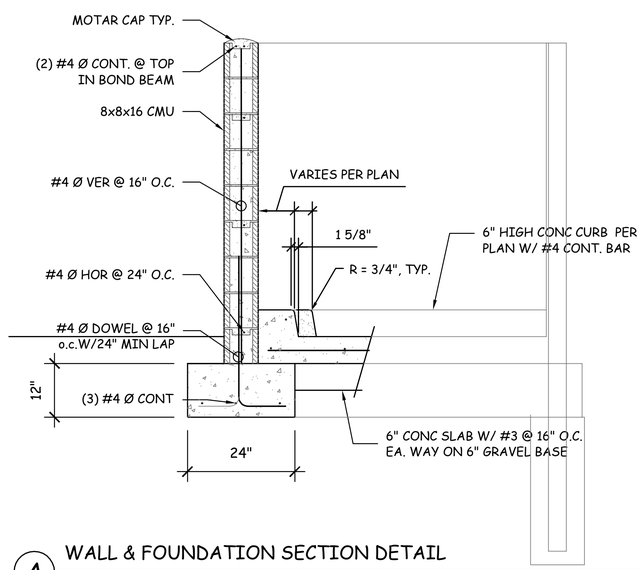
C TYPICAL SECTION @ COLUMN

SCALE: 3/8" = 1'-0"



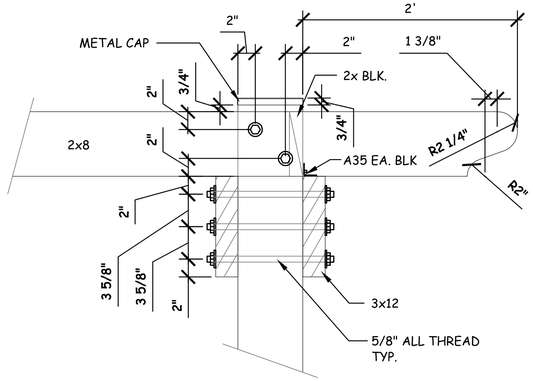
ROOF TRELLIS PLAN @ PATIO

SCALE: 1/4" = 1'-0"



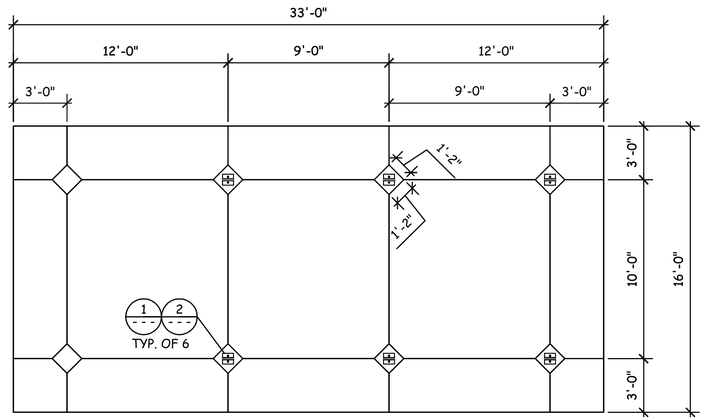
A WALL & FOUNDATION SECTION DETAIL

SCALE: 3/4" = 1'-0"



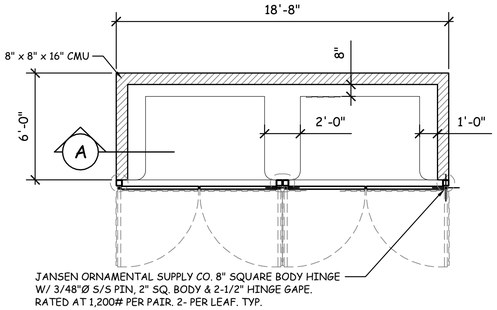
3 COLUMN CAP DETAIL

SCALE: 1-1/2 = 1'-0"



PATIO SLAB PLAN

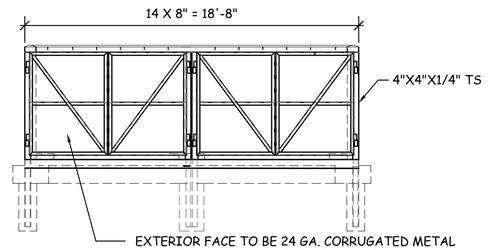
SCALE: 1/4" = 1'-0"



JANSEN ORNAMENTAL SUPPLY CO. 8" SQUARE BODY HINGE W/ 3/48"Ø S/S PIN, 2" SQ. BODY & 2-1/2" HINGE GAPE. RATED AT 1,200# PER PAIR. 2- PER LEAF. TYP.

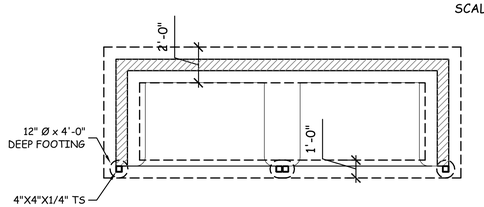
PLAN

SCALE: 1/4" = 1'-0"



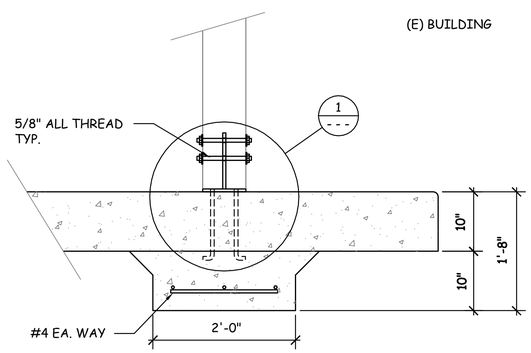
GATE ELEVATION

SCALE: 1/4" = 1'-0"



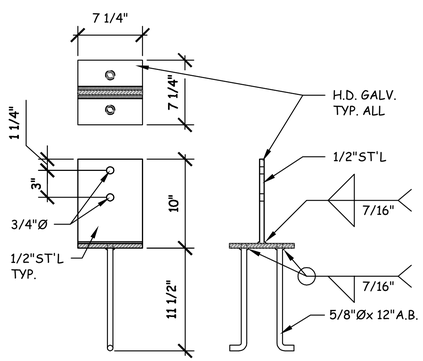
FOUNDATION PLAN

SCALE: 1/4" = 1'-0"



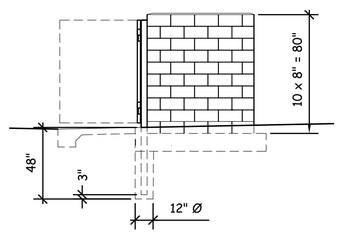
2 POST TO CONCRETE CONNECTION

SCALE: 1" = 1' - 0"



1 POST BASE

SCALE: 1-1/2 = 1'-0"



SIDE WALL ELEVATION

SCALE: 1/4" = 1'-0"

REVISIONS	BY

SITE: 1350 HASTINGS AVE. UKIAH, CA 95482

APN: 180-070-19-00 - 2.80 AC.

TRASH & RECYCLE STORAGE ENCLOSURE, NOTES & DETAILS

SITE WORK PLAN for:
CITY OF UKIAH - ELECTRIC UTILITY DEPARTMENT
400 WEST CLAY STREET, UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.19
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-0137

DATE	06/14/2019
SCALE	AS NOTED
DRAWN	LSM/BCM
PROJECT	1350 HASTINGS
SHEET	AS111

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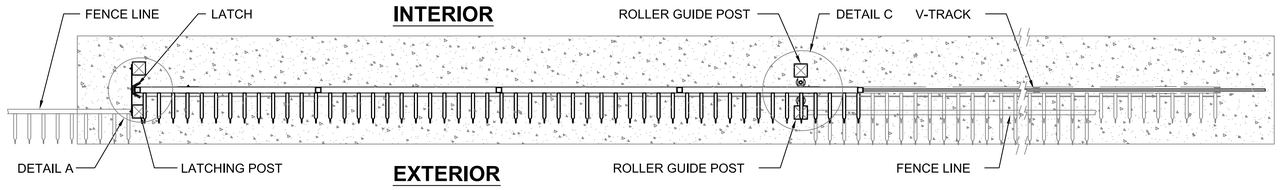
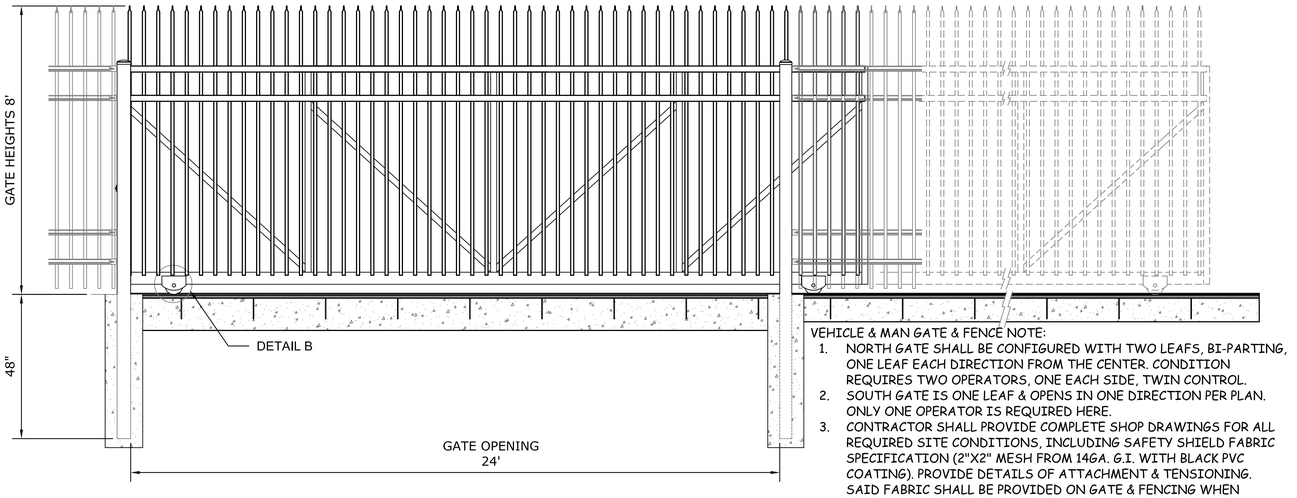


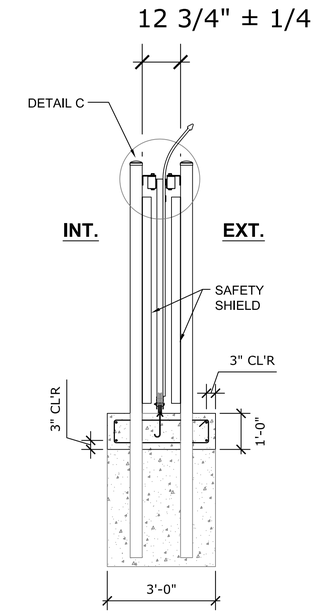
1 PLAN VIEW @ GATE

SCALE: N.T.S.



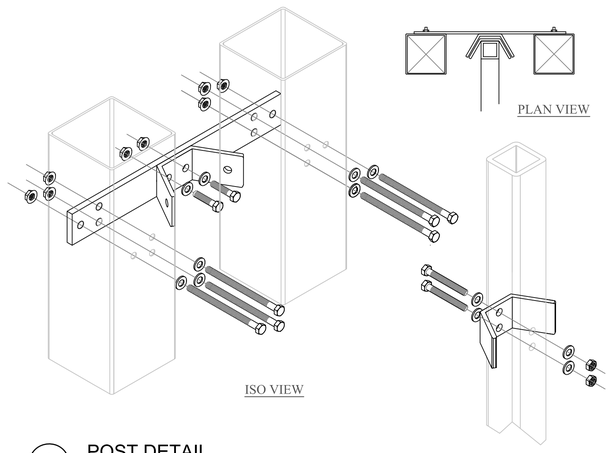
VEHICLE & MAN GATE & FENCE NOTE:

1. NORTH GATE SHALL BE CONFIGURED WITH TWO LEAFS, BI-PARTING, ONE LEAF EACH DIRECTION FROM THE CENTER. CONDITION REQUIRES TWO OPERATORS, ONE EACH SIDE, TWIN CONTROL.
2. SOUTH GATE IS ONE LEAF & OPENS IN ONE DIRECTION PER PLAN. ONLY ONE OPERATOR IS REQUIRED HERE.
3. CONTRACTOR SHALL PROVIDE COMPLETE SHOP DRAWINGS FOR ALL REQUIRED SITE CONDITIONS, INCLUDING SAFETY SHIELD FABRIC SPECIFICATION (2"X2" MESH FROM 14GA. G.I. WITH BLACK PVC COATING). PROVIDE DETAILS OF ATTACHMENT & TENSIONING. SAID FABRIC SHALL BE PROVIDED ON GATE & FENCING WHEN MOVING PARTS ARE ADJACENT FOR THE PURPOSE OF PROVIDING SAFETY WHERE MOVING PARTS COULD CAUSE INJURY.



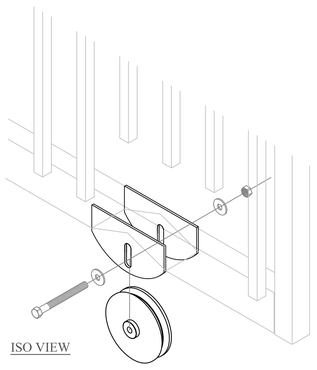
2 ELEVATION - EXTERIOR VIEW

SCALE: N.T.S.



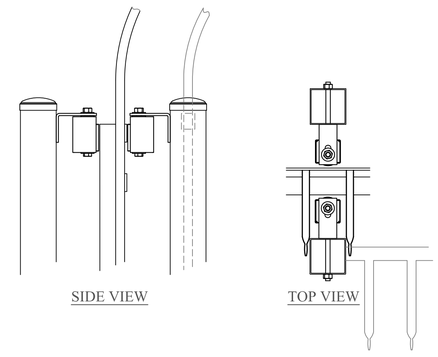
A POST DETAIL

SCALE: N.T.S.



B ROLLER DETAIL

SCALE: N.T.S.



C ROLLER GUIDE POST DETAIL

SCALE: N.T.S.

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REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482

APN: 180-070-19-00 [2.80 AC.]

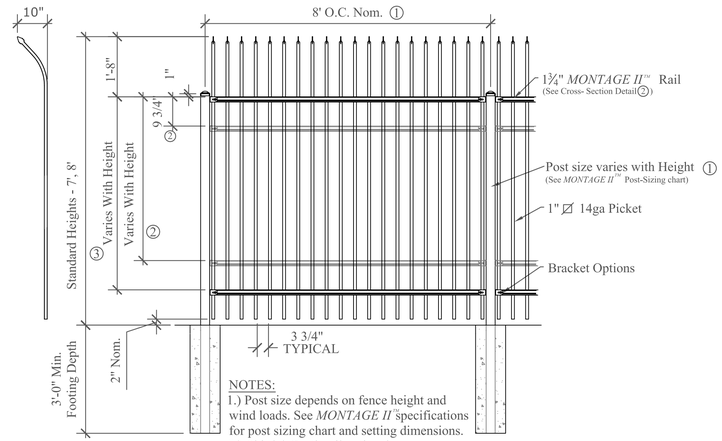
VEHICLE GATE DETAILS

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
411 W. CLAY ST.
UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.21
STATE OF CALIFORNIA

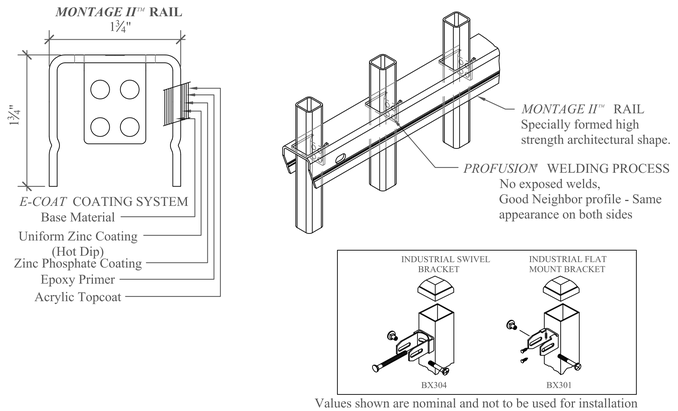
L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 489-3337

DATE	06/14/2019
SCALE	AS NOTED
DRAWN	LSM/BCM
PROJECT	1350 HASTINGS AVE.
SHEET	AS200



1 FENCE PANEL

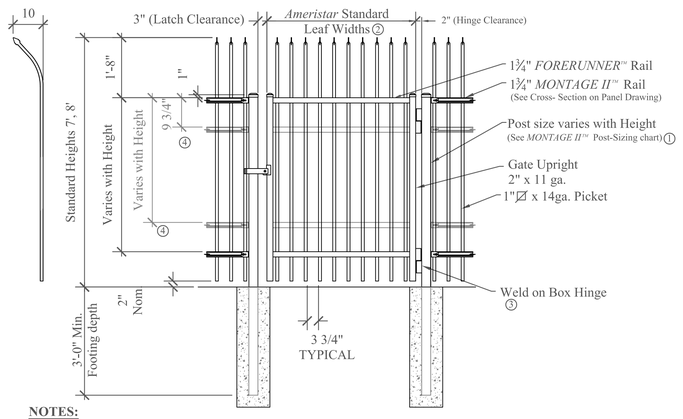
SCALE: N. T. S.



Values shown are nominal and not to be used for installation purposes. See product specification for installation requirements.

2 1" MONTAGE II™ Rail (Cross- Section)

SCALE: N. T. S.



NOTES:
1.) Post size depends on fence height, weight and wind loads. See *MONTAGE II*™ specifications for post sizing chart.
2.) See *Ameristar* gate table for standard out to outs. Custom gate openings available for special out to out/leaf widths.
3.) Additional styles of gate hardware are available on request This could change the Latch & Hinge Clearance.
4.) Third & Forth rail optional.

3 SINGLE GATE ARRANGEMENT

SCALE: N. T. S.

REVISIONS	BY

SITE: 1350 HASTINGS AVE.
UKIAH, CA 95482

APN: 180-070-19-00 - 2.80 AC.
- -

-

FENCE DETAILS

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
400 WEST CLAY STREET, UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.21
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
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UKIAH, CALIFORNIA 95482
(707) 468-5357

DATE 03/09/2020
SCALE AS NOTED
DRAWN LSM/BCM
PROJECT 1350 HASTINGS
SHEET
AS201

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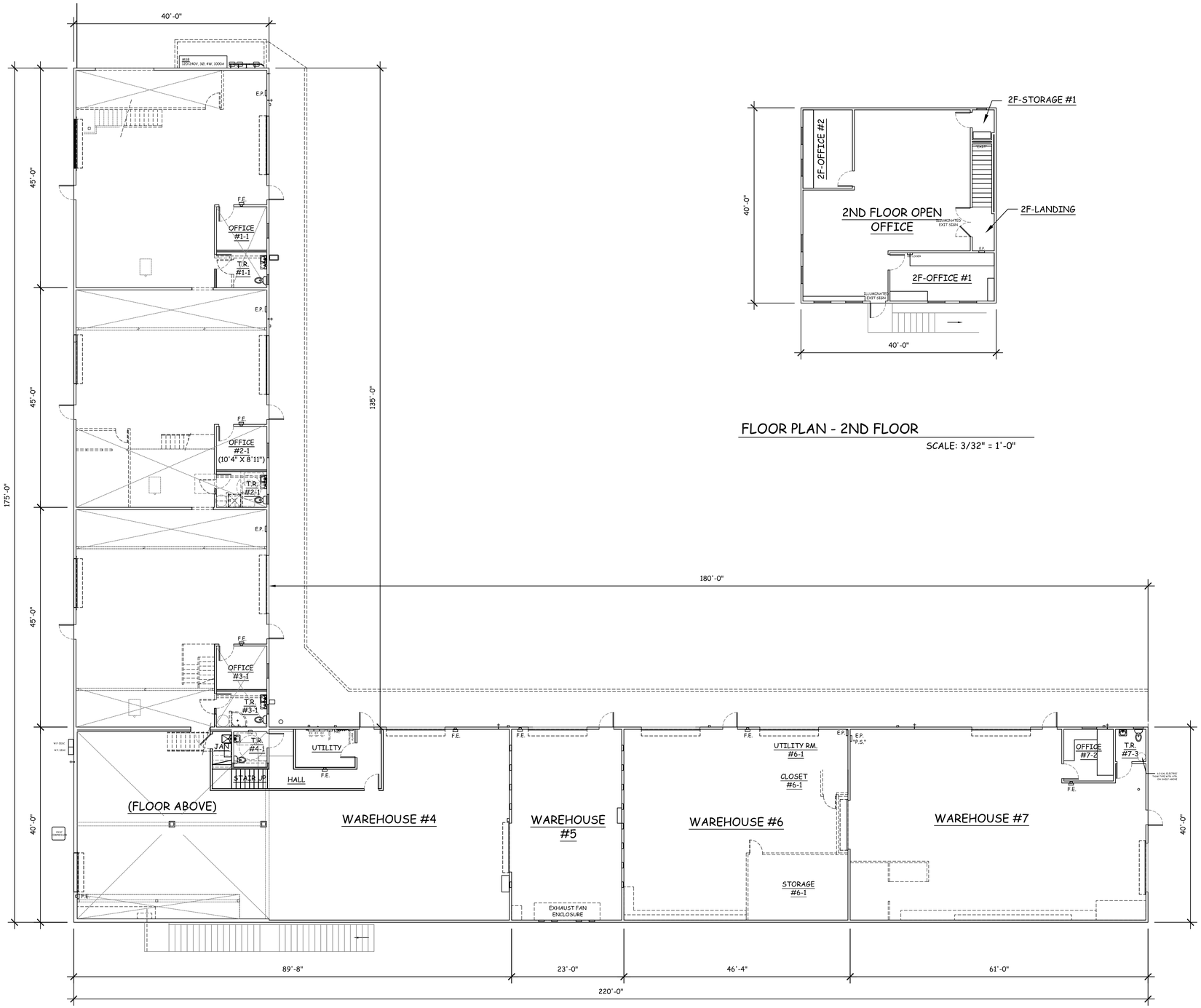

FLOOR PLAN - GROUND FLOOR

SCALE: 3/32" = 1'-0"

FLOOR PLAN - 2ND FLOOR

SCALE: 3/32" = 1'-0"

NORTH

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REVISIONS	BY

SITE: 1350 HASTINGS AVE.
UKIAH, CA 95482

APN: 180-070-19-00 - 2.80 AC.
- -

FLOOR PLANS, NOTES & DETAILS

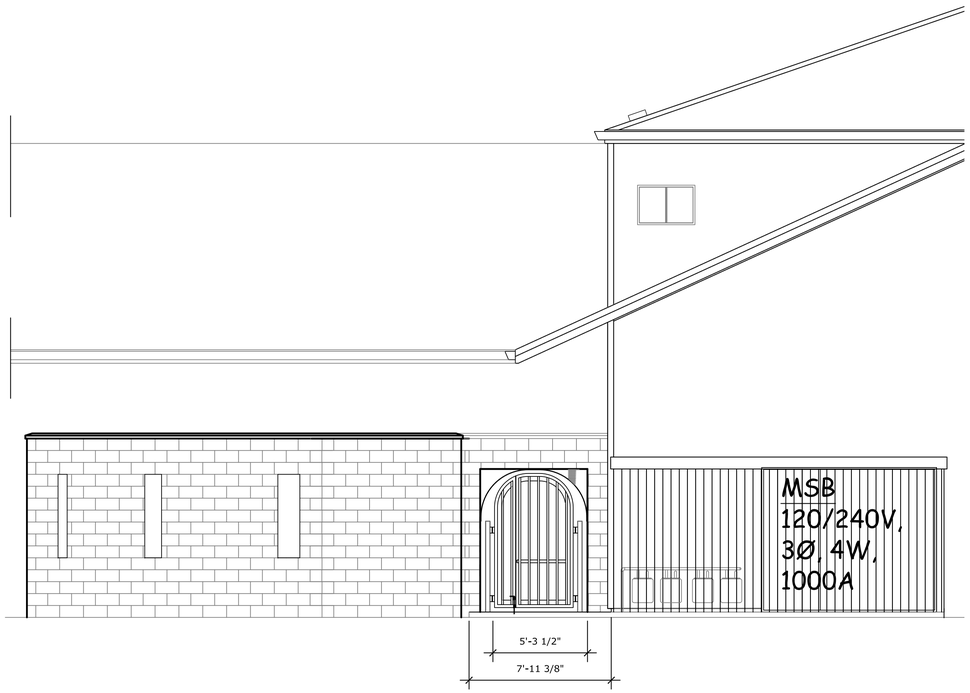
-

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
400 WEST CLAY STREET, UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL AIA
C-13860
11.30.21
STATE OF CALIFORNIA

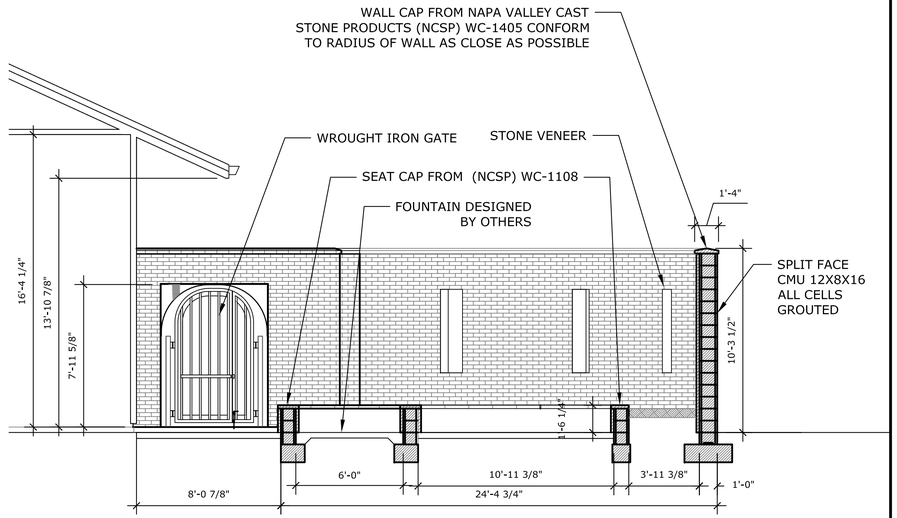
L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-5537

DATE	03/09/2020
SCALE	AS NOTED
DRAWN	LSM/BCM
PROJECT	1350 HASTINGS
SHEET	A100



NORTH ELEVATION

SCALE: 1/4" = 1'-0"



SOUTH ELEVATION

SCALE: 1/4" = 1'-0"

REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482

APN: 180-070-19-00 [2.80 AC.]

COURTYARD SECTIONS, PLAN & NOTES

TENANT IMPROVEMENT for:
ELECTRIC UTILITY DEPT - CITY OF UKIAH
411 W. CLAY ST.
UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.19
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-9533

DATE	06/14/2019
SCALE	AS NOTED
DRAWN	LSM/BCM
PROJECT	1350 HASTINGS AVE.
SHEET	A300

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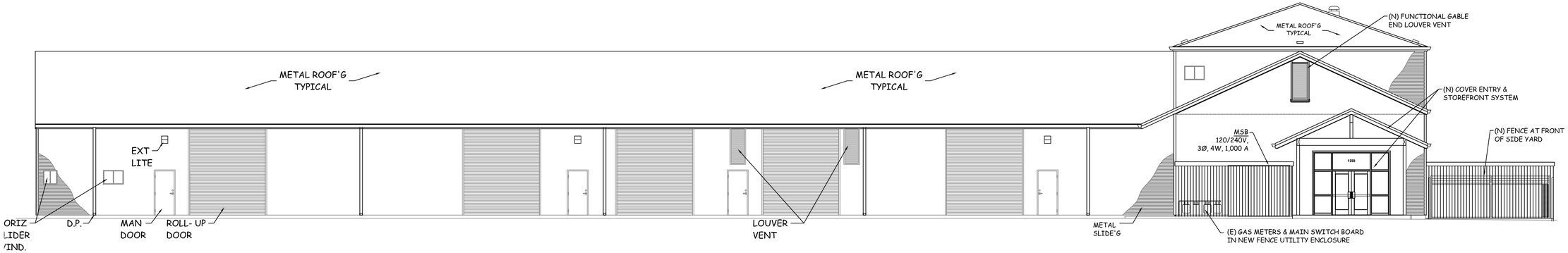
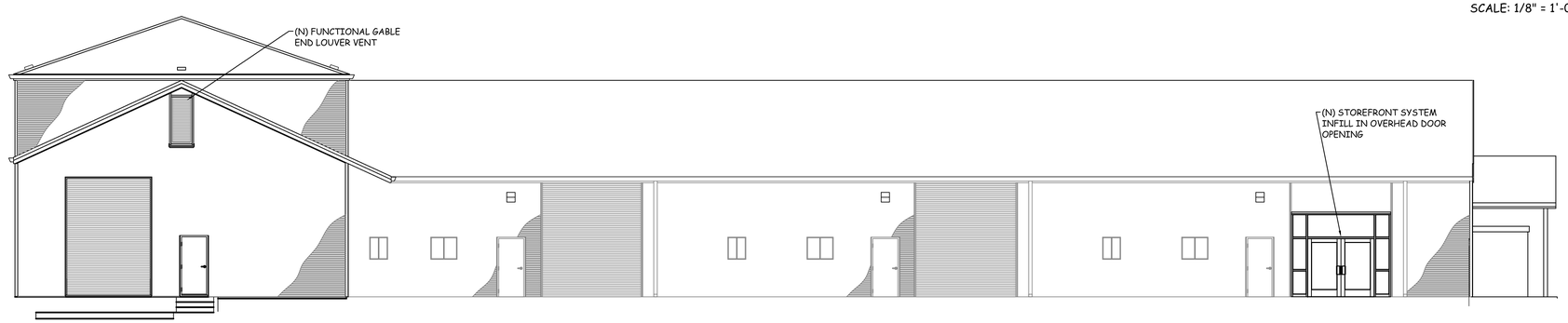


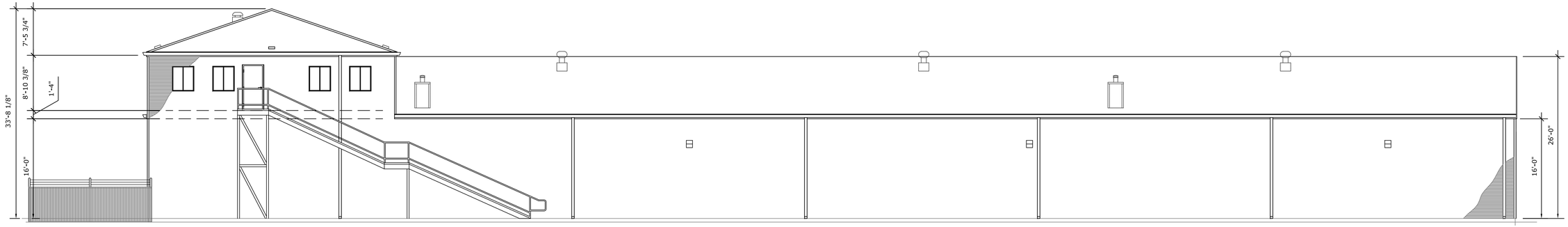
NORTH ELEVATION

SCALE: 1/8" = 1'-0"



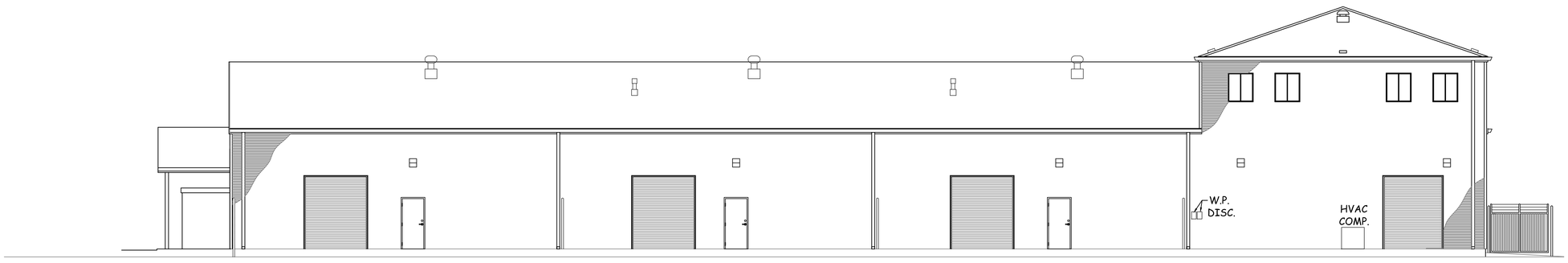
EAST ELEVATION

SCALE: 1/8" = 1'-0"



SOUTH ELEVATION

SCALE: 1/8" = 1'-0"



WEST ELEVATION

SCALE: 1/8" = 1'-0"

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REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482

APN: 180-070-19-00
-

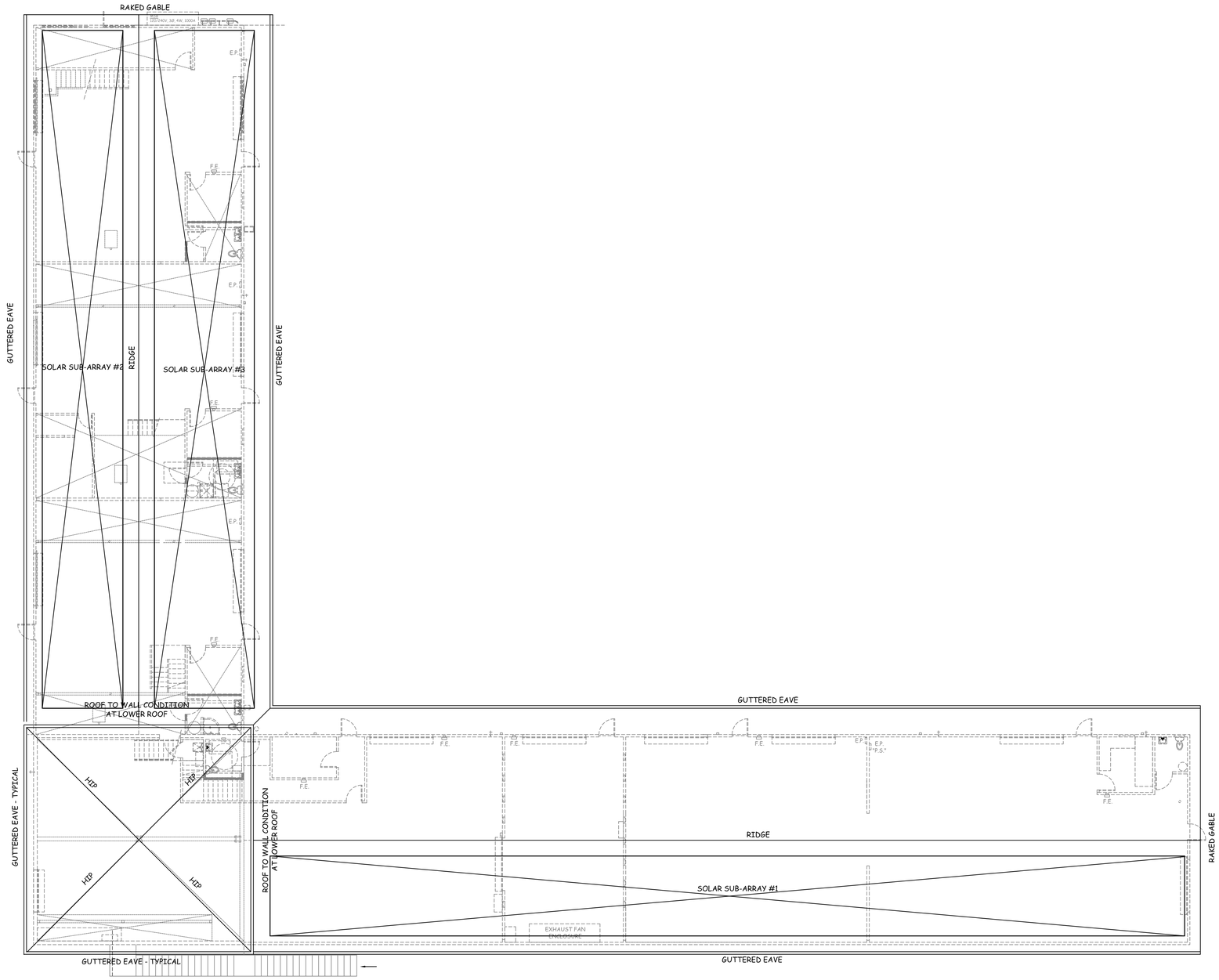
EXTERIOR ELEVATIONS, NOTES AND DETAILS [W/ NORTH ENTRY]

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
411 W. CLAY ST.
UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.21
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
135 WEST GOBBI STREET, SUITE 203
UKIAH, CALIFORNIA 95482
(707) 462-5778

DATE	01/20/2015
SCALE	AS NOTED
DRAWN	LSM/BCM
PROJECT	TENANT IMPROVM'T
SHEET	A400



ROOF PLAN, NOTES & DETAILS

SCALE: 3/32" = 1'-0"

NORTH

REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482

APN: 180-070-19-00
-

ROOF PLAN, NOTES & DETAILS

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
411 WEST CLAY STREET
UKIAH, CA 95482

LICENSED ARCHITECT
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STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-9237

DATE	06/14/2019
SCALE	AS NOTED
DRAWN	LSM
PROJECT	1350 HASTINGS
SHEET	A500

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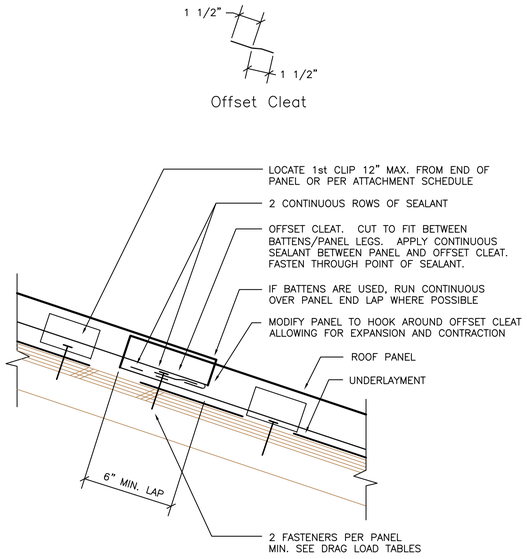
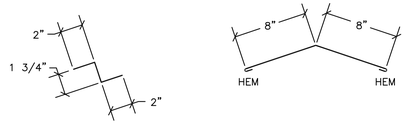
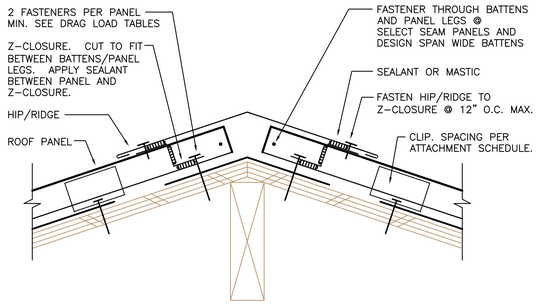


*NOTE: (OPTIONAL) STAGGER PANEL END LAPS OF ADJACENT PANELS.

15 DS_15 PANEL END LAP

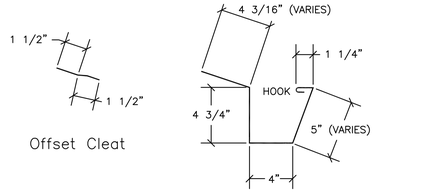
SCALE # = 1'-0"

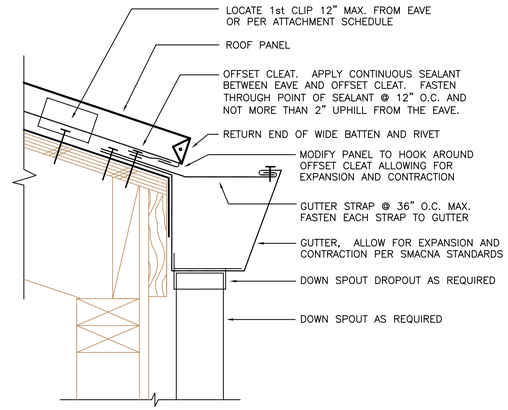




6 DS_6 HIP/RIDGE

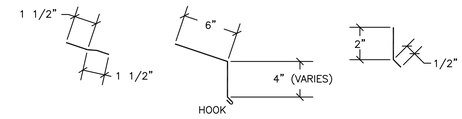
SCALE # = 1'-0"

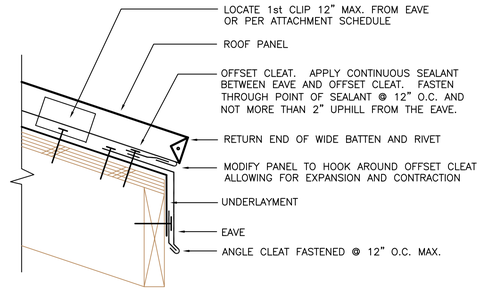




2 DS_2 GUTTER FLASHING

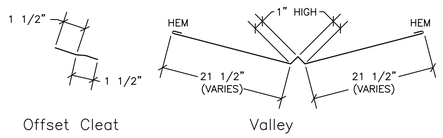
SCALE # = 1'-0"

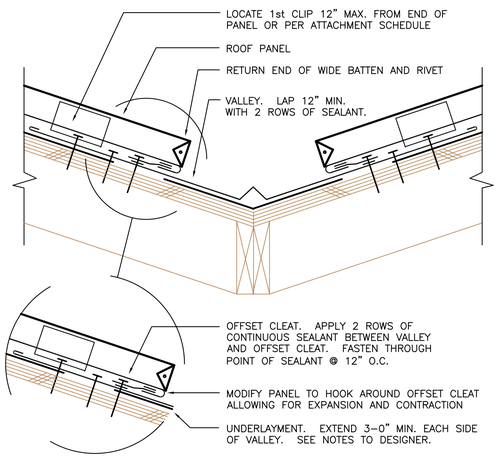




1 DS_1 EAVE FLASHING

SCALE # = 1'-0"

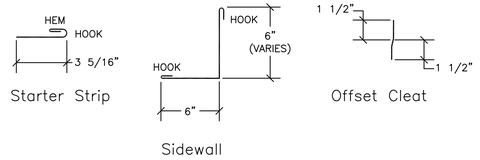


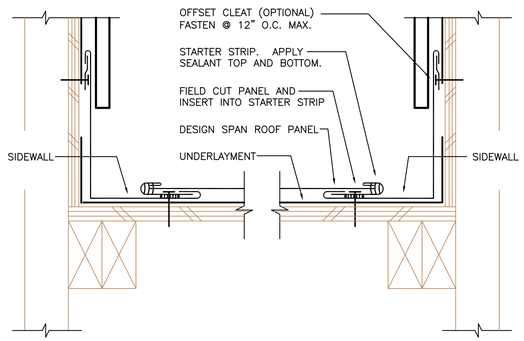


*NOTE: CONSULT WITH BHP IF HEAVY SNOW & ICE CONDITIONS EXIST. MINIMUM SLOPE FOR THIS DETAIL IS 3:12

8 DS_8 VALLEY FLASHING

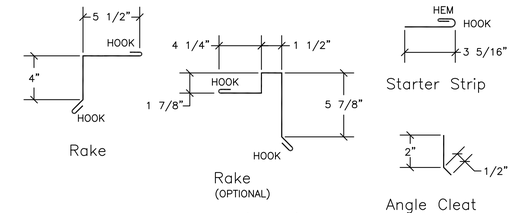
SCALE # = 1'-0"

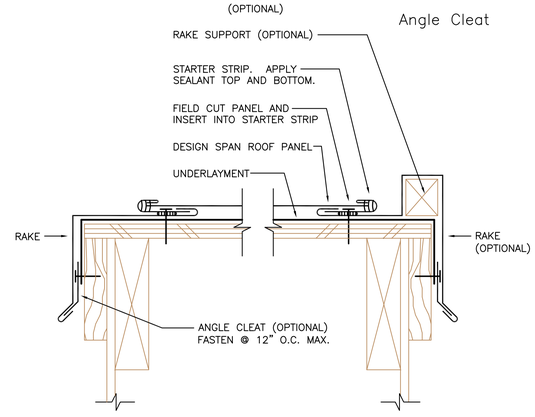




11 DS_11 DESIGN SPAN SIDEWALL

SCALE # = 1'-0"





9 DS_9 DESIGN SPAN RAKE

SCALE # = 1'-0"

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REVISIONS	BY

SITE: 1350 HASTINGS AVE. UKIAH, CA 95482
APN: 180-070-19-00 - 2.80 AC.

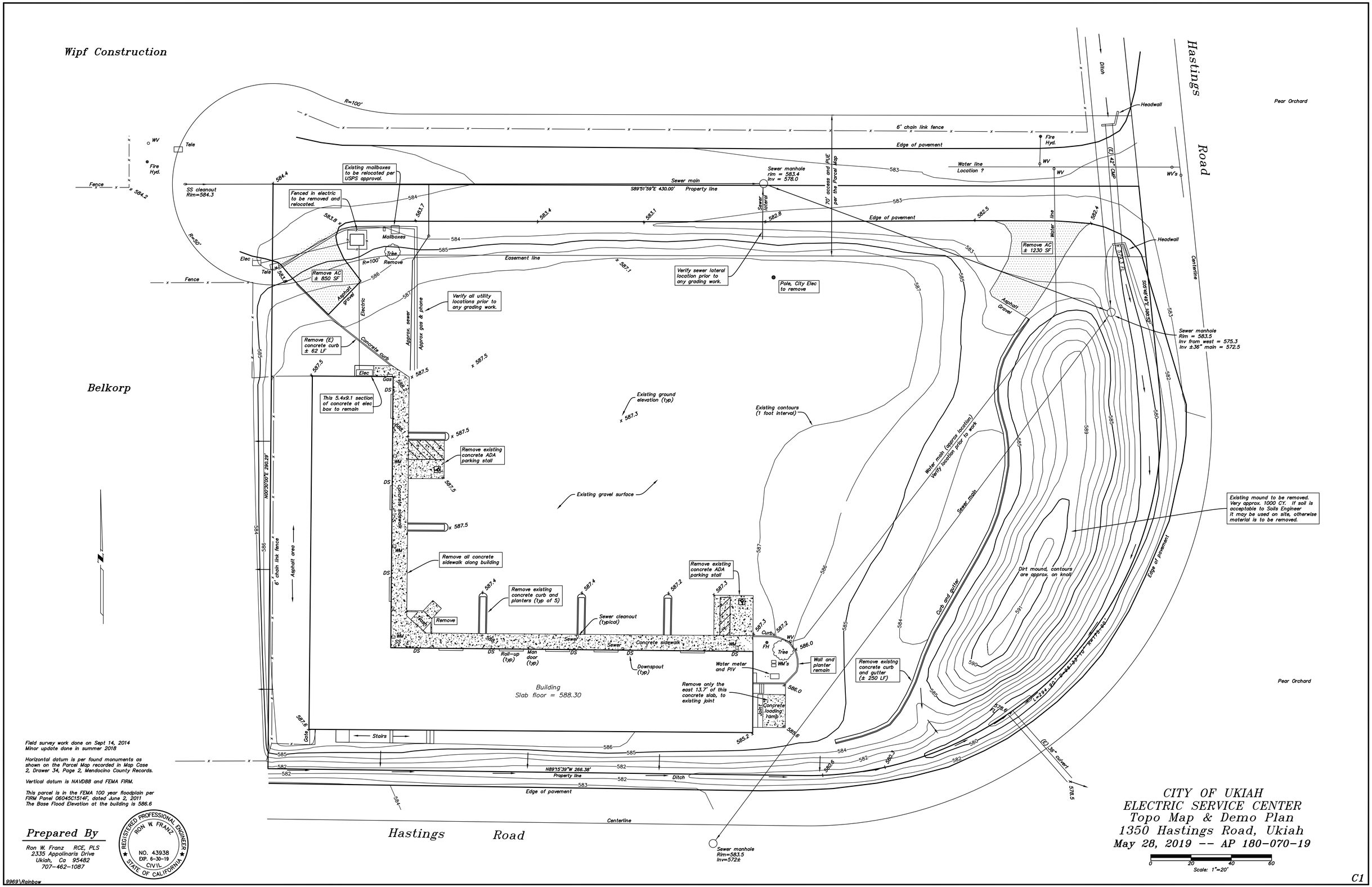
MISCELLANEOUS ROOFING NOTES & DETAILS

SITE WORK for:
CITY OF UKIAH - ELECTRIC SERVICE CENTER
400 WEST CLAY STREET, UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.19
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-8837

DATE 06/14/2019
SCALE AS NOTED
DRAWN LSM/BCM
PROJECT 1350 HASTINGS
SHEET A501



Field survey work done on Sept 14, 2014
Minor update done in summer 2018

Horizontal datum is per found monuments as shown on the Parcel Map recorded in Map Case 2, Drawer 34, Page 2, Mendocino County Records.

Vertical datum is NAVD88 and FEMA FIRM.

This parcel is in the FEMA 100 year floodplain per FIRM Panel 06045C1514F, dated June 2, 2011
The Base Flood Elevation at the building is 586.6

Prepared By

Ron W. Franz RCE, PLS
2335 Appolinaris Drive
Ukiah, Ca 95482
707-462-1087

REGISTERED PROFESSIONAL ENGINEER
RON W. FRANZ
NO. 43938
EXP. 6-30-19
CIVIL
STATE OF CALIFORNIA

CITY OF UKIAH
ELECTRIC SERVICE CENTER
Topo Map & Demo Plan
1350 Hastings Road, Ukiah
May 28, 2019 -- AP 180-070-19

9969\Rainbow

C1

NOTE:
See sheet C3 for details on this new parking area, walkway, block wall and sidewalk ramps to entry.

Belkorp

Hastings Road

Pear Orchard

6' chain link fence

Edge of pavement

Fire Hyd.

Water line

WV

WV's

Ditch

42" CMP

Headwall

Move mailboxes into this new planter area per USPS approval.

Sewer manhole rim = 583.4 Inv = 578.0

New commercial driveway approach per the County DOT requirements.

S89°51'59"E 430.00'

Property line

Fence

WV

Tele

Fire Hyd Top 586.90

SS cleanout Rim=584.3

584.4

Final grades and locations to be staked out by the Engineer prior to construction. Grades may change slightly to best fit the existing road.

4' concrete valley gutter

Sawcut line

2'

Existing EP

Sewer cleanout adjust to new grade

583.7 (E)

583.4 (E)

583.1 (E)

582.8 (E)

582.5 (E)

582.4 (E)

Top berm=583.5 on north side of raingarden

Rock lined spillway from raingarden Invert = 583.0 at berm

Edge of AC

New earth swale ±0.5%

Water line

Sewer main

Curb tapers from 6" to 0"

New asphalt parking

6" curb face

New 5' sidewalk

-0.26%

583.08 FL

584.08

584.63

583.59

584.16 BOW

582.72

582.70

582.40

S=0.4%

4.5%

2.7%

3.3%

10%

Bollard

Elec

Tele

Fence

Approximate new transformer location, by others

Tran

Sign

585

Finish contours (1 foot interval)

New fence

588.5

588.0

Landscape block wall along back of sidewalk (3.5' tall) (± 212 LF) (See detail)

Grade this area so gate track is level. (each side)

Gate track

New gate

25'

586.0

586.52

587.7 TW

588.2 TW

Slope

Existing gas line and phone lines are too shallow in this area and need to be lowered prior to any work in this area.

Parking area: 12" AB between fence and new pavement, all per the Soils Report

Finish contours (1 foot interval)

Stormwater retention and infiltration raingarden area Floor = 582.5±

583

584

585

586

587

588

Yard work area: 12" AB between swale and new pavement, all per the Soils Report

See raingarden and bio-swale plans and details by Kelder Engineering for details.

Headwall

Centerline

Sewer manhole Rim = 583.5 Inv from west = 575.3 Inv ±36" main = 572.5

584.0

583

582

Existing Building Slab floor = 588.30

Patio area by others

0.66%

Edge asphalt

587.47

2.0%

2.2%

1.0%

586.42

12" SD S=0.5%

Paved area: 3" AC on 12" AB all per the Soils Report

Finish contours (1 foot interval)

587.85

587.90

588.19

588.18

588.12

588.30

588.20

588.10

588.00

587.91

20.3'

Hose bibb

Elec

Gas

DS

Inv 586.30

WM

WV

586.30

1.5%

1.4%

1.0%

1.2%

2.0%

20'x26' concrete pad for ADA stalls. All striping, signage, detectable warnings, per current ADA requirements.

Approx waterline Confirm location and grade

Vegetated bio-swale along fence line to direct runoff into the new rain garden

Existing contours (1 foot interval)

Bio-Swale

S=0.5%

Property line

Edge of pavement

Note:
All grading, base and pavement, and concrete work shall be done in accordance with the Soils Report prepared by LACO.

N00°30'00"W 290.29'

6' chain link fence

Asphalt area

See building plans for new door locations and other bldg changes

AC 1.4%

8" SD S=1.2%

18"x18" drop inlet with traffic grate Grade = 587.29 Invert = 584.98

AC 1.0%

586.21

586.69

24"x24" drop inlet with traffic grate Grade = 585.69 Invert = 583.10

6" and 8" storm drains to be PVC, 12" to be ADS N-12 or equal

Sewer mainline

Finish contours (1 foot interval)

Build berm along east side of the bio-swale for fence. Min grade to be 0.5 feet above bio-swale slowline

Edge of concrete sidewalk and new asphalt to be flush

Invert of new storm drain

6" SD S=1.3%

8" SD S=1.3%

588.18

588.22

586.30

Set all existing and new utility boxes flush with the new sidewalk.

Roll-up (typ)

Man door (typ)

Sewer

PH

Tree

WM's

WV

2.2%

587.00

30'

New 8' wide concrete sidewalk along building. Slope out at 1.5% Per City Standards.

Grades on new sidewalk at man doors shall not exceed 2% in any direction for entire 6'x6' landing at each door per the current ADA code requirements. Slopes on sidewalk are 2% max cross slope and 5% in travel direction. (confirm which doors stay with the new building plans).

6'x6' landing at each man door, see note to left

Connect existing downspout to new 6" diameter drain pipe (typical of 8)

Existing Building Slab floor = 588.30

New trash structure, see Architects plans for details. Final grades to conform to site.

Gate track (by others)

585.4 FL Begin

New fence

New gate

Existing 36" culvert

R=50'

578.6

578.5

Stairs

587.6

Gate

586.0

585.0

582.7

582.8

582.9

R=10'

New commercial driveway approach per the County DOT requirements. Grades to conform to existing. Contractor to obtain encroachment permit from the County DOT

New 70 LF 30" ADS N-12 storm drain with concrete headwalls all per Mendocino County DOT requirements. Pipe to conform to ditch grades.

Sewer manhole Rim = 583.5 Inv = 572 ±

N89°15'39"W 266.38'

Property line

Ditch

Centerline

Prepared By

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707-462-1087

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NO. 43938
EXP. 6-30-19
CIVIL
STATE OF CALIFORNIA

9969\Rainbow

CITY OF UKIAH
ELECTRIC SERVICE CENTER
Grading and Drainage Plan
1350 Hastings Road, Ukiah
Sept 21, 2019 -- AP 180-070-19

Scale: 1"=20'

C2

This concrete pad area for ADA stall and others. All striping, signage, detectable warnings, etc. per current ADA requirements. (6" concrete on 12" base per ths Soils Report)

Move mailboxes into this new planter area per USPS approval.

Sewer cleanout adjust to new grade

Sewer manhole
Rim = 583.4
Inv = 578.0

Sewer main

Property line

Sewer lateral. Locate prior to any grading

New asphalt between valley gutter and sawcut line to conform to existing grades.

Final grades and locations to be staked out by the Engineer prior to construction. Grades may change slightly to best fit the existing road

4' concrete valley gutter

Sawcut line

Existing edge of asphalt

2"

4' concrete valley gutter

Mail

LS area

Curb tapers from 6" to 0"

New parking area
0.25' AC on 1.3' AB
all per Soils Report

6" curb face

New 5' concrete sidewalk

9' typ

20' (typ)

New paved driveway

Bol's

Elec

Tele

Concrete parking stalls

3' concrete parking bumpers

Flush (no curb)

5' concrete sidewalk

ADA sign

Landscape area

Transf

Fence

Property line

Small mound (see section)

Fence not shown

Landscape block wall along back of sidewalk (3.5' tall) (± 212 LF) (See detail)

Gate

Slope

Existing gas line and phone lines are too shallow in this area and need to be lowered prior to any work in this area.

Concrete steps, equal height on all

Handrails along each side of steps per code requirements

Note:
All grading, base and pavement, and concrete work shall be done in accordance with the Soils Report prepared by LACO.

Parking area:
12" AB between fence and new pavement, all per the Soils Report

Finish grade contours (1 foot interval)

Paved area

Landscape area

New concrete entry

Elec

Gas

New door

Conform to existing concrete around elec.

Box out concrete sidewalk at the gas risers as necessary.

Patio area by others

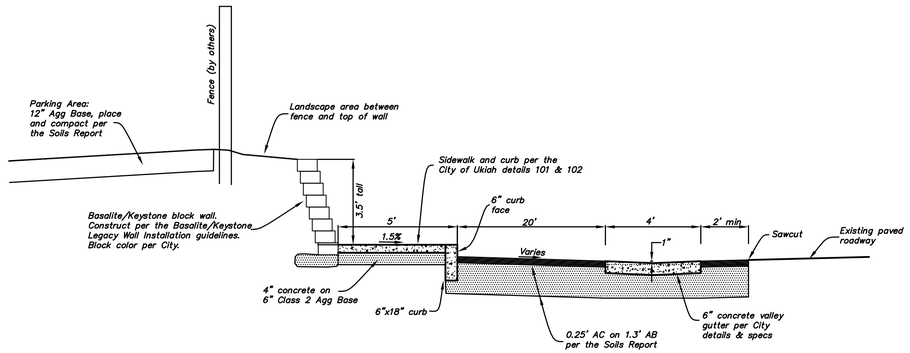
Base rock

Asphalt

Yard area

Existing building

Paved area



Parking/Wall Section

No Scale

Prepared By

Ron W. Franz RCE, PLS
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Ukiah, Ca 95482
707-462-1087

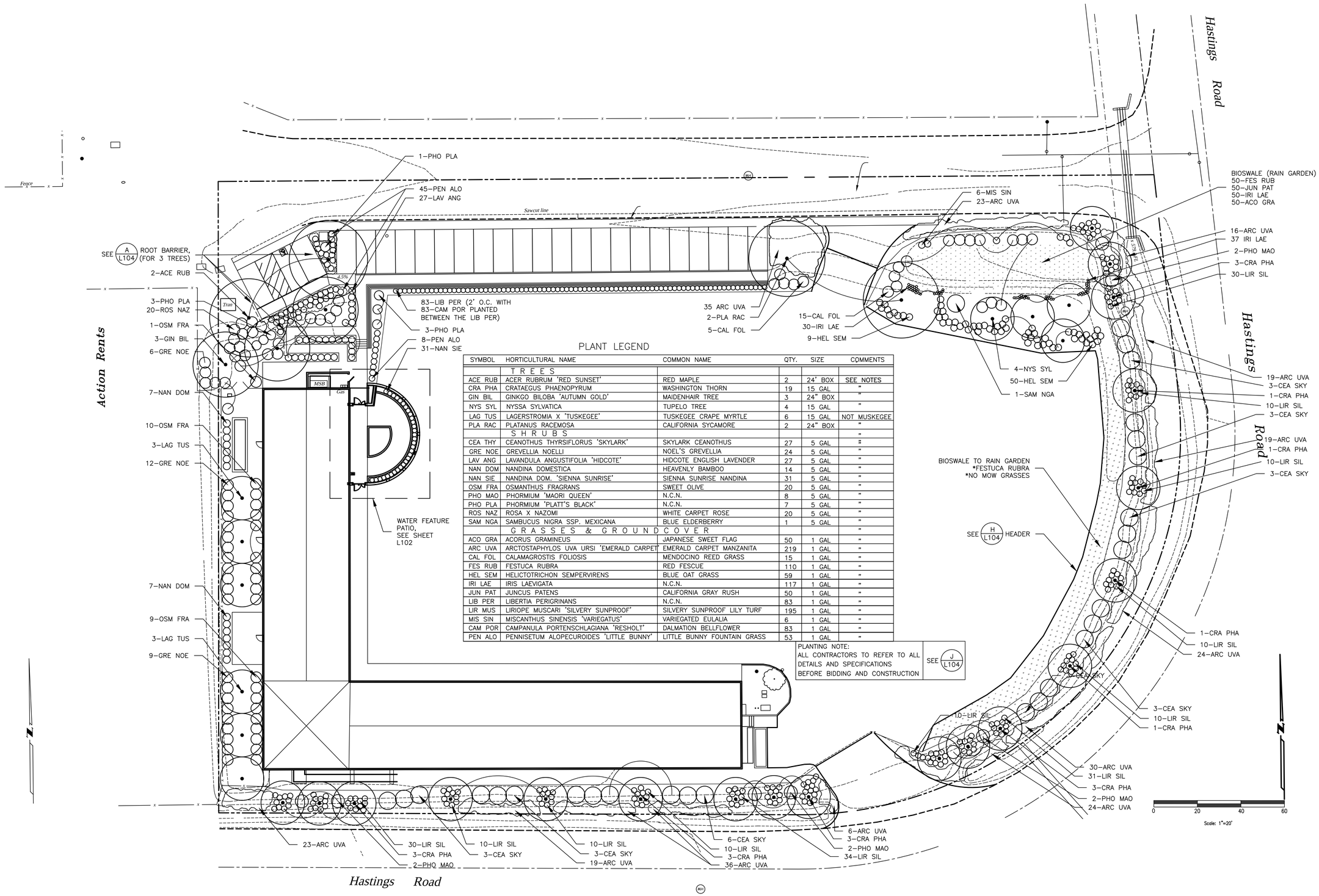
REGISTERED PROFESSIONAL ENGINEER
RON W. FRANZ
NO. 43938
EXP. 6-30-19
CIVIL
STATE OF CALIFORNIA

9969\rainbow

CITY OF UKIAH
ELECTRIC SERVICE CENTER
Parking/Ramp Plan and Details
1350 Hastings Road, Ukiah
May 28, 2019 -- AP 180-070-19

0 10 20 30
Scale: 1"=10'

C3



PLANT LEGEND

SYMBOL	HORTICULTURAL NAME	COMMON NAME	QTY.	SIZE	COMMENTS
	TREES				
ACE RUB	ACER RUBRUM 'RED SUNSET'	RED MAPLE	2	24' BOX	SEE NOTES
CRA PHA	CRATAEGUS PHAENOPYRUM	WASHINGTON THORN	19	15 GAL	"
GIN BIL	GINKGO BILOBA 'AUTUMN GOLD'	MAIDENHAIR TREE	3	24" BOX	"
NYS SYL	NYSSA SYLVATICA	TUPELO TREE	4	15 GAL	"
LAG TUS	LAGERSTROMIA X 'TUSKEGEE'	TUSKEGEE CRAPE MYRTLE	6	15 GAL	NOT MUSKEGEE
PLA RAC	PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	2	24" BOX	"
	SHRUBS				"
CEA THY	CEANOTHUS THYRSIFLORUS 'SKYLARK'	SKYLARK CEANOTHUS	27	5 GAL	"
GRE NOE	GREVELLIA NOELLI	NOEL'S GREVELLIA	24	5 GAL	"
LAV ANG	LAVANDULA ANGUSTIFOLIA 'HIDCOTE'	HIDCOTE ENGLISH LAVENDER	27	5 GAL	"
NAN DOM	NANDINA DOMESTICA	HEAVENLY BAMBOO	14	5 GAL	"
NAN SIE	NANDINA DOM. 'SIENNA SUNRISE'	SIENNA SUNRISE NANDINA	31	5 GAL	"
OSM FRA	OSMANTHUS FRAGRANS	SWEET OLIVE	20	5 GAL	"
PHO MAO	PHORMIUM 'MAORI QUEEN'	N.C.N.	8	5 GAL	"
PHO PLA	PHORMIUM 'PLATT'S BLACK'	N.C.N.	7	5 GAL	"
ROS NAZ	ROSA X NAZOMI	WHITE CARPET ROSE	20	5 GAL	"
SAM NGA	SAMBUCUS NIGRA SSP. MEXICANA	BLUE ELDERBERRY	1	5 GAL	"
	GRASSES & GROUNDCOVER				"
ACO GRA	ACORUS GRAMINEUS	JAPANESE SWEET FLAG	50	1 GAL	"
ARC UVA	ARCTOSTAPHYLOS UVA URSI 'EMERALD CARPET'	EMERALD CARPET MANZANITA	219	1 GAL	"
CAL FOL	CALAMAGROSTIS FOLIOSIS	MENDOCINO REED GRASS	15	1 GAL	"
FES RUB	FESTUCA RUBRA	RED FESCUE	110	1 GAL	"
HEL SEM	HELICTOTRICHON SEMPERVIRENS	BLUE OAT GRASS	59	1 GAL	"
IRI LAE	IRIS LAEVIGATA	N.C.N.	117	1 GAL	"
JUN PAT	JUNCUS PATENS	CALIFORNIA GRAY RUSH	50	1 GAL	"
LIB PER	LIBERTIA PERIGRINANS	N.C.N.	83	1 GAL	"
LIR MUS	LIRIOPE MUSCARI "SILVERY SUNPROOF"	SILVERY SUNPROOF LILY TURF	195	1 GAL	"
MIS SIN	MISCANTHUS SINENSIS 'VARIEGATUS'	VARIEGATED EULALIA	6	1 GAL	"
CAM POR	CAMPANULA PORTENSCHLAGIANA 'RESHOLT'	DALMATION BELLFLOWER	83	1 GAL	"
PEN ALO	PENNISETUM ALOPECUROIDES 'LITTLE BUNNY'	LITTLE BUNNY FOUNTAIN GRASS	53	1 GAL	"

PLANTING NOTE:
ALL CONTRACTORS TO REFER TO ALL DETAILS AND SPECIFICATIONS BEFORE BIDDING AND CONSTRUCTION — SEE J L104

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REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482

APN: 180-070-19-00
-

LICENSED LANDSCAPE ARCHITECT
MICHAEL P. DALY
Signature
APPR. 30, 2022
Renewal Date
Date
STATE OF CALIFORNIA

Daly
LANDSCAPE ARCHITECTURE
MICHAEL DALY, ASLA — R.L.A. NO. 4034
351 EASTGATE AVENUE #291H
SEBASTOPOL, CALIFORNIA 95472
(707) 824-8558

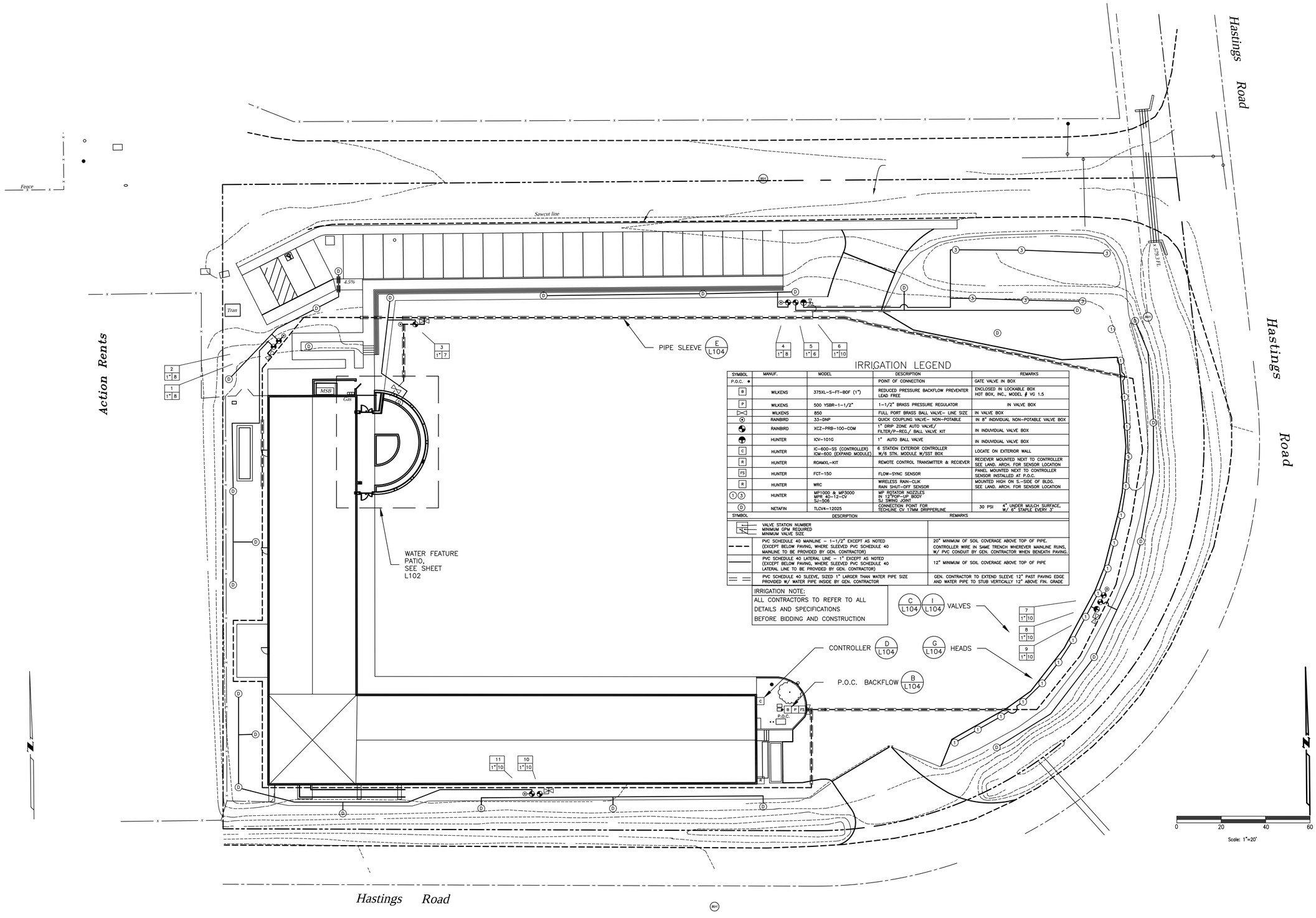
PLANTING PLAN

TENANT IMPROVEMENT for:
ELECTRIC SERVICE CENTER - CITY OF UKIAH
411 W. CLAY ST.
UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.21
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
1400 MADRONE DRIVE
UKIAH, CALIFORNIA 95482
(707) 468-1537

DATE	3/12/2020
SCALE	AS NOTED
DRAWN	MPD/LSM
PROJECT	TENANT IMPROVM'T
SHEET	L100



IRRIGATION LEGEND

SYMBOL	MANUF.	MODEL	DESCRIPTION	REMARKS
P.O.C. ●			POINT OF CONNECTION	GATE VALVE IN BOX
B	WILKENS	375XL-S-FT-BOF (1")	REDUCED PRESSURE BACKFLOW PREVENTER LEAD FREE	ENCLOSED IN LOCKABLE BOX HOT BOX, INC., MODEL # VG 1.5
P	WILKENS	500 YSBR-1-1/2"	1-1/2" BRASS PRESSURE REGULATOR	IN VALVE BOX
	WILKENS	850	FULL PORT BRASS BALL VALVE- LINE SIZE	IN VALVE BOX
	RAINBIRD	33-DNP	QUICK COUPLING VALVE- NON-POTABLE	IN 8" INDIVIDUAL NON-POTABLE VALVE BOX
	RAINBIRD	XCZ-PRB-100-COM	1" DRIP ZONE AUTO VALVE/ FILTER/P-REG./ BALL VALVE KIT	IN INDUVIDUAL VALVE BOX
	HUNTER	ICV-101G	1" AUTO BALL VALVE	IN INDUVIDUAL VALVE BOX
C	HUNTER	IC-600-SS (CONTROLLER) ICM-600 (EXPAND MODULE)	6 STATION EXTERIOR CONTROLLER W/6 STN. MODULE W/SST BOX	LOCATE ON EXTERIOR WALL
R	HUNTER	ROAMXL-KIT	REMOTE CONTROL TRANSMITTER & RECIEVER	RECIEVER MOUNTED NEXT TO CONTROLLER SEE LAND. ARCH. FOR SENSOR LOCATION
FS	HUNTER	FCT-150	FLOW-SYNC SENSOR	PANEL MOUNTED NEXT TO CONTROLLER SENSOR INSTALLED AT P.O.C.
R	HUNTER	WRC	WIRELESS RAIN-CLIK RAIN SHUT-OFF SENSOR	MOUNTED HIGH ON S.-SIDE OF BLDG. SEE LAND. ARCH. FOR SENSOR LOCATION
1 3	HUNTER	MP1000 & MP3000 MPR 40-12-CV SJ-506	MP ROTATOR NOZZLES IN 12"POP-UP BODY SJ SWING JOINT	
D	NETAFIN	TLCV4-12025	CONNECTION POINT FOR TECHLINE CV 17MM DRIPPERLINE	30 PSI 4" UNDER MULCH SURFACE, W/ 6" STAPLE EVERY 3'

SYMBOL	DESCRIPTION	REMARKS
4 1" 8	VALVE STATION NUMBER MINIMUM GPM REQUIRED MINIMUM VALVE SIZE	
	PVC SCHEDULE 40 MAINLINE – 1-1/2" EXCEPT AS NOTED (EXCEPT BELOW PAVING, WHERE SLEEVED PVC SCHEDULE 40 MAINLINE TO BE PROVIDED BY GEN. CONTRACTOR)	20" MINIMUM OF SOIL COVERAGE ABOVE TOP OF PIPE. CONTROLLER WIRE IN SAME TRENCH WHEREVER MAINLINE RUNS, W/ PVC CONDUIT BY GEN. CONTRACTOR WHEN BENEATH PAVING.
	PVC SCHEDULE 40 LATERAL LINE – 1" EXCEPT AS NOTED (EXCEPT BELOW PAVING, WHERE SLEEVED PVC SCHEDULE 40 LATERAL LINE TO BE PROVIDED BY GEN. CONTRACTOR)	12" MINIMUM OF SOIL COVERAGE ABOVE TOP OF PIPE
	PVC SCHEDULE 40 SLEEVE, SIZED 1" LARGER THAN WATER PIPE SIZE PROVIDED W/ WATER PIPE INSIDE BY GEN. CONTRACTOR	GEN. CONTRACTOR TO EXTEND SLEEVE 12" PAST PAVING EDGE AND WATER PIPE TO STUB VERTICALLY 12" ABOVE FIN. GRADE

IRRIGATION NOTE:
ALL CONTRACTORS TO REFER TO ALL DETAILS AND SPECIFICATIONS BEFORE BIDDING AND CONSTRUCTION

C L104 I L104 VALVES
CONTROLLER D L104
G L104 HEADS
P.O.C. BACKFLOW B L104

REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482
APN: 180-070-19-00
-

LICENSED LANDSCAPE ARCHITECT
MICHAEL P. DALY • LICENSE NO. 4034
Signature
APPR. 30, 2022
Renewal Date
Date
STATE OF CALIFORNIA

Daly
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IRRIGATION PLAN
TENANT IMPROVEMENT for:
ELECTRIC SERVICE CENTER - CITY OF UKIAH
411 W. CLAY ST.
UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
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STATE OF CALIFORNIA

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DATE 3/12/2020
SCALE AS NOTED
DRAWN MPD/LSM
PROJECT TENANT IMPROVM'T
SHEET L101

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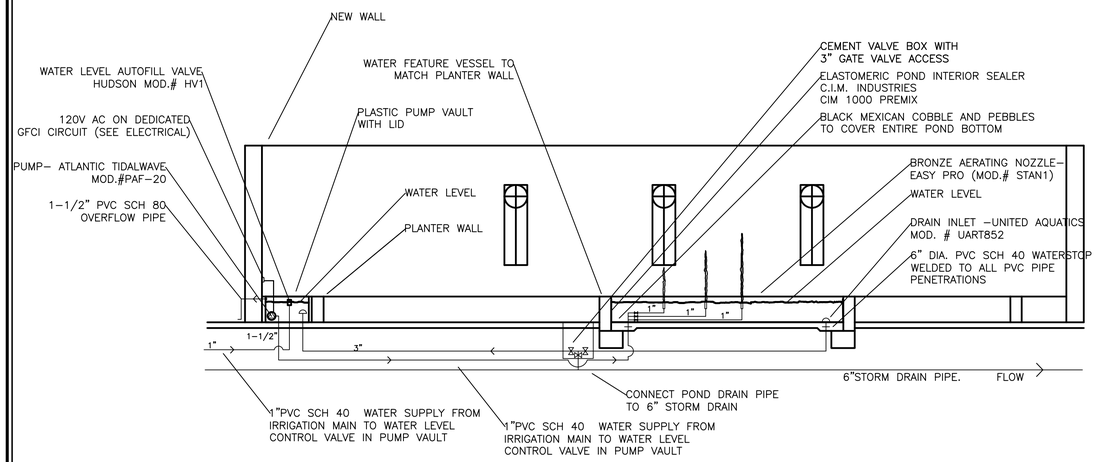
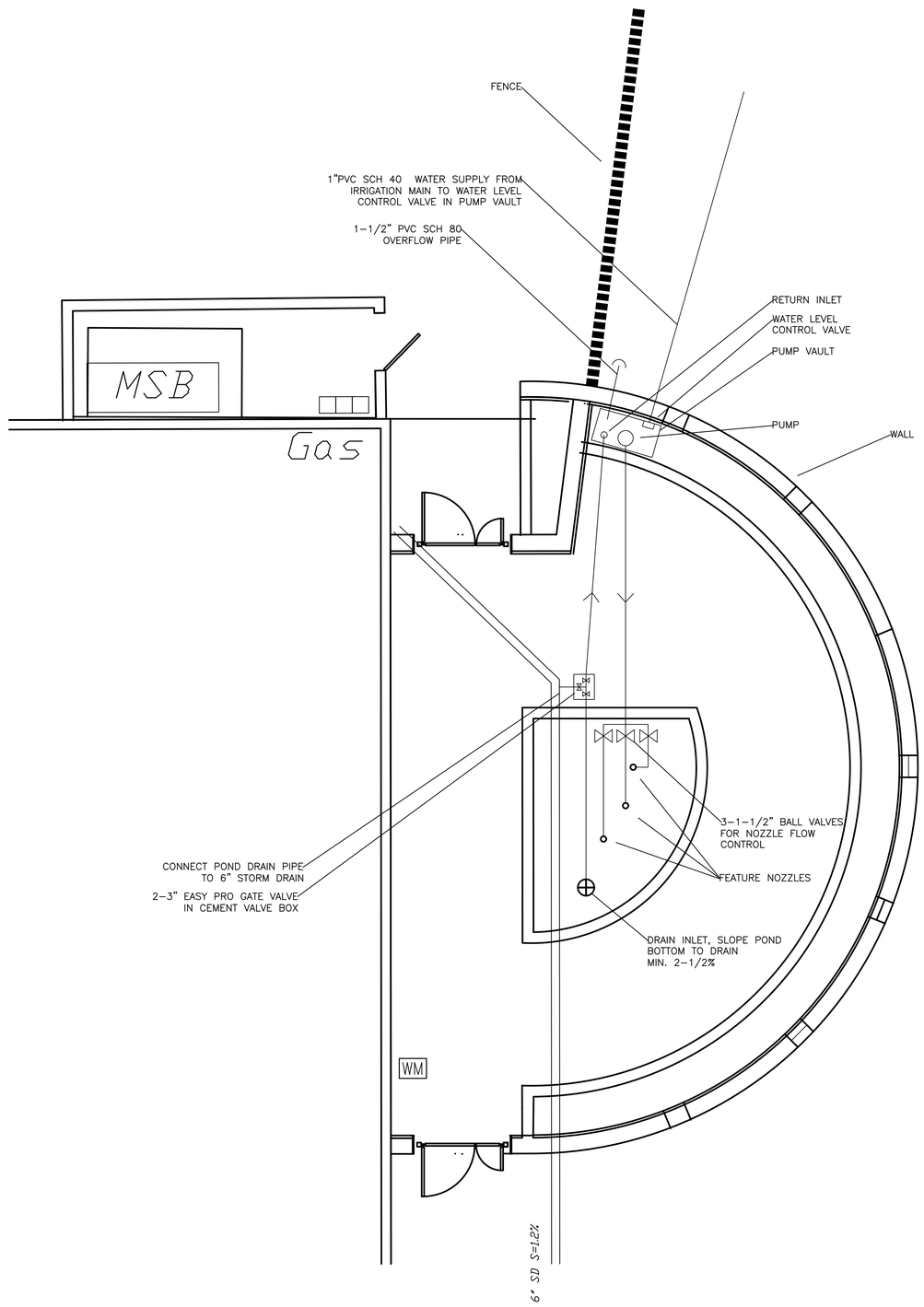


B WATER FEATURE SECTION

SCALE: 1/4"=1'–0"



A WATER FEATURE PLAN

SCALE: 1/4"=1'–0"

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REVISIONS/DATE	BY
1	

SITE: 1350 HASTINGS ROAD
SANTA ROSA, CA 94928
APN: 180-070-19-00 - 2.8Ac.

LICENSED LANDSCAPE ARCHITECT
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WATER FEATURE PLAN AND DETAILS

TENANT IMPROVEMENT
ELECTRIC SERVICE CENTER - CITY OF UKIAH
400 WEST CLAY STEET
UKIAH, CA 95482

LICENSED ARCHITECT
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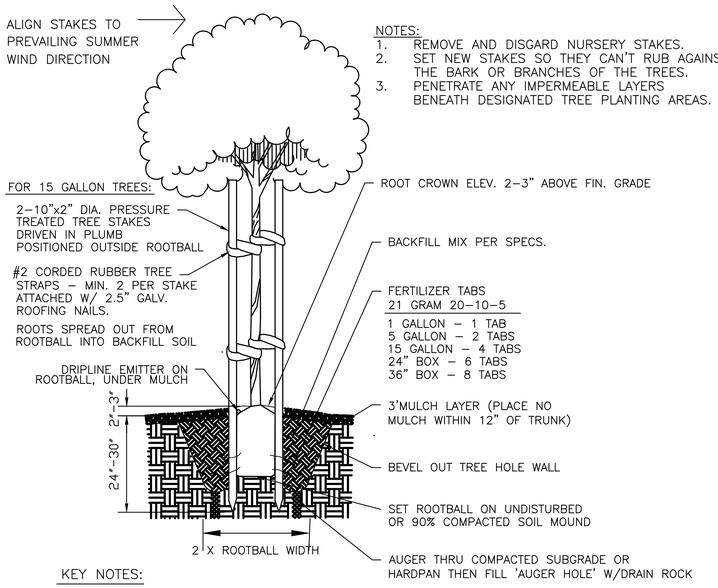
DATE	3.12.2020
SCALE	AS NOTED
DRAWN	MPD/LSM
PROJECT	1350 HASTINGS
SHEET	L102

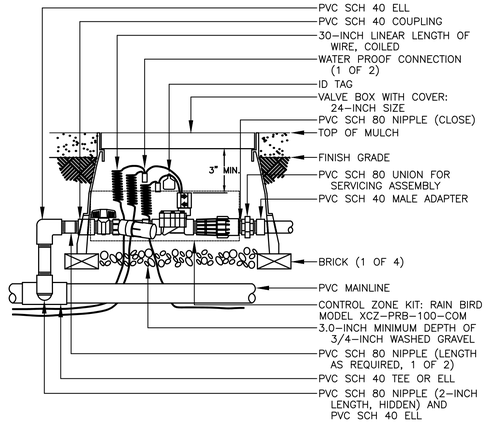
PLOTTED: 03.15.11



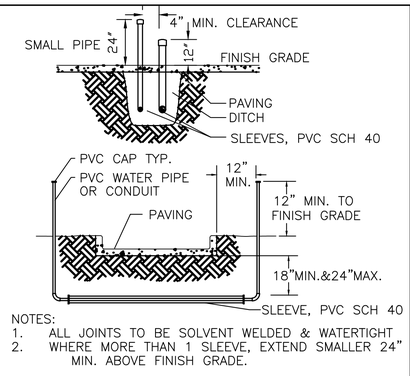
KEY NOTES:

1. SCARIFY SIDES OF PIT WITH A SPADEFORK, AND SQUARE SIDES OF AUGER–DRILLED PLANTING PIT.
2. INSTALL A 10 FOOT LONG BY 18" DEEP ROOT BARRIER SHEET AT EDGE OF HARDSCAPE (CONCRETE WALKS, PATIOS, MOW STRIPS ETC.) WHEN A TREE IS PLANTED WITHIN 5 FEET OF THE EDGE. SEE DETAIL 'A' THIS SHEET.
3. SUPPORT 24" BOX SIZE AND UP WITH THREE GUY WIRE SYSTEM, PER SPECIFICATIONS.

J PLANTING – TREE & SHRUB
NOT TO SCALE

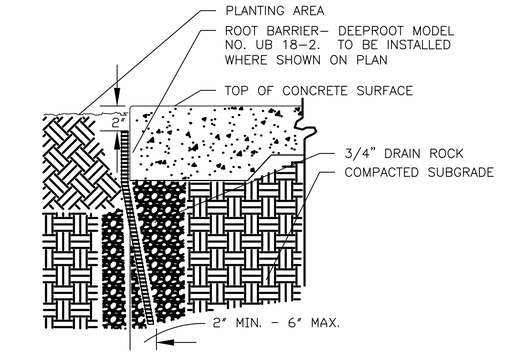


I DRIP VALVE, FILTER ASSEMBLY
NOT TO SCALE

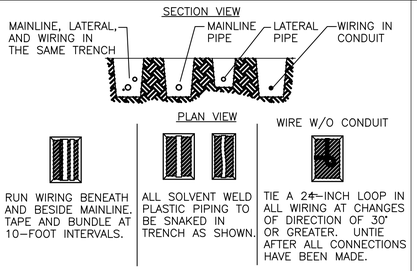


NOTES:
1. ALL JOINTS TO BE SOLVENT WELDED & WATERTIGHT
2. WHERE MORE THAN 1 SLEEVE, EXTEND SMALLER 24" MIN. ABOVE FINISH GRADE.

E SLEEVING
NOT TO SCALE

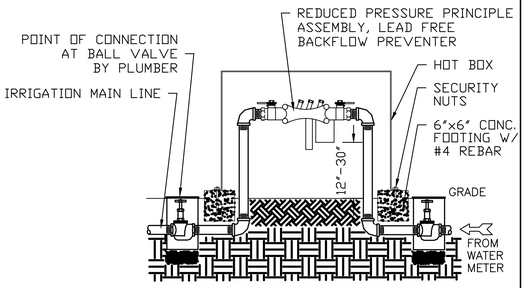


A ROOT BARRIER
NOT TO SCALE

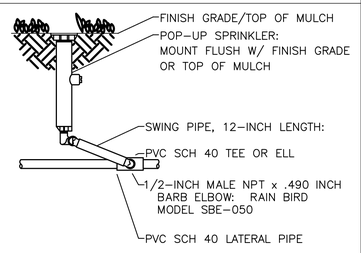


NOTE: SEE IRRIGATION PLAN FOR SLEEVE MATERIAL. SIZE AND DEPTH.

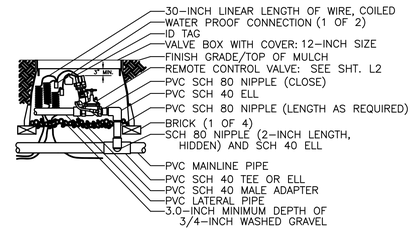
F PIPE & WIRE TRENCHING
NOTE: SEE IRRIGATION PLAN FOR SLEEVE MATERIAL. SIZE AND DEPTH.



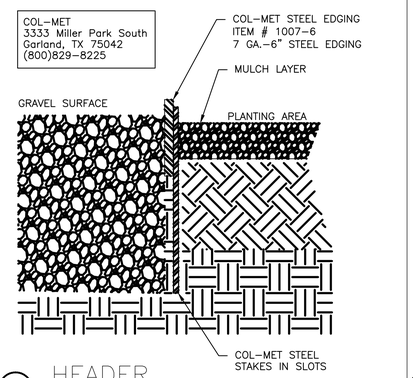
B POINT OF CONNECTION/ BACKFLOW
NOT TO SCALE



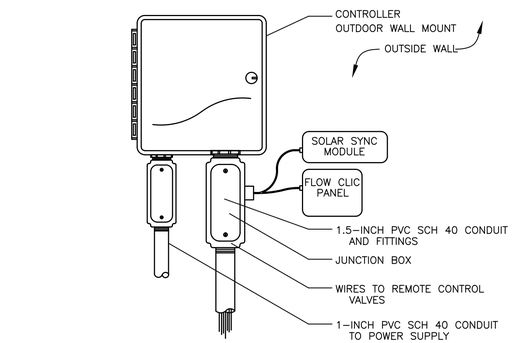
G SPRAY SPRINKLERS
NOT TO SCALE



C REMOTE CONTROL VALVE
NOT TO SCALE



H HEADER
NOTE: SEE IRRIGATION PLAN FOR SLEEVE MATERIAL. SIZE AND DEPTH.



D CONTROLLER
NOT TO SCALE

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REVISIONS/DATE	BY
1	

SITE: 1350 HASTINGS ROAD
SANTA ROSA, CA 94928
APN: 180-070-19-00 - 2.8Ac.

LICENSED LANDSCAPE ARCHITECT MICHAEL DALY STATE OF CALIFORNIA

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PLANTING & IRRIGATION DETAILS

TENANT IMPROVEMENT
ELECTRIC SERVICE CENTER - CITY OF UKIAH
400 WEST CLAY STEET
UKIAH, CA 95482

LICENSED ARCHITECT LAWRENCE S. MITCHELL, AIA C-13860 (11.30.11) STATE OF CALIFORNIA

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DATE	3.12.2020
SCALE	AS NOTED
DRAWN	MPD/LSM
PROJECT	1350 HASTINGS
SHEET	L103

PLOTTED: 03.15.11

FINE GRADING AND SOIL PREPARATION NOTES

1. Prior to any soil disturbance or grading work in any of the existing planting areas, all planting areas shall be cleaned of weeds and debris, once a week for 3 weeks. Noxious weeds and grasses shall be removed by the roots wherever they are found at any stage of the work. Weeds and debris shall be disposed of off the site.

2. The Landscape Contractor is responsible for fine grading and positive surface drainage in all landscape areas. The Landscape Contractor shall verify all rough grades in the field and bring all discrepancies to the attention of the General Contractor, Landscape Architect and Civil Engineer for a decision before proceeding with the work. Subgrades have been established under other portions of the work by the Civil Engineer. No soil preparation shall be done until rough grades are to within one tenth of an foot of finished grade and rough grades have been approved by the Landscape Architect and Owner. Allow for depth of soil amendments and mulch in determining the difference between finish subgrade in groundcover and shrub beds. Verify that subgrades are not compacted. Do not proceed until condition is corrected.

3. See Civil Engineer's drawings for paving and sidewalk surface elevations, sections, catch basins, and top of curb elevations.

4. Contractors are to exercise extreme care in backfilling and compacting any excavation or trenching in areas previously compacted for other aspects of the work so as to maintain original level of compaction.

5. All debris and unsuitable material generated by construction operations that remain in the landscape areas, along with soil contaminants by cement, paint, plaster, herbicides, or other construction debris shall be removed from the site and replaced with soil at no extra cost to the Owner by the Landscape Contractor . Replacement soil shall be reviewed by the Landscape Architect prior to placement.

6. The Landscape Contractor shall verify that all on-grade areas are marked for planting and are within a tenth of a foot of final grade. The Landscape Contractor shall rip compacted rough graded soil to a depth of 8 inches, then till in the soil amendment program into the upper 6 inch soil layer in both directions. The soil amendment shall be Mango Mulch, Available from Grab n' Grow or equivalent upon written approval of Landscape Architect, applied at a rate of 6 cu. yds. Per 1000 sq. ft.. Contractor is responsible for meeting all exterior finished grades.

7. Review structural soils report for recommendations on soil type, grading procedures, soil compaction, maximum allowable slopes, flatwork base material, etc. Copies of the report are available from the Architect.

8. All planting areas shall provide positive runoff at a minimum 2 percent slope without pockets or low points. Bring any discrepancies to the attention of the Landscape Architect for a decision prior the fine grading.

9. Groundcover areas: Finish grades (top of mulch) shall be 1" below the top of adjacent pavement, curbs, or walls and 2" below headers, unless otherwise specified. Lower headers where required to allow water to flow to drainage structures.

~~10. Turf Areas: Finish grades shall be 1" below the top of adjacent pavement, headers, curbs, or walls, unless otherwise specified. Lower headers where required to allow water to flow to drainage structures.~~

11. Moisture Content: Soil shall not be worked when moisture content is so great that excessive compaction will occur nor when it is so dry that dust will form in air or that clods will not readily break. Water shall be applied, if necessary, to bring soil to an ideal moisture content for tilling and planting.

PLANTING NOTES

1. The description of the planting work includes, but is not limited to the following:

A. Ordering and delivery of the plant materials to site.
B. Soil preparation and conditioning.
C. Fine grading of all landscape areas, including supplying and installing amendments or Imported topsoil as described on the drawing and as recommended by the soils testing report.
D. Coordination of additional drainage work as shown on the drawing.
E. Soil Testing by Landscape Contractor.
F. Installation of plant materials.
G. Ninety (90) day maintenance period.
H. Replacement of all unsatisfactory plant material.
I. Final Approval
J. Warranty

2. The Landscape Contractor shall notify the General Contractor and Landscape Architect of any discrepancy between the Drawings and/or Specifications and actual conditions. No work shall be done in any area where there is such a discrepancy until the discrepancy has been clarified and the Landscape Architect has given a written response.

3. All work shall be preformed by persons familiar with planting work and under supervision of a qualified planting foreman.

4. Within 30 days after award of contract, the Landscape Contractor shall arrange with a nursery to secure all plant materials noted on the plans and have them available for inspection by the Landscape Architect. All plant material selected and subsequently brought onto the site shall meet the State of California, Food and Agricultural Code, DIVISION 4. PLANT QUARANTINE AND PEST CONTROL, PART1.GENERALLY CHAPTER 4.5. INVASIVE PEST PLANNING. Upon approval of the plant material, the contractor shall purchase the material and have it segregated and (if required) grown for the job. The deposit necessary for such contract growing (if required) is to be born by the Landscape Contractor. If travel is required by the L.A. to inspect plant material, cost of travel shall be at the contractor's expense.

5. The Landscape Contractor shall provide for and include in his bid 2 (two) agricultural suitability and soil fertility tests to be performed on the rough graded soil. Test locations are to be determined by the Landscape Architect. The results of these tests shall be reviewed by the Landscape Architect for a decision prior to amending the soil. This analysis shall be conducted and paid for by the Landscape Contractor. Recommendations for amendments contained in this analysis are to be carried out before planting occurs. Such changes are to be accompanied by equitable adjustments in the contract price if/when necessary.

6. All trees are to be staked or guyed as shown in the staking/guying diagrams (see Detail Sheet L102). Landscape Contractor shall establish one installed example of each for approval by the Landscape Architect. Cut stake height as directed by the Landscape Architect. All trees shall be planted and staked per Tree Staking Detail.

7. The Landscape Contractor shall be responsible for providing all plant material indicated on the plans, unless otherwise directed in writing. Landscape Contractor to submit unit quantities and unit costs as a part of his bid. Cost for additional plants requested and approved by Owner and Landscape Architect will be based on this bid unit price.

8. Plant locations are diagrammatic and are to be adjusted in the field as necessary to screen utilities but not impede access.

9. The Landscape Architect reserves the right to make substitutions, additions, and deletions in the planting scheme as the feels necessary while work is in progress. Such changes, with written authorization by Owner, are to be accompanied by equitable adjustments in the contract price if / when necessary.

10. All ground cover planting areas and plant pits shall be top-dressed with 3"-4" layer of wood mulch. Submit samples to Landscape Architect for approval prior to bid and installation.

11. The planting backfill mix shall consist of 50% (by volume) amended native topsoil (with no rocks larger that 2" diameter) mixed with 50% approved soil amendment. Amend only top half of backfill, do not add amendment to the bottom half of plant pits. The bottom half is to match adjacent soil profiles.

12. Materials Delivery and Storage: Manufactured materials shall be delivered in original containers with brand and maker's name marked thereon. Materials in broken containers or showing evidence of damage will be rejected and must be immediately removed from the site. Odorous materials shall not be brought to the site until they are to be used.

13. The Landscape Contractor shall provide dust alleviation and control measures during the course of the work to the Owner's satisfaction at no additional costs to the contract.

14. Plant Material Specifications and Quantities: Plant materials shall be furnished in quantities required to complete the work as indicated on the Drawings and shall be of species, variety, sizes, spacing, etc., specified in the Drawings herein.
A. Plant material shall conform to American Association of Nurseryman Standards, ANSI Z60.I, in all ways.
B. Nomenclatures: Plant Names listed on drawing conform to Standardized Plant Names established by American Joint Committee on Horticultural Nomenclature, except that for names not covered therein the established custom of the nursery trade is followed.
C. Right of inspection for approval or rejection is reserved at the place of growth or on the project site at any time upon delivery or during the work. Plants shall be inspected for size, variety, condition, defects, disease or injury. Notify the Landscape Architect as to place of growth for inspection of plants within one month of award of contract.
D. No plant shall be bound with wire, rope or anything else at any time so as to damage the bark or break branches.
E. Dimensions: If applicable, height and spread of specimen plant materials are specified on the drawings. Measurements shall be made with materials in normal position without support of branches. Plants specified by container size shall be equal in size to similar plants in local retail nurseries. Otherwise, California's Nursery Standards will govern appropriateness of sizing of specimen material.
F. Plants shall not be pruned prior to delivery, except as authorized by the Landscape Architect.

15. Planting Procedures:
A. Do not install plant materials until all exterior construction work has been completed and irrigation systems have been installed and tested. Planting areas shall have been graded and prepared as specified and shall be approved by the Landscape Architect.
B. In areas with compacted foundation and /or lime treatment, a 18" diameter drainage well shall be drilled through the impervious layer(s) prior to placement of the trees.
C. Before excavation, plants in containers shall be placed as indicated on the planting plan bringing any conflict with underground utility lines or other elements to the attention of the Landscape Architect.
D. Excavate square shaped and angled side holes to the sizes and depths indicated on the Detail Drawings. Scarify the sides and bottom of all holes.
E. Remove containers, including boxes, prior to backfilling.
F. Verify that plants are not root bound or girdled, and that the primary leader is not damaged.
G. Backfill the planting holes with the special backfill mix herein specified, see note 11 above.
H. Water-settle backfill thoroughly or compact by other approved method after planting so plants do not settle.
I. Place "Best" products fertilizer tablets or Agriform Plant Tablets in holes, per manufacturer's written recommendations, at the following rates:
1-Gallon Containers: 2 tablets @ 21 grams.
5-Gallon Containers: 4 tablets @ 21 grams.
Larger sized plants per manufacturers recommendations.
J. Trees shall be planted a minimum of 5 ft. from driveways, 30 ft. on either side of street lights, 5 ft. from fire hydrants, and 3 ft. from underground utility lines.
K. All planting located adjacent to signs shall be field adjusted so as not to interfere with visibility of the signs.

16. Establishing Maintenance Period:
A. As soon as all planting is completed, a planting review and preliminary inspection to determine the condition of the plantings will be held by the Landscape Architect upon request of the Landscape Contractor.
B. Upon recommendatioanded witn by the Landscape Architect, in writing, and the approval of the Owner, the 90 day maintenance period will begin at project substantial complection.

IRRIGATION NOTES

1. These irrigation drawings are diagrammatic and indicative of the work to be installed. All piping, valves, etc. Shown within Paved areas is for clarity only and are to be installed within planting areas where possible. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. The Landscape Contractor is required to investigate the structural and finished conditions affecting all of the contract work including obstructions, grade differences or area dimensional differences which may not have been considered in the engineering. In the event of field differences, the Landscape Contractor is required to plan the installation work accordingly by notification and approval of the owner's authorized representative and according to the contract specification. The contractor is also required to notify and coordinate irrigation contract work with all applicable contractors for the location and installation of pipe, conduit or sleeves through or under walls, roadways, paving, structure, etc., before construction. In the event these notifications are not performed. The contractor shall assume full responsibility for all required revisions.

2. The intent of this irrigation system is to provide the minimum amount of water required to sustain good plant health.

3. It is the responsibility of the Landscape Contractor and/or Owner to program the irrigation controllers to provide the minimum amount of water needed to sustain good plant health. This includes making adjustments to the program for seasonal weather changes. Plant material, water requirements, mounds and slopes, sun, shade, and wind exposures.

4. 120 volt A.C. (2.5 amp demand per controller) electrical service to irrigation controller location(s) to be provided under electrical contract work. Landscape Contractor to make final connection from electrical stub-out to controller(s) and provide proper grounding per controller manufacturer's instructions.

5. Each irrigation controller to have its own independent 24 volt common ground wire.

6. Install new batteries in irrigation controller(s) to retain program in memory during temporary poser failures. Use quantity, type, and size required as per controller manufacturer's instructions.

7. Irrigation control wires shall be copper with U.L. approval for direct burial in ground, size #14-1. Common ground wire shall have green insulating jacket. Control wire shall have insulating jacket of color other than green. Splice shall be made with 3M-DBY seal packs or equivalent.

8. Install spare control wire of a different color along the entire main line. Loop 36" excess wire into each single valve box and into one valve box in each group of valves. Minimum of one spare wire per controller.

9. Splicing of 24 volt wires is not permitted except in valve boxes. Leave a 36" long, 1" diameter coil of excess wire at each splice and a 36" long expansion loop every 100 feet along wire run. Tape wires together every ten feet. Taping wires is not required inside sleeves.

10. Plastic valve boxes are to be green in color with bolt down, non-hinged cover marked "irrigation". Box body shall have knock outs. Manufacturer shall be Carson Industries or equivalent with approval of Landscape Architect.

11. Install remote control valve boxes 12" from walk, curb, lawn, header board, building or landscape feature. At multiple valve box groups, each box shall be 12" from the walk, curb, lawn, etc., and each box shall be 12" apart.

12. The Landscape Contractor shall flush and adjust all sprinkler heads for optimum performance and to prevent over spray onto walks, roadways, and/or buildings as much as possible. This shall include selecting the best degree of arc to fit the existing site conditions and to throttle the flow control at each valve to obtain the optimum operating pressure for each system.

13. All sprinkler heads shall be set perpendicular to finish grade of the area to be irrigated unless otherwise noted on the drawings.

14. Where it is necessary to excavate adjacent to existing trees, the contractor shall use all possible care to avoid injury to trees and tree roots. Excavation in areas where two (2) inch and larger roots occur shall be done by hand. Trenches adjacent to tree should be closed within twenty-four (24) hours; and where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas. No roots greater than 1" in diameter shall be cut or damaged without consulting with Landscape Architect.

15. Landscape Contractor to notify Landscape Architect for inspection and testing of installed backflow prevention device. Installation and inspection is to be performed by Plumbing Contractor

16. The irrigation system design is based on the minimum operating pressure shown on the irrigation drawings. The Landscape Contractor shall verify water pressure prior to construction. Report any difference between the water pressure indicated on the drawing and the actual pressure reading at the irrigation point of connection to the owner's authorized representative.

17. Irrigation demand: 15 GPM at a minimum dynamic pressure of 45 PSI at irrigation point of connection.

18. Teflon tape or paste is not to be used. Pipe Thread sealant compound shall be PERMATEX 51, Rector Seal Tru-Blu or Rector Seal T + 2.

MAINTENANCE

1. Maintenance Period: Continuously maintain all planting in areas included in the Contract form the beginning of the Contract work, during the progress of work, and for a period of 90 days after certified completion of all work until final acceptance of all contract work.
2. Scope: Continuous operations of watering, cultivating, weeding, trimming, pruning, adjustment of planting depth, fertilizing, spraying, and debris removal and clean-up, insect, pest, fungus, and rodent control, and any other operations are to be included in this scope of work to assure good, normal growth.
3. Fertilizing: In addition to fertilizing trees, shrubs, and groundcovers specified herein, furnish and apply additional fertilizers necessary to maintain plantings in a healthy, green, vigorous growing condition during the Maintenance Period.
4. Weeding, Cultivating, and Cleanup: Planting areas shall be kept neat and free from debris at all times and shall be cultivated and weeded at not more that 10 day intervals. Said areas shall be weed free at the end of the Maintenance Period. (If pre-emergent weed control is used, verify compatibility of the germicide with the plant material.) Do not use material which inhibits specified plant material's growth.
5. Protection: Work under this Section shall include complete responsibility for maintaining adequate protection for all areas. Any area damage by the maintenance contractor, including paved areas, shall be repaired at no additional expense to the Owner.
6. Replacements: Immediately replace any plant materials that die or are damaged. Replacements shall be made to the same Specifications as required for original plantings.
7. The irrigation system shall be kept in perfect working condition: flushing lines, adjusting watering schedules, adjusting heads, and additional work as required to maintain the system.
8. At the termination of the Maintenance Period, all plant materials shall be alive, healthy, undamaged, free from infestations, and in flourishing condition. All lawn areas shall be completely covered at the time of final acceptance leaving no barren spots. Lawns shall be free of all weeds (broadleaf and grass weeds). Plantings that do not conform to Specifications shall be replaced and brought to a satisfactory condition before final acceptance of the work can be made.
9. The Landscape Contractor shall arrange a meeting with the manufacturer's representative of the irrigation controller to train the maintenance personnel where applicable on the controller's proper use, changing dripper system filters and any other element of the irrigation system that requires periodic maintenance. Controller charts and as-builts of the planting and irrigation plans shall be given to the Owner areas at the end of the maintenance period.
10. All valve boxes are to be branded with the valve numbers as specified in the Irrigation Plans.

11. Final Approval: At the completion of the 90-day Maintenance Period, the Owner, the City and the Landscape Architect will be notified by the Landscape Contractor. A date will be set for a Final Walk Through to accept the installation. A Final Written report will be distributed by the Landscape Architect. Final Acceptance of the installation will be after all items on this list are completed by the Landscape Contractor. A written acceptance will be distributed by the Owner.

12. Warranty: Trees, shrubs, groundcovers and other plant materials shall be warranted to take root, grow and thrive for a period of one year after final acceptance of work. This will be as determined by the Owner and Landscape Architect at the end of the one year period.

13. Post Warranty Owner Responsibility: The intent of the layout design and planting is to establish a high quality landscape installation. Future plant growth requires that the Owner provide for the trimming, thinning and pruning of the plant materials. This may also include the removal of some plant materials if over crowding occurs. The planting installations will require maintenance and management, by knowledgeable and trained personnel, to assure a quality project.

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REVISIONS/DATE	BY
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SITE: 1350 HASTINGS ROAD
SANTA ROSA, CA 94928
APN: 180-070-19-00 - 2.8Ac.

LICENSED LANDSCAPE ARCHITECT
MICHAEL P. DALY
No. 4034
STATE OF CALIFORNIA

Daly
LANDSCAPE ARCHITECTURE
MICHAEL DALY, ASLA - R.L.A. NO. 4034
384 PLEASANT HILL AVENUE NORTH
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SPECIFICATIONS

TENANT IMPROVEMENT
ELECTRIC SERVICE CENTER - CITY OF UKIAH
400 WEST CLAY STEET
UKIAH, CA 95482

LICENSED ARCHITECT
LAWRENCE S. MITCHELL, AIA
C-13860
11.30.11
STATE OF CALIFORNIA

L.S. Mitchell Architect, Inc.
Building Architect & Land Planner
135 WEST OBRIEN STREET, SUITE 203
UKIAH, CALIFORNIA 95482
(707) 462 8778

DATE 3.12.2020
SCALE AS NOTED
DRAWN MPD/LSM
PROJECT 1350 HASTINGS
SHEET L104
PLOTTED: 03.15.11

F STRUCTURAL SPECIFICATIONS

CONCRETE CONSTRUCTION

1. CONCRETE SHALL BE HARD ROCK CONCRETE AND MEET THE FOLLOWING REQUIREMENTS:

LOCATION	MIN 28-DAY STRENGTH (PSI)	AGGREGATE SIZE	MAX WATER TO CEMENT RATIO	MIN SACKS CEMENTITIOUS MATERIAL PER CUBIC YARD[4]
STRUCTURAL				
EXTERIOR SLAB ON GRADE[3]	2,500	1"x#4	0.57	5.0
FOUNDATIONS	3,000 (DESIGNED FOR 2,500)	1"x#4	0.53	5.0

2. CONCRETE MIX DESIGN AND TESTING SHALL MEET THE REQUIREMENTS OF CBC SECTIONS 1705 AND 1903, ACI 318 CHAPTER 19 & 26, ACI 301, AND THESE SPECIFICATIONS. CEMENT TO BE IN ACCORDANCE WITH ASTM C150 TYPE II. AGGREGATE TO MEET ASTM C33. FLY ASH TO MEET ASTM C618 CLASS F. SUBMIT MIX DESIGN AND SUPPORTING DOCUMENTATION IN ACCORDANCE WITH ACI 301 AND ACI 318 FOR REVIEW PRIOR TO PLACEMENT.
3. CLASS F FLY ASH MAY BE SUBSTITUTED UP TO 25% FOR CEMENT AT A POUND-FOR-POUND RATE, UNLESS SPECIFIED OTHERWISE. DO NOT USE FLY ASH IN HIGH EARLY STRENGTH CONCRETE.
4. REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60 OR A706 GRADE 60. BARS #3 AND SMALLER MAY BE ASTM A615 GRADE 40. STEEL SHALL BE KEPT CLEAN AND FREE OF RUST. SECURELY TIE REBAR IN PLACE PRIOR TO CONCRETE PLACEMENT. SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO INSTALLATION.
5. SLABS, WALLS AND OTHER CONCRETE SHALL BE KEPT CONTINUOUSLY WET FOR 48 HOURS, AFTER PLACEMENT, AND SHALL BE KEPT DAMP FOR 7 DAYS AFTER PLACEMENT. SLABS SHALL HAVE CURE/SEALER APPLIED IMMEDIATELY AFTER FINISHING IF OTHER FINISHES ARE NOT AFFECTED. WHEN CURE SEALER CAN NOT BE APPLIED, SLAB SHALL BE KEPT CONTINUOUSLY WET OR COVERED WITH CURING PAPER. CURE SHALL BE OF A TYPE THAT WILL NOT BE DETRIMENTAL TO SEALERS TO BE APPLIED LATER.

CONCRETE MASONRY CONSTRUCTION (CMU)

1. CONCRETE MASONRY UNITS SHALL BE MEDIUM- OR LIGHT-WEIGHT CONFORMING TO ASTM C90. UNITS TO BE DOUBLE OPEN END WHERE POSSIBLE AND SINGLE OPEN END OTHERWISE. ALL CELLS TO BE GROUTED SOLID. COMPRESSIVE STRENGTH OF MASONRY AT 28 DAYS, F'_m, SHALL BE 2,000 PSI.
2. GROUT TYPE SHALL BE COURSE CONFORMING TO ASTM C476, HAVING A COMPRESSIVE STRENGTH OF 2,000 PSI MINIMUM AT 28 DAYS AND SHALL HAVE MINIMUM 6 SACKS OF CEMENT PER CUBIC YARD. ADD 1 POUND SIKA GROUT AID PER SACK OF CEMENT UP TO 6 POUNDS MAXIMUM PER CUBIC YARD. MAINTAIN SLUMP BETWEEN 10 AND 11 INCHES.
3. MORTAR SHALL BE 1800 PSI MINIMUM TYPE S OR 2500 PSI MINIMUM TYPE M CONFORMING TO ASTM C270, AND PROPORTIONED TO OR WITH PROPERTY SPECIFICATIONS & TEST RESULTS PER CBC SECTION 2103.2.1.
4. REINFORCING STEEL SHALL BE BENT AND LAPPED AT ALL CORNERS AND INTERSECTIONS. THE MINIMUM LAP SPLICE SHALL BE PER DRAWINGS. ALL STEEL, INCLUDING EMBEDS, SHALL BE POSITIONED AND TIED, PRIOR TO PLACING GROUT.
5. A POUR IS DEFINED AS THE HEIGHT OF GROUT TO BE PLACED IN ONE DAY. THE HEIGHT OF MASONRY UNIT PLACEMENT AT THE TIME OF GROUTING SHALL NOT EXCEED THE POUR HEIGHT. MASONRY SHALL HAVE CURED A MINIMUM OF 4 HOURS BEFORE GROUT PLACEMENT. MAXIMUM POUR HEIGHT IS 24'-0", OR LESS, AS DETERMINED BY THE CONTRACTOR. MAXIMUM INDIVIDUAL LIFT HEIGHT IS 12'-8", OR LESS, AS DETERMINED BY THE CONTRACTOR. ALLOW TIME BETWEEN LIFTS FOR INITIAL WATER LOSS OF GROUT TO OCCUR. DO NOT ALLOW GROUT TO CURE BETWEEN LIFTS. CONTRACTOR IS RESPONSIBLE FOR ADEQUATE CLEANING AND PREVENTION OF BLOWOUTS.
6. TO FACILITATE CLEANOUT WHERE POUR HEIGHT EXCEEDS 5'-4", PROVIDE INVERTED BOND BEAM UNITS AT THE BOTTOM OF EACH POUR AND PROVIDE CLEANOUTS IN THESE COURSES AS NECESSARY, NOT EXCEEDING 32'oc. PROVIDE MECHANICAL CLEANOUT METHODS AS NEEDED.
7. SUBMIT HOT AND/OR COLD WEATHER PROTECTION PROCEDURES WHEN AMBIENT TEMPERATURE IS BELOW 40°F OR ABOVE 90°F. CONFORM WITH TMS 602 AND CBC.
8. SUBMIT REINFORCING SHOP DRAWINGS FOR REVIEW. INCLUDE DETAILS AND LOCATION OF ALL CONTROL JOINTS.

WOOD CONSTRUCTION (CARPENTRY)

1. EACH PIECE OF LUMBER SHALL BEAR THE STAMP OF THE WEST COAST LUMBER INSPECTION BUREAU (WCLIB) OR WESTERN WOOD PRODUCTS ASSOCIATION (WWPA) SHOWING GRADE MARK OR APPROVED EQUAL. BEAMS AND POSTS TO BE FREE OF HEART CENTER (FOHC). OTHER MATERIALS SHALL BE AS SHOWN BELOW:

SAWN LUMBER MEMBER	SPECIES AND MINIMUM GRADE, UNO	F_B (PSI)	F_v (PSI)	E (PSI)
6x POSTS	DOUGLAS FIR - #1	1200	170	$1.6x10^6$
6x BEAMS	DOUGLAS FIR - #1	1350	170	$1.6x10^6$
4x POSTS & BEAMS	DOUGLAS FIR - #1	1000	180	$1.7x10^6$
2x JOISTS, RAFTERS	DOUGLAS FIR - #2	900	180	$1.6x10^6$

2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THE MAXIMUM MOISTURE CONTENT OF WOOD AT THE TIME OF INSTALLATION SHALL BE NOT MORE THAN 19%.
3. NAILS TO BE OF COMMON WIRE AND OF FULL-ROUND HEADS WHERE NAILING IS SPECIFIED ON THE DRAWINGS. MACHINE-DRIVEN NAILS MEETING SIZE REQUIREMENTS ARE ACCEPTABLE. NAILS MUST NOT BE OVER-DRIVEN. PRE-DRILL NAIL HOLES WHERE WOOD TENDS TO SPLIT. NAILS AS SPECIFIED ON PLANS AND INCLUDING IN PTDF MATERIAL CONTAINING AMMONIA IN EXTERIOR APPLICATIONS SHALL BE TYPE 304 OR 316 STAINLESS STEEL. NAILS USED IN EXTERIOR APPLICATIONS OR IN INTERIOR PTDF SHALL BE HOT-DIPPED GALVANIZED PER ASTM A153.

WIRE NAIL	MINIMUM SHANK DIAMETER	MINIMUM NAIL LENGTH UNO	TYPICAL NAIL APPLICATION, UNO
16d COMMON	0.162"	3½"	FRAMING
16d SINKER	0.148"	3¼"	FRAMING
10d COMMON	0.148"	3"	FRAMING
10d COMMON	0.148"	PER 5/S1.2	SHEATHING
8d COMMON	0.131"	PER 5/S1.2	SHEATHING

4. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ASSURE THAT THE METAL FRAMING CLIPS, HANGERS, ETC. ARE BY SIMPSON STRONG-TIE. NAILING SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS WITH A NAIL PROVIDED FOR EACH PUNCHED HOLE UNO. CONNECTORS AS SPECIFIED ON PLANS AND THOSE IN CONTACT WITH PTDF MATERIAL CONTAINING AMMONIA IN EXTERIOR APPLICATIONS SHALL BE TYPE 304 OR 316 STAINLESS STEEL. ALL OTHER CONNECTORS USED IN EXTERIOR APPLICATIONS OR INTERIOR PTDF SHALL BE HDG (MINIMUM 2.0 oz/SQ FT) OR ZMAX (MINIMUM 1.85 oz/SQ FT PER ASTM A653). IN APPLICATIONS WHERE NON-AMMONIA TREATED WOOD IS DRY WHEN INSTALLED AND WILL REMAIN DRY IN-SERVICE A COATING THICKNESS OF 0.9 oz/SQ FT MAY BE USED.
5. WOOD SCREWS SHALL CONFORM TO ANSI/ASME B18.6.1. PROVIDE PILOT HOLE 70% OF DIAMETER OF SCREW SHANK WHERE FASTENING HARDWOOD TIMBER SPECIES OR WHERE WOOD TENDS TO SPLIT. MINIMUM PENETRATION IS (10) DIAMETERS, UNO.
6. BOLTS SHALL BE UNFINISHED MACHINE BOLTS PER ASTM A307. NUTS SHALL BE PER ASTM A563 AND OF STANDARD SIZE UNLESS NOTED OTHERWISE. LENGTH OF BOLTS SHALL BE SUCH THAT THE BOLT PROJECTION IS NOT LESS THAN ⅛" NOR MORE THAN ½" PAST END OF NUT. BOLT HOLES IN WOOD SHALL BE 1/32" LARGER THAN BOLT SIZES (UNO). PROVIDE STANDARD CUT WASHERS UNDER HEAD AND NUT WHERE BOLT HEADS WOULD BEAR ON WOOD. USE MALLEABLE IRON WASHERS WHERE EXPOSED TO VIEW OR NOTED. NUTS SHALL BE TIGHTENED WHEN PLACED AND RETIGHTENED BEFORE CLOSING IN OF WALLS OR OTHER CONSTRUCTION. DO NOT CRUSH WOOD WHEN TIGHTENING. BOLTS AS SPECIFIED ON PLANS AND THOSE IN CONTACT WITH PTDF MATERIAL CONTAINING AMMONIA IN EXTERIOR APPLICATIONS SHALL BE TYPE 304 OR 316 STAINLESS STEEL. ALL OTHER BOLTS USED IN EXTERIOR APPLICATIONS SHALL BE HOT-DIPPED GALVANIZED PER ASTM A153.
7. WOOD AGAINST CMU OR CONCRETE SHALL BE PRESSURE TREATED DOUGLAS FIR (PTDF) PER AWPA STANDARD U1. "USE CATEGORY" UC2 AT INTERIOR. "USE CATEGORY" UC3B AT EXTERIOR (NO GROUND CONTACT). CUT FACES SHALL BE BRUSH TREATED WITH EQUIVALENT PRESERVATIVE PRIOR TO INSTALLATION.

PLYWOOD/ORIENTED STRAND BOARD (OSB) SHEATHING

1. STRUCTURAL SHEATHING SHALL CONFORM TO PRODUCT STANDARD PS-1 OR PS-2. ALL PANELS SHALL HAVE AN EXTERIOR EXPOSURE RATING AND BEAR THE TRADEMARK OF THE ENGINEERED WOOD ASSOCIATION (APA) OR OTHER QUALIFIED AGENCY. SHEATHING SHEETS SHALL BE SPLICED ALONG CENTERLINE OF FRAMING MEMBER WITH NAILING SPACED NOT LESS THAN ⅜" FROM EDGE OF SHEETS. MACHINE-PLACED NAILING AND NAILS TO BE APPROVED BY THE ENGINEER PRIOR TO USE. SHEATHING NAILS OF COMMON WIRE WITH FULL ROUND HEADS ARE REQUIRED.
2. OSB WITH EQUIVALENT THICKNESS AND SPAN RATING MAY BE USED IN LIEU OF PLYWOOD CALLED OUT. ALL OSB SHALL CONFORM TO PS-2.

ABBREVIATIONS

AB	ANCHOR BOLT	GB	GRADE BEAM	PTDF	PRESSURE TREATED DOUGLAS FIR
ABV	ABOVE	GLB	GLUE LAMINATED BEAM	PT	POINT
AC	AIR CONDITIONING	GR	GRADE	R	RADIUS
ADJ	ADJACENT	HD	HOLD DOWN	RBS	REDUCED BEAM SECTION
ADDL	ADDITIONAL	HDG	HOT-DIP GALVANIZED	RFTR	RAFTER
ALT	ALTERNATE	HDR	HEADER	REF	REFERENCE
ALUM	ALUMINUM	HGR	HANGER	REINF	REINFORCING
ARCH	ARCHITECT	HK	HOOK	REQD	REQUIRED
@	AT	HORIZ	HORIZONTAL	RET	RETAINING
BLDG	BUILDING	HS	HIGH STRENGTH	REV	REVISION
BLK/BLKG	BLOCK/BLOCKING	HSB	HIGH STRENGTH BOLT	RF	ROOF
BLW	BELOW	HSFB	HIGH STRENGTH FRICTION BOLT	RWD	REDWOOD
BM	BEAM	HSG	HIGH STRENGTH GROUT	S	AMERICAN STANDARD BEAM
BOT	BOTTOM	HSH	HORIZONTAL SLOTTED HOLE	SAD	SEE ARCHITECTURAL DRAWINGS
BRG	BEARING	HSS	HOLLOW STRUCTURAL SECTION	SB	SOLID BLOCK
BTWN	BETWEEN	HT	HEIGHT	SC	SLIP CRITICAL
BU	BUILT-UP	ID	INSIDE DIAMETER	SCBF	SPECIAL CONCENTRIC BRACED FRAME
BYND	BEYOND	IJ	I SHAPED WOOD BUILT UP TRUSS	SCD	SEE CIVIL DRAWINGS
C	AMERICAN STANDARD CHANNEL	INT	INTERIOR	SCHED	SCHEDULE
CANT	CANTILEVER	JST	JOIST	SED	SEE ELECTRICAL DRAWINGS
CB	CARRIAGE BOLT	JT	JOINT	SEOR	STRUCTURAL ENGINEER OF RECORD
CIP	CAST IN PLACE	KP	KING POST	SFRS	SEISMIC FORCE RESISTING SYSTEM
CGL	CERTIFIED GLUED LUMBER	L	STEEL ANGLE	SHTG	SHEATHING
CJ	CONTROL JOINT	Lb or #	POUND(s)	SIM	SIMILAR
℄	CENTERLINE	LGMF	LIGHT GAGE METAL FRAMING	SKYLT	SKYLIGHT
CJP	COMPLETE JOINT PENETRATION	LGMFC	LIGHT GAGE METAL FRAMING CONTRACTOR	SMF	SPECIAL MOMENT FRAME
CLG	CEILING	LL	LIVE LOAD	SMS	SHEET METAL SCREW
CLR	CLEAR	LLH	LONG LEG HORIZONTAL	SMD	SEE MECHANICAL DRAWINGS
COL	COLUMN	LLV	LONG LEG VERTICAL	SOG	SLAB ON GRADE
COLL	COLLECTOR	LOC	LOCATION	SPCG	SPACING
CONC	CONCRETE	LS	LAG SCREW	SPD	SEE PLUMBING DRAWINGS
CONN	CONNECTION	LSL	LAMINATED STRAND LUMBER	SPEC	SPECIFICATION
CONT	CONTINUOUS	LVL	LAMINATED VENEER LUMBER	SQ	SQUARE
COORD	COORDINATE/ COORDINATION	MAX	MAXIMUM	SS	SELECT STRUCTURAL or STAINLESS STEEL
CMU	CONCRETE MASONRY UNIT	MB	MACHINE BOLT	STGR	STAGGERED
CSK	COUNTERSINK	MBM	METAL BUILDING MANUFACTURER	STD	STANDARD
CW	CUT WASHER	MC	MISCELLANEOUS CHANNEL	STIFF	STIFFENER
DBA	DEFORMED BAR ANCHOR	MECH	MECHANICAL	STL	STEEL
DBL	DOUBLE	MEZZ	MEZZANINE	STRUCT	STRUCTURAL
DCW	DEMAND CRITICAL WELD	MF	MOMENT FRAME	SW	SHEAR WALL
DF	DOUGLAS FIR	MFR	MANUFACTURER	SYM	SYMMETRICAL
DIA or ⌀	DIAMETER	MIN	MINIMUM	T&B	TOP AND BOTTOM
DIAG	DIAGONAL	MISC	MISCELLANEOUS	T&G	TONGUE AND GROOVE
DIM	DIMENSION	MLW	MALLEABLE IRON WASHER	THK	THICK
DJ	DOWEL JOINT	MTL	METAL	THRD	THREADED
DL	DEAD LOAD	NIC	NOT IN CONTRACT	THRU	THROUGH
DN	DOWN	NO or #	NUMBER	TL	TOTAL LOAD
DO	DITTO	NS	NEAR SIDE	TN	TOE NAIL
DWG	DRAWING	NSG	NON-SHRINK GROUT	TOC	TOP OF CONCRETE
DWL	DOWEL	NTS	NOT TO SCALE	TOF	TOP OF FRAMING
EA	EACH	O/	OVER	TOM	TOP OF MASONRY
EE	EACH END	oc	ON CENTER	TOP	TOP OF PLYWOOD
EF	EACH FACE	OD	OUTSIDE DIAMETER	TOS	TOP OF STEEL
ELEC	ELECTRICAL	OH	OPPOSITE HAND	TOT	TOTAL
ELEV	ELEVATOR/ELEVATION	OPNG	OPENING	TU	TILT UP
EMBED	EMBEDMENT	OPP	OPPOSITE	TYP	TYPICAL
EQ	EQUAL	OVS	OVERSIZED	UNO	UNLESS NOTED OTHERWISE
EQUIP	EQUIPMENT	OW	OTHERWISE	VERT	VERTICAL
ES	EACH SIDE	OWT	OPEN WEB TRUSS	VIF	VERIFY IN FIELD
EW	EACH WAY	℘	PLATE or PROPERTY LINE	VSH	VERTICAL SLOTTED HOLE
EXIST or (E)	EXISTING	PA	POST ABOVE	W	WIDE FLANGE STEEL BEAM
EXP	EXPANSION	PDP	POWDER DRIVEN PINS	W/	WITH
EXT	EXTERIOR	PEN	PANEL EDGE NAIL	W/O	WITHOUT
FDN	FOUNDATION	PERP	PERPENDICULAR	WD	WOOD
FIN	FINISH	PES	PANEL EDGE SCREWS	WHS	WELDED HEADED STUD
FG	FINISH GRADE	PJP	PARTIAL JOINT PENETRATION	WLD	WELDED
FLI	FERRULE LOOP INSERT	PLF	POUNDS PER LINEAR FOOT	WP	WORK POINT/WATERPROOF
FLR	FLOOR	PNL	PANEL	WS	WOOD SCREW
FN	FACE NAIL	PSF	POUNDS PER SQUARE FOOT	WT	WEIGHT
FOC	FACE OF CONCRETE	PSI	POUNDS PER SQUARE INCH	WTS	WELDED THREADED STUD
FOM	FACE OF MASONRY	PSL	PARALLEL STRAND LUMBER	WWR	WELDED WIRE REINFORCEMENT
FOS	FACE OF STUD	PTB	PANEL TIE BAR		
FRMG	FRAMING				
FS	FAR SIDE				
FTG	FOOTING				
GA	GAGE or GAUGE				
GALV	GALVANIZED				

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E WOOD FRAMING NOTES

1. HEADERS, BEAMS, POSTS, TOP PLATE SPLICES, AND ETC., ARE PER 1/S1.2 WHERE NOT NOTED ON PLAN AND DETAILS.
2. ALL BEAMS AND JOISTS (EXCLUDING I JOISTS) SHALL BE SEAT CUT FOR FULL UNIFORM BEARING AT SUPPORTS, INCLUDING BEAM SEATS AND COLUMN CAPS.
3. SEE 5/S1.2 FOR SHEATHING NAILING REQUIREMENTS. ALL NAILING NOT NOTED OR DETAILED OTHERWISE SHALL BE PER 4/S1.2 . NAIL LENGTH TO BE SUFFICIENT TO MEET CBC PENETRATION REQUIREMENTS.
4. WOOD POST SIZES ARE TO MATCH BEAM AND STUD WIDTH, UNO.
5. FOR ROOF DRAINAGE, TOP OF FRAMING BETWEEN NOTED POINTS IS A STRAIGHT LINE.
6. JOISTS AND RAFTERS ARE PER PLAN. UNLESS NOTED OTHERWISE, PROVIDE "LU" HANGER AT FLUSH FRAMING AND "HU" HANGER WHERE HANGER IS SHOWN SKEWED PER PLAN AND/OR HANGER SEAT IS INDICATED TO BE SLOPED. HANGER SIZE TO BE CORRECT FULL SIZE FOR JOIST SIZE (I.E. LU210 FOR 2x10). HANGERS FOR PANELIZED ROOF CONSTRUCTION ARE PER PLAN.
7. ROUND HOLES IN STEEL PLATES TO BE ¹⁄₁₆" OVERSIZE. SLOTTED HOLES IN STEEL PLATES SHALL BE ¹⁄₁₆" WIDER THAN THE BOLT DIAMETER AND HAVE A LENGTH OF 2 TIMES THE BOLT DIAMETER. THE DIRECTION OF THE SLOTTED LENGTH IS INDICATED ON THE DETAILS (VSH OR HSH). INSTALL BOLT AT THE CENTER LINE OF THE HOLE. BOLT HOLES IN WOOD SHALL BE ROUND AND ⅛" OVERSIZE. CUT OFF BOLT THREADED END FLUSH WITH NUT WHEN REQUIRED BY FINISHES AND 1" MAXIMUM FROM NUT OTHERWISE. PROVIDE STANDARD CUT WASHERS UNDER HEAD AND NUT WHERE BOLT BEARS ON WOOD. USE PLATE OR MALLEABLE IRON WASHERS AT EXPOSED CONDITIONS OR AS INDICATED.
8. ALL BOLTED OR NAILED STRAP CONNECTIONS SHALL HAVE AN EQUAL NUMBER OF BOLTS OR NAILS EACH SIDE OF THE SPLICE JOINT. THE FIRST BOLT OR NAIL FROM EACH SIDE OF THE SPLICED OR STRAPPED MEMBER SHALL BE EQUIDISTANT FROM THE SPLICE. STRAPS USING 16d NAILS ON 2x MATERIAL TO BE INSTALLED ON THE 1½" EDGE OF THE MEMBER.
9. VENTING IS REQUIRED IN ENCLOSED FRAMING AREAS, SAD. DRILL BLOCKING AND LEDGERS AND PROVIDE SKIP BLOCKING AS DETAILED.
10. ALL SHEATHING SHALL HAVE 1/8" GAP AT ALL EDGES AND JOINTS. TYPICAL SHEATHING:
    A. SLOPING ROOF SHEATHING (SLOPE GREATER THAN 2:12): 15/32 " APA RATED SHEATHING (32/16) EXP 1 WITH 10d @ 6"oc EDGES (PEN) AND 12"oc FIELD UNO ON PLANS. LAY PERPENDICULAR TO FRAMING MEMBERS. PROVIDE SHEATHING CLIPS AT UNSUPPORTED EDGES UNLESS NOTED TO BE BLOCKED ON PLANS. NO PANELS LESS THAN 24" WIDE SHALL BE USED. STAGGER SHEETS.

G EXISTING CONSTRUCTION NOTES

1. ORIGINAL CONSTRUCTION DRAWINGS WERE NOT AVAILABLE FOR REVIEW AT THE TIME THESE DOCUMENTS WERE PREPARED. EXISTING BUILDING CONDITIONS SHOWN ARE ASSUMED BASED ON INFORMATION PROVIDED BY OTHERS AND ASSUMPTIONS BASED ON PROBABLE CONSTRUCTION METHODS. ACTUAL FIELD CONDITIONS MAY VARY. THE CONTRACTOR SHALL VERIFY ALL EXISTING JOB CONDITIONS, REVIEW THE PLANS AND VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER OF ALL DISCREPANCIES AND EXCEPTIONS BEFORE PROCEEDING WITH ANY WORK.
2. ALL WORK NOT INDICATED AS EXISTING (E) SHALL BE ASSUMED TO BE NEW (N).
3. ANY REMOVAL, CUTTING, DRILLING, ETC OF EXISTING WORK SHALL BE PERFORMED WITH GREAT CARE. SMALL TOOLS SHALL BE USED IN ORDER NOT TO JEOPARDIZE THE STRUCTURAL INTEGRITY OF THE STRUCTURE. IF STRUCTURAL MEMBERS OR MECHANICAL, ELECTRICAL, OR ARCHITECTURAL ELEMENTS NOT INDICATED FOR REMOVAL INTERFERE WITH THE NEW WORK, THE ARCHITECT/ENGINEER SHALL BE IMMEDIATELY NOTIFIED AND PRIOR APPROVAL SHALL BE OBTAINED BEFORE REMOVAL OF THE MEMBERS.
4. DO NOT OVER CUT EXISTING WOOD, CONCRETE, MASONRY OR OTHER WORK TO REMAIN. CUTS SHALL BE MADE NEATLY TO A CORNER, THEN ALTERNATE MEANS SHALL BE USED TO REMOVE REMAINING MATERIAL. CONTRACTOR IS RESPONSIBLE FOR REPAIR/REPLACEMENT OF OVER CUT MATERIAL AS DIRECTED BY THE ARCHITECT AND/OR ENGINEER.
5. EXISTING DAMAGED STRUCTURAL MEMBERS WHICH ARE UNCOVERED SHALL BE REPORTED TO THE ARCHITECT/ENGINEER FOR REVIEW AND REPAIR.
6. EXISTING CONCRETE SURFACE ABUTTING NEW CONCRETE SHALL BE ROUGHENED TO ¼" AMPLITUDE AND THOROUGHLY CLEANED OF DUST, LOOSE AGGREGATE, LAITANCE, ETC.
7. REMODELING REQUIRES ASSUMPTIONS BE MADE REGARDING EXISTING CONDITIONS WHICH MAY NOT BE VERIFIABLE WITHOUT DESTROYING OTHERWISE ADEQUATE OR SERVICEABLE PORTIONS OF THE STRUCTURE. THIS ANALYSIS DOES NOT MAKE ANY GUARANTEE TO THE ADEQUACY OF THE STRUCTURAL DESIGN OF THE EXISTING BUILDING NOT SPECIFICALLY ADDRESSED IN THE STRUCTURAL CALCULATIONS. ZFA SHALL NOT BE RESPONSIBLE FOR UNSATISFACTORY PERFORMANCE OF EXISTING PORTIONS OF THE STRUCTURE NOT SPECIFICALLY ADDRESSED IN THE CONSTRUCTION DOCUMENTS.
8. DIFFERENTIAL SETTLEMENT BETWEEN NEW AND EXISTING CONSTRUCTION AT REMODEL OR ADDITION FOUNDATION INTERFACES CAN BE EXPECTED. ZFA SHALL NOT BE RESPONSIBLE FOR UNSATISFACTORY PERFORMANCE RESULTING FROM THESE CONDITIONS.

A DESIGN CRITERIA

DESIGN CRITERIA:	2016 CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 2 (CBC)
FLOOR LIVE LOAD:	NA
ROOF LIVE LOAD:	20 PSF (REDUCIBLE)
RISK CATEGORY:	II
WIND DATA:	ULTIMATE WIND SPEED (3 SEC GUST) IN MPH: 110 WIND EXPOSURE: C INTERNAL WIND PRESSURE COEFFICIENT (GCPI) = ±0.18 COMPONENTS AND CLADDING DESIGN PRESSURES FOR SYSTEMS DESIGNED BY OTHERS SHALL COMPLY WITH THE "ASCE 7" DESIGN STANDARD
EARTHQUAKE DATA:	SEISMIC IMPORTANCE FACTOR, I_e: 1.0 MAPPED SPECTRAL RESPONSE ACCELERATIONS: S_s = 2.249; S_1 = 0.924 SITE CLASS: D SPECTRAL RESPONSE COEFFICIENTS: S_{DS} = 1.499; S_{D1} = 0.924 SEISMIC DESIGN CATEGORY: E SEISMIC FORCE RESISTING SYSTEM(S): EXTERIOR NONSTRUCTURAL WALLS RESPONSE MODIFICATION FACTOR(S): R = 2.5 SEISMIC RESPONSE COEFFICIENT(S), C_s = 0.50 (ULTIMATE) ANALYSIS PROCEDURE USED: EQUIVALENT LATERAL FORCE

B GENERAL NOTES

1. REFER TO SHEETS **S1.1**, **S1.2** AND **S1.3** FOR STANDARD DETAILS OF CONSTRUCTION. REFER TO THE PROJECT SPECIFICATIONS FOR MATERIALS AND METHODS.
2. BUILDING DIMENSIONS SHOWN ARE FOR GENERAL REFERENCE ONLY. SEE ARCHITECTURAL DRAWINGS (SAD) FOR ALL ACTUAL BUILDING DIMENSIONS. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER SO CLARIFICATION CAN BE MADE PRIOR TO COMMENCING WORK.
3. STRUCTURAL DRAWINGS SHALL NOT BE SCALED. ALL DIMENSIONS AND FIT SHALL BE DETERMINED AND VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING WORK.
4. DETAILS NOT FULLY OR SPECIFICALLY SHOWN SHALL BE OF SAME NATURE AS OTHER SIMILAR CONDITIONS.
5. REFER TO ARCHITECTURAL DRAWINGS FOR SIDEWALK SLABS AND DIMENSIONS.
6. COORDINATION OF MECHANICAL, ELECTRICAL, PLUMBING, AND SITE UTILITY SYSTEMS WITH THE STRUCTURAL SYSTEM IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. USE DETAILS **2/S1.1** **3/S1.1** **2/S1.2** AND **3/S1.2**. AT CONDITIONS WHERE THESE DETAILS DO NOT APPEAR TO APPLY, NOTIFY THE STRUCTURAL ENGINEER PRIOR TO INSTALLATION. AT CONDITIONS WHERE FIELD MODIFICATIONS OF MECHANICAL, ELECTRICAL, PLUMBING, OR SITE UTILITIES AFFECT STRUCTURAL SYSTEMS, NOTIFY STRUCTURAL ENGINEER PRIOR TO INSTALLATION.
7. SHORING AND BRACING DESIGN, MATERIALS AND INSTALLATION SHALL BE PROVIDED BY THE GENERAL CONTRACTOR, AND SHALL BE ADEQUATE FOR ALL LOADS. LEAVE IN PLACE AS LONG AS MAY BE REQUIRED FOR SAFETY AND UNTIL FINAL STRUCTURAL CONSTRUCTION IS COMPLETED.
8. SPECIAL INSPECTIONS ARE REQUIRED PER **D/S0.1** AND THE TESTING AND INSPECTION FORM.
9. STRUCTURAL OBSERVATION PER CBC SECTION 1704.6 IS NOT REQUIRED. NOTIFY ZFA FOR GENERAL REVIEW OF:
    - MINIMUM FOOTING SIZE AND REINFORCING STEEL.
    - STRUCTURAL WOOD FRAMING

    NOTIFY ZFA FOR REVIEW PRIOR TO COVERING ABOVE LISTED WORK. PROVIDE 2 WORKING DAYS MINIMUM SCHEDULING NOTICE PRIOR TO REVIEW DATE.

C FOUNDATION NOTES

1. FOUNDATION DESIGN PRESSURES ARE PER CBC SECTION 1806.2:
   SHALLOW FOOTINGS:

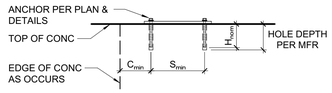
   DEAD LOAD + LIVE LOAD = 1,500 PSF
   DEAD LOAD + LIVE LOAD + LATERAL = 2,000 PSF
2. ALL SOILS WORK SHALL BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS AND THE REQUIREMENTS OF CHAPTER 18 OF THE CBC. ALL FOUNDATIONS SHALL BEAR ON FIRM, UNDISTURBED, NATIVE SOILS AT OR EXCEEDING DEPTHS SHOWN ON THE DRAWINGS. INCREASE FILL AND OR FOOTING DEPTH AS REQUIRED. ALL FOOTING EXCAVATIONS SHALL BE AS NEAT AS PRACTICABLE. MAXIMUM OVER EXCAVATION IN WIDTH SHALL BE LESS THAN 12 INCHES OR 25% OF FOOTING WIDTH, WHICH EVER IS LESS. 6 INCHES MAXIMUM PER SIDE. LARGER OVER-EXCAVATIONS IN WIDTH SHALL BE FILLED WITH ADDITIONAL REINFORCED CONCRETE AS DIRECTED BY THE ENGINEER, OR FORMWORK SHALL BE PROVIDED. OVER-EXCAVATIONS IN DEPTH MAY BE FILLED WITH LEAN CONCRETE OR COMPACTED APPROVED BACKFILL. ALL LOOSE SOILS SHALL BE REMOVED FROM EXCAVATIONS PRIOR TO PLACEMENT OF REINFORCING OR CONCRETE.
3. WHERE BOTTOM OF ADJACENT FOOTINGS ARE DIFFERENT PROVIDE STEPPED FOOTING PER **5/S1.1**.

D SPECIAL INSPECTION BY OWNERS TESTING AGENCY

SPECIAL INSPECTIONS AND TESTING SHALL BE PERFORMED BY AN APPROVED AGENCY IN ACCORDANCE WITH CBC CHAPTER 17 AND THE STATEMENT OF SPECIAL INSPECTIONS AS REQUIRED BY CBC SECTIONS 1704.2.3 AND 1704.3 FOR BUILDING STRUCTURAL ELEMENTS SUMMARIZED AS FOLLOWS:

1. **CONCRETE CONSTRUCTION** PER CBC SECTIONS 1705.3, AND TABLE 1705.3 INCLUDING FORMWORK, REINFORCING STEEL, CAST-IN-PLACE BOLTS, MIX DESIGNS, CONCRETE SAMPLES, AND PLACEMENT FOR ALL CONCRETE. REINFORCING DOWELS FROM FOOTINGS TO RETAINING WALLS SHALL BE INSPECTED PRIOR TO PLACEMENT OF FOOTING CONCRETE AND WALL GROUT OR CONCRETE. CONTINUOUS OR ISOLATED SPREAD FOOTINGS WITH DESIGN STRENGTH NO GREATER THAN 2500 PSI, NON-STRUCTURAL SLABS ON GRADE, AND EXTERIOR FLATWORK DO NOT REQUIRE SPECIAL INSPECTION PER CBC SECTION 1705.3.
2. **MASONRY CONSTRUCTION** PER CBC SECTION 1705.4 INCLUDING COMPRESSIVE STRENGTH, BLOCK LAYING PROCEDURES, MORTAR PREPARATION, REINFORCEMENT SIZE AND GRADE, REINFORCEMENT PLACEMENT, GROUT PREPARATION AND GROUT PLACEMENT, AND ANCHOR BOLT TYPE, SIZE AND PLACEMENT.
3. **SOILS** PER CBC SECTION 1705.6, TABLE 1705.6, AND THE APPROVED SOILS REPORT INCLUDING SUBGRADE PREPARATION, FOUNDATION BEARING MATERIALS AND DEPTH OF EXCAVATIONS, AND VERIFICATION, PLACEMENT AND TESTING OF CONTROLLED FILL.
4. **SPECIAL CASES** PER CBC SECTION 1705.1.1 AND PRODUCT ICC REPORTS FOR ALL STRUCTURAL MATERIALS AND SYSTEMS REQUIRED TO BE INSTALLED IN ACCORDANCE WITH ADDITIONAL MANUFACTURER'S INSTRUCTIONS THAT PRESCRIBE REQUIREMENTS NOT CONTAINED IN THE CBC OR REFERENCED STANDARDS INCLUDING POST-INSTALLED ANCHOR BOLTS

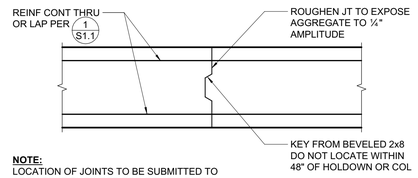
SCREW ANCHOR IN 2500 PSI MIN CONCRETE							
ANCHOR TYPE	ANCHOR AND PILOT HOLE DIA	MINIMUM EMBEDMENT H_{nom}	MINIMUM EDGE DIST C_{min}	MINIMUM SPCG S_{min}	MINIMUM CONCRETE THICKNESS H_{min}	MIMIMUM INSTALL TORQUE (FT-LB)	MAXIMUM INSTALL TORQUE (FT-LB)
SIMPSON TITEN HD (ICC-ESR 2713)	¼"	1⅜"	1½"	1½"	3¼"	10	24
	⅜"	2½"	1¾"	3"	4"	10	50
	½"	3¼"	1¾"	3"	5"	10	65
	⅝"	4"	1¾"	3"	6"	10	100
	¾"	5¼"	1¾"	3"	8¾"	20	150
HILTI KH-EZ (ICC-ESR 3027)	¼"	1⅜"	2"	1½"	3¼"	10	18
	⅜"	2½"	1½"	3"	4"	10	40
	½"	3"	1¾"	3"	4¾"	10	45
	⅝"	3½"	1¾"	4"	5"	10	85
	¾"	4"	1¾"	4"	6"	20	95



NOTES:

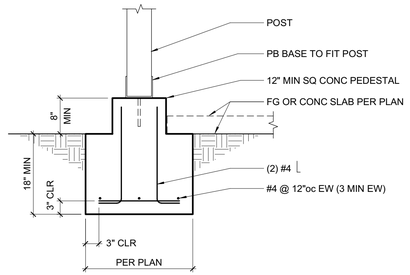
1. INSTALL SCREW ANCHORS PER MANUFACTURER'S INFORMATION AND ICC REPORT INSTRUCTIONS. SPECIAL INSPECTION IS REQUIRED PER SECTION 1705 OF THE CBC AND THE REQUIREMENTS OF THE ICC REPORTS. INSTALLED ANCHORS SHALL BRING CONNECTED PLIES INTO FIRM CONTACT, MEETING THE INSTALL TORQUE BUT NOT EXCEEDING THE MAXIMUM INSTALL TORQUE.
2. CONTRACTOR TO VERIFY MINIMUM EDGE DISTANCES, SPACING AND THICKNESS ARE IN ACCORDANCE W/ SCHEDULE PRIOR TO INSTALLING ANCHOR.
3. HOLES TO BE DRILLED W/ ROTARY DRILL ONLY. WHEN INSTALLING DRILLED-IN ANCHORS IN EXISTING REINFORCED CONCRETE, USE CARE AND CAUTION TO AVOID CUTTING OR DAMAGING THE EXISTING REINFORCING BARS. MAINTAIN A REASONABLE CLEARANCE BETWEEN REINFORCEMENT AND THE DRILLED-IN ANCHOR. FILL ABANDONED HOLES W/ HIGH STRENGTH GROUT.
4. THE SPECIAL INSPECTOR MUST BE ON THE JOBSITE PERIODICALLY DURING ANCHOR INSTALLATION TO VERIFY ANCHOR TYPE, ANCHOR DIMENSIONS, HOLE CLEANLINESS, EMBEDMENT DEPTH, CONCRETE TYPE, CONCRETE COMPRESSIVE STRENGTH, DRILL BIT DIAMETER, HOLE DEPTH, EDGE DISTANCE(S), ANCHOR SPACING(S), CONCRETE THICKNESS, AND TIGHTENING TORQUE.

10 SCREW ANCHOR IN CONCRETE
3/4" = 1'-0"



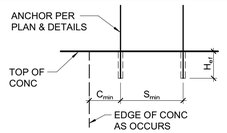
NOTE:
LOCATION OF JOINTS TO BE SUBMITTED TO ARCHITECT/ENGINEER FOR REVIEW PRIOR TO PLACEMENT OF CONCRETE

7 FOOTING CONSTRUCTION JOINT
3/4" = 1'-0"



8 PAD FOOTING AT POST
3/4" = 1'-0"

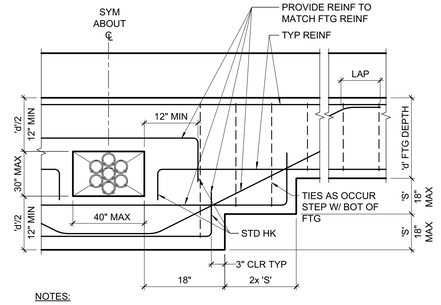
ADHESIVE ANCHOR IN 2500 PSI MIN CONCRETE							
ADHESIVE TYPE	ANCHOR		PILOT HOLE	MIN EMBED UNO H_{ef}	MIN EDGE DISTANCE C_{min}	MIN SPCG S_{min}	MIN CONC DEPTH H_{min}
	THRD ROD	REBAR					
SIMPSON SET-XP (ICC-ESR 2508)	⅜"ø	#3	½"ø	3"	1¾"	3"	5"
	½"ø	#4	⅝"ø	4"	1¾"	3"	6½"
	⅝"ø	#5	¾"ø	5"	1¾"	3"	8¼"
	¾"ø	#6	⅞"ø	6"	1¾"	3"	9¾"
	⅞"ø	#7	1"ø	7"	1¾"	3"	11½"
	1"ø	#8	1⅛"ø	8"	1¾"	3"	13"
	1¼"ø	#10	1⅜"ø	10"	2¾"	6"	16¼"
HILTI HIT-HY 200R (ICC-ESR 3187)	⅜"ø	N/A	⅞"ø	3"	1¾"	1½"	4¼"
	N/A	#3	½"ø	3"	1¾"	1½"	4¼"
	½"ø	N/A	⅞"ø	4"	1¾"	2½"	5¼"
	N/A	#4	⅝"ø	4"	1¾"	2½"	5¼"
	⅝"ø	#5	¾"ø	5"	1¾"	3½"	6½"
	¾"ø	#6	⅞"ø	6"	1¾"	3¾"	7¾"
	⅞"ø	#7	1"ø	7"	1¾"	4⅜"	9"
	1"ø	#8	1¼"ø	8"	1¾"	5"	10¼"
	N/A	#9	1⅜"ø	9"	1¾"	5⅝"	11¾"
	1¼"ø	N/A	1⅜"ø	10"	1¾"	6¼"	12¾"
	N/A	#10	1½"ø	10"	1¾"	6¼"	13"



NOTES:

1. INSTALL ADHESIVE ANCHORS PER MANUFACTURER'S INFORMATION AND ICC REPORT.
2. CONTRACTOR TO VERIFY MINIMUM EDGE DISTANCES, SPACING, AND THICKNESS ARE IN ACCORDANCE W/ SCHEDULE PRIOR TO INSTALLING ANCHOR.
3. HOLES TO BE DRILLED W/ ROTARY DRILL ONLY. WHEN DRILLING HOLES IN EXISTING CONCRETE, USE CARE AND CAUTION TO AVOID CUTTING OR DAMAGING THE EXISTING REINFORCING BARS. MAINTAIN A REASONABLE CLEARANCE BETWEEN REINFORCEMENT AND THE DRILLED-IN ANCHOR. FILL ABANDONED HOLES W/ HIGH STRENGTH GROUT.
4. SPECIAL INSPECTION IS REQUIRED PER SECTION 1705 AND THE REQUIREMENTS OF THE ICC REPORTS. THE SPECIAL INSPECTOR MUST BE ON THE JOB SITE PERIODICALLY DURING ANCHOR INSTALLATION TO VERIFY ANCHOR TYPE, ANCHOR DIMENSIONS, HOLE CLEANLINESS, EMBEDMENT DEPTH, CONCRETE TYPE, CONCRETE COMPRESSIVE STRENGTH, DRILL BIT DIAMETER, HOLE DEPTH, EDGE DISTANCE(S), ANCHOR SPACING(S), CONCRETE THICKNESS, AND ADHESIVE INJECTION.

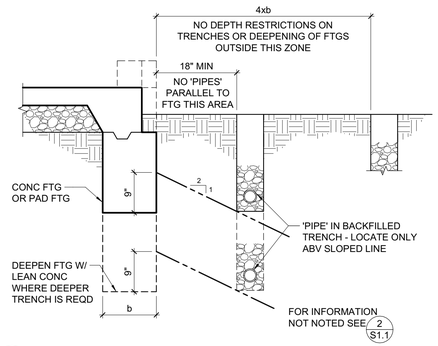
9 ADHESIVE ANCHOR IN CONCRETE
3/4" = 1'-0"



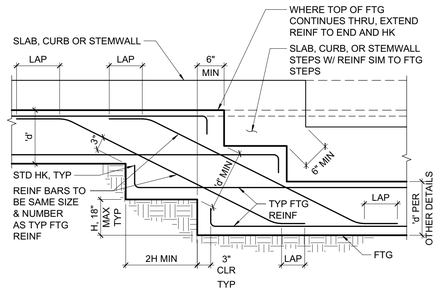
NOTES:

1. DO NOT LOCATE BLOCKOUT WITHIN 48" OF SHEAR WALL HOLD DOWN, IN FRAME FOUNDATIONS OR COLUMN PAD FOOTINGS.
2. MINIMUM DISTANCE BETWEEN BLOCKOUTS OR OTHER PIPES TO BE 48".

3 FOUNDATION BLOCKOUT
3/4" = 1'-0"

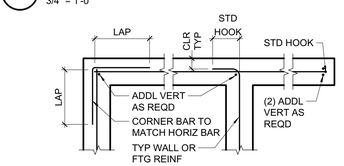


4 TRENCHING ADJACENT TO FOOTING
3/4" = 1'-0"

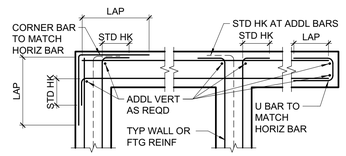


NOTE:
REMOVE ALL EARTH LOOSENED DURING EXCAVATION AND FILL W/ CONCRETE.

5 STEPPED FOOTING
3/4" = 1'-0"



PLAN VIEW - SINGLE LAYER



PLAN VIEW - 2 OR MORE LAYERS

NOTE:
FOOTING REINFORCING AT CORNER AND INTERSECTION TO BE SIMILAR

6 TYPICAL CORNER, INTERSECTION AND END REINFORCING
3/4" = 1'-0"

MINIMUM BAR LAPS FOR REINFORCING STEEL CONCRETE STRENGTH: 2500 PSI OR GREATER (STAGGER SPLICES)					
SIZE	LAP LENGTH	SIZE	LAP LENGTH	SIZE	LAP LENGTH
#3	13"	#6	38"	#9	94"
#4	25"	#7	61"	#10	115"
#5	37"*	#8	77"	#11	138"

(CLASS B TOP BAR)
BAR SPCG SHALL NOT BE LESS THAN 4x BAR DIA OR 4".
* WHERE COVER NOT LESS THAN 1½", #5 LAP LENGTH = 31"

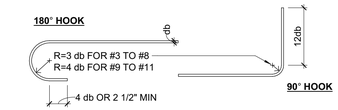
CONC COVER FOR REINF STL ..... 'CLR'

CAST AGAINST EARTH OR GR ..... 3"

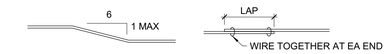
EXPOSED TO EARTH (FORMED) OR WEATHER
#5 & SMALLER ..... 1½"
#6 & LARGER ..... 2"

NOT EXPOSED TO EARTH OR WEATHER
#5 & SMALLER ..... 1"
#6 & LARGER, & ALL BM STIRRUPS, COL TIES & SPIRALS ..... 1½"

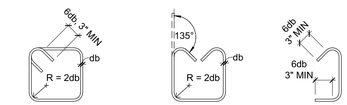
ALL REINF BARS SHALL EXTEND AS FAR AS POSSIBLE &
END IN A STD 90° OR 180° HK UNLESS DETAILED OTHERWISE



STANDARD HOOKS & BENDS

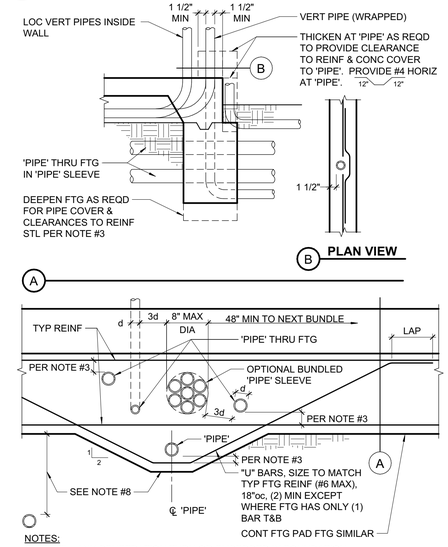


COL BAR & STRUCT OFFSET **SPLICE**



135° STIRRUP TIES #3, #4, #5 **STIRRUP #3, #4, #5** **CROSSTIE #3, #4, #5**

1 TYPICAL CONCRETE REINFORCING DETAILS (f'c = 2500psi MIN)
3/4" = 1'-0"



NOTES:

1. 'PIPE' = ANY PENETRATION THRU OR EMBEDDED IN FOUNDATION.
2. ALL PIPES THROUGH FOOTINGS TO BE WRAPPED OR SLEEVED AS FOLLOWS:
   a. SLEEVES: PROVIDE 1" MIN CLEAR ALL AROUND O.D. PIPE TO I.D. SLEEVE, UNO. SEAL SLEEVE ENDS W/ MASTIC OR PLASTIC BITUMINOUS CEMENT.
   b. WRAPPED VERTICAL PIPES: PROVIDE ⅛" NOMINAL SHEET FOAM W/ (3) WRAPS MINIMUM, UNO.
   c. WRAPPED HORIZONTAL PIPES: PROVIDE ¼" NOMINAL SHEET FOAM W/ (8) WRAPS MINIMUM, UNO.
   d. UNDERGROUND FIRE LINES 4" AND LARGER:
      1. SLEEVES: PROVIDE 2" MIN CLEAR ALL AROUND O.D. PIPE TO I.D. SLEEVE. SEAL ENDS PER ABOVE.
      2. WRAPPED: PROVIDE ⅛" NOMINAL SHEET FOAM W/ (16) WRAPS MINIMUM.
3. WRAPPED AND SLEEVED PIPES SHALL HAVE 1½" MIN CLEAR TO REINF STEEL. MINIMUM CONCRETE COVER AT PIPES TO BE 3".
4. CLEARANCE BETWEEN 'PIPES' TO BE 3d MIN TYP W/ A MAXIMUM OF (8) PIPES PER 48". GROUPS OF PIPES MAY BE BUNDLED AS SHOWN, EXCEPT IN PAD FOOTINGS.
5. NO 'PIPE' TO RUN PARALLEL IN FOOTINGS, STEM OR CURB.
6. PVC CONDUIT ('PIPE') EMBEDDED IN CURB/STEM MAY BE WIRE TIED TO HORIZONTAL REINF.
7. NO HORIZONTAL PIPES ALLOWED THROUGH FOOTING WITHIN 2'-0" EACH SIDE OF HOLDOWNS OR STEEL COLUMNS. NO VERTICAL PIPES ALLOWED IN FOOTINGS AT BRACED FRAMES.
8. PROVIDE 18" MIN OF COMPACTED FILL ABOVE PIPES UP TO 12"ø, FOR LARGER PIPES INCREASE COMPACTED FILL DEPTH 1'-0" FOR EACH 6" INCREASE IN PIPE DIAMETER. OTHERWISE DEEPEN FOOTING AS SHOWN.

2 PIPES THRU FOOTING
3/4" = 1'-0"

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Revision Schedule		
#	Revision Description	Date

ZFA STRUCTURAL ENGINEERS
1212 fourth street | suite z
santa rosa ca 95404
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PROJECT

UKIAH ELECTRIC UTILITY BUILDING
1350 HASTINGS RD, UKIAH, CA 95482
(Manage -> Project Information)

SHEET DESCRIPTION

TYPICAL CONCRETE DETAILS

ENGR: JG	DATE: SEP 6, 2019
PM: DRC	

SHEET

S1.1

PERMIT SET - NOT FOR CONSTRUCTION

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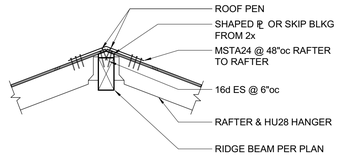
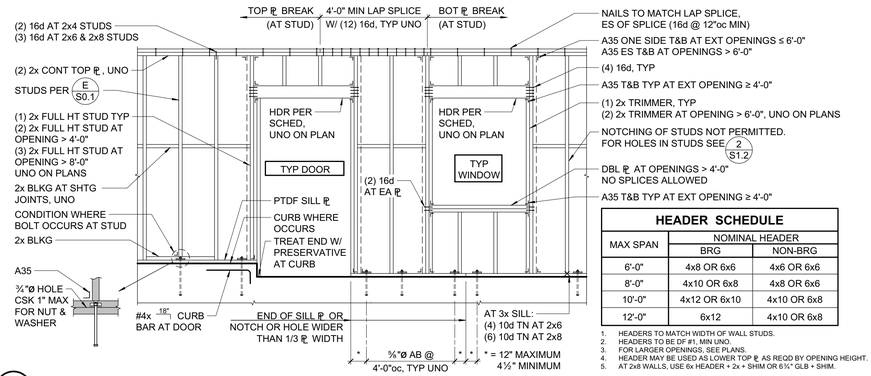


7 FRAMING AT RIDGE BEAM
3/4" = 1'-0"

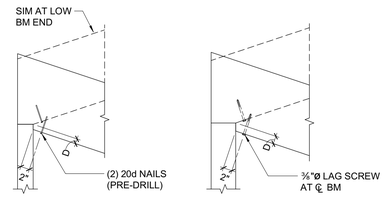


HEADER SCHEDULE

MAX SPAN	NOMINAL HEADER	
	BRG	NON-BRG
6'-0"	4x8 OR 6x6	4x6 OR 6x6
8'-0"	4x10 OR 6x8	4x8 OR 6x6
10'-0"	4x12 OR 6x10	4x10 OR 6x8
12'-0"	6x12	4x10 OR 6x8

1. HEADERS TO MATCH WIDTH OF WALL STUDS.
2. HEADERS TO BE DF #1, MIN UNO.
3. FOR LARGER OPENINGS, SEE PLANS.
4. HEADER MAY BE USED AS LOWER TOP ℄ AS REQD BY OPENING HEIGHT.
5. AT 2x8 WALLS, USE 6x HEADER + 2x + SHIM OR 6⅞" GLB + SHIM.

1 TYPICAL STUD WALL AND OPENING FRAMING
3/8" = 1'-0"



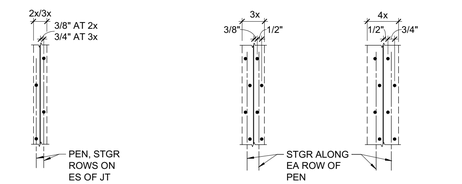
NOTES:

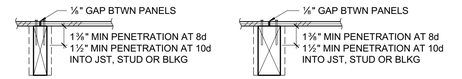
1. DO NOT OVERCUT NOTCHES OR SEAT CUTS.
2. SEE OTHER DETAILS FOR MAXIMUM NOTCH OR SEAT CUT SIZE.

8 BEAM SEAT CUT/NOTCH REINFORCEMENT
3/4" = 1'-0"

RIM JOIST TO TOP ℄, TOE NAIL	10d @ 6"oc
TRUSSES, JOISTS OR RAFTERS AT ALL BEARING POINTS	
TOE NAILS EACH SIDE	(2) 10d
TRUSSES, JOISTS OR RAFTERS TO SIDE OF STUDS	
EIGHT (8) INCH JOISTS OR LESS	(3) 16d
FOR EACH ADDITIONAL 4 INCHES OF DEPTH OF JOIST	(1) 16d
BLOCKING BETWEEN JOISTS OR RAFTERS:	
TO JOIST OR RAFTERS - TOE NAILS EA SIDE, EA END	(2) 10d
TO JOIST OR RAFTER BEARINGS - TOE NAILS EA SIDE	(2) 10d
BLOCKING BETWEEN STUDS, EACH END TOE NAILS	(2) 10d OR (2) 16d
BRIDGING TO JOIST, TOE NAIL EACH END	(2) 8d
2" SUBFLOOR TO JOIST OR GIRDER, BLIND & FACE NAIL	(2) 16d
SOLE PLATE TO JOIST OR BLOCKING, FACE NAIL	16d @ 16"oc
SOLE PLATE TO JOIST OR BLOCKING AT BRACED WALL PANELS	(3) 16d @ 16"oc
TOP PLATE TO STUD, END NAIL	(2) 16d
STUD TO SOLE PLATE, TOE NAIL	(4) 8d
DOUBLE STUDS AT EXTERIOR WALLS, FACE NAIL	16d @ 12"oc
DOUBLE STUDS, FACE NAIL	16d @ 24"oc
DOUBLE TOP PLATES, FACE NAIL	16d @ 12"oc
TOP PLATES, LAPS & INTERSECTIONS, FACE NAIL	(3) 16d
CONTINUOUS HEADER, TWO PIECES	16d @ 16"oc ALONG EACH EDGE
DOUBLE TOP PLATE LAP AT CORNER	(3) 16d
CONTINUOUS HEADER TO STUD, TOE NAIL	(4) 8d
CEILING JOISTS, LAPS OVER PARTITIONS, FACE NAIL	(3) 16d
CEILING JOISTS TO PARALLEL RAFTERS, FACE NAIL	(3) 16d
BUILT-UP CORNER STUDS	16d @ 12"oc
POST TO SILL/SOLE/TOP PLATE, EACH SIDE TOE NAIL	(4) 10d

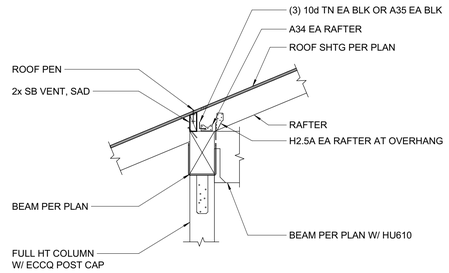
4 NAILING SCHEDULE
3/4" = 1'-0"



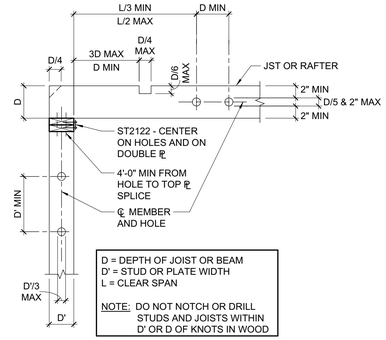


NOTE:
SHEATHING SHEETS ARE TO BE AS LARGE AS POSSIBLE. STAGGER SHEETS. JOINTS ARE TO BE CENTERED OVER BEARING. NAIL HEADS SHALL BE DRIVEN FLUSH W/ SHEATHING. MINIMUM SHEATHING SIZE IS 24" WIDTH x 48" LENGTH AT FLOOR AND ROOF, AND 12"x48" AT WALLS.

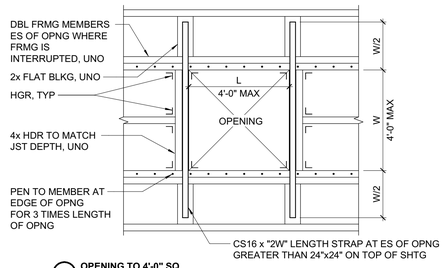
5 SHEATHING NAILING
1 1/2" = 1'-0"



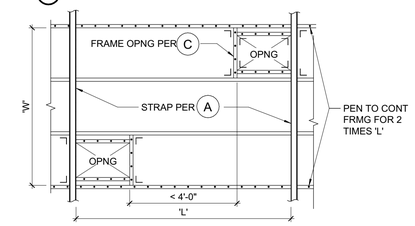
6 FRAMING AT POST
3/4" = 1'-0"



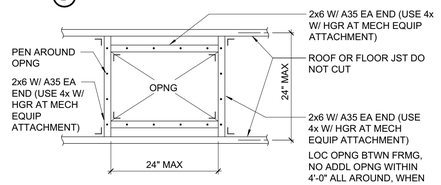
2 HOLES AND NOTCHES IN WOOD STUDS, JOISTS, AND PLATES
3/4" = 1'-0"



A **OPENING TO 4'-0" SQ**



B **CLOSELY SPACED OPENINGS BETWEEN FRAMING**



PLAN

C **ISOLATED OPENING BETWEEN FRAMING UP TO 24"**

3 OPENING IN DIAPHRAGM
3/4" = 1'-0"

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Revision Schedule

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1350 HASTINGS RD, UKIAH, CA 95482
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SHEET DESCRIPTION

TYPICAL WOOD DETAILS

ENGR: JG	DATE: SEP 6, 2019
PM: DRC	

SHEET

S1.2

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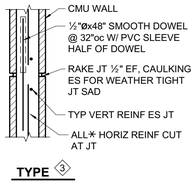
H CONCRETE MASONRY UNIT NOTES

1. CONCRETE MASONRY UNIT CONSTRUCTION SHALL BE PER -/--- UNO. USE DOUBLE OPEN END WHERE POSSIBLE AND SINGLE OPEN END OTHERWISE. ALL CELLS TO BE GROUTED SOLID. ALL CMU TO BE LAID IN RUNNING BOND.
2. PROVIDE INVERTED BOND BEAM UNITS AT FOUNDATION LEVEL. SEE SPECIFICATIONS FOR CLEANOUT AND GROUTING REQUIREMENTS.
3. DOWELS FROM FOUNDATION ARE TO MATCH SIZE AND ALIGNMENT WITH THE WALL VERTICAL REINFORCEMENT. EXTEND DOWELS FROM FOUNDATION INTO WALL TO PROVIDE MINIMUM LAP WITH WALL VERTICAL REINFORCEMENT. INSTALL DOWEL BARS PER PLAN AND 1/S1.3 . ALL DOWELS TO EXTEND TO THE LOWEST FOUNDATION REINFORCEMENT AND END WITH A STANDARD HOOK.
4. WALL REINFORCING SHALL BE PER SCHEDULE BELOW AND -/--- UNO.
5. PROVIDE (2) #5 IN BOND BEAM UNITS AT THE TOPS OF ALL WALLS AND AT EACH FLOOR AND ROOF ELEVATION, UNO.
6. PROVIDE SASH UNITS AT ALL OPENINGS TYPICAL UNO.
7. SET ALL LEDGER AND CONNECTOR BOLTS PER 3/S1.3 . 1" GROUT AROUND BOLT REQUIRED.
8. SAD FOR TYPE OF FINISH, LOCATION, COLOR, ETC. SEE SPECIFICATIONS OTHERWISE.
9. VERTICAL CONTROL JOINTS SHALL BE SPACED NO GREATER THAN 1.5x THE WALL HEIGHT BUT NOT GREATER THAN 25'-0"oc. SEE 6/S1.3 .

CMU WALL SCHEDULE

WALL TYPE	NOMINAL THICKNESS	HORIZONTAL REINFORCING	VERTICAL REINFORCING	REMARKS
A	12"	#4 @ 24"oc EF	#4 @ 16"oc EF	



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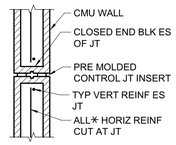
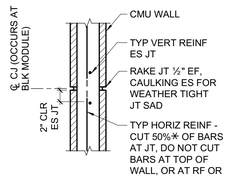
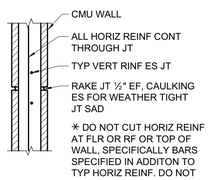


SITE WALL



TYPE 1



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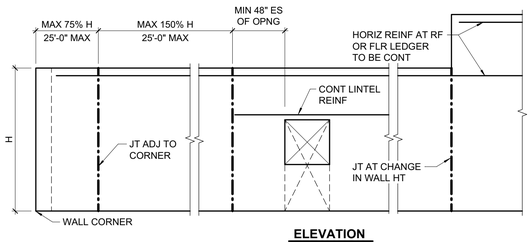
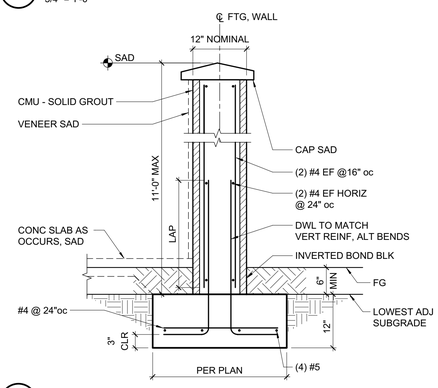
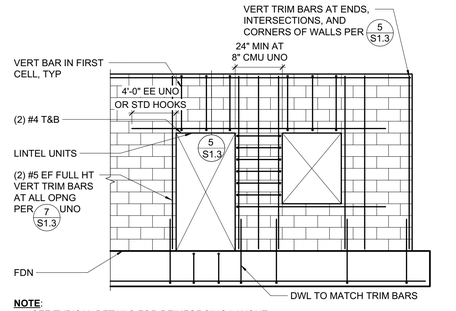


ELEVATION

6 CMU WALL CONTROL JOINT
3/4" = 1'-0"

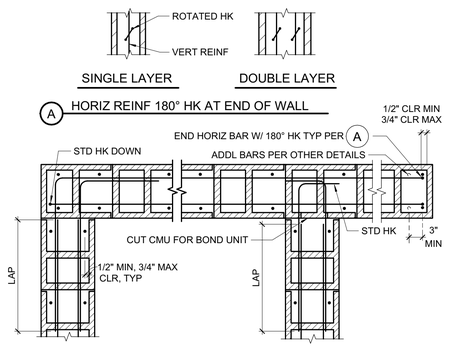


7 CMU SITE WALL
3/4" = 1'-0"

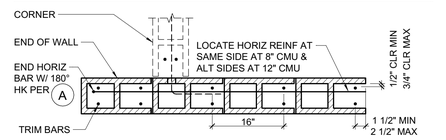


NOTE:
1. SEE TYPICAL DETAILS FOR REINFORCING LAYOUT.
2. FOR LAP SPLICES OF VERTICAL AND HORIZONTAL REINFORCING SEE
3. BLOCK LAYUP AND CONFIGURATION SHOWN IS SCHEMATIC, SEE ARCHITECTURAL DRAWINGS FOR ACTUAL BLOCK LAYUP, SIZE, ETC.

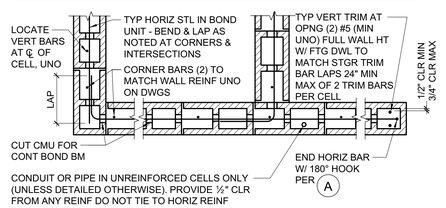
4 TYPICAL CMU WALL OPENINGS
3/4" = 1'-0"



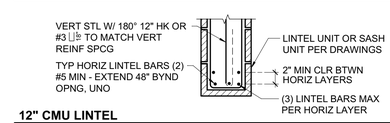
12" CMU (PLAN VIEW) - DBL LAYER HORIZ AND VERT REINF



8" CMU SINGLE OPEN END UNITS - DOUBLE LAYER VERT REINF



8" CMU (PLAN VIEW) - SINGLE LAYER VERT REINF



12" CMU LINTEL

5 8", 10" & 12" CMU TYPICAL REINFORCING
3/4" = 1'-0"

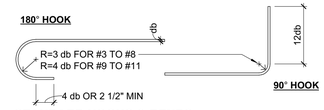
MINIMUM BAR LAPS FOR REINFORCING STEEL MASONRY STRENGTH: 2000 PSI OR GREATER (STAGGER SPLICES)					
SIZE	LAP LENGTH	SIZE	LAP LENGTH	SIZE	LAP LENGTH
#3	12"	#6	54"	#9	82"
#4	24"	#7	64"		
#5	36"	#8	72"		

MINIMUM CLEARANCES . . . . . 'CLR'

CMU TO BAR . . . . . ½"

BAR TO BAR . . . . . 2"

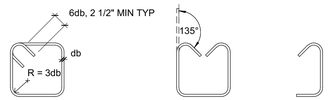
ALL REINFORCING BARS SHALL EXTEND AS FAR AS POSSIBLE



STANDARD HOOKS & BENDS



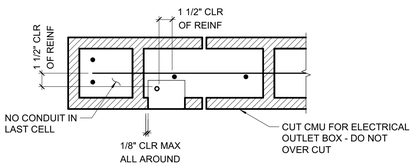
COL BAR & STRUCT OFFSET **SPLICE**



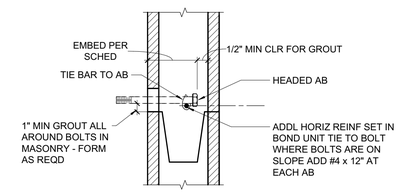
135° STIRRUP TIES #3, #4, #5 **STIRRUP #3, #4, #5** **CROSSTIE #3, #4, #5**

1 TYPICAL CMU REINFORCING DETAILS (f'm = 2000psi MIN)
3/4" = 1'-0"

NOTES:
1. DO NOT TIE CONDUIT TO REINFORCING.
2. PLACE CONDUIT IN CELLS W/O REINF WHERE POSSIBLE.



2 CONDUIT IN CMU
1 1/2" = 1'-0"



8" CMU WALL EMBEDMENT	12" CMU WALL EMBEDMENT	16" MIN PILASTER EMBEDMENT
5½"	9½"	12"

NOTE:
1. USE TEMPLATE TO SET ALL BOLTS.
2. BEDMENT TOLERANCE IS ±½" AND AS REQUIRED FOR CLEARANCE TO CMU.
3. AB SHALL PROJECT NOT LESS THAN ¼" OR MORE THAN 1" BEYOND NUT. REMOVE EXCESS THREADS WHERE NUT IS TO BE COUNTERSUNK FLUSH

3 BOLT EMBEDMENT SCHEDULE
3/4" = 1'-0"

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ENGR: JG	DATE: SEP 6, 2019
PM: DRC	

SHEET

S1.3

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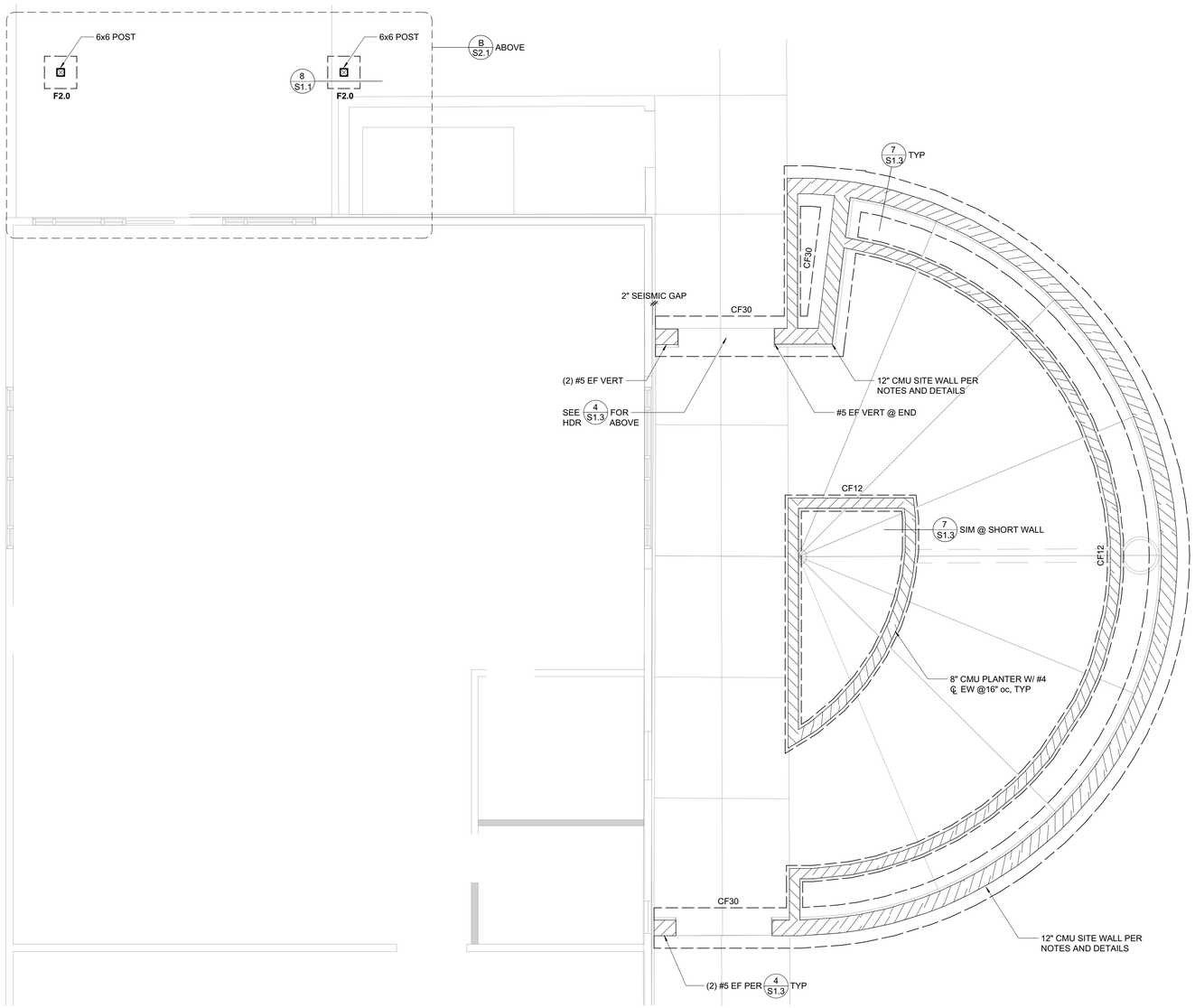
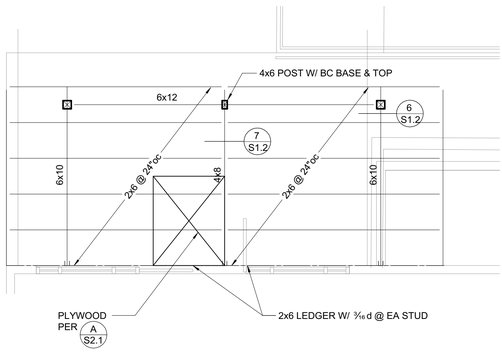


A FOUNDATION PLAN
1/4" = 1'-0"



B ENTRYWAY FRAMING PLAN
1/4" = 1'-0"

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FOUNDATION PLAN NOTES:

1. REFER TO SHEETS **S0.1**, **S1.1**, **S1.2** AND **S1.3** FOR GENERAL NOTES AND TYPICAL DETAILS. THE FOLLOWING DETAIL REFERENCES ARE PROVIDED FOR THE CONTRACTOR'S CONVENIENCE ONLY. ALL GENERAL NOTES AND TYPICAL DETAIL SHEETS NOTED ABOVE ARE APPLICABLE AND SHALL BE FOLLOWED.
2. DIMENSIONS ARE TO FACE OF STUD UNLESS NOTED OTHERWISE. COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS PRIOR TO CONSTRUCTION. NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES.
3. PLUMBING AND ELECTRICAL CONDUIT AND GROUND STRAP SHALL NOT BE LAID WITHIN FOUNDATIONS. NO UTILITY PIPES OR CONDUITS SHALL BE LOCATED THRU COLUMN FOOTINGS OR FRAME FOOTINGS. NO PIPES OR CONDUITS THRU SILL PLATES SHALL BE WITHIN 12" OF HOLDOWN BOLTS. NO MECHANICAL, ELECTRICAL, OR PLUMBING OPENINGS SHALL BE LOCATED IN SHEAR WALLS UNLESS SHOWN AND DETAILED ON THE STRUCTURAL DRAWINGS. NO VERTICAL OR HORIZONTAL PIPES OR CONDUITS SHALL BE LOCATED THROUGH STEEL FRAMES, STEEL COLUMNS, OR STEEL BASE PLATES. PROVIDE FURRING AND/OR THICKENED CONCRETE WHERE REQUIRED TO CLEAR UTILITY SYSTEMS. NOTIFY STRUCTURAL ENGINEER/ARCHITECT PRIOR TO ANY INSTALLATION NOT CONFORMING TO THESE DETAILS.

   PIPES THROUGH FOOTINGS SHALL BE PER **2/S1.1** AND **3/S1.1** .

   PIPES PARALLEL TO FOOTINGS SHALL BE PER **4/S1.1**.
4. CONTRACTOR SHALL DETERMINE FOUNDATION STEP LOCATIONS BASED ON GEOTECHNICAL REPORT, CIVIL, ARCHITECTURAL AND LANDSCAPE DRAWINGS. STEP FOOTING PER **5/S1.1**.
5. ELEVATION OF THE TOP OF FINISHED SLAB = 0'-0", UNLESS NOTED OTHERWISE.

FRAMING PLAN NOTES:

1. REFER TO SHEETS **S0.1**, **S1.2** AND **S1.3** FOR GENERAL NOTES AND TYPICAL DETAILS. THE FOLLOWING DETAIL REFERENCES ARE PROVIDED FOR THE CONTRACTOR'S CONVENIENCE ONLY. ALL GENERAL NOTES AND TYPICAL DETAIL SHEETS NOTED ABOVE ARE APPLICABLE AND SHALL BE FOLLOWED.
2. DIMENSIONS ARE TO FACE OF STUD UNLESS NOTED OTHERWISE. COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS PRIOR TO CONSTRUCTION. NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES.

PLAN LEGEND

SYMBOL	REFERENCE DETAIL	DESCRIPTION
⊠	E/S0.1	INDICATES WOOD POST.
═══	E/S0.1	INDICATES HANGER.
— — —		INDICATES LEDGER. SEE PLAN FOR SIZE AND ANCHORAGE.
88		INDICATES GRIDLINE AT FACE OF STUD.
(88)		INDICATES GRIDLINE AT CENTERLINE OF COLUMN.
1 / S3.1		INDICATES ELEVATION.
		INDICATES EXISTING FRAMING.
		INDICATES CMU WALL.
		INDICATES FOUNDATION.
F2.0		INDICATES PAD FOOTING SIZE AND REINFORCING PER SCHEDULE.

PAD FOOTING SCHEDULE

MARK	SIZE	REINFORCING
F2.0	2'-0" SQ x 18" DEEP	(3) #5 T&B EW

CONTINUOUS FOOTING SCHEDULE

MARK	'b'	'd'	REINF 'a'	NOTES
CF12	12"	12"	(1) #5 T&B	
CF30	30"	12"	(4) #5	

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Revision Schedule

#	Revision Description	Date

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PROJECT

UKIAH ELECTRIC UTILITY BUILDING
1350 HASTINGS RD, UKIAH, CA 95482
(Manage -> Project Information)

SHEET DESCRIPTION

FOUNDATION AND ENTRYWAY FRAMING PLAN

ENGR: JG	DATE: SEP 6, 2019
PM: DRC	

SHEET

S2.1

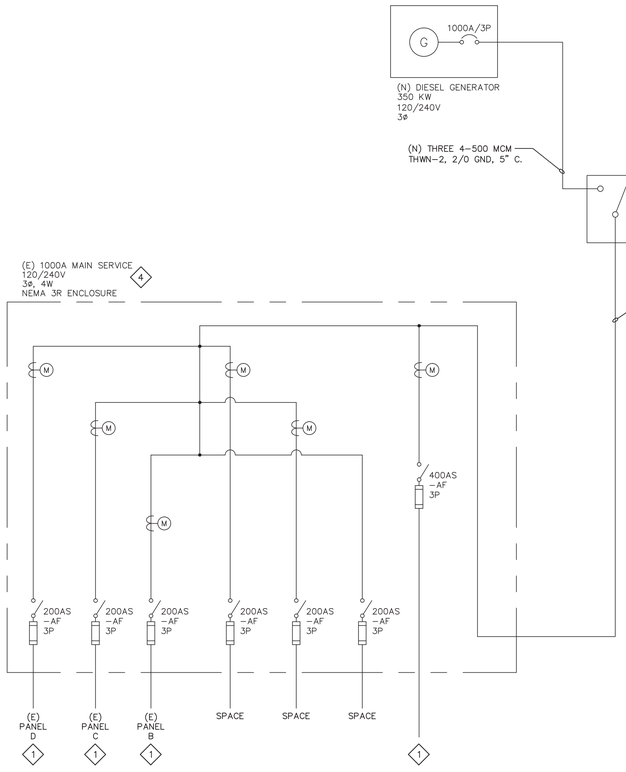
PERMIT SET - NOT FOR CONSTRUCTION

GENERAL NOTES

1. ALL PRODUCTS AND EXECUTION OF WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND AS SHOWN ON PLANS.
2. IN THE EVENT OF A DISCREPANCY BETWEEN CONTRACT DRAWINGS AND SPECIFICATIONS, THE MOST STRINGENT SHALL GOVERN.
3. ALL WORK TO BE IN ACCORDANCE WITH REQUIREMENTS OF GOVERNING FIRE, BUILDING MECHANICAL, PLUMBING AND ELECTRICAL CODES.
4. PRIOR TO SUBMISSION OF BID, THIS CONTRACTOR SHALL CONDUCT A THOROUGH SITE SURVEY AND BECOME FAMILIAR WITH ALL FEATURES IN THE DESIGNATED CONSTRUCTION AREA. ANY POSSIBLE CONFLICTS BETWEEN EXISTING SITE CONDITIONS, AND THIS CONTRACTORS ABILITY TO CONSTRUCT IN ACCORDANCE WITH CONTRACT DOCUMENTS, SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER OF RECORD, FOR DETERMINATION, IN WRITING. NO ADDITIONAL FUNDS SHALL BE PAID TO CONTRACTOR DUE TO FAILURE OF THIS CONTRACTOR TO COMPLETE THIS REQUIREMENT AND INCLUDE ALL COSTS IN HIS BID.
5. IF ANY PART OF THIS CONTRACTOR'S WORK DEPENDS UPON THE WORK OF A SEPARATE CONTRACTOR, THIS CONTRACTOR SHALL INSPECT SUCH OTHER WORK AND PROMPTLY REPORT IN WRITING TO THE OWNER ANY DEFECTS IN SUCH OTHER WORK THAT RENDERS IT UNSUITABLE TO PERFORM THE WORK OF THIS CONTRACTOR. FAILURE OF THIS CONTRACTOR TO SO INSPECT AND REPORT SHALL CONSTITUTE AN ACCEPTANCE OF THE OTHER CONTRACTOR'S WORK, EXCEPT AS TO DEFECTS WHICH MAY DEVELOP IN OTHER CONTRACTOR'S WORK AFTER EXECUTION OF THIS CONTRACTOR'S WORK.
6. CONTRACTOR SHALL REMOVE, RELOCATE, REPLACE WITH NEW AND/OR RECONNECT ALL EXISTING SERVICES AS REQUIRED BY NEW CONSTRUCTION.
7. SCHEDULE ALL WORK WITH THE FACILITY INCLUDING CONSTRUCTION ACCESS AND STORAGE. THE CONSTRUCTION SCHEDULE PROCEDURE SHALL BE APPROVED BY THE FACILITY PRIOR TO THE START OF CONSTRUCTION.
8. ALL UTILITIES REQUIRED FOR THE CONTINUOUS OPERATION OF ALL EXISTING FACILITIES MUST BE MAINTAINED IN SERVICE AT ALL TIMES EXCEPT AS REQUIRED FOR NEW SYSTEMS CONNECTION. COORDINATE SHUTDOWN WITH RESPONSIBLE FACILITY PERSONNEL.
9. CONTRACTOR SHALL PROVIDE DUST CONTROL AS REQUIRED TO CONTAIN DUST AND DEBRIS WITHIN CONSTRUCTION AREA. CLEAN ALL AREAS EACH DAY. KEEP DIRT AND DUST TO A MINIMUM.
10. ALL REMOVED ITEMS DEEMED TO HAVE VALUE BY THE OWNER SHALL BE DELIVERED TO A PLACE OF STORAGE AT THE SITE AS DIRECTED. ALL OTHER ITEMS MUST BE DISPOSED OF OFF-SITE IN A LEGAL MANNER.
11. WHERE EXISTING CONSTRUCTION IS DAMAGED, REPAIR WITH MATERIALS TO MATCH IN KIND, QUALITY AND PERFORMANCE.
12. WORK SHALL BE EXECUTED IN A CAREFUL AND ORDERLY MANNER WITH THE LEAST POSSIBLE DISTURBANCE TO PUBLIC AND OCCUPANTS OF THE FACILITY.
13. CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR SAFETY OF ALL PERSONS ON OR ABOUT THE CONSTRUCTION SITE, IN ACCORDANCE WITH APPLICABLE LAWS AND CODES. GUARD ALL HAZARDS IN ACCORDANCE WITH THE SAFETY PROVISIONS OF THE LATEST MANUAL OF ACCIDENT PREVENTION PUBLISHED BY THE ASSOCIATED GENERAL CONTRACTORS' OF AMERICA AND OSHA.
14. ALL NEW CONDUCTORS SHALL BE THHN COPPER.
15. ALL WORK SHALL MEET THE REQUIREMENTS OF THE LATEST ELECTRICAL CODE AS ACCEPTED BY THE LOCAL JURISDICTION.

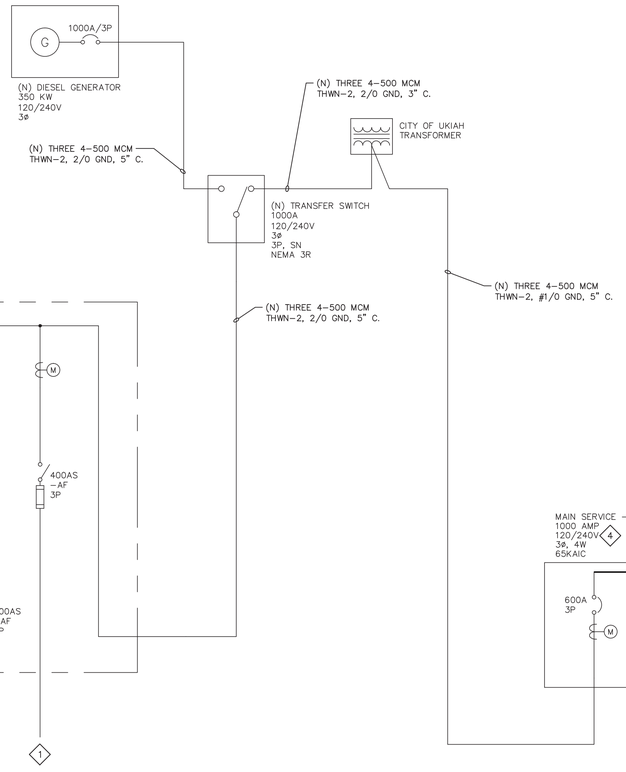
DRAWING INDEX

SHEET #	TITLE
ES001	ELECTRICAL COVER SHEET
ES100	ELECTRICAL SITE PLAN
ES200	DETAILS
ES700	SPECIFICATIONS
ES701	SPECIFICATIONS



SINGLE LINE DIAGRAM - (E) 1000A SERVICE

1. (E) PANELS IN BUILDING



SINGLE LINE DIAGRAM - (N) 1000A SERVICE

1. SIZE CIRCUIT BREAKER FOR SOLAR INSTALLATION PER CEC 690.
2. SIZE CONDUCTOR FOR SOLAR INSTALLATION PER CEC 690.
3. SEE SOLAR DRAWINGS FOR DISCONNECT INFORMATION.
4. VERIFY HIGH LEG WITH CITY OF UKIAH.
5. ESTIMATE. VERIFY ARRAY SIZE WITH SOLAR CONTRACTOR.

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SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482

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-

ELECTRICAL COVER SHEET
ELECTRICAL SERVICE CENTER - CITY OF UKIAH

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DATE	10/16/18
SCALE	AS NOTED
DRAWN	JW//MW
PROJECT	1350 HASTINGS
SHEET	ES001

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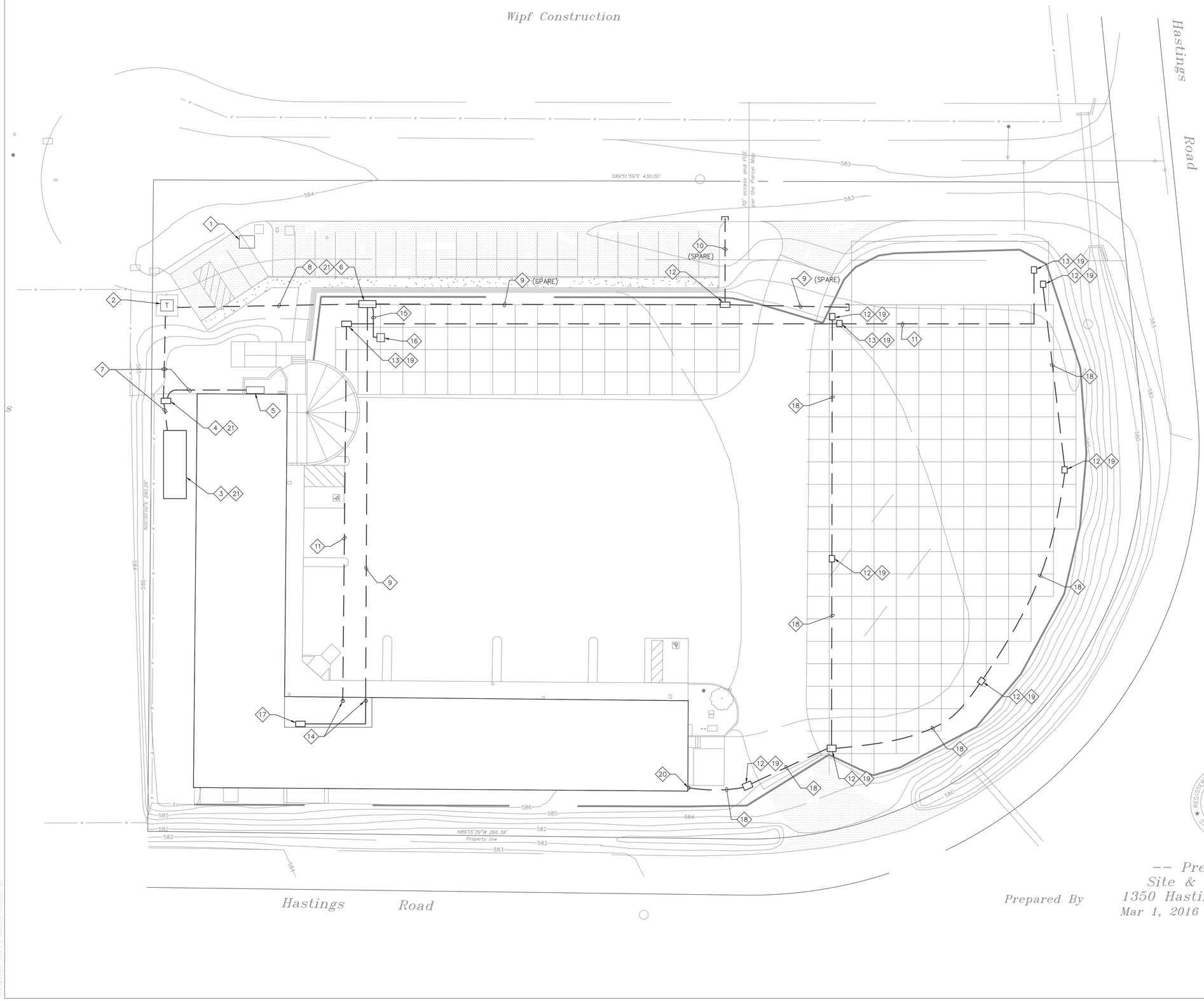

SHEET NOTES

1. (E) CITY OF UKIAH TRANSFORMER. TO BE RELOCATED BY OTHERS.
2. RELOCATED TRANSFORMER.
3. (N) 350 KW DIESEL GENERATOR. 120/240V, 3ϕ, 4W.
4. (N) 1000A AUTOMATIC TRANSFER SWITCH. 240V, 3ϕ, 4W, SN. NEMA 3R ENCLOSURE LISTED FOR SERVICE ENTRANCE EQUIPMENT.
5. (E) 1000A SERVICE. 120/240V, 3ϕ, 4W.
6. (N) 1000A SERVICE EQUIPMENT. 120/240V, 3ϕ, 4W. NEMA 3R ENCLOSURE.
7. (N) 3–5" SCH 40 CONDUIT
8. (N) 3–5" SCH 40 CONDUIT
9. (N) 2–4" SCH 40 CONDUIT
10. (N) 2–4" SCH 40 CONDUIT
11. (N) 2–2" SCH 40 CONDUIT
12. (N) UNDERGROUND BOX (POWER)
13. (N) UNDERGROUND BOX (SIGNAL)
14. ROUTE CONDUIT UP EXTERIOR WALL. PENETRATE INTO (N) ELECTRICAL ROOM. S.A.D.
15. (N) 4" C. TO CANOPY SOLAR DISCONNECT. COORDINATE WITH SOLAR DRAWINGS.
16. CANOPY SOLAR DISCONNECT. COORDINATE WITH SOLAR DRAWINGS.
17. BUILDING SOLAR DISCONNECT. COORDINATE WITH SOLAR DRAWINGS.
18. (N) TWO 2" CONDUIT.
19. (N) TRAFFIC RATED PULL BOX 17"x30"
20. PENETRATION INTO BUILDING
21. COORDINATE LOCATION WITH LANDSCAPE ARCHITECT.

-- Preliminary --
Site & Grading Plan
1350 Hastings Road, Ukiah
Mar 1, 2016 -- AP 180-070-19-00

Prepared By

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REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482

APN: 180-070-19-00
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ELECTRICAL SITE PLAN
ELECTRICAL SERVICE CENTER - CITY OF UKIAH

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SCALE	AS NOTED
DRAWN	JW/MW
PROJECT	1350 HASTINGS
SHEET	ES100

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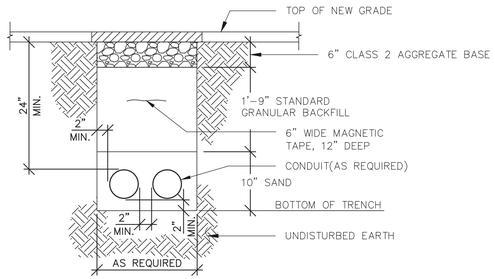
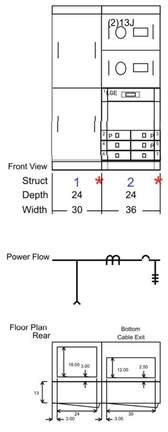


1 TYPICAL TRENCH DETAIL - PARKING AREA

Scale: NTS



Total of 2 Structures, Total Weight of 942 Weight-Lbs. with Front Hinged Doors.
Total of 2 Structures, Total Width of 66 Inches with Front Hinged Doors.

Structure	1	2				
Ship-Inches	30.00	36.00				
Ship-MM	762	914				
Width-Inches	30.00	36.00				
Width-MM	762	914				
Depth(Inner)-In.	24.00	24.00				
Depth(Inner)-MM	609	609				
Depth(Outer)-In.	37.00	37.00				
Depth(Outer)-MM	939	939				
Height-Inches	90.00	90.00				
Height-MM	2286	2286				
Weight-Lbs.(Est.)	300	642				
Weight-Kg.(Est.)	136	291				

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PREPARED BY	DATE	Eaton	SumterSC
BOYD WESTOVER	2/5/2019		
APPROVED BY	DATE	JOB NAME	Sonoma Engr - City of Ukiah
		DESIGNATION	Main Service
VERSION		TYPE	DRAWING TYPE
9.0.15.0		Switchboards	CustAppr

NEG-ALT Number	REVISION	DWG SIZE	G.O.	ITEM	SHEET
SR560205X9K4-0000	0	DwgA			2 of 3

2 NEW 1000A SWITCHBOARD DIMENSIONS

Scale: NTS

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REVISIONS	BY

SITE: 1350 HASTINGS ROAD
UKIAH, CA 95482

APN: 180-070-19-00
-

DETAILS

ELECTRICAL SERVICE CENTER - CITY OF UKIAH

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SCALE	AS NOTED
DRAWN	JW//MW
PROJECT	1350 HASTINGS
SHEET	ES200

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SECTION 16010

GENERAL PROVISIONS

PART 1 – GENERAL

1.1 WORK INCLUDED

A. SCOPE: THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, SERVICES AND TRANSPORTATION NECESSARY FOR THE CONSTRUCTION OF THE ELECTRICAL WORK AS INDICATED ON THE CONSTRUCTION DRAWINGS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. WORK DESCRIBED IN ALL SECTIONS OF THIS SPECIFICATION.
2. CUTTING AND PATCHING AS A RESULT OF THIS WORK.
3. HANGERS, ANCHORS, METAL SUPPORTS AND CHANNELS AS REQUIRED FOR WORK INCLUDED IN THIS SPECIFICATION.
4. TESTING, ADJUSTING OF COMPLETED WORK, INSPECTIONS AND INSTRUCTIONS.
5. SHOP DRAWINGS AND SUBMITTALS.
6. PERMIT AND FEES.

1.2 REFERENCES AND STANDARDS

A. THE FOLLOWING REFERENCES AND STANDARDS ARE A PART OF THIS SPECIFICATION AND WORK SHALL CONFORM TO APPLICABLE REQUIREMENTS AS SHOWN ON THE DRAWINGS OR IMPLIED HEREIN.

B. CODES AND STANDARDS: COMPLY WITH PROVISION OF THE FOLLOWING, EXCEPT AS OTHERWISE INDICATED.

1. CALIFORNIA BUILDING CODE AND UNIFORM BUILDING CODE STANDARDS OF THE INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS, 2007.
2. CALIFORNIA ELECTRICAL CODE, 2007.
3. APPLICABLE RULES AND REGULATIONS OF LOCAL AND STATE CODES HAVING JURISDICTION.

C. COMPLY WITH THE LATEST EDITION OF ALL APPLICABLE STANDARDS, INCLUDING ASME, ANSI, ASTM, UL AND OSHA.

D. MINIMUM REQUIREMENTS:

1. THE REQUIREMENTS OF APPLICABLE CODES AND STANDARDS SHALL DICTATE MINIMUM ACCEPTABLE QUALITY OF WORK.

1.3 SUBMITTALS

A. PROCEDURES: SUBMIT IN ACCORDANCE WITH THE GENERAL CONDITIONS OF THE SPECIFICATIONS.

B. SUBMIT PRODUCT DATA AND BROCHURES FOR:

1. CONDUCTORS
2. CONDUIT
3. CIRCUIT BREAKER

1.4 WORK RESPONSIBILITIES

A. SITE CONDITIONS

1. EXAMINE ALL THE DRAWINGS AND THE SPECIFICATIONS, SURVEY THE EXISTING SITE CONDITIONS AND INCLUDE ALL NECESSARY ALLOWANCES IN BID PROPOSAL.
2. RESOLVE ALL CONFLICTS WITH CODE REQUIREMENTS, SITE CONDITIONS, THE WORK OF OTHER TRADES, OR OTHER ELECTRICAL CONTRACTORS.
3. VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION AND PROTECT FROM DAMAGE.
4. PAY ALL COSTS INCURRED DUE TO DAMAGE OF EXISTING UTILITIES OR OTHER FACILITIES.

B. LOCATIONS:

1. THE DRAWINGS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED TO DETERMINE EXACT EQUIPMENT LOCATIONS OR RACEWAY DISTANCES. THEY SHALL BE FOLLOWED AS CLOSELY AS ACTUAL CONSTRUCTION AND THE WORK OF OTHER TRADES ON THIS PROJECT IS REQUIRED. AVOID OBSTRUCTIONS, PRESERVE HEADROOM, MAINTAIN REQUIRED ACCESSIBILITY AND SATISFY THE REQUIREMENTS OF THE GOVERNING CODE AND STANDARDS OF GOOD PRACTICE.
2. THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS TAKE PRECEDENCE OVER THE ELECTRICAL DRAWINGS FOR LOCATION OF CASEWORK, EQUIPMENT, LIGHTS, POWER RECEPTACLES, PHONE AND DATA OUTLETS, ETC. CONTRACTOR SHALL REFER TO THE DRAWINGS, SPECIFICATIONS, AND REVIEW SHOP DRAWINGS FOR ALL WORK, IN ORDER TO COORDINATE HIS ELECTRICAL WORK WITH THE OTHER WORK OF THE PROJECT.
3. BRING DISCREPANCIES BETWEEN DIFFERENT DRAWINGS, BETWEEN DRAWINGS AND ACTUAL FIELD CONDITIONS OR BETWEEN DRAWINGS AND SPECIFICATIONS, PROMPTLY TO THE ATTENTION OF THE ARCHITECT FOR DECISION.

C. RESPONSIBILITY:

1. PROVIDE COMPLETE FUNCTIONING SYSTEMS AND INCLUDE ALL LABOR, MATERIAL AND ASSOCIATED TOOLS AND TRANSPORTATION REQUIRED FOR THE SYSTEM TO OPERATE SAFELY AND SATISFACTORILY.
2. PROVIDE ALL WORK INDICATED ON THE DRAWINGS WHETHER OR NOT SPECIFICALLY MENTIONED IN THE SPECIFICATIONS.
3. COORDINATE THE INSTALLATION OF ELECTRICAL ITEMS WITH THE SCHEDULES FOR WORK OF OTHER TRADES AND OTHER CONTRACTORS TO PREVENT DELAYS IN TOTAL WORK. ASSUME RESPONSIBILITY FOR ANY COOPERATIVE WORK WHICH MUST BE ALTERED DUE TO LACK OF PROPER SUPERVISION OR FAILURE TO MAKE PROPER PROVISIONS IN TIME.
4. OBTAIN AND PAY FOR ALL PERMITS, FEES AND INSPECTIONS.

1.5. SYSTEM ACCEPTANCE:

A. FINAL REVIEW: REQUEST A FINAL REVIEW PRIOR TO SYSTEM ACCEPTANCE AFTER:

1. COMPLETION OF THE INSTALLATION OF ALL SYSTEMS REQUIRED UNDER THE CONTRACT DOCUMENTS.
2. COMPLETION OF CLEANING.
3. SATISFACTORY OPERATION OF ALL SYSTEMS FOR A PERIOD OF ONE WEEK.

B. ACCEPTANCE SHALL BE CONTINGENT ON:

1. COMPLETION OF FINAL REVIEW AND CORRECTION OF ALL DEFICIENCES.
2. SATISFACTORY COMPLETION OF THE ACCEPTANCE TESTS WHICH SHALL DEMONSTRATE COMPLIANCE WITH ALL PERFORMANCE AND TECHNICAL REQUIREMENTS OF THE CONTRACT DOCUMENTS.
3. SUBMISSION OF AS-BUILT DRAWINGS.

**END OF SECTION*

SECTION 16110

CONDUITS AND ELECTRICAL METALLIC TUBING

PART 1 – GENERAL

1.1 WORK INCLUDED:

A. THE CONTRACTOR SHALL FURNISH CONDUITS, ELECTRICAL METALLIC TUBING AND FITTINGS FOR ALL POWER, LIGHTING, MECHANICAL EQUIPMENT AND SIGNAL SYSTEMS SHOWN ON THE DRAWINGS AND AS SPECIFIED HEREIN, UNLESS NOTED ELSEWHERE IN THESE SPECIFICATIONS UNDER "WORK NOT INCLUDED".

PART 2 – PRODUCTS

2.1 CONDUITS AND TUBING

A. RIGID METTALIC CONDUIT (RMC): SHALL BE HOT-DIP GALVANIZED STEEL INCLUDING THREADS AS PER UL 6, FEDERAL SPECIFICATIONS WWC-581-D AND ANSI C80-1.

B. ELECTRICAL METALLIC TUBING (EMT): SHALL BE ELECTROLYTICALLY GALVANIZED STEEL PER UL 797 AND ANSI C33.98.

C. ELECTRICAL METALLIC TUBING FITTINGS: COUPLINGS AND INSULATED THROAT CONNECTORS SHALL BE SET SCREW TYPE.

D. LIQUID TITE FLEXIBLE METAL CONDUIT: SHALL BE ELECTROLYTICALLY GALVANIZED STEEL PER UL 1 AND ANSI C33.92 AND COVERED WITH POLYVINYL CHLORIDE (PVC) TO JIC REQUIREMENTS.

E. FLEXIBLE METAL CONDUIT: SHALL BE ELECTROLYTICALLY GALVANIZED STELL PER UL-1 AND ANSI C33.92.

F. RIGID NONMETALLIC CONDUIT (PVC) SCHEDULE 40: SHALL BE POLYVINYL CHLORIDE (PVC) AS REQUIRED PER UL 651, FEDERAL SPECIFICATIONS WC-1094A AND NEMA STANDARDS PUBLICATION NO. TC2-1978.

PART 3 – EXECUTION

3.1 INSTALLATION OF CONDUIT AND TUBING

A. A MINIMUM OF 6-INCHES CLEARANCE SHALL BE MAINTAINED BETWEEN ALL ELECTRICAL CONDUITS AND ANY PIPING, DUCTS OR OBJECTS OPERATING AT TEMPERATURES OVER 86 DEGREES FAHRENHEIT.

B. INSTALL CONDUIT PER CEC AND CONCEAL WHEREVER POSSIBLE AND/OR PRACTICAL. RIGID METAL CONDUIT AND EMT, INSTALLED EXPOSED SHALL BE MOUNTED ON SUPPORTS SPACED NOT OVER 8 FEET APART UNLESS OTHERWISE NOTED. RUNS SHALL BE PARALLEL OR PERPENDICULAR TO WALLS, CEILINGS, OR STRUCTURAL MEMBERS.

C. EVERY CONDUIT OR TUBING CONTAINING ENERGIZED CONDUCTORS AND INSTALLED AS PART OF THIS WORK SHALL CONTAIN A GREEN INSULATED COPPER EQUIPMENT GROUNDING CONDUCTOR SIZED IN ACCORDANCE WITH CEC. UNDER NO CIRCUMSTANCES SHALL CONDUITS OR TUBING ALONE BE USED AS AN EQUIPMENT GROUND CONDUCTOR. IF LARGE CONDUCTORS ARE USED AS EQUIPMENT GROUNDS AND THEY ARE NOT AVAILABLE WITH GREEN COLORED INSULATION, THEY SHALL BE MARKED WITH GREEN PLASTIC TAPE AT ALL TERMINATIONS AND PULLBOXES TO IDENTIFY THEM AS GROUNDING CONDUCTORS.

D. CONDUIT OR METALLIC TUBING INSTALLED ABOVE SUSPENDED CEILINGS SHALL BE SUPPORTED INDEPENDENTLY FROM THE CEILING SYSTEM IN AN APPROVED MANNER TO THE BUILDING STRUCTURE. SUCH CONDUITS OR TUBING SHALL BE INSTALLED IN A MANNER THAT DOES NOT INTERFERE WITH ACCESS TO THE SPACE. DO NOT ATTACH OR SUPPORT THESE CONDUITS OR TUBING FROM THE CEILING SUPPORT SYSTEM.

E. TYPES OF CONDUITS OR ELECTRICAL METALLIC TUBING TO BE INSTALLED THROUGH FIRE RATED WALLS, FLOORS OR CEILINGS SHALL BE DETERMINED BY THE U.L. SYSTEM NUMBER OF THE FIRE RATED SEALANT SELECTED FOR THE SPACE. THE INSTRUCTIONS FOR A PARTICULAR U.L. SYSTEM NUMBER SHOULD SPECIFY WHAT TYPE OF CONDUIT CAN BE USED WITH THE FIRE SEALANT TO CREATE AN ACCEPTABLE SYSTEM. DO NOT ASSUME THAT SOMETHING WILL BE ACCEPTABLE, CONSULT WITH THE PROJECT INSPECTOR AND THE PRODUCT INSTALLATION INSTRUCTION BEFORE DOING THE WORK. THE HOURLY RATING OF THE SURFACE TO BE PENETRATED SHOULD DETERMINE THE U.L. SYSTEM TO BE USED.

F. STUB-UPS SHALL BE PROTECTED FROM DAMAGE AND CAREFULLY REBENT WHEN NECESSARY. BENDS AND OFFSETS SHALL BE CAREFULLY MADE SO THAT THE INSIDE DIAMETER IS NOT EFFECTIVELY REDUCED. UNLESS OTHERWISE REQUIRED, THE LEGS OF A BEND SHALL BE IN THE SAME PLANE, THE STRAIGHT LEGS OF OFFSETS ARE PARALLEL.

G. ALL EXPOSED CONDUITS FROM THE FINISHED FLOOR OR WORKING SURFACES, UP TO EIGHT FEET, SHALL BE RIGID METAL CONDUIT. ALL CONDUITS SUBJECT TO MECHANICAL DAMAGE SHALL BE RIGID METAL CONDUIT.

H. PROVIDE ANCHORAGE OF ALL CONDUITS, GUIDES AND SUPPORTS IN ACCORDANCE WITH THE SMACNA GUIDELINES.

END OF SECTION

SECTION 16120

CONDUCTORS AND TERMINATIONS

PART 1 – GENERAL

1.1 WORK INCLUDED:

A. THE CONTRACTOR SHALL FURNISH CONDUCTORS PROVIDING POWER FOR FEEDERS AND BRANCH CIRCUITS AT LESS THAN 600 VOLTS, UNLESS NOTED OTHERWISE ON THE DRAWINGS OR IN THE SPECIFICATIONS.

PART 2 – PRODUCTS

2.1 CONDUCTORS (600 VOLTS AND BELOW)

A. WIRE AND CABLE SHALL BE NEW AND SHALL HAVE SIZE, TYPE OF INSULATION, VOLTAGE RATING AND MANUFACTURER'S NAME PERMANENTLY MARKED ON OUTER COVERING AT REGULAR INTERVALS. WIRE AND CABLE SHALL BE FACTORY COLOR-CODED BY INTEGRAL PIGMENTATION.

B. WIRE SHALL CONFORM TO UL 83 AND ANSI C33.8 STANDARDS, FEDERAL SPECIFICATIONS JC 30A. USE THWN TYPE OF INSULATION ON FEEDERS AND BRANCH CIRCUITS, UNLESS A DIFFERENT TYPE OF INSULATION IS REQUIRED BY THE CEC OR AN AGENCY HAVING JURISDICTION OVER THIS WORK.

C. THE COPPER CONDUCTOR SHALL HAVE A 90 PERCENT MINIMUM CONDUCTIVITY AND SHALL BE STRANDED, UNLESS OTHERWISE NOTED. MINIMUM WIRE SIZE SHALL BE NO 12 AWG, UNLESS NOTED OTHERWISE. ALUMINUM WIRE IS NOT ACCEPTABLE FOR THIS WORK.

D. BARE GROUND CONDUCTORS SHALL MEET FEDERAL SPECIFICATION QQ-W-343.

2.2 TERMINATIONS

A. ELECTRICAL SPRING STEEL CONNECTORS WITH UL APPPROVED INSULATING CAPS SHALL BE USED ON #10 AWG AND SMALLER STRANDED OR SOLID COPPER CONDUCTORS WHERE SPLICING IS REQUIRED.

B. RING AND FORK TYPE COPPER TERMINATIONS WITH APPLICATION BY A SPECIAL CRIMPING TOOL SHALL BE USED ON #10 AWG AND SMALLER CONDUCTORS FOR TERMINATING, EXCEPT WHEN TERMINATED INTO CIRCUIT BREAKERS OR WIRING DEVICES WITH BUILT-IN SPRING CLIPS.

C. FOR CONDUCTORS #8 AWG AND LARGER, ALL SPLICES AND/OR TERMINATIONS SHALL BE SOLDERLESS LONG BARREL COLOR KEYED COMPRESSION TYPES FOR APPLICATION WITH A HYDRAULIC TOOL.

D. CONNECTORS SHALL BE CERTIFIED AS MEETING UL 486 CYCLING TEST REQUIREMENTS.

E. INSULATED TAPE SHALL CONFORM TO UL 510 AND ANSI C33.74 STANDARDS.

PART 3 – EXECUTION

3.1 INSTALLATION OF CONDUCTORS

A. CONDUCTORS SHALL NOT BE SUBJECTED TO PULLING TENSIONS IN EXCESS OF MANUFACTURER'S RECOMMENDATIONS.

B. CONDUCTORS SHALL BE CONTINUOUS FROM POINT TO POINT. NO SPLICES SHALL BE PERMITTED, EXCEPT IN SPLICE BOXES OR ENCLOSURES APPROVED FOR THIS PURPOSE.

C. CONDUCTORS SHALL BE TAGGED AT EACH END WITH TUBULAR MARKERS. A SCHEDULE SHALL BE PROVIDED ON THE AS-BUILT DRAWINGS CORRELATING THE WIRE MARKINGS.

D. INSTALLATION OF THE GROUNDED (NEUTRAL) CONDUCTORS SHALL COMPLY WITH ARTICLE 200 AND 210.5 OF THE CEC, EXCEPT THAT INSULATION IS REQUIRED ON THE CONDUCTOR.

E. INSTALLATION AND CONNECTION OF EQUIPMENT GROUNDING CONDUCTORS SHALL BE PER ARTICLE 210.5 AND 250.1 OF THE CEC.

F. 480/277 VOLTS, 3-PHASE, 4-WIRE SYSTEMS SHALL HAVE A COLOR CODE OF BROWN (PHASE A), ORANGE (PHASE B), YELLOW (PHASE C), AND NATURAL GRAY FOR NEUTRAL. 208/120 VOLT, 3-PHASE, 4-WIRE SYSTEMS SHALL HAVE A COLOR CODE OF BLACK (PHASE A), RED (PHASE B), BLUE (PHASE C), AND WHITE FOR NEUTRAL. COLORS SHALL BE MAINTAINED THROUGHOUT THE PROJECT. EQUIPMENT GROUNDING CONDUCTORS SHALL HAVE GREEN INSULATION, UNLESS OTHERWISE NOTED. INTERMIXING OF COLORS WITH DIFFERENT VOLTAGES SHALL NOT BE DONE.

G. NO CONDUCTOR CARRYING 120 VOLTS OR MORE SHALL BE SMALLER THAN #12 AWG.

H. WIRE AND CABLE SHALL BE SUITABLE FOR THE TEMPERATURE, CONDITIONS AND LOCATION WHERE IT IS INSTALLED. ACCESSORY MATERIALS, SUCH AS CONNECTORS, SPLICE AND TAP FITTINGS AND TERMINATIONS SHALL BE OF A TYPE DESIGNED OR INTENDED AND SUITABLE FOR THE USE. THEY SHALL BE COMPATIBLE WITH THE CONDUCTOR MATERIAL.

I. CONDUCTOR SPLICES SHALL BE KEPT TO A MINIMUM. SPLICES AND TAPS SHALL HAVE AT LEAST THE EQUIVALENT MECHANICAL STRENGTH AND INSULATION OF THE CONDUCTORS. SPLICE AND TAP DEVICES SHALL BE OF THE PROPER SIZE AND TYPE FOR THE USE AND COMPATIBLE WITH THE CONDUCTOR MATERIAL.

J. THE LENGTH OF CONDUCTORS WITHIN CABINETS AND CUTOUT BOXES SHALL BE SUFFICIENT TO NEATLY TRAIN THEM TO THEIR TERMINAL POINT WITH NO EXCESS. WHEN THERE ARE MANY CONDUCTORS, THEY SHALL BE CABLED OR BUNDLED.

3.2 TESTING (600 VOLT OR LESS)

A. TESTS SHALL BE CONDUCTED WITH A 500 VOLT MEGGER WITH READINGS RECORDED AFTER CONTINUOUS VOLTAGE APPLICATION OF ONE MINUTE. VALUES SHALL NOT RUN LESS THAN THE FOLLOWING:

1. NO. 14 OR NO 12 AWG – 1 MEGOHM
2. NO. 10 THRU NO. 6 AWG – 1/4 MEGOHM
3. NO. 4 OR NO. 2 AWG – 50 K OHMS
4. NO 1/0 THRU 4/0 AWG – 25 K OHMS
5. 250 MCM THRU 750 MCM – 12 K OHMS

END OF SECTION

SECTION 16130

METALLIC OUTLET BOXES AND PULLBOXES

PART 1 – GENERAL

1.1 WORK INCLUDED:

A. FURNISH OUTLET BOXES FOR WIRING DEVICES, LIGHTING FIXTURES AND OTHER ELECTRICAL EQUIPMENT.

B. FURNISH JUNCTION BOXES AND PULLBOXES AS REQUIRED FOR THE CONSOLIDATION OF CONDUIT RUNS AND TO AID IN PULLING CONDUCTORS.

PART 2 – PRODUCTS

2.1 OUTLET BOXES, JUNCTION BOXES AND PULL BOXES

A. OUTLET BOXES SHALL BE SIZED FOR THE APPLICATION. BOXES SHALL BE EQUIPPED WITH PLASTER RINGS OR COVERS AS REQUIRED. UNITS SHALL BE PRESSED FROM GALVANIZED STEEL. GANGABLE AND THROUGH-WALL TYPES ARE NOT ACCEPTABLE.

B. OUTLET BOXES FOR WET AND EXPOSED LOCATION SHALL BE CAST METAL TYPE FS UNITS WITH GASKETED COVER.

C. JUNCTION AND PULLBOXES SHALL BE FABRICATED FROM 16 GAUGE OR HEAVIER GALVANIZED SHEET STEEL WITH A GREY ENAMEL FINISH, EXCEPT WHERE MOUNTING SURFACES ARE A DIFFERENT COLOR. PAINT TO MATCH IN THOSE CASES. FULL ACCESS FLUSH OR SURFACE SCREW COVERS SHALL BE FURNISHED AS REQUIRED. COVER RETENTION SHALL BE BY CORROSION RESISTANT MACHINE SCREWS. BOX SIZE SHALL BE PER 2004 CEC ARTICLE 314.

PART 3 – EXECUTION

3.1 OUTLET BOXES, JUNCTION BOXES AND PULL BOXES

A. BLANKING COVERS SHALL BE INSTALLED ON UNUSED OPENINGS.

B. BOXES SHALL HAVE SUFFICIENT VOLUME PER 2004 CEC ARTICLE 314 TO ACCOMMODATE CONDUCTORS, AND FITTINGS IF USED.

C. OUTLET BOXES SHALL BE OF A TYPE APPROPRIATE FOR THE USE AND LOCATION. THEY SHALL BE SECURELY AND RIGIDLY ATTACHED OR SUPPORTED PLUMB, LEVEL AND TRUE. OUTLET BOX SUPPORTS, HANGERS OR BRACKETS WHEN USED SHALL BE OF A TYPE DESIGNED OR SUITABLE FOR THE TYPE OF BOX USED AND THE BUILDING STRUCTURAL MEMBER TO WHICH ATTACHED. IN DETERMINING THE TYPE OF SUPPORT OR FASTENER, CONSIDERATION MUST BE GIVEN TO THE LOAD CAUSED BY ANY DEVICE OR EQUIPMENT, SUCH AS LIGHTING FIXTURES, WHICH ARE IN TURN SUPPORTED BY THE OUTLET BOX.

D. OUTLET BOXES FOR SWITCHES SHALL BE MOUNTED WITH THE LONG AXIS VERTICAL. BOXES FOR RECEPTACLES SHALL BE MOUNTED EITHER VERTICALLY OR HORIZONTALLY BUT CONSISTENT EITHER WAY. THREE OR MORE GANG BOXES SHALL BE MOUNTED WITH THE LONG AXIS HORIZONTAL. THE BOXES SHALL BE SO LOCATED THAT THE COVERS OR DEVICE PLATES WILL NOT SPAN DIFFERENT TYPES OF BUILDING FINISHES EITHER VERTICALLY OR HORIZONTALLY. BOXES FOR SWITCHES NEAR DOORS SHALL BE LOCATED ON THE SIDE OPPOSITE THE HINGE AND CLOSE TO THE DOOR TRIM.

E. JUNCTION AND PULL BOXES SHALL BE USED WHERE NECESSARY TO FACILITATE THE INSTALLATION OF RACEWAY AND PULLING OF WIRE OR CABLE. CONSIDERATION SHALL BE GIVEN TO THE SIZE AND NUMBER OF CONDUCTORS, NUMBER OF BENDS IN THE RACEWAY, CHANGE IN DIRECTION OF THE RACEWAY OR CONDUCTORS AND THE NEED FOR SUPPORT OF CONDUCTORS IN VERTICAL RACEWAYS. THEY SHALL BE OF A TYPE INTENDED OR SUITABLE FOR THE USE AND LOCATION. THEY MAY BE CATALOG ITEMS OR CUSTOM DESIGNED AND FABRICATED TO MEET THE PARTICULAR REQUIREMENTS.

F. JUNCTION AND PULL BOXES SHALL BE FIRMLY AND SECURELY FASTENED TO OR SUPPORTED FROM THE BUILDING STRUCTURE OR STRUCTURAL MEMBER. IN DETERMINING THE TYPE OF FASTENER, HANGER OR SUPPORT, CONSIDERATION MUST BE GIVEN TO THE LOAD CAUSED BY ANY CONDUCTORS SUPPORTED BY THE BOX AND ANY LOAD THAT MIGHT BE CAUSED BY EXTERNAL FORCES. KNOCKOUTS FOR RACEWAYS ENCLOSING THE SAME CONDUCTORS SHALL BE ARRANGED TO PROVIDE THE LONGEST SWEEP OR RADIUS FOR THE CONDUCTORS. SEE TABLE FOR RACEWAY SPACINGS.

G. JUNCTION AND PULLBOXES SHALL BE READILY ACCESSIBLE.

H. BOX DIMENSIONS SHALL BE IN ACCORDANCE WITH SIZE AND QUANTITY OF CONDUCTORS AND CONDUITS ENTERING AND LEAVING THE BOX PER 2004 CEC ARTICLE 314 REQUIREMENTS.

END OF SECTION

SECTION 16250

AUTOMATIC TRANSFER

PART 1 – GENERAL

1.01DESCRIPTION

A. Scope:
1. Furnish one complete automatic transfer switch switch in a NEMA 3R
2. Field testing is included.

B. Related Work Described Elsewhere:
1. Raceways and Fittings in Section 16110.
2. Conductors and Terminations in Section 16120..

1.02 QUALITY ASSURANCE

A. Standards:
1. The automatic transfer switches shall conform to applicable requirements of:
a. The Underwriter's Laboratories, Inc. (UL). Particularly UL-1008.
b. Joint Industry Council Standards (JIC).
c. The American Standards Institute (ANSI).
d. The National Electrical Manufacturer's Association (NEMA).
e. Federal Specifications.
B. Codes:
1. See Section 16010.

1.03 PRODUCT HANDLING

A. In the event of raceway damage, the Contractor shall immediately make all necessary repairs and replacements to the approval of the (Architect) (Engineer) and at no additional cost to the Owner.

1.04 INTENT OF DRAWINGS

A. Exact conduit locations are not shown unless specifically dimensioned or noted. One-line and riser diagrams are schematic and do not show physical arrangement of equipment unless specifically noted.

PART 2 – PRODUCTS

2.01 GENERAL

A. The automatic transfer switch (ATS), shall be mounted in a freestanding enclosure, as shown on the plans, and bussed together with copper bus to provide a complete and pretested assembly. Aluminum bus and/or cable interconnections are not acceptable. Construction shall be such that the Contractor need install only the power and control connections. Include a thermostatically controlled strip heater in this section. number.

2.02 AUTOMATIC TRANSFER SWITCH

A. Rating:
1. The automatic transfer switch ratings shall be as shown on the drawings. The complete switch assembly shall be listed under UL-1008 for use on emergency systems.

B. Construction and Performance:
1. The transfer switch shall be double throw, actuated by a single electrical operator, momentarily energized; and connected to the transfer mechanism by a simple over-center-type-linkage with a total transfer time not to exceed 1/2 second. The transfer switch shall be capable of transferring successfully in either direction with 70% of rated voltage applied to the switch terminals.
2. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in position in both the normal and emergency positions without the use of hooks, latches, magnets or springs and shall be silver-tungsten alloy. Separate arcing contacts, with magnetic blowouts, shall be provided on all transfer switches. Interlocked molded case circuit breakers or contactors are not acceptable. The transfer switch shall be equipped with a permanently attached safe manual operator designed to prevent injury to operating personnel. The manual operator shall provide the same contact-to-contact transfer speed as the electrical operator to prevent a flashover from switching the main contacts slowly.

C. Sequence of Operation:
1. Engine starting contacts shall be provided to start the generating plant should the voltage of the normal source drop below 80% on any phase after an adjustable time delay of 0.5-3 seconds to allow for momentary dips. The transfer switch shall transfer to emergency when 90% of rated voltage and frequency has been reached. After restoration of normal power on all phases to 90% of rated voltage, and adjustable time delay period of zero to 25 minutes shall delay retransfer to allow stabilization of normal power. If the emergency power source should fail during this time delay period, the switch shall automatically return to the normal source. After retransfer to normal, the engine-generator shall be allowed to operate at no load for a period of 5 minutes. A test switch shall be included to simulate normal power failure, and pilot lights shall be mounted on the cabinet door to indicate the switch position. Two auxiliary contacts rated 25 ampere, 120 volts shall be mounted on the main shaft; one closed on normal, the other closed on emergency. In addition, one set of relay contacts shall be provided to open upon loss of the normal power supply. All relays, timers, control wiring and accessories shall be front accessible. All control wire terminations are to be identified by tubular sleeve-type markers.
2. The automatic transfer switch shall include the following accessories:

a. Accessory
b. Number Function
c. 1d Time Delay to override momentary normal source power outages. To delay engine start signal and transfer switch operation. Adjustable 0.5 – 3 seconds, factory set at 3 seconds.
d. 3c Time Delay on retransfer to normal. Motor driven type adjustable 0 – 25 minutes, factory set at 5 minutes with engine overrun to provide fixed 5 minute unloaded engine operation after retransfer to normal.
e. 5a Load Test Switch to simulate normal power failure. (Maintained Type).

2.03 Contact to close on failure of normal source to initiate engine starting or other customer functions.

2.04 Contact to open on failure of normal source to initiate engine starting or other customer functions.

a. 9a Green Pilot Light to indicate switch in normal position.
b. 9b Red Pilot Light to indicate switch in emergency position.
c. 14a Auxiliary Contact closed in normal position.
d. 14b Auxiliary Contact closed in emergency position.

2.05 Adjustable Relay to prevent transfer to emergency until voltage and frequency of generating plant have reached acceptable limits. Factory set at 90% of rated value.

A. Approval:
1. As a precondition for approval, the manufacturer of the automatic transfer switch shall verify that his switch is listed by Underwriter's Laboratories, Inc., Standard UL-1008 with withstand and close-in values at least equal to the interrupting rating of the circuit breaker and/or fuse that is specified to protect the circuit.
2. When coordinated with circuit breakers, the automatic transfer switch shall have the following short circuit withstand capability:

Switch Ampere Rating	ATS Coordinated with Molded Case Circuit Breakers
225 – 800	50,000

3. During the Withstand Tests there shall be no contact welding or damage. The tests shall be performed on identical samples without the use of current limiting fuses. Oscillograph traces across the main contacts shall verify that contact separation has not occurred. Test procedures shall be in accordance with UL-1008 and testing shall be certified by Underwriter's Laboratories or any nationally recognized independent testing laboratory.
4. When conducting temperature rise tests to UL-1008, the manufacturer shall include post-endurance temperature rise tests to verify the ability of the transfer switch to carry full rated current after completing the overload and endurance tests.
5. The automatic transfer switch shall be ASCO 700 Series.

2.06
C. Manufacturer:
1. Combination automatic transfer switch shall be Asco 700 Series..

**END

SECTION 16210 – DIESEL POWERED GENERATOR SETS

PART 1 – GENERAL

1.01DESCRIPTION

A. SCOPE:
1. FURNISH NEW DIESEL POWERED GENERATOR SET.

B. RELATED WORK DESCRIBED ELSEWHERE:
1. CONDUIT AND FITTINGS IN SECTION 16110.
2. CONDUCTORS AND TERMINATIONS IN SECTION 1612

1.02 QUALITY ASSURANCE

A. STANDARDS:
1. IN ADDITION TO COMPLYING WITH PERTINENT STANDARDS, COMPLY WITH PERTINENT RECOMMENDATIONS CONTAINED IN THE FOLLOWING:
a. THE NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA).
b. THE UNDERWRITER'S LABORATORIES, INC. (UL).

B. CODES:
1. SEE SECTION 16010.
2. NATIONAL FIRE PROTECTION ASSOCIATION PUBLICATION NFPA-110.

PART 2 – PRODUCTS

2.01 DIESEL GENERATOR SET

A. GENERAL REQUIREMENTS:
1. IT IS THE INTENT OF THIS SPECIFICATION TO SECURE AN EMERGENCY GENERATOR SYSTEM THAT HAS BEEN PROTOTYPE TESTED, FACTORY BUILT, PRODUCTION TESTED, SITE TESTED, OF THE LATEST COMMERCIAL DESIGN, TOGETHER WITH ALL ACCESSORIES NECESSARY FOR A COMPLETE INSTALLATION AS SHOWN ON THE PLANS AND DRAWINGS, AND SPECIFIED HEREIN. THE EQUIPMENT SUPPLIED AND INSTALLED SHALL MEET THE REQUIREMENTS OF THE CALIFORNIA ELECTRICAL CODE, ALONG WITH ALL APPLICABLE CODES AND REGULATIONS. EQUIPMENT SHALL BE NEW, OF CURRENT PRODUCTION OF A NATIONAL FIRM WHICH MANUFACTURES THE GENERATOR(S) AND CONTROLS, TRANSFER SWITCH(ES), AND ASSEMBLES THE GENERATOR SET(S) AS MATCHED UNITS, SO THAT THERE IS ONE-SOURCE RESPONSIBILITY FOR WARRANTY, PARTS, AND SERVICE THROUGH A LOCAL REPRESENTATIVE WITH FACTORY-TRAINED SERVICEMEN.

B. SUBMITTAL:
1. SUBMITTAL SHALL INCLUDE PROTOTYPE TEST CERTIFICATION AND SPECIFICATION SHEETS SHOWING ALL STANDARD AND OPTIONAL ACCESSORIES TO BE SUPPLIED, SCHEMATIC WIRING DIAGRAMS, DIMENSION DRAWINGS, AND INTERCONNECTION DIAGRAMS IDENTIFYING BY TERMINAL NUMBER, EACH REQUIRED INTERCONNECTION BETWEEN THE GENERATOR SET AND THE TRANSFER SWITCH.

C. TESTING:
1. TO ASSURE THAT THE EQUIPMENT HAS BEEN DESIGNED AND BUILT TO THE HIGHEST RELIABILITY AND QUALITY STANDARDS, THE MANUFACTURER AND LOCAL REPRESENTATIVE SHALL BE RESPONSIBLE FOR THREE SEPARATE TESTS: DESIGN PROTOTYPE TESTS, FINAL PRODUCTIONS TESTS, AND SITE TESTS.
a. MAXIMUM POWER (KW).
b. MAXIMUM MOTOR SETTING (KVA) AT 30% INSTANTANEOUS VOLTAGE DIP.
c. ALTERNATOR TEMPERATURE RISE BY EMBEDDED THERMO-COUPLE AND BY RESISTANCE METHOD PER NEMA MG1-22.40 AND 16.40.
d. GOVERNOR SPEED REGULATION UNDER STEADY-STATE AND TRANSIENT CONDITIONS.
e. VOLTAGE REGULATION AND GENERATOR TRANSIENT RESPONSE.
f. FUEL CONSUMPTION AT 1/4, 1/2, 3/4, AND FULL LOAD.
g. HARMONIC ANALYSIS, VOLTAGE WAVEFORM DEVIATION, AND TELEPHONE INFLUENCE FACTOR.
h. THREE-PHASE SHORT CIRCUIT TESTS.
i. ALTERNATOR COOLING AIR FLOW.
j. TORSIONAL ANALYSIS TESTING TO VERIFY THAT THE GENERATOR SET IS FREE OF HARMFUL TORSIONAL STRESSES.
k. ENDURANCE TESTING.
l.
d. FINAL PRODUCTION TESTS: THE GENERATOR SET SHALL BE TESTED UNDER VARYING LOADING WITH GUARDS AND EXHAUST SYSTEM IN PLACE. TESTS SHALL INCLUDE:
a. SINGLE-STEP LOAD PICKUP.
b. TRANSIENT AND STEADY-STATE GOVERNING.
c. SAFELY SHUTDOWN DEVICE TESTING.
d. VOLTAGE REGULATION.
e. RATED POWER.
f. MAXIMUM POWER.
g. UPON REQUEST, ARRANGEMENTS TO EITHER WITNESS THIS TEST WILL BE MADE OR CERTIFIED TEST RECORD WILL BE SENT PRIOR TO SHIPMENT.
h.
e. SITE TESTS: AN INSTALLATION CHECK, START-UP, AND BUILDING LOAD TEST SHALL BE PERFORMED BY THE MANUFACTURER'S LOCAL REPRESENTATIVE. THE ENGINEER, REGULAR OPERATORS, AND THE MAINTENANCE STAFF SHALL BE NOTIFIED OF THE TIME AND DATE OF THE SITE TEST. THE TESTS SHALL INCLUDE:
a. FUEL, LUBRICATING OIL AND ANTIFREEZE SHALL BE CHECKED FOR CONFORMITY TO THE MANUFACTURER'S RECOMMENDATIONS, UNDER THE ENVIRONMENTAL CONDITIONS PRESENT AND EXPECTED.
b. ACCESSORIES THAT NORMALLY FUNCTION WHILE THE SET IS STANDING BY SHALL BE CHECKED PRIOR TO CRANKING THE ENGINE. THESE SHALL INCLUDE: BATTERY CHARGER, BLOCK HEATER, GENERATOR STRIP HEATERS, ETC.
c. START-UP UNDER TEST MODE TO CHECK FOR EXHAUST LEAKS, COOLING AIR FLOW, MOVEMENT DURING STARTING AND STOPPING VIBRATION DURING RUNNING, NORMAL AND EMERGENCY LINE-TO

m. ACCESSORIES:
a. THE FOLLOWING ACCESSORIES SHALL BE SHIPPED LOOSE:
a. BATTERY RACK, BATTERY CABLES, 12–VOLT BATTERY, COLD CRANKING PERFORMANCE OF 630 AMPERES SHALL BE SUPPLIED DRY, ALONG WITH SEPARATE ELECTROLYTE WHICH WILL BE ADDED JUST PRIOR TO START–UP. BATTERIES SHALL BE MOUNTED INSIDE GENERATOR SET WEATHERPROOF HOUSING.
b. 10–AMPERE AUTOMATIC FLOAT BATTERY CHARGER WITH CONSTANT VOLTAGE REGULATION, CURRENT LIMITING CAPABILITY, CRANKING DISCONNECT RELAY, TEMPERATURE COMPENSATED FOR AMBIENTS FOR –20DEGREES F, VOLTMETER AND AMMETER. CHARGER SHALL BE MOUNTED INSIDE GENERATOR SET WEATHERPROOF HOUSING.
c. GASPROOF, SEAMLESS, STAINLESS STEEL, FLEXIBLE EXHAUST CONNECTION, AND ENGINE EXHAUST SILENCER RATED FOR CRITICAL APPLICATION. EXHAUST NOISE SHALL BE LIMITED TO 85DBA AS MEASURED AT 10 FEET IN A FREE–FIELD ENVIRONMENT.
d. TWO FLEXIBLE FUEL LINES.
e. 660 GALLON BASE TANK MOUNTED UNDER GENERATOR SET. (TANK SHALL BE FULL OF NO. 2 DIESEL FUEL AFTER FIELD TESTS.)
f. THERMOSTATICALLY CONTROLLED OUTER HEATER FOR ENGINE BLOCK.
g. REMOTE ANNUNCIATION PANEL TO INDICATE THE FOLLOWING:
h. NORMAL POWER ON (GREEN LIGHT).
h. EMERGENCY POWER ON (RED LIGHT).
h. BATTERY CHARGER OFF (AMBER LIGHT).
h. SONALERT TO AUDIBLY INDICATE BATTERY CHARGER OFF.
h. SILENCE SWITCH FOR AUDIBLE SIGNAL.

END OF SECTION 16210

SECTION 16440

DISCONNECT SWITCHES

PART 1 – GENERAL

1.01DESCRIPTION

A. Scope:
1. Furnish new disconnect switches.

B. Related Work Described Elsewhere:
1. Conduit and fittings in Section 16110.
2. Conductors and Terminations in Section 16120.

1.02 QUALITY ASSURANCE

A. Standards:
1. In addition to complying with pertinent standards, comply with pertinent recommendations contained in the following:
a. The National Electrical Manufacturer's Association (NEMA).
b. The Underwriter's Laboratories, Inc. (UL).

B. Codes:
1. See Section 16010.

PART 2 – PRODUCTS

2.01 DISCONNECT SWITCHES

A. General:
1. Switch assemblies shall be heavy duty types complying with UL–98. Standard for safety, enclosed and dead front switches and NEMA publication K51–1983, enclosed switches.
2. Switches shall have a built–in interlock by–pass. Switches shall have a provision to padlock the switch in the "off" position.
3. Highly visible on–off markings shall clearly indicate the position of the switch.
4. Fusible switches shall contain Class R fuse kits to prohibit insertion of all fuse types other than Class R.
5. Switches shall include a field installable grounding kit.
6. Switches shall be rated for the voltage to which they are connected and they shall be horsepower rated.
7. Switches shall have a NEMA rating of 1 (for indoor applications), 3R (for outdoor applications) and NEMA 4X (for corrosive atmospheres).
8. General duty switches are not acceptable.
9. Switches shall be Eaton Type DH(OSP–0012–10).

PART 3 – EXECUTION

3.01 DISCONNECT SWITCHES

A. Install isolation switches within sight of the equipment to be disconnected and preferably at the equipment involved.

B. If fusible switches are called for, make certain the proper size and type of fuse indicated on the Drawings is installed.

END OF SECTION 16440

SECTION 16425

SWITCHBOARD

PART 1 – GENERAL

1.01DESCRIPTION

A. Scope:
1. Furnish new main switchboard.

B. Related Work Described Elsewhere:
1. Conduit and fittings in Section 16110.
2. Conductors and Terminations in Section 16120.

1.02 QUALITY ASSURANCE

A. Standards:
1. In addition to complying with pertinent standards, comply with pertinent recommendations contained in the following:
a. The Western Utilities Electric Service Standardization Committee (WJESSC).
b. The National Electrical Manufacturer's Association (NEMA).
c. The Underwriter's Laboratories, Inc. (UL).

B. Codes:
1. See Section 16010.

PART 2 – PRODUCTS

2.01 MAIN SWITCHBOARD

A. Furnish the switchboard as herein specified and shown on the associated electrical drawings. The switchboard shall meet Underwriters' Laboratories requirements and be furnished with an Underwriters' Laboratories service entrance label.

B. The switchboard shall be totally enclosed, dead front, free standing, front and rear aligned with front accessibility only required. The switchboard shall be NEMA enclosed Type 3R. The framework shall be of UL gauge steel and secured together to support all cover plates, bussing and component devices during shipment and installation. Formed removable closure plates shall be used on the (front), rear and sides. Closure plates are to be single tool, screw removable. Ventilation shall be provided when required. Each section shall include a single–piece removable top plate. Provide a thermostatically controlled strip heater in each section complete with power source to operate it.

C. Painted parts shall be pretreated and provided with a corrosion–resistant, UL Listed acrylic baked paint finish. The paint color shall be #49 medium light gray per ANSI standard Z55.1–1967.

D. The entire switchboard shall be suitable for operation at the specified available fault current. The switchboard shall be labeled to indicate the maximum available fault current rating, taking into account the structure, bussing, switchboard main disconnect, and switchboard branch circuit devices. The short circuit current rating of the switchboard shall not be less than 50,000 RMS symmetrical amperes. The switchboard branch circuit devices short circuit current rating shall be fully rated.

E. The switchboard shall contain ground fault for the main overcurrent device in accordance with CEC 230–95 if the service is a solidly grounded wye rated for 1000 amperes or more at 150 volts or more to ground.
1. If the switchboard serves a health care facility covered by Article 517 of the CEC, two levels of ground fault shall be provided in accordance with Article 517–17 of the CEC.

F. The switchboard through–bus shall be tin plated aluminum. The switchboard bussing shall be of sufficient cross sectional area to meet UL Standard 891 for temperature rise. The through bus shall have a maximum ampacity as noted on plans and shall extend the full length of the switchboard. The through bus shall be 100% rated. Provisions shall be provided for future splicing of additional sections from either end. The neutral bus shall be 100% rated.
1. Each switching and protective device shall be provided with visible means of ON–OFF identification. Terminals shall be of the anti–turn solderless type suitable for UC or AL cable of sizes indicated.
2. A–B–C type bus arrangement, left–to–right, top–to–bottom, and front–to–rear, as viewed from the front, shall be used throughout.
3. Submittal drawings shall be furnished providing the following information: switchboard voltage/current ratings, overall outline dimensions including available conduit space, switching and protective device ampere ratings and positions of same, and one line diagram.
4. The switchboard distribution section bus shall be of the same material as the through bus and shall be rated the same as the through bus. The distribution section neutral plate shall be of copper provided with Cu/Al lugs for the devices installed and future specified devices.
5. A ground bus shall be furnished firmly secured to each vertical section structure and shall extend the entire length of the switchboard. A ground lug shall be furnished attached to the ground bus in a convenient location.
6. Ground rods at the main switchboard shall be copper clad cone pointed steel rods 5/8" diameter by 8 foot long except where noted otherwise. The rod heads shall be chamfered. The copper exterior shall be molten welded to the steel core. Ground rod fittings shall be Thomas and Betts compression fittings applied with a motor driven hydraulic compressing tool.

G. The switchboard utility metering compartment shall be located in the service entrance section of the switchboard and connected for hot sequence metering. The utility metering compartment shall comply with PG&E requirements.

H. The main disconnect device shall be a molded case circuit breaker rated for 80% duty.

I. The switchboard group–mounted circuit breaker branch devices are to be totally front accessible and front connectable. The circuit breaker connections to the distribution panel bussing shall be of a "blow–on" design such that the connections grip the bus bars firmly under high–fault conditions. Circuit breakers shall be rated for (30) KAIC minimum.
1. Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished when required. All groups of control wires leaving the switchboard shall be provided with terminal blocks with suitable numbering strips. All hardware used on conductors shall have a high tensile strength and an anti–corrosive zinc plating.

J. The switchboard shall be separated into shipping blocks. Each switchboard section shall be capable of being handled individually with the use of removable lifting bars or rollers and be clearly labeled with proper handling procedures.
1. Switchboard sections shall be capable of being joined at the job site with the use of internal splice bars. These splice bars shall be preassembled onto the through bus and not shipped loose in a splice bar kit.
2. The through bus splice bars shall utilize two bolts, one on each side of the shipping split, for each phase. Conical washers shall be used to provide a constant pressure once the proper torque is achieved. The through bus splice connection shall be capable of being maintained by the use of a single tool and shall be from accessible.

K. 1/8" thick Laminated nameplates shall be installed for each circuit breaker. Nameplates shall be fastened to switchboard with rivets, and have a black background with engraved 1/4" high white letters indicating the function of each circuit breaker.

L. Factory Assembly and Tests:
1. The switchboard shall be completely assembled, wired, adjusted and tested at the factory. After assembly, the complete switchboard will be tested for operation under simulated service conditions to assure the accuracy of the wiring and the functioning of all equipment.
2. The main circuits shall be given a dielectric test of 2200 volts for one minute between live parts and ground, and between opposite polarities. The wiring and control circuits shall be given a dielectric test of 1500 volts for one minute between live parts and ground.

M. The switchboard shall be Eaton Pow–R–Line C or equal. It shall be approved by the serving utility company.

PART 3 – EXECUTION

3.01 MAIN SWITCHBOARD

A. Sections of switchboard shall be firmly bolted together.

B. The interiors of all sections shall be clean. Scrap wire, parts and debris shall be removed.

C. Paint scratched exterior surfaces.

D. The entire switchboard line–up shall be installed on a concrete housekeeping pad per the drawings. The width and length of the pad shall exceed the width and length of the switchboard line–up by 6 inches. Fasten switchboard to the pad per the drawings.

END OF SECTION 16425

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SPECIFICATIONS
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DATE	10/16/18
SCALE	AS NOTED
DRAWN	JW/MW
PROJECT	1350 HASTINGS
SHEET	ES701

Agenda Item No: 11.a.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-478

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Consideration and Possible Approval of Final Environmental Impact Report for Closure and Post-Closure Maintenance Plan for City of Ukiah Landfill, and Approval of the Closure and Post-Closure Maintenance Plan.

DEPARTMENT: Public Works

PREPARED BY: David Rapport, City Attorney

PRESENTER: David Rapport, City Attorney and Steve Brown, SMB Environmental.

ATTACHMENTS:

1. City of Ukiah Landfill - Final Closure & Post Closure Maintenance Plan (April 2019)
2. Ukiah Landfill Closure Project - Complete Public Draft EIR - With Appendicies
3. Complete Final EIR- 4.22.20 (1)
4. 11a EIR Objection
5. Memo Recommending Continuance
6. 2020-07-17 Ukiah Landfill Response Memo
7. Attachments to ESA Memo
8. Ukiah Landfill Closure Project- Findings of Fact
9. Resolution Adopting Findings EIR & MMRP
10. Pioneer Law Group Opinion Letter 7.30.20

Summary: The City Council will conduct a noticed quasi-legislative public hearing to review a proposed Environmental Impact Report ("EIR") for a project at the City of Ukiah's solid waste landfill called a Closure and Post-Closure Maintenance Plan ("the Plan"). The Plan calls for the use of an artificial cover to prevent water intrusion into the formerly active portion of the landfill, among other measures in compliance with state regulatory requirements for the closure of solid waste landfill disposal sites. The City Council is being asked to conduct the hearing and to certify the EIR as adequate and complete in compliance with the California Environmental Quality Act ("CEQA") and to approve the Plan.

Background: The City has not used the Ukiah landfill solid waste disposal site since it began using the Taylor Drive solid waste transfer station in 2001. The 40-acre active landfill site is located within the 283.5 acre parcel located at 3100 Vichy Springs Road and also known as Mendocino County Assessor's Parcel No. 178-130-01.

State regulations require a closed landfill to be covered to prevent water intrusion and to have installed a methane gas collection system to prevent the release of methane, a greenhouse gas, produced by decomposing solid waste. These improvements and post-closure maintenance requirements are contained in the proposed Closure and Post-Closure Maintenance Plan (the "Plan," attached as Attachment 1), which must be approved by CalRecycle and the North Coast Regional Water Quality Control Board ("Regional Board").

The standard cover uses a four-foot deep compacted clay layer overlaid with two feet of soil and grass seeding ("Standard Cover"). Alternatives are permitted if they perform as well as or better than the Standard Cover. The City has proposed, and both CalRecycle and the Regional Board have found that, the use of an

alternative cover for the Ukiah Landfill, consisting of a synthetic tufted geotextile called the ClosureTurf® Final Cover System, manufactured by Watershed Geosynthetics (“ClosureTurf”), satisfies regulatory requirements. ClosureTurf consists of a structured membrane with studs to prevent slippage (referred to as Super Gripnet or SGN), an engineered turf to resemble grass, and sand infill to protect the engineered turf and underlying components. From top to bottom, the system consists of the following components:

- Minimum 5/8-inch-thick sand infill layer.
- Specialized tufted geotextile (Engineered Turf)
- 50 mil linear low-density polyethylene (LLDPE) geomembrane liner (Super Gripnet® with Spike Down)
- Minimum 2-foot-thick soil foundation layer

The City, acting as the Lead Agency under CEQA, arranged for the completion of a draft Environmental Impact Report ("DEIR") for this project (attached as Attachment 2) and closed the 45-day public comment period on January 9, 2020. As required by CEQA, responses to comments on the DEIR received during the 45day public comment period have been prepared and are contained in a proposed Final EIR ("FEIR," attached as Attachment 3). Collectively the DEIR (Attachment 2) and FEIR (Attachment 3) are referred to as the EIR.

During the 45-day DEIR public review period the City received a total of four (4) comment letters on the DEIR. The comment letters consist of a letter from CalRecycle (labelled in the FEIR letter “A”), a letter from the North Coast Regional Water Quality Control Board (labelled letter “B”), and two letters from Vichy Springs Resort (labelled letters “C” and “D”).

The responses to the comment letters are contained in Chapter 3 of the FEIR (pages 3-1 to 3-17). The revisions to the DEIR made in response to the comments are contained in Chapter 4 (pages 4-1 to 4-14). A table found on page 2-1 in Chapter 2 of the FEIR contains the letter designation for each comment letter. Each comment in each letter is assigned a number (e.g., B-1 in the Regional Board letter (B) is the first comment to which the FEIR responds).

A notice of hearing on the EIR for the August 5, 2020, City Council meeting was published in the Ukiah Daily Journal on July 14, 2020, and notice of the hearing was also emailed to all parties who submitted comments on the DEIR to comply with the 10 day notice publication requirement in the City’s locally adopted CEQA Guidelines and with the requirement in the State’s CEQA Guidelines to give notice to those who submitted timely comments on the DEIR.

This hearing was originally noticed for May 20, 2020. On May 15, 2020, lawyers for Vichy Springs Resort, Russian River Keepers and the Mateel Environmental Justice Foundation submitted a 41 page document, not counting attached exhibits, entitled: CEQA Non-Compliance For City of Ukiah’s Environmental Impact Report (“FEIR”) for Landfill Closure Plan (“EIR Objections”). (A copy of the EIR Objections is attached as Attachment 4.) Neither Russian River Keepers nor Mateel Environmental Justice Foundation submitted comments on the DEIR during the public comment period. In addition to reprising objections by Vichy Springs to the DEIR and criticizing the response to comments in the FEIR, the EIR Objections claim for the first time that the use of ClosureTurf poses risks in a wildfire, including the potential release of toxic chemicals, and also adverse water quality impacts that they assert should have been addressed in the DEIR.

Because of the voluminous nature of the materials submitted in the EIR Objections, the City Attorney recommended delaying the hearing scheduled for May 20 which is now rescheduled for August 5. (See May

19, 2020 memorandum from the City Attorney to the City Council, attached as Attachment 5.) In preparation for the August 5 hearing, the City Attorney arranged for an independent environmental consulting firm not involved in the preparation of the DEIR or the FEIR to review and respond to all the issues raised in the EIR Objections.

The consultant, Environmental Science Associates (ESA), was instructed to carefully consider the EIR Objections and the additional materials submitted. ESA has no pride of authorship or reason to defend the DEIR or FEIR. Its sole role was to exercise its professional judgment in evaluating the claimed CEQA violations and the additional materials submitted with the CEQA Objections to determine whether they provide evidence of the claimed additional adverse impacts of ClosureTurf or demonstrate that the EIR findings are not supported by substantial evidence and the requirements of CEQA. The results of that evaluation are set forth in a Memorandum in Response to Comments on the Environmental Impact Report for the City of Ukiah Landfill Closure Plan ("ESA Memo") prepared by Luke Evans, Senior Managing Associate, attached as Attachment 6. Exhibits to the ESA Memo, containing additional evidence considered by Mr. Evans, is contained in the attached Attachment 7.

Discussion: The purpose of the hearing is for the City Council to determine whether to certify the Landfill Closure Plan EIR as adequate and complete and if so, whether to approve the Plan. At the hearing, the City Council should consider a presentation by SMB Environmental addressing the EIR and its analysis of the environmental impacts of the Plan. City staff will provide information and answer City Council questions about the Closure and Post-Closure Maintenance Plan, including how the Plan satisfies regulatory requirements. Before making any decisions, the Council should also consider written comments from members of the public received prior to or during the hearing, testimony or arguments from members of the public during the hearing and the analysis and advice of staff and consultants.

The EIR finds that there are no significant adverse environmental impacts from the Plan that cannot be avoided or substantially reduced to a less than significant impact. It finds that ClosureTurf artificial cover with artificial grass turf has no significant adverse environmental impacts, including to aesthetics or viewsheds, and is superior to a Standard Cover both based on its environmental impacts as compared to the impacts of the Standard Cover and in achieving the project's objectives. It is also substantially less costly than use of the Standard Cover.

The comments from Vichy Springs dispute these findings. The response to those comments are set forth in Chapter 3 of the FEIR at pages 3-5 to 3-14 and 3-14 to 3-17.

The FEIR revises the DEIR to make relatively minor changes shown in redline/strikeout format at pages 4-1 to 4-33 in response to the comments received during the public comment period and in a separate section 4.2.2 at pages 4-24 to 4-30, to compare the use of ClosureTurf with the natural clay cover.

Among the response to comments, the FEIR compared the Standard Cover to the ClosureTurf cover in terms of performance, installation, maintenance and cost. Given that use of ClosureTurf is the primary source of Vichy Springs' opposition to the EIR, that comparison is summarized as follows.

Based on Joint Technical Documents ("JTDs") prepared by EBA Engineers on behalf of the City and submitted to CalRecycle and the Regional Board in 2008, 2013 and 2015, the EIR compared using ClosureTurf rather than the Standard Cover in terms of performance, installation, maintenance and cost. It found as follows:

1. Performance

- ClosureTurf exhibits substantially lower water infiltration rates as compared to clay and offers more

efficient removal of moisture, thereby reducing the amount of potential water infiltration into decomposing landfill material, which is the primary purpose of a final landfill cover.

- The engineered turf component eliminates the potential for soil creep and veneer failures resulting from saturation of the vegetative soil cover that is a required component of the clay cover. This potential for soil creep and veneer failure is exacerbated by the very steep 2:1 slope that exists at the Ukiah Landfill.

- The drainage aspects of the ClosureTurf are designed to allow rainfall to penetrate rapidly through the sand infill layer and into the structured drain liner below which water drains rapidly for subsequent conveyance of the water off of the liner system. The sand infill has been demonstrated to handle over six inches per hour of rainfall intensity without erosion when applied on 3:1 vertical slopes. The Ukiah landfill has a 2:1 slope. Such rainfall energy conditions on a traditional vegetative soil cover would likely result in significant damage from erosion.

- The drainage aspects of the ClosureTurf promote very "clean" and low turbidity stormwater run-off, which represents a beneficial feature since the collected run-off is subsequently discharged to the ephemeral creek that borders the northern boundary of the landfill. Achieving comparable stormwater run-off quality from a traditional vegetative soil cover would be difficult.

- ClosureTurf is designed to provide weathering resistance and geomembrane protection when exposed to extreme heat and ultra-violet exposure. Based on results of independent, real-world weathering tests and data from existing projects, ClosureTurf® can provide decades of reliable performance beyond the standard 30-year post-closure maintenance period.

2. Installation

- EBA concluded that installation of ClosureTurf deployment is very straightforward both from a placement and seaming standpoint. Furthermore, heavy equipment requirements for ClosureTurf deployment are limited primarily to a rubber-tire forklift or equivalent. Conversely, clay cover construction is very labor intensive with substantial reliance on heavy equipment (i.e., scrapers, dozers, compactors, etc.)

- Less construction quality assurance (CQA) is required for ClosureTurf due to the consistency of the materials and manufacturing process. CQA testing for a clay cover, in turn, is more extensive and occurs at a higher frequency to verify the consistency of borrow source materials and the contractor's ability to achieve moisture content, compaction, and hydraulic conductivity during construction.

- Installation of a sealed, double-ring infiltrometer is required to test the field permeability of a clay cover, which is costly and time consuming. Such testing is not required for ClosureTurf.

- In comparison to other geosynthetic liner systems, ClosureTurf is slightly more labor intensive due to the placement of the sand infill layer. However, this increased labor is more than offset by the elimination of the vegetative soil layer used for the Standard Cover. Similar to the construction of the Standard Cover, construction of a vegetative soil layer over a geosynthetic liner is also labor intensive with substantial reliance on heavy equipment. In addition, the methane gas relief layer material and labor requirements required for the installation of the methane gas collection system are significantly greater using the Standard Cover as compared to the use of ClosureTurf. Thus, the ClosureTurf final cover system installation represents the least intensive approach from an installation standpoint.

3. Maintenance

According to the EBA JTD Addendum No. 2 ClosureTurf offers a significant maintenance advantage over the Standard Cover and any other traditional geosynthetic cover systems that require a vegetative soil cover. In essence, vegetative soil covers often require regular maintenance related to the repair of erosion, installation of erosion control measures (i.e., silt fences, hay bales, wattles, etc.), slope repairs, and revegetation. Erosion from the vegetative soil cover also causes siltation of drainage ditches and culverts that require subsequent repair. Such provisions are not required with the ClosureTurf product, thereby providing a significant cost savings over the course of the post-closure maintenance period.

4. Cost

As required by state regulations EBA prepared an economic analysis as part of its JTD that compared the closure construction costs for ClosureTurf versus a clay based final cover system. The comparison revealed that the construction cost for ClosureTurf was approximately $420,000 less than the Standard Cover prescribed by state regulations. In addition, the 30-year post-closure maintenance costs associated with ClosureTurf were estimated to be approximately $277,000 less than any final cover system that requires an erosion-resistant layer comprised of a vegetative soil cover. Thus, the overall cost savings resulting from replacing the previously proposed GCL final cover system with ClosureTurf is approximately $697,000.

As to the new concerns expressed in the EIR Objections concerning the performance of ClosureTurf in a wildfire and its impact on water quality, the ESA Memo found that ClosureTurf is actually more fire resistant than natural grass and would create a fire break that reduces the impact of wildfire in the area as compared to natural grass. It also found that the materials asserting adverse water quality impacts from artificial turf submitted with the EIR Objections do not apply to ClosureTurf and there is no substantial evidence that ClosureTurf could have adverse water quality impacts. (See discussion of CloverTurf performance in a wildfire and its alleged adverse water quality impacts in the ESA Memo, Attachment 6, at I & II, pages (“pp”) 2-5.) In fact, the water quality impacts of ClosureTurf are superior to the water quality impacts of a clay based finalcover.

A resolution in Attachment 9 adopts the Findings of Fact, attached to this ASR as Attachment 8, which contains the findings of fact that support certification of the EIR in accordance with CEQA requirements.

The ESA Memo (Attachment 6) concluded that the EIR Objections do not contain substantial evidence of additional environmental impacts from ClosureTurf not considered by the EIR or demonstrate that the EIR’s factual determinations are not supported by substantial evidence or a proper analysis of the claimed adverse environmental impacts as required by CEQA. The ESA Memo finds that contrary to the claims in the EIR Objections, the EIR did not fail to analyze a reasonable range of project alternatives (Attachment 6, III, pp. 5-7), did provide an accurate and complete project description (Attachment 6, IV, pp. 7-8), did provide an accurate description of baseline conditions (Attachment 6, V, pp. 5-12), recirculation of the DEIR is not warranted based on the purported new information on ClosureTurf’s performance in a wildfire or its alleged adverse water quality impacts or claimed noise impacts (Attachment 6, VI, pp. 12-13), the EIR did not fail to identify or consider feasible mitigation measures to reduce adverse environmental impacts of the project (Attachment 6, VII, pp. 13-14), substantial evidence in the record does support the environmental impact findings presented in the FEIR (Attachment 6, VIII, pp. 14-16), and recirculation of the DEIR is not warranted due to alleged discrepancies described in the EIR Objections. (Attachment 6, IX, pp. 16-17.)

Andrea Matarazzo of the Pioneer Law Group, who specializes in environmental law with an emphasis on CEQA, was retained by the City to review and advise the City Council on the legal arguments contained in the EIR Objections. A letter expressing her opinion is attached as Attachment 10. She concludes:

ESA's detailed evaluation of the attorneys' comments and the evidence in the City's record as a whole demonstrate that the attorneys' comments identify no fundamental defect or inadequacy in the EIR and present no substantial evidence of a new or substantially more severe environmental impact of the project that would require revision and recirculation of the EIR. (CEQA Guidelines, § 15088, 15088.5.)

In addition to Steve Brown of SMB Environmental and Luke Evans from ESA, City consultants at the hearing will include Andrea Matarazzo.

Recommended Action: Take two actions in the following order: (1) adopt the Resolution attached as Attachment 9, adopting the Statement of Facts (Attachment 8), which makes findings of fact and certifies as complete the final EIR for the Closure and Post-Closure Maintenance Plan; and (2) approve the Closure and Post-Closure Maintenance Plan.(Attachment 1).

BUDGET AMENDMENT REQUIRED: N/A

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: Landfill Fund

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Tim Ericksen, Public Works Director, Jarod Thiele, Andrea Matarazzo

Approved: 
Sage Sangiacomo, City Manager

FINAL CLOSURE AND POSTCLOSURE MAINTENANCE PLAN

FOR

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

APRIL 2019

Prepared for:

City of Ukiah
Department of Public Works
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Ukiah, CA 95482

City of Ukiah

Prepared by:

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CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SECTION 1
INTRODUCTION

EBA Engineering (EBA) has prepared this Final Closure and Postclosure Maintenance Plan (Final CPMP), City of Ukiah Landfill, Mendocino County, California (herein after referred to as the "Landfill"), for the City of Ukiah (City) in accordance with Title 27 of the California Code of Regulations, Division 2, Subdivision 1. The Landfill is a Class III disposal site that occupies approximately 40 acres of the 283.5-acre site. This Final CPMP was developed to address closure and postclosure maintenance for the entire landfill.

In general, the intent of this Final CPMP is to identify and describe the tasks for closing and maintaining the Landfill in a manner that will protect the public health and safety and the environment. Details of the respective programs are presented herein under Section 2 (*Final Closure Plan*) and Section 3 (*Final Postclosure Maintenance Plan*). This plan also serves as the basis for developing a reasonable estimate of maximum expected costs to close the entire landfill and maintain the landfill during the postclosure maintenance period (30 years). The estimated costs for each of the programs are presented in Section 4 (*Closure and Postclosure Maintenance Cost Estimates*). Finally, Section 5 (*Disbursement Schedule for Closure*) presents a preliminary fund disbursement schedule during implementation the final closure construction activities. As an aid to the reader, references to Title 27 of the California Code of Regulations throughout this report are cited as 27CCR followed by the corresponding section number(s).

A copy of this Final CPMP will be maintained at the City's Department of Public Works office (300 Seminary Avenue, Ukiah, California 95482) throughout the closure and postclosure maintenance period.

1.1 LANDFILL HISTORY AND DEVELOPMENT

The Landfill, which is owned and operated by the City, is located at 3100 Vichy Springs Road, approximately three miles east of Ukiah in Mendocino County, California. Waste disposal operations at the Landfill began in 1955 at the eastern end of the waste management unit (WMU) footprint and progressed upslope and westward. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the WMU to separate the waste from the realigned creek channel. The method of operation during the Landfill's development was a fill and cover approach in a canyon/gully terrain. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing Ukiah and the surrounding area. The Landfill ceased operations in September 2001.

Environmental monitoring at the Landfill was originally regulated under Waste Discharge Requirements (WDR) Order No. 75-43 in conformance with Title 23 of the California Code of Regulations (23CCR). In September 1993, WDR Order No. 75-43 was amended by WDR Order No.93-83 as a mechanism to implement State Water Resources Control Board Resolution No. 93-62 and federal municipal solid waste regulations (i.e., "Subtitle D") per Title 40 of the Code of Federal Regulations (40 CFR), Parts 257 and 258. Concurrent with this amendment was the preparation of a Report of Waste Discharge (RoWD) (EBA, 1993) for the purpose of formally updating the Landfill's WDRs and to address groundwater impacts previously identified at the site. The combination of these two documents was subsequently used by the California Regional Water Quality Control Board, North Coast Region (RWQCB) to issue a new WDR (WDR Order No.94-123) for the site in October 1994. In August 1999, the initial Final CPMP (EBA, 1999) was submitted for the Landfill which resulted in the eventual issuance of interim closure WDRs (WDR Order No. R1-2002-0061) by the RWQCB in June 2002. WDR Order No. R1-2002-0061 represents the current WDR regulating environmental monitoring at the Landfill.

1.2 PURPOSE OF PLAN

The purpose of this Final CPMP is to identify, describe and provide cost estimates for the tasks necessary to close and maintain the Landfill in a manner which will protect the public health and safety and the environment. The Final CPMP for a Class III facility must meet the requirements of 27CCR, Division 2, Subdivision 1, Chapter 4. Accordingly, this Final CPMP provides the various information and describes the tasks that will be employed to comply with the said regulations. The following provides a synopsis of the information included herein as they pertain to the proposed final closure and postclosure maintenance activities:

Final Closure

- Various site maps showing the site location, physical and topographic features, and current monitoring and control systems.
- Proposed postclosure land use and an estimate of the maximum extent requiring closure.
- Details regarding site security and structure removal.
- Final cover design and grading characteristics, including presentation of an engineered alternative final cover system and supporting documentation (i.e., engineered alternative analysis, Technical Specifications and Construction Drawings).
- Final cover survey information.

- A construction quality assurance (CQA) program for the final cover construction project.
- Drainage and erosion control provisions.
- Descriptions of the current environmental monitoring and control systems.
- Closure provisions for a former leachate surface impoundment.
- Sequence of closure stages.
- Closure cost estimate and disbursement schedule.

Final Postclosure Maintenance

- Emergency Response Plan.
- Details of responsible parties and resources during the postclosure maintenance period.
- Presentation of the inspection and maintenance program that will be employed as part of postclosure maintenance, including the final cover and grading, drainage system, various monitoring and control systems, and site security.
- Reporting provisions for the various inspection and monitoring/control systems.
- Postclosure maintenance cost estimate.

Please note that this Final CPMP supersedes all previous closure/postclosure maintenance documents submitted to date. The original Final CPMP was submitted in August 1999 (EBA, 1999) that proposed a prescriptive standard final cover system (i.e., compacted clay liner [CCL] for the low-hydraulic conductivity layer [LHCL]). In March 2003, an engineered alternative analysis (EBA, 2003) was submitted to the RWQCB for approval that incorporated a geosynthetic clay liner (GCL) to replace the CCL as the LHCL due to the significantly higher cost associated with the CCL final cover system. This alternative was proposed again as part of a Joint Technical Document (JTD) dated January 2008 (EBA, 2008) and subsequent addendum dated June 2013 (EBA, 2013a).

In August 2015, a second addendum (Addendum No. 2) to the JTD (EBA, 2015) was submitted for approval that incorporated a new engineered alternative design ("ClosureTurf™") to replace the previously proposed GCL final cover system. The alternative design was pursued due to the significant cost savings over the associated GCL final cover system scenario, as well as an increase in cover system stability. Whereas the California Department of Resources Recycling and Recovery (CalRecycle) and Mendocino County Health & Human Services Agency (i.e., Local Enforcement Agency [LEA]) conditionally approved the proposed alternative design (separate letters dated October 21 and November 9, 2015, respectively), both agencies requested that the design and

associated provisions be summarized in a new stand-alone Final CPMP. A new stand-alone Final CPMP (EBA, 2016a) was subsequently submitted on March 8, 2016. Following its submittal, miscellaneous comments were issued by the respective regulatory agencies. The various issues were addressed in an updated Final CPMP dated May 2016 (EBA, 2016b).

As part of the regulatory review of the May 2016 Final CPMP, several unresolved issues remained pertaining to the final cover design and maintenance provisions. The most prominent of these issues corresponded to the proposed thicknesses of the foundation layer (i.e., one foot versus two feet) and geomembrane thickness (50-mil versus 60-mil). After multiple deliberations, an agreement was reached to adhere to the 2-foot thick foundation layer standard, while the 50-mil geomembrane thickness was conditionally approved with provisions for increased postclosure maintenance funding. These items, along with the other previous regulatory comments, have been incorporated into this latest version of the Final CPMP.

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SECTION 2
FINAL CLOSURE PLAN

This Final Closure Plan has been prepared to meet the following primary objectives: develop a detailed plan and schedule for the City to implement upon closure of the WMU; allow for monitoring of closure activities to determine that the requirements of landfill closure have been implemented in accordance with the appropriate plan; provide a basis for the City to establish an accurate detailed estimate of closure costs; and enable CalRecycle and the LEA to assess the reasonableness of the cost estimate for non-water quality aspects of closure. The contents of this Final Closure Plan have developed to comply with the requirements set forth in 27CCR, §21769(c)(2) and §21800.

2.1 SITE MAPS

2.1.1 Location Maps
27CCR, §21790(b)(2)

The Landfill is located at 3100 Vichy Springs Road, approximately three miles east of Ukiah in Mendocino County, California. A site location map showing the location of the Landfill is presented as Figure 1 (Appendix A). The Landfill's WMU occupies approximately 40 acres of permitted landfill area on a 283.5-acre parcel having a maximum width of approximately 1,000 feet in the north-south direction and a maximum length of about 3,500 feet in the east-west direction. A City-owned shooting range is situated on the Landfill property approximately 2,000 feet southeast of the WMU footprint.

Land adjacent to the Landfill property is zoned primarily as rangeland and is used for grazing. Dwellings within 1,000 feet of the landfill property include a group of structures owned by Gilbert and Marjorie Ashjoff that are located within 500 feet of the Landfill's south property line and a single-family residence located approximately 900 feet west of the Landfill's western property boundary. A rural residential development is located approximately ¼-mile west of the Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000 feet southward of the Landfill property boundary and is separated from the Landfill by an intervening ridge.

It should be noted that the City owns an approximate 97-acre parcel (Assessor's Parcel No. 178-210-01) that adjoins a portion of the Landfill's southern property boundary. This property, which has been previously identified as the "Gun Club Parcel", was purchased as

a buffer zone to limit future development adjacent to the Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the Landfill property.

Site plans showing the general site configuration (i.e., property boundary, limit of waste, entry road, etc.) and existing site features are presented as Figures 2 and 3 (Appendix A). Also shown on Figure 2 are the locations of dwellings and structures located within 1,000 feet of the Landfill property boundary.

2.1.2 Topographic Maps
27CCR, §21769(c)(2)(D)

Existing ground surface elevations at the Landfill range from approximately 710 feet above mean sea level (MSL) near the western footprint, to about 970 feet MSL along the southeast footprint. The WMU has been graded to form a series of terraces stepping down from south to north. Slopes on the WMU range from approximately 2:1 to 3:1 (horizontal to vertical). The final cover system elevations and slope configurations will generally coincide with the existing surfaces described above. Please refer to Sheets 100 and 101 of the Construction Drawings (Appendix J) for maps illustrating the existing and proposed final grades, respectively.

2.1.3 Current Monitoring and Control Systems Maps
27CCR, §21790(b)(4)

Enclosed in Appendix A are a series of site maps illustrating the various current monitoring and control systems at the Landfill. The types of monitoring and control systems include: landfill gas (LFG)(Figure 4); leachate (Figure 5); groundwater (Figure 6); and surface water (Figure 7). The Landfill is also currently equipped with drainage and erosion control features that include benches, ditches and down drains on the slope areas, as well as four sedimentation ponds. Please refer to Sheet 100 of the Construction Drawings (Appendix J) for the locations of these features.

2.2 PROPOSED POSTCLOSURE LAND USES
27CCR, §21769(c)(2)(H) and §21790(b)(5)

Postclosure land use for the Landfill will be non-irrigated open space.

2.3 ESTIMATE OF MAXIMUM EXTENT REQUIRING CLOSURE
27CCR, §21790(b)(6)

The WMU covers approximately 40 acres of the 283.5-acre site. The limits of waste are based on City survey records and historical topographical maps of the site. Exploratory trenching to verify the waste limits will not be necessary as the waste limits are well established. The limit of existing waste is shown on Figures 2 and 3 (Appendix A).

2.4 CLOSURE DATE
27CCR, §21790(b)(7)

The Landfill discontinued waste disposal operations in September 2001. At the time the waste disposal operations ceased, intermediate cover soil had been placed over the entire WMU footprint. In October and November, 2001, a drilling program was implemented by Rau and Associates, Inc. for the City to verify the thickness of the in-place intermediate cover over the entire WMU surface. The survey consisted of a series of shallow borings drilled at a spacing of approximately 50 feet apart on the roads and benches and approximately 100-foot spacing on the slopes. A total of 433 borings were drilled using a hydraulic drill motor (mounted on a backhoe boom) equipped with 4-inch diameter solid-stem augers. A hand-operated post-hole digger was used in areas not accessible by the backhoe-mounted drill. Findings from this investigation revealed that the thickness of the intermediate cover is equal to or greater than 2 feet for approximately 81 percent of the WMU surface, whereas approximately 93 percent of the WMU surface contains at least one foot of intermediate cover. The average thickness of the intermediate cover for the remaining seven percent is approximately 8 inches. These areas are primarily concentrated along the toe near the northern sedimentation pond and within the southern high point of the WMU.

The intermediate cover has been maintained by the City since its placement, pending implementation of the final closure construction project.

2.5 SITE SECURITY AND STRUCTURE REMOVAL
27CCR, §21790(b)(8)(A)

2.5.1 Site Security

Access to the Landfill is via Vichy Springs Road only. Unauthorized access is currently prevented by perimeter barbed-wire fencing and a locked gate located at the site access road. “No Trespassing” signs are also posted at the east and west boundaries of the site. Site security upon closure will be provided by the City and will conform with the requirements of 27CCR, §21135. Site security components will include:

- A lockable gate at the Landfill entrance from the site access road (existing).
- “No Trespassing” signs (existing). “Methane Hazard” signs will also be posted at the site entrance and every 1,000 feet along the perimeter barbed-wire fencing.
- At least one sign posted in a visible location at the site access road indicating where the Final CPMP is located. The sign will also include a telephone number for emergency notification. A sign of this nature will remain posted throughout the postclosure maintenance period.

- Lockable utility boxes, or gates, or both, enclosing the environmental control systems (existing).

- Security fencing and lockable gate around the gas control system's flare station and equipment complex.

- Perimeter barbed-wire fencing (existing).

2.5.2 Structure Removal

As required under 27CCR, §21137, all site structures will be removed as part of the final closure construction project. These structures include the gatehouse and truck scale. The gatehouse debris will be transported and disposed of at a permitted solid waste disposal facility. The truck scale, in turn, will be dismantled and either re-assigned/sold for use at an alternate location or transported and disposed of at a permitted solid waste disposal facility.

2.6 FINAL COVER AND GRADING

2.6.1 Final Cover Requirements
27CCR, §21090(a) and §21800(b)(8)(B)

The following subsections provide the necessary information to address the various final cover requirements stipulated in 27CCR, §21090(a)(1 through 6). Specific topics include: final cover design; discharge of leachate, condensate and/or other liquids to the final cover; and stability of the final cover.

Final Cover Design

The proposed final cover system will consist of a patented geosynthetic product identified as "ClosureTurf™". ClosureTurf™ is a three-component system comprised of a structured geomembrane, a specialized tufted geotextile, and a sand infill layer. The structured geomembrane component serves as the LHCL, whereas the specialized tufted geotextile and sand infill layer represent the erosion-resistant layer as defined in 27CCR. This proposed final cover system represents an engineered alternative design to the prescriptive standard (i.e., CCL) and therefore requires regulatory approval. As such, an engineered alternative analysis was prepared that demonstrated its viability as a final cover alternative. A copy of the engineered alternative analysis, which includes literature for the ClosureTurf™ product, is enclosed in Appendix D. Please note that product literature pertaining to ultra-violet (UV) longevity and supporting infiltration equivalency calculations that were included in EBA's May 26, 2017 Response to Comments (EBA, 2017) to supplement the engineered alternative analysis have been incorporated into Appendix D.

Overall, the proposed final cover system design can be summarized as follows (in ascending order):

- Minimum 2-foot thick soil foundation layer.
- 50 mil linear low-density polyethylene (LLDPE) geomembrane liner (Super Gripnet® with Spike Down).
- Specialized tufted geotextile (Engineered Turf).
- Minimum 5/8-inch thick sand infill layer.

As noted above, the erosion-resistant layer for the proposed final cover system is comprised of the Engineered Turf and sand infill layer. As presented in the engineered alternative analysis (Appendix D), the combination of these components are designed to provide weathering resistance and geomembrane protection when subjected to the most extreme conditions, including rain, wind, heat, and UV exposure. Based on the absence of a traditional erosion-resistant layer constructed of soil, the proposed system is not subject to erosional channeling that can lead to exposure of the geomembrane component. As a result of the aforementioned characteristics, the proposed system meets the performance criteria specified in 27CCR with regard to resisting the foreseeable erosion effects by wind-scour, raindrop impact, and run-off.

In addition to the above features, the final cover system will also be equipped with a gas relief component. This component will consist of a series of 3.5-foot wide collection strips placed parallel to the slopes on the outer edges of the respective benches. The collection strips, which will be constructed of the same Super Gripnet® with Spike Down material described above for the geomembrane liner component, will be connected to the gas control system to prevent the build-up of gas pressures beneath the final cover system. Pressure release valves will also be installed at regular intervals between the collection strips as an additional precautionary measure.

Please refer to the Technical Specifications (Appendix H), Construction Quality Assurance (CQA) Plan (Appendix I), and Construction Drawings (Appendix J) for details regarding material and installation specifications for the respective final cover system components described above.

Discharges of Liquids to Covers (Leachate and Condensate)

The discharge of leachate, LFG condensate or other waste liquids onto the final cover is not proposed at the Landfill. Instead, these liquids will be processed through the facility's existing leachate collection and pumping system as described in Subsection 2.10 (*Leachate Monitoring and Control Systems*) of this Section.

Discharges of Liquids to Covers (Other Liquids)

The discharge of other liquids onto the final cover is also not proposed at the Landfill. Postclosure land use will be non-irrigated open space. As a result, monitoring of potential liquid through flow to the underlying waste will not be necessary.

Please note that the need for dust control provisions (other than during final closure construction) as outlined in CalRecycle citations 27CCR, §20800 and §21600(b)(8)(D) during the postclosure maintenance period is not anticipated since the access areas will be covered with aggregate base rock (perimeter access road) and engineered turf (benches) at the time of closure. In regards to final closure construction, the Technical Specifications (Appendix H) for construction stipulate that dust control provisions must be such as to protect against excess water application that could result in potential through flow into underlying waste or run-off into surface water drainages.

Stability Analysis

In accordance with 27CCR, §21090(a)(6), a stability analysis was performed for the proposed final cover system to demonstrate conformance with 27CCR, §21750(f)(5). In this regard, an infinite-slope stability analysis for the ClosureTurf™ final cover system is presented in Appendix E. This represents the same analysis included in the May 2016 Final CPMP (EBA, 2016b). The analysis also summarizes the results of an earlier stability and seismic hazard analysis performed for the Landfill that is referenced in the Landfill's January 2008 JTD (EBA, 2008). The earlier study includes critical cross sections used in the stability analysis and the results of a two-dimensional limit equilibrium analysis for a sliding block failure through the base of the waste mass. The study also presents the results of a seismic response analysis and seismic displacement analysis using the procedures outlined in Bray et al., 1995; Matasovic, 1995; and Matasovic, 1997.

Findings from the stability analysis are summarized as follows:

- A deterministic seismic hazards assessment performed for the site concluded that the Maacama Fault, with an estimated Maximum Credible Earthquake (MCE) of 7.1Mw is located 0.6 miles (1.0 kilometers) west of the site and is expected to generate the highest average peak bedrock acceleration of 0.66g.

- The static factor of safety of the entire waste mass was modeled by evaluating failure mechanisms passing through refuse and the base of the WMU and indicate a static factor of safety greater than 1.7 for failure through the base of the WMU at critical cross section B.

- The yield acceleration (Ky) of the waste mass under seismic conditions is 0.13g.

- Seismic displacement analyses using the program YSLIP PM (Matasovic, 1997) indicate that permanent seismically induced displacements will be less than 8 inches for failure through the base of the WMU.

As the final waste mass grades have not been increased with the ClosureTurf™ final cover system design, EBA does not believe additional global stability analyses are warranted and the corresponding findings from the previous analysis remain valid for the final closure design presented in this current version of the Final CPMP.

Please note that a probabilistic analysis predicts a peak ground acceleration of 0.52g at the Landfill with a 475-year return period (10 percent exceedance in 50 years) and a shear-wave velocity of 270 meters per second (California Geologic Survey, Probabilistic Seismic Hazards Ground Motion Interpolator). Given the deterministic nature of EBA's evaluation, it is our opinion that the seismic hazard analysis is appropriate for the Landfill final closure design.

2.6.2 Grading Requirements
27CCR, §21090(b) and §21800(b)(8)(B)

Grading plans for the WMU are shown on Sheet 101 and Sheets 300 through 302 of the Construction Drawings (Appendix J). As shown on the grading plans, the final cover slopes on the WMU will range from approximately 2:1 to 3:1 (horizontal to vertical). These slope inclinations are sufficient to prevent ponding on the WMU surface. In addition, as previously outlined in Subsection 2.6.1 (*Final Cover Requirements*), the physical characteristics of the Engineered Turf and sand infill layer (i.e., erosion-resistant layer) meet the performance criteria specified in 27CCR with regard to resisting the foreseeable erosion effects by wind-scour, raindrop impact, and run-off. Finally, the WMU is designed with a perimeter drainage system that will serve to protect against potential run-on from adjoining surfaces.

Grading plan design considerations included provisions to ensure compliance with prescribed clearance specifications beneath a set of high power transmission lines that extend over the WMU (see Sheets 301 and 302 of the Construction Drawings [Appendix J] for location). Pacific Gas and Electric (PG&E) states that the minimum required ground clearance is 28 feet. As a means of integrating this specification into the design, a survey of the transmission lines was performed by PG&E in the Summer of 2018. Results from this survey determined that existing refuse will need to be excavated from beneath portions of the transmission lines in order to attain the prescribed clearance. The excavated refuse will be relocated to other areas within the WMU. Please refer to Sheet 102 of the Construction Drawings (Appendix J) for the corresponding refuse re-location areas.

As part of the final closure construction project, borrow soil material will be required for construction of the foundation layer and placement of engineered fill and trench backfill. The borrow area for this soil will correspond to an on-site area located northeast of the WMU. This area corresponds to the same borrow area used during landfill operations. Excavation within this borrow area will conform to the grading plan shown on Sheet 303 of the Construction Drawings (Appendix J).

27CCR, §21800(b)(8)(B) requires information regarding the types and estimated quantities of materials needed for construction of the final cover system. In this regard, the majority of the final cover system will be comprised of geosynthetic products associated with the ClosureTurf™ system. The estimated quantity of these materials is approximately 1.9 million square feet. As for the soil components, on-site materials will be used for the foundation layer, engineered fill, and trench backfill as outlined in the previous paragraph.

The estimated quantity of borrow soil material for this purpose is approximately 100,000 cubic yards.

2.6.3 Final Cover Surveys
27CCR, §21090(e)

A topographic map of the completed final cover grades will be produced at a minimum scale of 1 inch to 100 feet and accompany the CQA Certification Report. In addition, iso-settlement maps will be produced every five (5) years thereafter to calculate any differential settlement. The iso-settlement maps will be prepared with a maximum contour interval of 2 feet and a scale of 1 inch equals 60 feet. As required by 27CCR, §21090(e)(4), each iso-settlement map will highlight areas of repeated or severe differential settlement. The delineation of such areas will be made by, or under the supervision of, a registered civil engineer or registered geologist.

2.7 CONSTRUCTION QUALITY ASSURANCE (CQA)
27CCR, §21790(b)(8)(C)

A CQA program will be implemented for closure of the WMU to verify that materials, construction methods, and testing procedures are in accordance with the intent and purpose of the Technical Specifications. Implementation of the CQA program will be administered by a registered civil engineer or certified engineering geologist in accordance with 27CCR, §20324(b)(1) and (2). The results of the CQA program will be summarized in a "CQA Certification Report" containing all reports associated with the construction activities. This document will provide evidence that the CQA program was implemented as proposed and that the construction proceeded in accordance with design criteria, plans and specifications.

2.7.1 CQA Plan

A CQA Plan for the Landfill is enclosed in Appendix I. As required by 27CCR, §20324(c), the contents of the CQA Plan include the following:

- A description of the CQA management organization and reporting protocol; and
- A description of CQA testing protocols for preconstruction, construction and post-construction testing including:
    - Procedures and equipment to be utilized for field testing and sampling;
    - Location, method, and frequency of sampling;
    - Laboratory testing procedures to be used during construction;
    - Pass/fail criteria for sampling and testing methods;
    - Frequency of performance audits; and
    - Inspection frequencies.

Closure construction will be administered by a qualified consultant or a City registered civil engineer, acting as the CQA Officer. The CQA Officer will supervise the execution and overall progress of the project. He will be assisted by a CQA Certifying Engineer, CQA Monitors, a CQA Surveyor, independent soil and geosynthetic testing laboratories, and a consulting design and construction management firm, if necessary. The construction work will be done by a licensed construction contractor who will be selected through a public bidding process.

2.7.2 Closure Construction Documentation

The closure operations will be conducted under the supervision of the CQA Officer. Inspection, field and laboratory data sheets, and other relevant closure activity documentation will include the following:

- Daily summary reports;
- Daily field logs (Inspection Data Sheet);
- Construction monitoring forms;
- Laboratory testing reports;
- Non-conformance/corrective action forms;
- Acceptance reports;
- Meeting/discussion summary reports;
- Photograph logs;
- Document control; and
- As-built record drawings.

Please refer to Section 01400 of the Technical Specifications (Appendix H) for further details regarding the nature and content of the respective documentation listed above.

At the completion of the project, a CQA Certification Report prepared and certified by the CQA Officer will be submitted to the RWQCB, CalRecycle, and the LEA. The CQA Certification Report will consist of information and data generated by the CQA program and will document that the final closure construction is in compliance with the design intent of the Construction Drawings and Technical Specifications. At a minimum, the CQA Certification Report will contain the following information:

- Summary of construction methods for each unit of construction completed;

- Summary of the CQA program implemented during construction and specific CQA activities (monitoring and testing) performed for each unit of construction completed;

- Results of conformance testing and construction testing;
- Revisions made to the Construction Drawings and variances from Technical Specifications allowed; and

- Final as-built record documents.

The CQA Certification Report shall be a self-standing document and contain all subordinate reports. The CQA Certification Report will also contain a statement of compliance with the design intent of the Construction Drawings and Technical Specifications, signed and stamped by the CQA Certifying Engineer, a professional engineer or certified engineering geologist registered in the State of California. The certificate of closure will include a statement by the Operator, under penalty of perjury, pursuant to 27CCR, §21880(a), that with the exception of deviations due to reasonably unforeseeable circumstances, the Landfill was closed in accordance with the approved Final Closure Plan.

2.7.3 Documentation Archive Storage

A copy of the CQA Certification Report, as well as all original closure construction documents, will be stored and maintained throughout the postclosure maintenance period in a protected location that is accessible to RWQCB, CalRecycle, and LEA personnel during normal business hours. At the present time, the City offices at 300 Seminary Avenue, Ukiah are proposed as the storage location for the CQA Certification Report.

2.8 DRAINAGE AND EROSION CONTROL *27CCR, §21790(b)(8)(D)*

2.8.1 Drainage System

The proposed drainage system for the WMU and borrow area have been designed to comply with the requirements of 27CCR, §21150. Overall, the proposed drainage facilities consist of a network of benches, channels/swales, and storm drains that collect and convey stormwater run-off to a series of corrugated metal pipe (CMP) discharge culverts. These CMP culverts discharge to the unnamed ephemeral creek channel at various locations along the length of the WMU's northern boundary. In general, the drainage system is designed to intercept run-off at intervals along the inside edges of berms, benches, or access roads. A sedimentation pond is located at the western end of the WMU to control sediment run-off from slope areas along the western and portions of the southern fill boundaries. Two (2) additional sedimentation ponds are located at the northeastern end of the WMU to contain sediment run-off from the eastern portion of the WMU and the soil borrow area. Please refer to the 200 Series and 300 Series sheets of the Construction Drawings (Appendix J) for plan views and details of the various drainage system components. The supporting drainage calculations for sizing the various drainage system components are enclosed in Appendix F. As required by 27CCR, §21150, the drainage system components are designed to accommodate 100-year, 24-hour precipitation conditions.

As noted above, a portion of the stormwater run-off from the WMU is discharged via CMP culverts to the unnamed ephemeral creek channel. While such provisions are currently employed at the Landfill, the design of the new drainage outfalls into the creek have been

modified to reduce the potential for erosion. Since this provision will require accessing the creek to install the new drainage outfalls, a series of permits must be obtained before implementing the improvements. These permits include: *Streambed Alteration Agreement (1602 Permit)* from the California Department of Fish and Game; *Water Quality Certification (401 Permit)* from the RWQCB; and a *Clean Water Action Section 404 Permit (404 Permit)* from the United States Army Corps of Engineers. As outlined later in Subsection 2.14 (*Sequence of Closure Stages*) of this Section, provisions are currently being made to acquire these permits.

2.8.2 Erosion Control

The overall design includes features and provisions to minimize the potential for erosion as required by 27CCR, §21150. The following bullet items provide a summary of the erosion control features and provisions:

- The selected contractor will be required to prepare a construction Storm Water Pollution Prevention Plan (SWPPP) before the commencement of work and to implement the provisions of the SWPPP for the duration of the construction project.

- The geosynthetic final cover system (ClosureTurf™) will essentially eliminate the discharge of sediment from the WMU surface as no soil component will be utilized in the final cover design.

- The final surface of the soil borrow area, as well as other areas disturbed by the construction operations, will be repaired/graded as necessary and then hydroseeded. The aforementioned areas with surface slopes steeper than ten percent will also be covered with 1.5 inches of straw and secured with erosion control netting.

- Drainage channels outside the WMU footprint that will potentially be subjected to high flow velocities will be lined with rock rip-rap to protect against erosion.

- Drainage outfalls will be lined with rock rip-rap.

- Aggregate base placed on perimeter access roads to allow for all-weather access will also serve to reduce the potential for sediment-laden run-off from these areas.

Please refer to Sheet 308 of the Construction Drawings (Appendix J) for additional details regarding straw wattle, drainage inlet, and check dam provisions.

2.9 GAS MONITORING AND CONTROL SYSTEMS *27CCR, §21790(b)(8)(E)*

2.9.1 Gas Monitoring System

The gas monitoring system consists of ten gas monitoring points (GAS-1 through GAS-10) located at various locations along the Landfill property boundary. The locations of the gas monitoring points are shown on Figure 4 (Appendix A). No changes to the monitoring system components are proposed as part of closure. Each of the gas monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter polyvinyl chloride (PVC) casing and capped with labcock valves. The monitoring probes range in depth from approximately 9 to 250 feet below ground surface (BGS). The number and depth of monitoring probes at each location are based on site lithology (i.e., permeable zones) and the maximum depth of refuse as measured within 1,000 feet of the monitoring point in question.

Table B-1 in Appendix B of this document provides a summary of the gas monitoring point construction characteristics. Copies of exploratory boring logs for the respective gas monitoring points are enclosed in Appendix C.

2.9.2 Gas Control Systems

The Landfill is currently equipped with a partial perimeter gas collection system that was installed between the southwestern edge of the WMU and the property line in 1997 as a mitigation measure against subsurface gas migration. The system consists of 17 vertical extraction wells installed in native geologic materials and completed at depths ranging from 35 to 133 feet BGS. The wells are connected to a 6-inch diameter, high-density polyethylene (HDPE) header pipe that leads to a vacuum blower located at the western end of the WMU. The vacuum blower creates a vacuum in the header pipe that draws the gas from the soil through the extraction wells and subsequently to the blower. Discharge from the system is vented directly to the atmosphere via a 4-foot tall, 4-inch diameter stack. This system continues to operate on an intermittent basis. Please refer to Table B-2 in Appendix B of this document for individual gas extraction well construction characteristics.

A full-scale gas control system for the entire WMU is planned for installation as part of the final closure construction project. This system as currently proposed will consist of 18 extraction wells (EW-1 through EW-18), aboveground conveyance piping, and a flare station that will include a totally-enclosed vertical ground flare (flare) for combustion of the collected gas. Information pertaining to this system, including design criteria/rationale and details for the various system components, are presented in the *Updated Design Plan for Landfill Gas Collection and Control System (Updated Design Plan)* dated April 2019 (EBA, 2019). A copy of the Updated Design Plan is enclosed in Appendix G. The corresponding Technical Specifications and Construction Drawings for the system are enclosed in Appendices H and J, respectively.

It should be noted that once the full-scale gas control system is installed and operational, the need to operate the partial perimeter gas collection system may no longer be

necessary. Under this scenario, the partial perimeter gas collection system will either be abandoned or maintained for emergency use only.

2.10 LEACHATE MONITORING AND CONTROL SYSTEMS *27CCR, §21790(b)(8)(F)*

The WMU is unlined and is not equipped with an engineered or blanket leachate collection and removal system (LCRS). Instead, leachate collection for the WMU currently consists of a series of PVC piping and French drain systems installed to collect leachate from seeps occurring along existing WMU slope faces. Leachate collected by these components is then conveyed by gravity flow to a primary buried pipeline located along the northern toe of the WMU. The buried pipeline, in turn, drains the leachate westward and ultimately discharges to the leachate management facilities located at the western toe of the WMU. A description of the leachate management facilities is as follows:

- Discharge from the primary buried pipeline is diverted to a subsurface concrete sedimentation chamber equipped with a valved sediment drain at its base. The clarified leachate within the chamber is then discharged (by gravity flow) to an adjacent pump station wet well (identified herein as the "leachate wet well") via a 10-inch diameter overflow line.

- Clarified leachate discharged to the leachate wet well is then pumped to a 63,500-gallon leachate aboveground storage tank (AST) for temporary storage. The leachate wet well is equipped with two (2) 25-gallon per minute (gpm), low-head, submersible pumps that are actuated by high/low water level controls. If the clarified leachate discharge rate exceeds the leachate wet well's pumping capacity (50 gpm), the excess leachate is currently diverted to an emergency leachate pond via a 10-inch diameter overflow line.

- As noted above, leachate from the leachate wet well is diverted to the leachate AST. The leachate AST is constructed of AWWA factory epoxy lined and coated bolted steel. As was the case for the leachate wet well, the AST is also equipped with a 10-inch diameter overflow line that diverts leachate to the emergency leachate pond in the case of an emergency.

- Leachate stored in the leachate AST is subsequently pumped to a sewer line connection located on Vichy Springs Road via a force main/gravity drain. The force main/gravity drain is constructed of 4-inch diameter PVC and is approximately 5,200 feet in length. The pump lift station for the leachate AST is equipped with two (2) 45-gpm pumps (one duty, one standby), thereby giving the system a total pumping capacity of 90 gpm.

In addition to the aforementioned features, three leachate level monitoring wells (LW-1, LW-2, and LW-3) have been installed at the Landfill as part of a previous study. However, these leachate wells have not been used historically for monitoring as they are not identified in the Landfill's existing Monitoring and Reporting Program (M&RP). The

locations of these monitoring wells, as well as the other leachate management facilities described above, are shown on Figure 5 (Appendix A). In addition, a summary of the leachate well construction characteristics and copies of exploratory boring logs are presented in Table B-3 (Appendix B) and Appendix C, respectively.

Several upgrades to the leachate control system as described above will be implemented as part of the final closure construction project. These upgrades will include lining the existing leachate wet well and sedimentation chamber to provide a higher degree of containment. In addition, the emergency leachate pond will be backfilled and an underground storage tank (UST) system installed to provide new overflow protection provisions. Finally, the leachate wet well and leachate storage tank will be retrofitted with communication telemetry to enhance emergency capabilities.

2.11 GROUNDWATER MONITORING SYSTEM

The groundwater monitoring network currently consists of 18 groundwater monitoring wells primarily concentrated along the northern and western margins of the WMU. No changes to the monitoring system components are proposed as part of closure. The locations of the groundwater monitoring wells are shown on Figure 6 (Appendix A). Groundwater monitoring well 87-1 was installed in 1987 and was subsequently used as part of the Water Quality Solid Waste Assessment Test (SWAT) conducted at the Landfill during the late 1980s. The remaining groundwater monitoring wells were installed over the period of 1990 through 1996 as a mechanism to characterize groundwater impacts at the site and to upgrade the Landfill's detection monitoring network. In accordance with the criteria specified in Section D(3)(b) of M&RP Order No. R1-2002-0061, the respective groundwater monitoring wells have the following use designations:

Detection Monitoring Wells:

- 87-1, 90-1, 90-2, 90-5, 90-6, 90-7, 90-8, 92-2, 92-3, 94-1, 94-2, 96-1, 96-2, and 96-3

Corrective Action Monitoring Wells:

- 90-3, 90-4, 92-1, and 92-4

Point of Compliance Wells:

- 87-1, 90-2, 90-3, 90-4, 90-5, 90-7, and 90-8

The two (2) primary water-bearing formation deposits underlying the site correspond to Quaternary alluvial deposits and Plio-Pleistocene upper/lower continental basin deposits. Groundwater monitoring wells completed within the Quaternary alluvial deposits include 87-1, 90-1, 90-3, 90-4, 92-1, and 94-1. These groundwater monitoring wells range in depth from approximately 12 to 35 feet BGS. The remaining groundwater monitoring wells are completed in the Plio-Pleistocene upper or lower continental basin deposits and range in depth from approximately 23 to 160 feet BGS.

Table B-4 in Appendix B of this document provides a summary of the groundwater monitoring well construction characteristics. Copies of exploratory boring logs for the respective groundwater monitoring wells are enclosed in Appendix C.

2.12 SURFCE WATER MONITORING SYSTEM

The surface water monitoring system for the Landfill is comprised of two (2) surface water sampling stations (S-1 and S-2) located along the unnamed ephemeral creek that flows along the northern margin of the WMU from east to west. The surface water sampling stations are shown on Figure 7 (Appendix A). As illustrated on Figure 7, S-1 and S-2 are located upstream and downstream of the WMU, respectively.

It should be noted that a Notice of Termination (NOT) for the Landfill's former stormwater permit (WDID Number 123I001656) was approved by the RWQCB on July 30, 2015 on the basis that industrial activity no longer occurs at the site, nor will it occur in the future as the end use of the Landfill during the postclosure maintenance period will be non-irrigated open space. Surface water monitoring and inspection at the Landfill will continue to be performed as part of the Landfill's postclosure maintenance program (see Section 3), thereby providing long-term provisions for monitoring surface water quality.

2.13 CLOSURE OF SURFACE IMPOUNDMENT

As part of the January 2008 JTD (EBA, 2008), recommendations were provided for assessing the unlined leachate surface impoundment for potential environmental impacts. Authorization to proceed with the assessment was issued by the RWQCB in their letter dated April 24, 2013. The work was subsequently implemented by EBA on August 6, 2013. The scope of work entailed the advancement of four (4) soil borings within the footprint of the surface impoundment to depths ranging from 11.5 to 16.5 feet BGS and the collection of four (4) soil samples from each borehole for chemical analysis. All soil samples from each borehole were analyzed for volatile organic compounds (VOCs), arsenic, and barium. In addition, one (1) soil sample from each borehole was analyzed for organochlorine pesticides, polychlorinated biphenyls, organophosphorus pesticides, chlorinated herbicides, and oil and grease.

Findings from the aforementioned investigation were summarized in a technical report dated October 3, 2013 (EBA, 2013b) and submitted to the RWQCB, CalRecycle, and LEA. Results from the soil sampling activities did not reveal any evidence of appreciable residual contamination associated with the former leachate surface impoundment operations. Based on these results, it was concluded by EBA that no further assessment or remedial actions were necessary. Furthermore, it was recommended that the leachate surface impoundment be backfilled with "clean" engineered fill and the final ground surface graded to promote positive drainage and prevent ponding. These provisions, which are included in the Technical Specifications (Appendix H) and Construction Drawings (Appendix J), meet the closure requirements for surface impoundments as outlined in 27CCR, §21400.

2.14 SEQUENCE OF CLOSURE STAGES
27CCR, §21800(c)

As previously described, the Landfill discontinued waste disposal operations in September 2001 and has been inactive since that time. Thus, the actual implementation of the final closure construction project represents the final sequence of the closure stages. In this regard, the remaining sequence of events that are required to complete the project are as follows:

- Solicitation of competitive bids from qualified contractors to implement the final closure project. The competitive bid process will commence in August 2019 and the contract awarded to the successful bidder by December 2019.

- Completion of the California Environmental Quality Act (CEQA) process, which is currently in progress. The estimated completion date for the CEQA process is August 2019.

- Acquisition of 1602, 401, and 404 permits to allow for streambed alteration associated with the installation of new drainage outfalls in the unnamed ephemeral creek channel. As with the CEQA process, this task is currently in progress with an estimated completion date of December 2019.

- Commence the construction operations by May 2020. Based on an estimated construction period of six months, the corresponding completion date for the construction operations is October 2020.

- Completion of the CQA Certification Report by January 2021.

Please note that a definitive construction schedule for the various tasks associated with the final closure construction project will become available upon selection of a qualified contractor. Such a schedule will be provided to the applicable regulatory agencies at that time.

CITY OF UKIAH LANDFILL
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SECTION 3
FINAL POSTCLOSURE MAINTENANCE PLAN

This section describes the responsibilities, resources, and inspection frequencies for implementing postclosure maintenance for the Landfill upon closure. Specific inspection and maintenance activities are detailed in the subsequent subsections. The contents of this Final Postclosure Maintenance Plan (Final PMP) have been developed to comply with the requirements set forth in 27CCR, §21769(c)(2) and §21830.

3.1 EMERGENCY RESPONSE PLAN
27CCR, §21830(b)(1)

An Emergency Response Plan (ERP) has been prepared for the Landfill in accordance with 27CCR, §21130 and is presented in Appendix K. The ERP identifies steps to be taken in the event of a failure or breakdown of the WMU under potential contingency situations. Appropriate agency and business points of contact are also included in the ERP.

3.2 RESPONSIBLE PARTIES AND RESOURCES
27CCR, §21830(b)(2)

3.2.1 Responsible Parties

The Landfill is wholly owned by the City. Maintenance responsibilities following Landfill final closure will be assigned to the City of Ukiah Public Works Department (Public Works Department). The Public Works Department will be responsible for all inspection, maintenance and monitoring activities related to the final cover system, drainage systems, final grading, environment monitoring and control systems, and emergency response. The person at the Public Works Department responsible for managing the postclosure maintenance activities and the corresponding emergency phone numbers are as follows:

Name	Position	Emergency Phone Numbers
Tim Eriksen	Director of Public Works / City Engineer	(707) 463-6280
Tim Eriksen	Off-hour Emergencies	(707) 972-0839

The work address for Mr. Eriksen and the City office is:

- City of Ukiah
  Public Works Department
  300 Seminary Avenue
  Ukiah, CA 95482

3.2.2 Resources

Current resources of the Public Works Department for inspection, maintenance, and monitoring of the Landfill are as follows:

- *Technical Services Staff:*
  - Public Works Director/City Engineer (Registered Civil Engineer)
  - Deputy Director of Public Works (Registered Civil Engineer)
  - Senior Civil Engineer (Registered Civil Engineer)(position currently vacant)
  - Water, Sewer, and Street Maintenance Supervisor
  - Street Maintenance Leadman
- *Annual Maintenance Contracts:*
  - Gas control system
- *Annual Consultant Agreement for Environmental Monitoring and Consulting Services:*
  - Detection and corrective action monitoring systems
  - Gas monitoring system

Routine and periodic inspection will be conducted by the Street Maintenance Leadman. At least twice a year and immediately after any special events such as major earthquakes, storms, and fires, a thorough and comprehensive inspection will be conducted by one of the three Registered Civil Engineers. Inspection frequency will be as shown in the following table:

INSPECTION RESPONSIBILITIES AND FREQUENCIES				
Activities	***Immediately***	***Monthly***	***Quarterly***	***Semi-Annually***
Special Events	RCE			
Security		SML[(1)]	SML[(2, 3)]	RCE
Final Cover		SML[(1)]	SML[(2)]	RCE
Final Grading		SML[(1)]	SML[(2)]	RCE
Drainage System		SML[(1)]	SML[(2)]	RCE
Leachate Control System		SML[(1)]	SML[(2)]	RCE
Detection and Corrective Action Monitoring System			C[(4)]	C[(4)]
Gas Monitoring System			C	
Gas Control System		C		

RCE: Registered Civil Engineer
SML: Street Maintenance Leadman
C: Consultant

(1) During the wet season (October 1 through April 30)
(2) During the dry season (May 1 through September 30)
(3) Assumes consultant will check security monthly between quarterly inspections as part of gas control system monitoring.
(4) Combination of quarterly and semi-annual sampling frequencies as described in Subsection 3.5.2 (*Monitoring Program*).

3.3 POSTCLOSURE PLANNED USES *27CCR, §21830(b)(3)*

The end use of the Landfill will be non-irrigated open space. The area will be returned to a natural setting with the exception that all necessary access roads, monitoring wells and drainage structures will remain.

3.4 AS-BUILTS FOR MONITORING AND CONTROL SYSTEMS *27CCR, §21830(b)(4)*

Descriptions of the current monitoring and control systems at the Landfill were previously presented in Section 2 (*Final Closure Plan*). Please refer to the following subsections and appendices for details and as-built information:

Gas Monitoring System

- Subsection 2.9.1, Figure 4 (Appendix A), Table B-1 (Appendix B), Appendix C

Gas Control Systems
- Subsection 2.9.2, Figure 4 (Appendix A), Table B-2 (Appendix B)

Leachate Monitoring and Control Systems
- Subsection 2.10, Figure 5 (Appendix A), Table B-3 (Appendix B), Appendix C

Groundwater Monitoring System
- Subsection 2.11, Figure 6 (Appendix A), Table B-4 (Appendix B), Appendix C

Surface Water Monitoring System
- Subsection 2.12, Figure 7 (Appendix A)

Other than the full-scale gas control system to be installed during the final closure construction project (see Subsection 2.9.2 and Appendix G for further details), no other changes to the current monitoring and control systems will be implemented as part of final closure.

3.5 INSPECTION/MAINTENANCE AND MONITORING PROGRAMS *27CCR, §21830(b)(5)*

The following subsections provide a summary of the inspection/maintenance and monitoring programs that will be employed as part of postclosure maintenance. Specific features and components to be targeted by the inspection/maintenance program include the final cover, final grading, drainage system, leachate control system, detection and corrective action monitoring system, gas monitoring system, and security. The monitoring program, in turn, will focus on implementing monitoring and sampling tasks to comply with applicable regulations and facility permits.

3.5.1 Inspection/Maintenance Program

Final Cover

The final cover is designed to limit water infiltration, minimize leachate generation, prevent exposure of waste to people and animals, limit gas emissions, minimize odor, control fires, and provide for a pleasant appearance. As such, the postclosure maintenance program will be instituted to ensure that the final cover continues to meet these objectives. The final cover areas will be visually inspected on a monthly or quarterly basis as previously outlined in Subsection 3.2.2 (*Resources*) and evaluated for:

- Breaches in the liner system
- Odors
- Exposed refuse
- Slope failure
- Leachate seeps
- Sand migration

Based on the nature of the final cover system and the absence of a vegetative soil layer, erosional damage does represent a potential concern at the Landfill. Thus, from an integrity perspective, a physical breach in the final cover's liner system would be the most probable cause prompting the need for final cover maintenance. In this regard, the detection of odors, exposed refuse, and/or leachate seeps would be indicative of a potential breach. In the event a breach is identified, the damaged portion of the liner will be repaired as soon as practical depending upon contractor availability and liner material delivery, as well as weather. With that being said, every effort will be made to implement the repairs as soon as practical. In the interim, provisions will be employed to temporarily tarp and secure the area to prevent water infiltration into the refuse. All repairs to the liner will be to design conditions and in accordance with the Technical Specifications for the respective final cover components. Any underlying subgrade improvements will also be repaired in accordance with the foundation layer Technical Specifications.

Since the sand infill layer is an integral part of the final cover system, the surface of the final cover will be inspected for evidence of bare patches and/or excessive sand accumulation. Bare patches will be repaired by either manually redistributing the sand in the immediate area or adding new sand material. The resulting sand thickness for either approach shall be 5/8-inch minimum. In the case of excessive sand, the accumulated sand will be manually spread around the immediate area to achieve a uniform thickness of at least 5/8-inch. If excess sand remains after such provisions, the excess sand will be physically removed and stockpiled at a location off of the WMU surface. Any areas of displacement or migration that are 1/8-acre in size or larger will be repaired upon their discovery as soon as weather and access conditions permit. Any discernable smaller areas that are identified during the annual facility inspection will be prepared as part of annual winterization maintenance activities in preparation for the wet season. In addition to the monthly and quarterly inspections as previously outlined in Subsection 3.2.2 (*Resources*), inspection of the sand fill layer will also be performed after major storm events.

Final Grading

Surface grading of a closed WMU, when properly designed and constructed, can be an economical method of controlling infiltration and promoting surface water run-off. The final grading configuration is designed to compensate for the effects of settlement, thereby preventing the need for difficult and costly maintenance and repair. Thus, the postclosure maintenance program will be implemented to ensure that the WMU final grades are maintained properly to ensure final cover integrity and effectiveness. The final cover areas will be visually inspected on a monthly or quarterly basis as previously outlined in Subsection 3.2.2 (*Resources*) and evaluated for:

- Visible depressions
- Ponded water
- Settlement and subsidence

Based on the steep slopes that exist throughout the WMU, any settlement that might occur that could potentially compromise drainage or induce ponding would likely be limited to bench areas. If such deficiencies are identified, or in the unlikely scenario that an area(s)

requiring repair occurs on a slope between benches, the ClosureTurf™ material will be removed from the area in question, additional foundation layer soil will be placed and compacted within the depressed area to restore positive drainage, and the exposed area recovered with either the existing (if condition is suitable) or new ClosureTurf™ material. Foundation layer placement and liner repairs will be in accordance with the CQA Plan for the respective final cover components.

As an additional means of monitoring settlement and subsidence, the entire site will be aerially photographed every five years during the postclosure maintenance period and iso-settlement maps prepared to calculate any differential settlement. The iso-settlement maps will be generated with a maximum contour interval of 2 feet and a scale of 1 inch equal to 60 feet.

Drainage System

Drainage control problems can result in accelerated erosion of a particular area. In addition, differential settlement of drainage control structures can limit their usefulness and may result in failure to direct stormwater properly off of the site. Therefore, the postclosure maintenance program will be implemented to ensure that the integrity and effectiveness of the final drainage system are maintained throughout the postclosure maintenance period. The final drainage system will be inspected on a monthly or quarterly basis as previously outlined in Subsection 3.2.2 (*Resources*) and evaluated for:

- Evidence of erosion
- Standing water
- Formation of gullies
- Settlement, blockage of and damage to drainage channels, structures, swales, and culverts

Deficiencies, damage to, and failure of the drainage system will be repaired and restored within two weeks, weather permitting, to design conditions and in accordance with construction specifications. Temporary repairs may be made until permanent repairs can be scheduled. Culverts and drainage basins will be cleaned of sediments before they are no longer able to function properly. Drainage inlet grates will be kept free of debris. Drainage channels will be maintained to permit free flow and sealed or repaired to maintain structural integrity of the system.

Leachate Control System

The leachate control system will be inspected on a monthly or quarterly basis as previously outlined in Subsection 3.2.2 (*Resources*). In addition, preventive maintenance will be carried out on all components of the system at regular intervals to ensure proper operations. This consists of performing manufacturer's recommended maintenance on the pump system and monthly/quarterly (depending upon frequency shown in Subsection 3.2.2) inspection of the collection and storage system. This inspection includes assessing the condition of system components for possible leakage, failure, or damage, and adjusting individual pump controls or liquid levels for optimum performance. Any potential or existing

failure points will be noted and repairs implemented promptly. The leachate collection lines will be flushed as needed to remove any sediment buildup in the piping system.

Detection and Corrective Action Monitoring System

The leachate wet well will be inspected on a monthly or quarterly basis in conjunction with the leachate control system inspection as described in the previous subsection. The surface water monitoring system, in turn, requires no maintenance since there is no dedicated equipment or features. Finally, the groundwater and leachate monitoring wells will be inspected regularly in conjunction with the scheduled monitoring tasks (quarterly) for signs of failure or deterioration. If damage is discovered, the nature and extent of the problem will be recorded. A decision will be made to replace or repair the monitoring well. Possible repairs include redevelopment, chemical treatment, partial casing replacement or repair, resealing the annulus, pumping, and testing. If a monitoring well needs to be replaced, it will be properly decommissioned. Damaged monitoring wells will be scheduled for repair or replacement within one (1) month after identifying the problem. As for general maintenance, the following provisions will be performed on a quarterly basis:

- Cut weeds in 2-foot radius around each well, as needed.
- Replace locking well caps, as needed.
- Lubricate enclosure locks and hinges, as needed.

Gas Monitoring System

The gas monitoring system will be inspected quarterly in conjunction with scheduled monitoring tasks. System components will be repaired and replaced as required to maintain full system capabilities as intended at initial installation. Quarterly maintenance provisions will include the following:

- Cut weeds in 2-foot radius around each point, as needed.
- Replace probe parts, as needed.
- Lubricate enclosure locks and hinges, as needed.

Site Security

Site security upon closure will conform with the requirements of 27CCR, §21135. Perimeter fencing will be maintained to exclude cattle from the site. Other security provisions will include:

- Lockable gate at the site entrance.
- Lockable utility boxes, or gates, or both, enclosing the environmental control systems.

At least one sign will be posted in a visible location at the site access road indicating where the Final CPMP is located. The sign will also include a telephone number for emergency notification and will remain throughout the postclosure maintenance period.

3.5.2 Monitoring Program

The monitoring program applies to the environmental monitoring and control systems during the postclosure maintenance period and will coincide with applicable regulations and facility permits. The following subsections present the nature and scope of the respective monitoring components. Please note that in the case of detection and corrective monitoring for leachate, groundwater, and surface water, the scope and frequencies specified herein are proposed and will ultimately be dictated by the postclosure maintenance M&RP to be adopted by the RWQCB.

Detection and Corrective Action Monitoring

For the purpose of this Final PMP, it is assumed that detection and corrective action monitoring for leachate, groundwater, and surface water during the postclosure maintenance period will be similar to what is currently required under existing M&RP Order No. R1-2002-0061, with several modifications. The proposed modifications are outlined below. Please note that the current monitoring frequency required under existing M&RP Order No. R1-2002-0061 is quarterly for each of the aforementioned media.

- Eliminate the analyses for calcium, sodium, magnesium, potassium, bicarbonate, carbonate, and fluoride. Whereas these selected metals and general chemistry parameters were meaningful during previous site characterization work (i.e., definition of water types), they do not represent useful indicator parameters for potential releases, nor do they represent parameters of concern with respect to health and toxicity issues.

- Limit the quarterly monitoring frequency to selected groundwater monitoring wells located along the western property boundary, while reducing the monitoring frequency in the remaining groundwater monitoring wells to semi-annual. The western property boundary groundwater monitoring wells, which include 87-1, 90-2, 94-2, 96-1, and 96-3, are recommended for continued quarterly monitoring since they are situated between the WMU and downgradient off-site receptors that could possibly be influenced by a potential release.

- Remove groundwater monitoring wells 90-8 and 92-4 from the groundwater monitoring network since these monitoring wells are located outside the WMU's watershed and do not appear to be in hydraulic communication with groundwater underlying the WMU.

- Add semi-annual water level monitoring of leachate monitoring wells LW-1 through LW-3. The monitoring should be performed during the first and third quarters to allow for evaluation of seasonal variations.

- Reduce the quarterly monitoring frequency for surface water to semi-annual. The basis for this modification is that surface water flow in the ephemeral creek has historically occurred only between November and April, and sometimes intermittently during this time frame depending upon rainfall totals. Based on this

limited flow period, quarterly monitoring is not appropriate for the site. The semi-annual monitoring should be performed during the first and fourth quarters to provide the best odds for surface water flow being present.

Summaries of the scope and frequency of monitoring/testing proposed herein are presented in Table B-5 (Leachate), Table B-6 (Groundwater), and Table B-7 (Surface Water) of Appendix B.

The monitoring and testing activities will be performed using industry standard protocols. Provisions will include: use of dedicated pumps, sanitized portable pumps, and/or sanitized bailers; measurement of field parameters during purging and sampling; collection of quality assurance/quality control (QA/QC) samples; sample preservation during transport; chain-of-custody documentation; and laboratory QA/QC testing. Field procedures, field data, and laboratory test results will be summarized in the report submittals as described in Subsection 3.7 (*Reporting*).

Perimeter Gas Monitoring

The perimeter gas monitoring system will be monitored on a quarterly basis as required by 27CCR, §20921. The scope of monitoring at each probe will include: measuring static pressure conditions using a Magnehelic pressure gauge; purging the equivalent of one (1) probe volume using an air pump; and measuring methane, oxygen, and carbon dioxide concentrations initially, during and upon completion of the purging operations using a calibrated portable gas detector. The regulatory compliance level for methane along the landfill property boundary is 5 percent by volume.

Gas Emissions Monitoring

The gas control system and WMU surface will be monitored to comply with Assembly Bill 32 requirements in accordance with 17CCR, §95469. The scope of monitoring will include the following:

- Instantaneous surface monitoring will be conducted on a quarterly basis to determine if surface emissions of 500 parts per million by volume (ppmv) or greater, other than non-repeatable, momentary readings, are present at any location on the WMU surface. The monitoring will be accomplished using a calibrated portable gas detector.

- Integrated surface monitoring will be conducted on a quarterly basis to determine if the average methane concentration within designated grid areas exceed 25 ppmv. The monitoring will be accomplished using a calibrated portable gas detector.

- Any components of the gas control system that are under positive pressure will be monitored on a quarterly basis to determine if any leaks are present at methane concentrations exceeding 500 ppmv. The monitoring will be accomplished using a calibrated portable gas detector.

- The wellhead for each extraction well will be monitored on a monthly basis to determine whether the extraction well is being operated under vacuum conditions (i.e., negative pressure). The monitoring will be performed using a Magnehelic pressure gauge.

- The flare will be monitored for temperature and flow rate using dedicated instrumentation and the corresponding data documented using a continuous recorder. In addition, the flare will be source tested on an annual basis to verify compliance with emissions and destruction efficiency criteria.

The test methods and procedures employed to perform the respective monitoring provisions outlined above will be in accordance with the applicable subsections of 17CCR, §95471. This includes portable gas detector instrumentation and calibration, emissions monitoring procedures, wind speed data collection, and precipitation documentation. In addition, in the event that an emissions and/or operating threshold is identified, corresponding corrective actions will be implemented within the time frames specified in 17CCR, §95469. Please refer to the gas control system's Updated Design Plan (Appendix G) for further details regarding the methods and procedures.

Source Testing

In accordance with 17CCR, §95464(b)(4), an initial source test of the flare will be performed within 180 days of initial start-up of the gas control system. This will be followed by annual source testing thereafter during the postclosure maintenance period, or at an alternate frequency if approved by the Mendocino County Air Quality Management District (MCAQMD). The source testing will be performed by a qualified contractor experienced in this type of testing.

3.6 OPERATIONS AND MAINTENANCE PLAN FOR GAS CONTROL SYSTEM *27CCR, §21830(b)(6)*

Preventive maintenance for the existing partial perimeter gas collection system will be carried out on all mechanical equipment at manufacturer's recommended intervals. This includes cleaning, lubrication, and replacement of worn parts. The accessible portions of gas collection piping will be thoroughly inspected on a regular basis for detection of potential failure points and necessary repairs will be noted and implemented. System failures, such as pipe leaks or breaks that reduce gas collection efficiency and control effectiveness will be addressed to operating permit conditions. As previously noted, this system may become obsolete upon installation and operation of the full-scale gas control system. If that is the case, the maintenance provisions described above will be suspended accordingly.

In regards to the proposed full-scale gas control system, please refer to the corresponding Updated Design Plan (Appendix G) for details regarding operation and maintenance of the system. Please note that the totally-enclosed vertical ground flare has yet to be fabricated,

nor has the MCAQMD formally approved the system through the issuance of an Authority to Construct Permit. Any operation and/or maintenance provisions provided by the flare manufacturer or mandated by the MCAQMD through the permitting process will be incorporated into the operations and maintenance program accordingly.

3.7 REPORTING
27CCR, §21830(b)(7)

With the exception for the gas monitoring system (see below), the reporting requirements for the leachate control system, detection and corrective action monitoring system, and gas control system are permit specific. Under the current WDR/M&RP (Order No. R1-2002-0061), the leachate, groundwater, and surface monitoring and/or control data are reported to the RWQCB on a quarterly basis. However, a semi-annual reporting frequency is being requested as part of the new WDR to be issued for postclosure maintenance. As for gas control, documentation as to operation of the existing partial perimeter gas collection system is included as part of the perimeter gas monitoring reports prepared for 27CCR. As for the proposed full-scale gas control system, reporting will be dictated by the Permit to Operate to be issued by the MCAQMD. The reporting frequency recommended in the Updated Design Plan (EBA, 2019) is annually.

In regards to the gas monitoring system, the scope and frequency of reporting is dictated by 27CCR, §20934, which requires quarterly report submittals within a time period specified by the LEA but no more than within 90 days of sampling. Each report shall include methane concentrations, documentation of sampling conditions (i.e., barometric pressure, atmospheric temperatures, general weather conditions, and probe pressures), instrumentation utilized, monitoring personnel, and a brief description of methods.

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SECTION 4
CLOSURE AND POSTCLOSURE MAINTENANCE COST ESTIMATES

In accordance with 27CCR, §21769(c)(2)(A), §21800(c) and §21830(b)(8), engineer's cost estimates for closure of the Landfill and associated postclosure maintenance have been prepared by a Registered Professional Engineer or Certified Engineering Geologist and are presented in Appendix L. As presented in Appendix L, the estimated cost for closure of the Landfill is ***$10,987,856***. This cost includes a 20 percent contingency factor. The estimated cost for postclosure maintenance of the Landfill is ***$7,191,931*** for the 30-year postclosure maintenance period. This cost was calculated by multiplying the annual cost for maintenance and monitoring by 30 years (duration of postclosure maintenance period).

The aforementioned information represents the cost of closing the Landfill at the point in its active life (i.e., current site conditions) when the extent and manner of operation would make closure the most expensive. The closure and postclosure maintenance costs will be updated annually to incorporate changes resulting from increased or decreased site activities or monitoring. Any modifications to these costs will be submitted to CalRecycle for approval.

As required by 27CCR, Chapter 6, the operator of a disposal facility is responsible for establishing a "demonstration of financial responsibility" to provide funding for site closure and postclosure maintenance costs. Financial mechanisms to provide for such funding have been established by the City.

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SECTION 5
FUND DISBURSEMENT SCHEDULE

In accordance with 27CCR, §21790(b)(8)(F), a preliminary fund disbursement schedule for the final closure construction project has been prepared and is enclosed in Appendix N. Please note that the fund disbursement schedule presented in Appendix M is preliminary in nature as it is based on engineer's estimates for both construction sequencing and associated costs. Both of these variables as presented are subject to change based on the contractor selected from the competitive bid process. It should be further noted that the closure costs, which are based on the engineer's cost estimate presented in Section 4 (*Closure and Postclosure Maintenance Cost Estimates*), exclude the 20 percent contingency. An updated fund disbursement schedule will be provided to the applicable regulatory agencies upon selection of a qualified contractor.

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SECTION 6
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APPENDIX A

FIGURES

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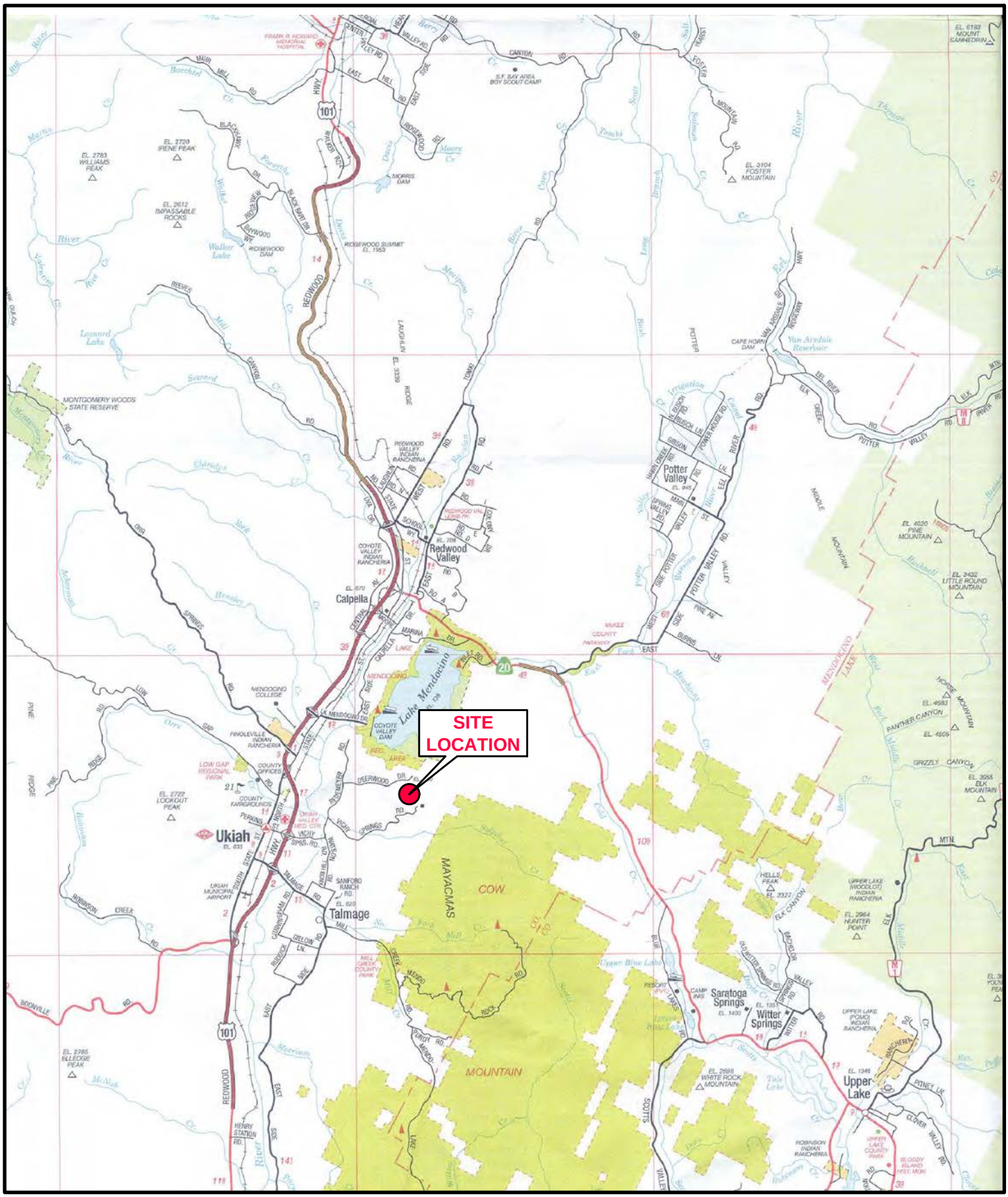

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

SITE LOCATION MAP

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

FIGURE
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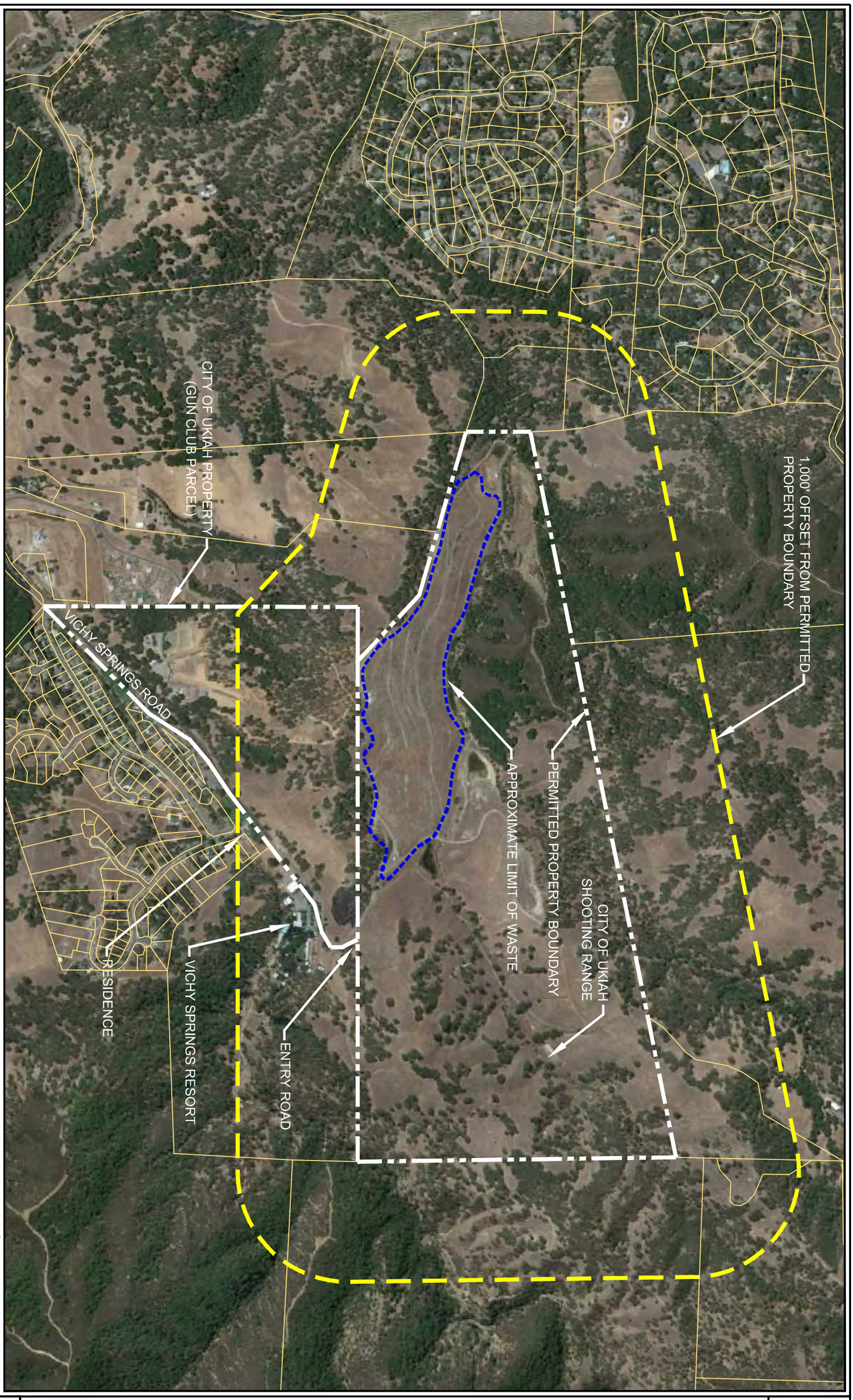

PHOTOGRAPH COPYRIGHT: DISCOVERY NETWORKS 2013 (SOURCE: GOOGLE EARTH)

0 400 800
1" = 800'

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

SITE PLAN

MENDOCINO COUNTY

FIGURE
2
02-907

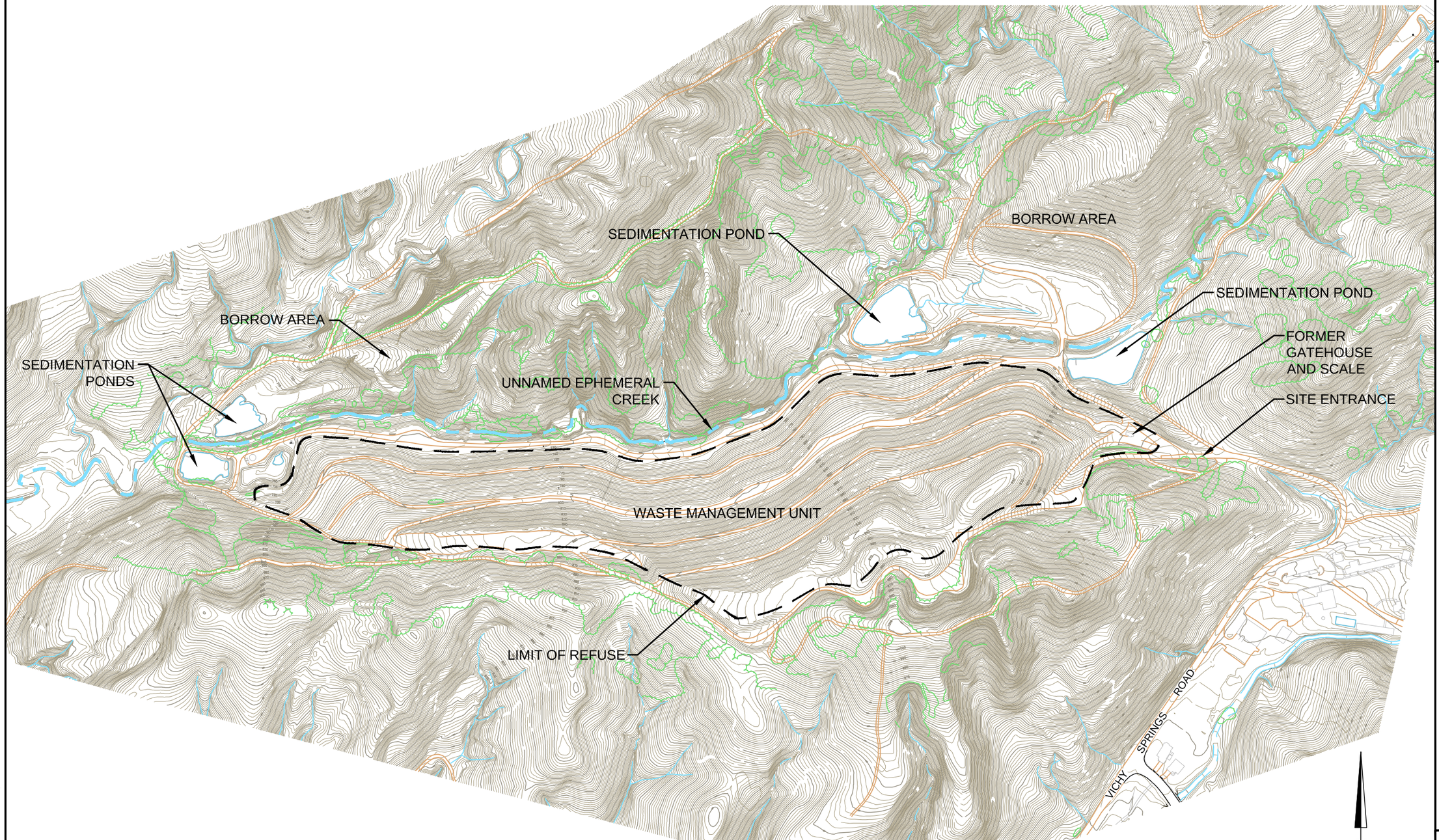

FIGURE 3

02-907

COUNTY

MENDOCINO

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

EXISTING SITE FEATURES

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LEGEND

PERIMETER LANDFILL GAS MONITORING POINT ◆ GAS–1

PERIMETER LANDFILL GAS EXTRACTION POINT ■

SEDIMENTATION POND

BORROW AREA

GAS–8

GAS–9

GAS–10

SEDIMENTATION POND

BORROW AREA

GAS–7

SEDIMENTATION PONDS

UNNAMED EPHEMERAL CREEK

FORMER GATEHOUSE AND SCALE

SITE ENTRANCE

GAS–1

GAS–6

LANDFILL GAS EXTRACTION BLOWER

WASTE MANAGEMENT UNIT

GAS–2

GAS–3

GAS–5

LIMIT OF REFUSE

GAS–4

VICHY SPRINGS ROAD

N

0 200 400

1" = 400'

FIGURE 4

02-907

COUNTY

MENDOCINO

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

GAS MONITORING/CONTROL SYSTEMS

EBA ENGINEERING
825 SONOMA AVENUE
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SANTA ROSA, CA 95404
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LEGEND

LEACHATE WELL ■ LW–1

SEDIMENTATION POND

BORROW AREA

BORROW AREA

SEDIMENTATION POND

SEDIMENTATION PONDS

UNNAMED EPHEMERAL CREEK

LW–3

FORMER GATEHOUSE AND SCALE

SITE ENTRANCE

LW–1

LW–2

WASTE MANAGEMENT UNIT

LEACHATE WET WELL

LEACHATE STORAGE TANK AND PUMP STATION

FORMER LEACHATE POND

LIMIT OF REFUSE

VICHY SPRINGS ROAD

N

0 200 400

1" = 400'

FIGURE 5

02-907

COUNTY

LEACHATE MONITORING/CONTROL SYSTEMS

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

MENDOCINO

EBA ENGINEERING
825 SONOMA AVENUE
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SANTA ROSA, CA 95404
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LEGEND

DETECTION GROUNDWATER MONITORING WELL ● 90–1

CORRECTIVE ACTION GROUNDWATER MONITORING WELL ◔ 90–3

BORROW AREA

SEDIMENTATION POND

BORROW AREA

94–1

SEDIMENTATION POND

FORMER GATEHOUSE AND SCALE

SITE ENTRANCE

90–6

UNNAMED EPHEMERAL CREEK

92–3

94–2

96–2

92–2

96–1

90–4

90–3

90–2

87–1

92–1

90–5

90–8

92–4

90–1

96–3

95–1

SEDIMENTATION PONDS

WASTE MANAGEMENT UNIT

90–7

LIMIT OF REFUSE

VICHY SPRINGS ROAD

N

0 200 400

1" = 400'

FIGURE 6 02-907

COUNTY

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

GROUNDWATER MONITORING SYSTEM

MENDOCINO

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

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LEGEND

SURFACE WATER SAMPLING STATION ▲ S–1

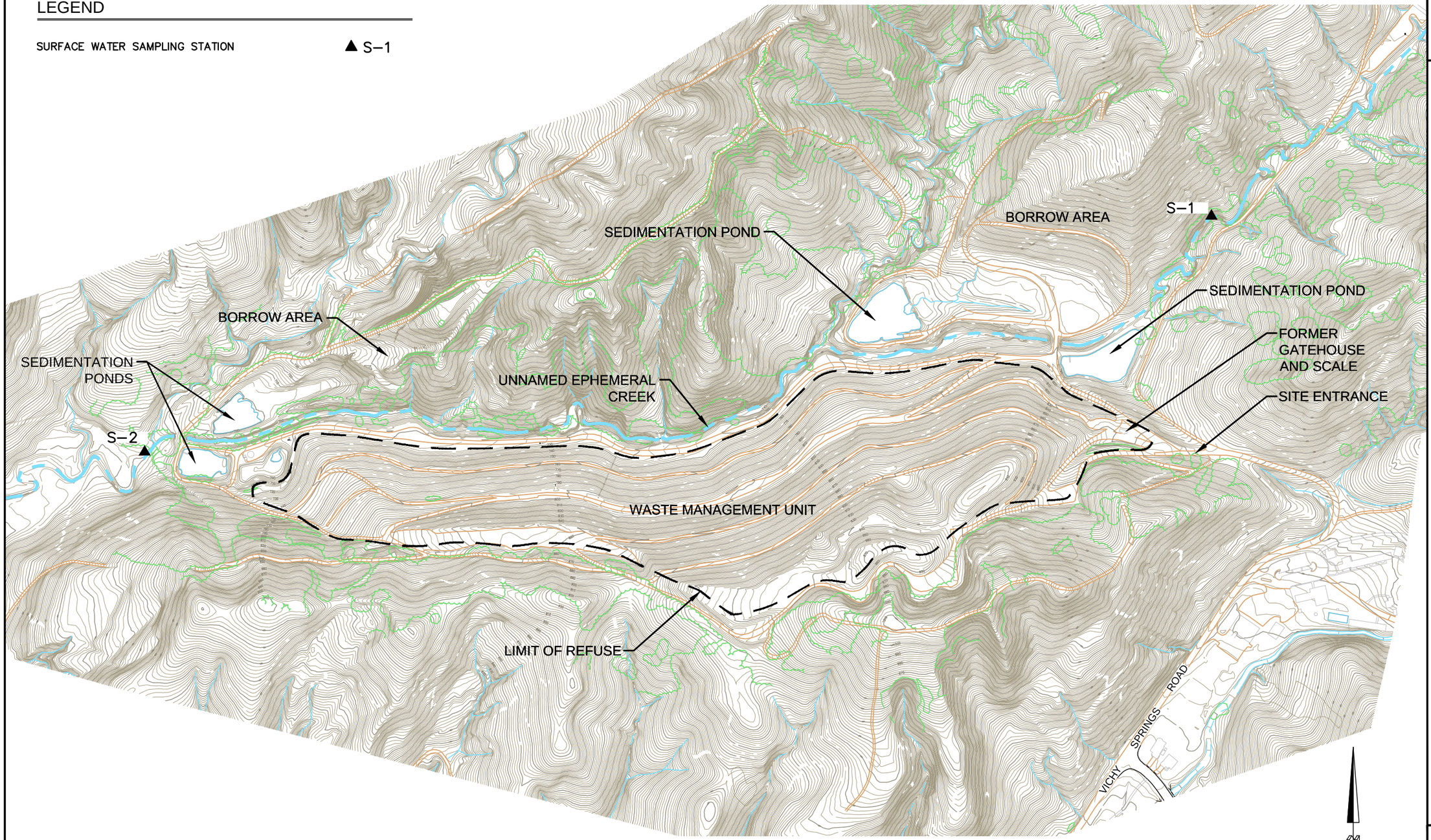

FIGURE 7

02-907

SURFACE WATER MONITORING SYSTEM

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

COUNTY
MENDOCINO

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544–0784

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APPENDIX B

TABLES

Table B-1
Perimeter Gas Monitoring Point Construction Information
City of Ukiah Landfill

Point No.	*Total Depth*	*Top of Casing Elevation (Feet Mean Sea Level)*	*Probe*	*Gravel Pack Interval*	*Screened Interval*
GAS-1	11'	686.59	---	4.5' - 9'	5' - 9'
GAS-2	126'	839.65	Shallow	5' - 10'	5' - 10'
			Intermediate	13' - 60'	30' - 60'
			Deep	65' - 105', 110' - 126'	80' - 100', 110' - 125'
GAS-3	135'	861.42	Shallow	4' - 15'	5' - 15'
			Intermediate	20' - 66.5'	35' - 65'
			Deep	83.5' - 135'	85' - 135'
GAS-4	145'	919.33	Shallow	5' - 11'	5' - 10'
			Intermediate	15' - 75'	52.5' - 72.5'
			Deep	85' - 145'	113' - 143'
GAS-5	250'	1,032.24	Shallow	5' - 10'	5' - 10'
			Intermediate 1	15' - 113'	73' - 113'
			Intermediate 2	118' - 166.5'	126' - 166'
			Deep	171.5' - 250'	210' - 250'
GAS-6	144.5'	865.60	Shallow	6.5' - 14.5'	7.5' - 12'
			Intermediate	19' - 69'	20' - 68.5'
			Deep	74' - 144.5'	78' - 144'
GAS-7	84.5'	771.52	Shallow	5' - 11'	5.5' - 10.5'
			Intermediate	16' - 42.5'	16.5' - 42'
			Deep	47.5' - 84.5'	47.5' - 82.5'
GAS-8	174.5'	920.47	Shallow	6.5' - 12.5'	7.5' - 11'
			Intermediate	17' - 84'	18' - 84'
			Deep	89.5' - 171.5'	90' - 165'
GAS-9	30'	763.85	Shallow	4.5' - 9.5'	5' - 9'
			Intermediate	14.5' - 20'	15' - 19.5'
			Deep	25' - 30'	25.5' - 30'
GAS-10	59'	788.54	Shallow	4.5' - 10'	5' - 9.5'
			Intermediate	14.5' - 28'	15' - 27.5'
			Deep	33' - 59'	33' - 55

Table B-2
Perimeter Gas Extraction Well Construction Information
City of Ukiah Landfill

Well No.	*Well Depth*	*Screened Interval*	*Plate Elevation (Feet MSL)*
PG-1	80'	27' - 76'	824.75
PG-1A	35'	15' - 35'	829.60
PG-2	90'	35.5' - 88'	838.09
PG-2A	40'	20' - 40'	852.19
PG-3	101'	44.5' - 99'	857.51
PG-3A	52'	24.5' - 47'	859.52
PG-4	107'	39' - 80'	868.00
PG-4A	50'	25' - 50'	873.24
PG-5	85'	44' - 83'	874.88
PG-5A	50'	24' - 50'	879.12
PG-6	93'	43' - 93'	889.07
PG-6A	51'	16' - 50'	899.90
PG-7	133'	45' - 120'	913.36
PG-7A	45'	15' - 42'	922.24
PG-8	117'	47' - 117'	927.50
PG-8A	50'	15' - 47'	931.22
PG-9	117'	47' - 114'	936.69

MSL = Mean Sea Level

Table B-3
Leachate Well Construction Information
City of Ukiah Landfill

Well No.	*Well Casing Dia.*	*Well Completion Depth*	*Well Screened Interval*	*Top of Casing Elevation (1) (Feet MSL)*	*Screen Size*	*Filter Pack Interval*	*Filter Pack Material*
LW-1	4"	55.0'	35.0' - 55.0'	762	0.020"	30.0' - 55.5'	#3 Monterey
LW-2	4"	29.0'	9.0' - 29.0'	777	0.020"	5.0' - 29.5'	#3 Monterey
LW-3	4"	15.0'	5.0' - 15.0'	772	0.020"	4.0' - 17.0'	#3 Monterey

Dia. = Diameter
MSL = Mean Sea Level

(1): Approximate

Table B-4
Groundwater Monitoring Well Construction Information
City of Ukiah Landfill

Well No.	*Well Casing Dia.*	*Well Completion Depth*	*Well Screened Interval*	*Top of Casing Elevation (Feet MSL)*	*Screen Size*	*Filter Pack Interval*	*Filter Pack Material*
87-1	2"	16.0'	6.0' - 16.0'	684.95	0.020"	5.0' - 16.0'	#3 Monterey
90-1	2"	14.0'	5.5' - 14.0'	679.52	0.020"	5.0' - 14.0'	#3 Monterey
90-2	2"	49.0	19.0 - 49.0'	686.00	0.020"	18.0' - 50.0'	#3 Monterey
90-3	2"	35.0'	25.0' - 35.0'	722.39	0.020"	24.5' - 35.0'	#3 Monterey
90-4	2"	34.0'	19.0' - 34.0'	720.90	0.020"	18.0' - 35.0'	#3 Monterey
90-5	2"	34.0'	19.0' - 34.0'	746.37	0.020"	18.0' - 35.0'	#3 Monterey
90-6	2"	37.5'	17.5' - 37.5'	758.94	0.020"	16.5' - 39.25'	#2/16 Monterey
90-7	2"	159.0'	135.0 - 159.0'	832.85	0.020"	135.0' - 160.0'	#3 Monterey
90-8	2"	138.5'	110.0' - 138.5'	839.03	0.020"	97.0' - 140.0'	#3 Monterey
92-1	2"	28.0'	15.0' - 28.0'	707.89	0.010"	13.0' - 28.0'	#2/12 Monterey
92-2	2"	40.0'	20.0' - 40.0'	711.67	0.010"	18.0' - 40.0'	#2/12 Monterey
92-3	2"	49.5'	29.5' - 49.5'	745.50	0.010"	28.0' - 49.5'	#2/12 Monterey
92-4	2"	130.0'	90.0' - 130.0'	805.81	0.020"	86.0' - 130.0'	#3 Monterey
94-1	2"	12.0'	6.0' - 12.0'	796.97	0.020"	4.0' - 12.0'	#12/14 Monterey
94-2	2"	75.0'	55.0' - 75.0'	708.35	0.020"	52.0' - 75.0'	#2/12 Monterey
96-1	4"	23.5'	8.0' - 23.0'	702.34	0.010"	7.0' - 23.0'	#2/12 Lone Star
96-2	4"	28.5'	13.5' - 28.5'	702.09	0.010"	11.5' - 23.0'	#2/12 Lone Star
96-3	4"	26.5'	11/5' - 26.5'	701.74	0.010"	11.0' - 23.0'	#2/12 Lone Star

Dia. = Diameter
MSL = Mean Sea Level

Table B-5
Summary of Leachate Monitoring Parameters
City of Ukiah Landfill

Parameter	*Units*	*Frequency*
Field Parameters		
Total Flow	gallons	Monthly
Flow Rate	gallons per day	Monthly
Specific Conductance	µmhos/cm	Quarterly
pH	pH units	Quarterly
Temperature	degrees F	Quarterly
Monitoring Parameters		
Total Dissolved Solids	mg/L	Quarterly
Chloride	mg/L	Quarterly
Nitrate-Nitrogen	mg/L	Quarterly
Total Ammonia	mg/L	Quarterly
Sulfate	mg/L	Quarterly
Chemical Oxygen Demand	mg/L	Quarterly
Biological Oxygen Demand	mg/L	Quarterly
Total Ammonia	mg/L	Quarterly
Total Alkalinity	mg/L	Quarterly
Volatile Organic Compounds (EPA Method 8260 with MtBE)	µg/L	Quarterly
Total Purgeable/Extractable Petroleum Hydrocarbons	mg/L	Quarterly
1-Year Constituents of Concern		
Inorganics (Dissolved Metals)[1]	mg/L	Annually
Extractable Oil and Grease	mg/L	Annually
5-Year Constituents of Concern		
Semi-Volatile Organic Compounds (EPA Method 8270)	µg/L	Every 5 Years
Organochlorine Pesticides (EPA Method 8081)	µg/L	Every 5 Years
Polychlorinated Biphenyls (PCBs) (EPA Method 8082)	µg/L	Every 5 Years
Organophosphorus Compounds (EPA Method 8141)	µg/L	Every 5 Years
Chlorophenoxy Herbicides (EPA Method 8150)	µg/L	Every 5 Years

µmhos/cm: Micromhos per Centimeter
degrees F: Degrees Fahrenheit
mg/L: Milligrams per Liter
µg/L: Micrograms per Liter
MtBE: Methyl tert-Butyl Ether

(1): Per Appendix II, Subtitle D, 40 Code of Federal Regulations (40 CFR).

Table B-6
Summary of Groundwater Monitoring Parameters
City of Ukiah Landfill

Parameter	*Units*	*Frequency*
Field Parameters		
Temperature	degrees F	Quarterly[2] / Semi-Annually[3]
Groundwater Elevation	Feet Above MSL	Quarterly[4]
Specific Conductance	µmhos/cm	Quarterly[2] / Semi-Annually[3]
pH	pH units	Quarterly[2] / Semi-Annually[3]
Turbidity	NTUs	Quarterly[2] / Semi-Annually[3]
Monitoring Parameters		
Total Dissolved Solids	mg/L	Quarterly[2] / Semi-Annually[3]
Chloride	mg/L	Quarterly[2] / Semi-Annually[3]
Sulfate	mg/L	Quarterly[2] / Semi-Annually
Nitrate-Nitrogen	mg/L	Quarterly[2] / Semi-Annually[3]
Manganese	mg/L	Quarterly[2] / Semi-Annually[3]
Boron	mg/L	Quarterly[2] / Semi-Annually[3]
Un-Ionized and Total Ammonia	mg/L	Quarterly[2] / Semi-Annually[3]
Total Alkalinity	mg/L	Quarterly[2] / Semi-Annually[3]
Volatile Organic Compounds (EPA Method 8260 with MtBE)	µg/L	Quarterly[2] / Semi-Annually[3]
Total Purgeable/Extractable Petroleum Hydrocarbons	mg/L	Quarterly[2] / Semi-Annually[3]
1-Year Constituents of Concern		
Inorganics (Dissolved Metals)[1]	mg/L	Annually
Extractable Oil and Grease	mg/L	Annually
5-Year Constituents of Concern		
Semi-Volatile Organic Compounds (EPA Method 8270)	µg/L	Every 5 Years
Organochlorine Pesticides (EPA Method 8081)	µg/L	Every 5 Years
Polychlorinated Biphenyls (PCBs) (EPA Method 8082)	µg/L	Every 5 Years
Organophosphorus Compounds (EPA Method 8141)	µg/L	Every 5 Years
Chlorophenoxy Herbicides (EPA Method 8150)	µg/L	Every 5 Years

degrees F: Degrees Fahrenheit
MSL: Mean Sea Level
µmhos/cm: Micromhos per Centimeter
NTUs: Nephelometric Turbidity Units
mg/L: Milligrams per Liter
µg/L: Micrograms per Liter
MtBE: Methyl tert-Butyl Ether

(1): Per Appendix II, Subtitle D, 40 Code of Federal Regulations (40 CFR).

(2): Corresponds to groundwater monitoring wells 87-1, 90-2, 94-2, 96-1 and 96-3.

(3): Corresponds to groundwater monitoring wells 90-1, 90-3, 90-4, 90-5, 90-6, 90-7, 92-1, 92-2, 92-3, 94-1 and 96-2.

(4): Corresponds to all groundwater monitoring wells listed above in Footnotes 2 and 3.

Table B-7
Summary of Surface Water Monitoring Parameters
City of Ukiah Landfill

Parameter	*Units*	*Frequency*
Field Parameters		
Temperature	degrees F	Quarterly
Specific Conductance	µmhos/cm	Quarterly
pH	pH units	Quarterly
Dissolved Oxygen	mg/L	Quarterly
Turbidity	NTUs	Quarterly
Monitoring Parameters		
Total Suspended Solids	mg/L	Quarterly
Total Settleable Solids	mg/L	Quarterly
Total Dissolved Solids	mg/L	Quarterly
Chloride	mg/L	Quarterly
Total-Nitrogen	mg/L	Quarterly
Un-Ionized and Total Ammonia	mg/L	Quarterly
Sulfate	mg/L	Quarterly
Chemical Oxygen Demand	mg/L	Quarterly
1-Year Constituents of Concern		
Inorganics (Dissolved Metals)[1]	mg/L	Annually
Extractable Oil and Grease	mg/L	Annually
5-Year Constituents of Concern		
Volatile Organic Compounds (EPA Method 8260 with MtBE)	µg/L	Every 5 Years
Semi-Volatile Organic Compounds (EPA Method 8270)	µg/L	Every 5 Years
Organochlorine Pesticides (EPA Method 8081)	µg/L	Every 5 Years
Polychlorinated Biphenyls (PCBs) (EPA Method 8082)	µg/L	Every 5 Years
Organophosphorus Compounds (EPA Method 8141)	µg/L	Every 5 Years
Chlorophenoxy Herbicides (EPA Method 8150)	µg/L	Every 5 Years

degrees F: Degrees Fahrenheit
µmhos/cm: Micromhos per Centimeter
NTUs: Nephelometric Turbidity Units
mg/L: Milligrams per Liter
µg/L: Micrograms per Liter
MtBE: Methyl tert-Butyl Ether

(1): Per Appendix II, Subtitle D, 40 Code of Federal Regulations (40 CFR).

APPENDIX C

EXPLORATORY BORING LOGS

PERIMETER GAS MONITORING POINTS

LOG OF EXPLORATORY BORING

EBA

PROJECT: CITY OF UKIAH LANDFILL | SHEET 1 OF 1

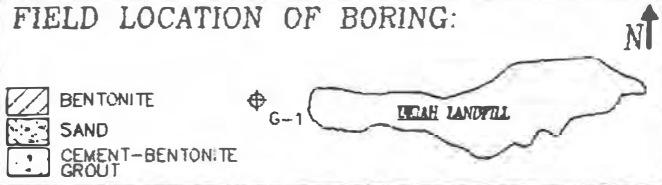
JOB NUMBER 93-461 (1.2) | BORING: GAS-1

LOGGED BY: CJB | DRILLER: CLEAR HEART CONSTRUCTION | DATE: 9-15-94

WELL CASING ELEVATION: ~690 MSL

EQUIPMENT AND SPECIFICATIONS:
3/4" SCHEDULE 80 PVC CASING
1/4" PEA-GRAVEL 4'-11', # 12/14 SAND 3.5' - 4'
0.040" SCREEN 4' - 11"

FIELD LOCATION OF BORING:



WATER DEPTH	6
TIME	14:30
DATE	9-15-94

SAMPLER TYPE	RECOVERY	INITIAL WATER	BLOWS/6 in.	DEPTH	RECOVERY SAMPLING DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
				1		SM	SILTY SAND (SM), light yellowish brown (2.5Y, 6/3), dry, ~5 - 10% Clay	
				2				
				3				
				4				
			9	5				
			13					
2"	15/18	▽	22	6		GM	SANDY GRAVEL (GM), olive brown (2.5Y, 4/4), Sub-angular 0.5 - 1" ø medium grained Sandy matrix, Saturated @ 6".	
				7				
				8				
				9				
				10			BASAL CONTACT WITH PLIO-PLEISTOCENE DEPOSITS	
			5					
2"	18/18		11	11		CL	SILTY CLAY (CL), Mottled dark gray (2.5Y, N4/), and olive brown (2.5Y, 4/3), Moist, mod. plasticity	
			18				Total Depth = 10'	
				12			Sampler Driven to 11.5'	
				13				
				14				
				15				
				16				
				17				
				18				
				19				
				20				
				21				
				22				
				23				
				24				

461TIBL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 1 OF 6

BORING: GAS-2

JOB NUMBER: 93-461 (4a)

DATE: 9-22-94

LOGGED BY: DFB

DRILLER: WEEKS DRILLING, AIR ROTARY

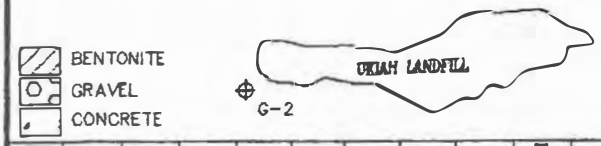
WELL CASING ELEVATION: EST. EG = 837 MSL

EQUIPMENT AND SPECIFICATIONS:

Three Probes: 3/4" ϕ, SCH 80 PVC w/0.040" Slotted Casing and 3/8" pea Gravel

A: Slotted = 5 - 10', Gravel = 5 - 10', Bentonite = 10 - 13'

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH / TIME / DATE
								1			Silty Clay (CL), olive gray (5Y, 4/2), 95% mod. plastic fines, < 5% fine sand and fine gravel, firm, slighty damp
								2			
								3			
								4			
							X	5		CL	Silty Clay (CL), light olive brown (2.5Y, 5/4), as above
								6			
								7			
								8		ML	Sandy Silt (ML), olive yellow (5Y, 6/6), low plasticity fines, slighty damp
								9			
							X	10		CL	Silty Clay (CL), olive (5Y, 5/4), 80% low - mod. plastic fines, 20% very fine sand, firm, slighty damp, slight FeO staining
								11			
								12			
								13			
								14			Clay (CH), dark gray (5Y, 4/1), high plasticity fines, slightly damp, soft - firm
							X	15		CH	
								16			
							X	17		CL	Silty Clay (CL), olive gray (5Y, 5/2), 95% low plasticity fines, 5% fine sand, soft - firm slightly damp
								18			
								19			
							X	20			Silty Clay, as above
								21			
								22			
								23			
								24			As above, olive brown (2.5Y, 4/4)

CASING CONSTRUCTION: C B A

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 2 OF 8

BORING: GAS-2

JOB NUMBER: 93-461 (4a)

DATE: 9-22-94

LOGGED BY: DFB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 837 MSL

EQUIPMENT AND SPECIFICATIONS:

B: Slotted = 30 - 60', Gravel 13 - 60', Bentonite 60 - 65'

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE / SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH / TIME / DATE
								26		CL	
								27		ML	Sandy Silt (ML), yellowish brown (10YR, 5/6), 75 - 80% low - non plastic fines, 20 - 25% fine - med. sand, well rounded, KJf chert and greenstone, slightly damp, firm - soft
							X	28			@ 27.5' Sandy Silt, olive brown (2.5Y, 4/3), 75% low plasticity fines, 25% fine - med. sand
								29			
							X	30			
								31			
								32			
								33			
								34			@ 34' higher sand content, 60% low plastic fines, 40% fine sand, slightly damp, firm
							X	35			
								36			
							X	37			
								38		CL	Silty Clay(stone) (CL), very dark gray (2.5Y N3/), mod. - high plasticity fines, soft - firm, slighty damp
								39			
							X	40			
								41			
								42			
								43			@ 43' light gray (2.5Y, 6/1), 95% mod. - high plasticity fines, 5% fine sand, slighty damp
								44			
							X	45			
								46			
								47			
								48			@ 48.5' very dark gray (2.5Y, N3/), 95% mod. - high placticity fines, 5% fine sand
								49			
							X				

CASING CONSTRUCTION: C B

461LFGBL.DWG

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS | SHEET 3 OF 6
BORING: GAS-2
JOB NUMBER: 93-461 (4a) | DATE: 9-22-94
LOGGED BY: DFB | DRILLER: WEEKS DRILLING, AIR ROTARY
WELL CASING ELEVATION: EST. EG = 837 MSL

FIELD LOCATION OF BORING:



EQUIPMENT AND SPECIFICATIONS:
C: Slotted = 80 - 100', Blank 100 - 110', Slotted 110 - 125'
Gravel = 65 -105', Bentonite 105 - 110', Gravel 110 - 125'
Bentonite 125 - 126.5'

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH / TIME / DATE
								51		CL	
								52			
								53			
								54			@ 54' Scattered gravel < 1%, up to 1.25" ø. KJf greenstone, well rounded
							X	55			@ 55' Silty Clay(stone), no gravel
								56			
								57			
								58			
								59			
								60			Silty Clay(stone), as above, no gravel, soft - firm, slighty damp
								61			
								62			
								63			
								64			
							X	65			
								66			
								67			
								68			
							X	69			Clay(stone) (CH), very dark gray (5Y, 3/1), high plasticity fines, stiff - very stiff, slighty damp
								70		CH	
								71			
								72			
								73			
								74			as above, black (5Y, 2.5/1)

CASING CONSTRUCTION: C B

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS | SHEET 4 OF 6

JOB NUMBER: 93-461 (4a) | BORING: GAS-2

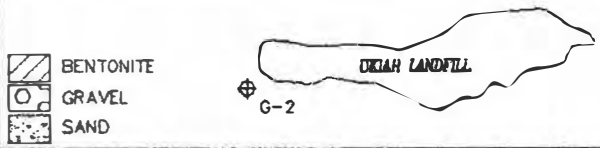
LOGGED BY: DFB | DATE: 9-22-94

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 837 MSL

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
											WATER DEPTH	
											TIME	
											DATE	
								76				C
								77				
								78				
								79				
							X	80				
								81				
								82		CL-ML	Silty Clay(stone) - Clayey Silt (CL-ML), dark greenish gray, (5G, 4/1), 95% mod. plastic fines, 5% fine - med. sand, firm - stiff, slighty damp	
								83				
								84				
								85				
								86				
							X	87		ML-SM	Silty Sand(stone) - Sandy Silt(stone) (ML-SM), light olive brown, (2.5Y, 5/6), 50% low plasticity fines, 50% fine sand, well rounded, soft - firm, slighty damp	
								88				
								89				
								90				
								91				
								92			@ 92' Scattered gravel, 5 - 10%, up to 0.75" ø, well rounded	
								93			@ 92.5' no gravel	
								94				
							X	95				
								96			Silty Sand(stone), olive grey (5Y, 4/2), 45% low plasticity fines, 55% fine - med. sand, KJf (chert, greenstone), med.dense, slighty damp	
								97				
								98				
								99				

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 5 OF 8

BORING: GAS-2

JOB NUMBER: 93-461 (4a)

DATE: 9-22-94

LOGGED BY: DFB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 837 MSL

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH / TIME / DATE
							X	101		CL	Sandy Clay(stone) (CL), dark blue gray, (5B, 4/1), 70 – 75% mod. – high plasticity fines, 25 – 30% fine – med. sand, firm, slighty damp
								102			
								103			
							X	104			Silty Clay(stone) (CL), dark greenish gray, (4G, 4/1), 95% mod – low plasticity fines, 5% fine sand, soft – firm, slighty damp
								105		CL	
								106			Clay(stone) (CH), dark greenish gray, (5G, 4/1), high plasticity fines
								07		CH	
								108			
								109		CL	Silty Clay(stone) (CL), as above at 103.5' – 105.5'
								110			
								111			
								112			
								113			
								114			
								115			Clay(stone) (CH), as above, high plasticity fines, firm – stiff, slighty damp
								116			
								117		CH	
								118			
								119			
								120		SC-SM	Clayey-Silty Sand(stone) (SC-SM), dark greenish gray, (5G, 4/1), 35 – 40% low – mod. plastic fines, 60 – 65% fine – med. sand, well rounded, loose – med. dense, slighty damp
							X	121			
								122		SM	Silty Sand(stone), as above, low plasticity fines, and fine sand, med.– dense, slighty damp
								123			
							X	124			

CASING CONSTRUCTION

C

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EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 6 OF 8

BORING: GAS-2

JOB NUMBER 93-461 (4a)

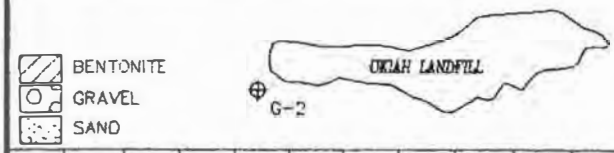
DATE: 9-22-94

LOGGED BY: DFB DRILLER: WEEKS DRILLING. AIR ROTARY

WELL CASING ELEVATION: EST. EG = 837 MSL

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
											WATER DEPTH	
											TIME	
											DATE	
							X	126		SM	Gravelly Sand (SW), dark greenish gray, (5G, 4/1), < 5% fines, 85% fine - course sand, 15% fine gravel, well rounded, moist - very	
						▽	X	127		SW	@ 126.5' very moist - wet, first encountered water @ 126.5'.	
								128			TD = 126.5'	
								129				
								130				
								131				
								132				
								133				
								134				
								135				
								136				
								137				
								138				
								139				
								140				
								141				
								142				
								143				
								144				
								145				
								146				
								147				
								148				
								149				

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 1 OF 3

BORING: GAS-3

JOB NUMBER: 93-461 (4a)

DATE: 9-26-94

LOGGED BY: CJB

DRILLER: WEEKS DRILLING, AIR ROTARY

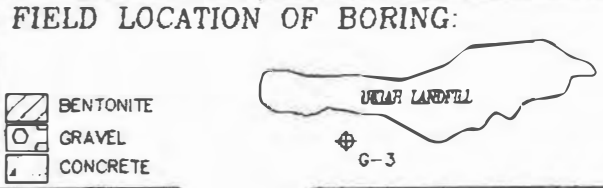
WELL CASING ELEVATION: EST. EG = 860 (MSL)

EQUIPMENT AND SPECIFICATIONS:

Three Probes: 3/4" ø, SCH 80 PVC w/0.040" Slotted Casing and 3/8" pea Gravel

A: Slotted = 5 - 15', Gravel = 4 - 15', Bentonite = 15 - 20'

FIELD LOCATION OF BORING:



WATER DEPTH			
TIME			
DATE			

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION C B A
							X	5		ML	Silty Clay (ML), brown	
								8		SM	Sandy Silt (SM), grayish brown	
								9			Silty Clay (ML), dark grayish brown (10YR, 4/2), damp (weathered Claystone)	
							X	10		ML		
								13			Sandy Silt (SM)	
							X	15		SM	decreasing Sand content @ 15'	
								19			Silty Clay (CL), light olive gray (5Y, 6/2), damp, 10 - 20% very fine Sand to coarse Sand, subangular	
							X	20		CL		
								24				
							X			ML		

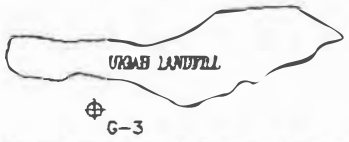
GAS3BL.DWG

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS | SHEET 2 OF 6
JOB NUMBER: 93-461 (4a) | BORING: GAS-3
LOGGED BY: CJB | DATE: 9-26-94
DRILLER: WEEKS DRILLING, AIR ROTARY
WELL CASING ELEVATION: EST. EG = 860 (MSL)
EQUIPMENT AND SPECIFICATIONS:

B: Slotted = 35 - 65', Gravel 20 - 66.5', Bentonite 66.5 - 83.5'

FIELD LOCATION OF BORING:



WATER DEPTH			
TIME			
DATE			

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE / SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION C	CASING CONSTRUCTION B
								26		ML	Sandy Clayey Silt (ML), light yellowish brown (10YR, 6/4), dry - damp, ~5% coarse Sand, (2 mm CC%), 20% very fine Sand, 65% Silt, 10% medium plasticity Clay		
							X	27			Claystone (CL), dark gray (10YR, 4/1), damp, ~2% coarse Sand (2 mm ø), 10% very fine Sand, 10 - 15% Silt, hard		
								28					
								29					
								30			decreasing Clay content @ 30', increasing Silt becoming dark grayish brown (10YR, 4/2), damp		
								31					
								32					
							X	33					
								34					
								35		CL	increasing Clay content @ 34.5', very dark gray (10YR, 3/1), damp, hard, <5% very fine Sand, primarily Silt and medium plasticity Clay		
							X	36					
								37					
								38					
							X	39					
								40					
								41					
								42					
								43					
							X	44			Sandy Clayey Silt (ML), dark gray (7.5YR, N4/), damp, ~20% fine Sand, ~10% medium plasticity fines		
								45					
								46		ML			
							X	47					
								48					
							X	49		ML	Sandy Clayey Silt (ML), olive gray (5Y, 4/2), damp, ~15 - 20% fine Sand, ~5% Clay		

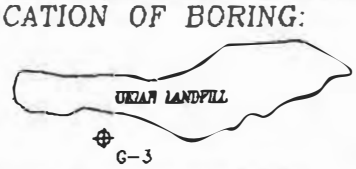
EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS | SHEET 3 OF 6
BORING: GAS-3
JOB NUMBER: 93-461 (4a) | DATE: 9-22-94
LOGGED BY: CJB | DRILLER: WEEKS DRILLING, AIR ROTARY
WELL CASING ELEVATION: EST. EG = 860 (MSL)
EQUIPMENT AND SPECIFICATIONS:

C: Slotted = 85 – 135', Gravel 83.5 – 135'

FIELD LOCATION OF BORING:



WATER DEPTH			
TIME			
DATE			

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								51		ML	
							X	52			Silty Gravelly Sand (SM), dark greenish gray, (5GY, 4/1), 20% Gravel (5 mm ø up to 1" ø) rounded, ~5% Clay, 50% Sand (very fine Sand to coarse)
								53			
								54		SM	
								55			
								56			
								57			Sandy Clayey Silt (ML), mottled dark gray (2.5Y, N4/) to dark brown (10YR, 3/3), damp, ~40% very fine Sand, 20% mod. plasticity fines, harder @ 59'
								58			
							X	59			
								60		ML	
								61			
								62			
								63			
										ML	Sandy Silt (ML), dark gray, (5Y, 4/1), ~40% course Sand, <5% Clay, damp to moist
								64			
							X	65		ML	Sandy Silt (ML), dark gray, (2.5Y, N4/), ~20% very fine Sand, <5% Clay, damp
								66			
								67			
							X	68			
								69			
								70			
							X	71			Clayey Gravel (GC), dark gray (2.5Y, N4/), moist, ~60% coarse Sand and Gravel (1 mm to 1" ø), subangular
							X	72		GC	
								73			Clayey Gravel (GC), as above with ~75% angular gravel, 0.5" ø, moist
										GC	
							X	74			Silty Sand (SM), dark gray (2.5Y, N4/), dry to damp, ~50% Sand & Gravel up to 1 cm ø,
										SM	

CASING CONSTRUCTION

C B

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 4 OF 6

BORING: GAS-3

JOB NUMBER: 93-461 (4a)

DATE: 9-26-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 860 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE / SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
											WATER DEPTH	C
											TIME	
											DATE	
							X	76			~5% Clay	
								77			becoming wet at 77'	
								78		SM		
								79				
								80				
								81				
								82				
							X	83			becoming dry at 83.5'	
								84				
							X	85			Silty Gravel (GM), dark grey (2.5Y, N4/) damp, > 85% Gravel, subangular up to 1" ø	
								86		GM		
								87		SM	Silty Sand (SM), very dark gray (2.5Y, N3/), moist, ~5% Gravel, subrounded up to 1" diameter, ~75% Sand, ~5% Clay	
							X	88				
								89				
								90				
								91			Claystone (CL), with Silt, very dark gray (2.5Y, N3/), damp, very hard	
							X	92				
								93		CL		
								94				
							X	95		SM	Silty Sand (SM), gray, damp	
								96			Gravel zone @ 96.5'	
							X	97			Claystone (CL), as above	
								98		CL		
								99				
							X				Silty Sand zone @ 99.5 - 100'	

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EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 5 OF 8

BORING: GAS-3

JOB NUMBER: 93-461 (4a)

DATE: 9-26-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 860 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



WATER DEPTH	-	-	-
TIME			
DATE			

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
								101			Claystone (CL), as above, damp	C
							X	102				
								103				
								104				
								105		CL		
								106				
							X	107				
								108				
							X	109			Silty Sand (SM), dark gray, damp, ~80% fine Sand, <5% Clay	
								110		SM	Claystone (CL), as above	
								111				
							X	112		CL	increasing Sand content @ 112' (~25% fine Sand), damp	
								113				
								114				
							X	115				
								116				
								117				
								118			increasing Silt content 118 – 118.5'	
								119				
								120				
								121				
							X	122			Silty Sand, (SM) as above @ 109', damp	
								123		CL		
								124			becoming Gravelly @ 124.5', ~5% subrounded Gravel 2 cm ø, damp – moist	
							X					

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 6 OF 6

BORING: GAS-3

JOB NUMBER: 93-461 (4a)

DATE: 9-26-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 860 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
								WATER DEPTH				
								TIME				
								DATE				
								126				C
								127				
							X	128			becoming moist to wet @ 128'	
								129		SM		
								130				
								131				
								132			Gravelly Sand (SP), dark gray, (2.5Y, N4/), moist to wet, ~5% Silt, ~5% Gravel up to 1 cm ø, very coarse Sand	
							X	133		SP		
								134				
								135			Total Depth = 135'	
								136				
								137				
								138				
								139				
								140				
								141				
								142				
								143				
								144				
								145				
								146				
								147				
								148				
								149				

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EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL | SHEET 1 OF 7
JOB NUMBER: 93-461 (2.2) | BORING: GAS-4 | DATE: 7/27/94

FIELD LOCATION OF BORING:



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY			GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION A B C
							X	5				Silty Sand (SM); pale yellow(2.5Y 7/4); 30-40% low plasticity fines, 60-70% v. fine sand, dry, med. dense.	
								8		SM		Scattered gravel - KJf - sandstone & chert - sub ∠ round.	
							X	10				As above, no gravel.	
							X	15		CL		Sandy Clay (CL), yellow brown (2.5Y, 6/4) 85% mod. plasticity fines, 15% fine sand, dry, dense - stiff.	
							X	20				Silty Clay (CL), lt. olive brown (2.5Y, 5/4) 95% mod. plasticity fines, < 5% fine sand, scattered gravel, damp, Med. dense - stiff.	

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EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL | SHEET 2 OF —

JOB NUMBER: 93-461 (2.2) | BORING: GAS-4 | DATE: 7/27/94

FIELD LOCATION OF BORING: N



LOGGED BY: DFB | DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 P.C W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10", gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY	GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION B C
						26					
						27					
						28					
						29					
					X	30				Slighty moist, stiff, no gravel.	
						31					
						32					
						33					
						34					
					X	35		CL		Sandy Clay (CL) olive (5Y, 5/3), 65-75% mod. - high plasticity fines, 25-30% fine sand, 5% gravel to 1 1/2" ø - Franciscan sandstone & chert - well rounded, damp, stiff.	
						36					
						37					
						38				less gravel w/ depth.	
						39					
						40				Clay(stone) (CH) Gray Green (2.5Y N5/), mod. plasticity fines, damp, stiff.	
					X	41		CH			
						42				@ 42' back to yellow sandy Clay - moist.	
						43		CL			
						44					
					X	45		CH		@ 44.5' Clay(stone) (CH) dark blue gray (5B 4/1) mod. plasticity fines, minor sand (<5%), scattered KJf gravel - sub ∠ to round, Dry, stiff - very stiff.	
						46					
						47					
						48				@ 48' color change - Dark greenish gray (5G, 4/1)	
						49					
					X			CL		@ 49' - Sandy Clay (CL) - 75% med. plasticity fines,	

461BL.DWG

LOG OF EXPLORATORY BORING

EBA

PROJECT: UKIAH LANDFILL

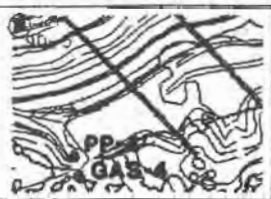
SHEET 3 OF 7

BORING: GAS-4

JOB NUMBER: 93-461 (2.2)

DATE: 7/27/94

FIELD LOCATION OF BORING:



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY			GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION B C
								51		CL		25% fine - med. sand, scattered gravel to 1 1/2" ø well-rounded KJf chert & sand.	
								52					
								53					
								54					
								55					
								56					
								57					
								58					
								59					
								60					
								61					
								62					
								63					
								64					
							X	65		CL		@ 65' - 60% low to mod. plasticity fines, 40% fine - med. sand, Damp, stiff - dense.	
								66					
								67					
								68		CL		Bit chatter (CL) - gravely zone, 25-30% fine gravel - well rounded.	
								69					
								70		CL			
								71					
								72					
								73					
								74					
							X						

461BL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL

SHEET 4 OF 7

BORING: GAS-4

JOB NUMBER: 93-461 (2.2)

DATE: 7/27/94

FIELD LOCATION OF BORING:



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY			GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH				CASING CONSTRUCTION
											TIME				
											DATE				
											DESCRIPTION				C
								76							
								77							
								78							
								79		ML-SM	Sandy silt(stone) - Silty Sand(stone) (ML-SM), Dark blue gray (5B 4/1), 45-55% low plasticity fines, 45-55% fine sand, damp - moist, dense, Hard bit chatter.				
							X	80							
								81							
								82							
							X	83							
								84							
								85		SC	Silty, Clayey Sand(stone) (SC), Dark blue gray, 40-45% low - mod. plasticity fines, 55-60% fine & med. sand, scattered gravel (<2%), dry.				
								86							
								87							
								88							
								89							
							X	90							
								91							
								92							
								93							
								94							
							X	95			Grade into Clay(stone) (CH) Dark olive gray (5y, 3/2), high plasticity fines, trace fine sand, dry - slightly damp, very stiff.				
								96							
								97		CH					
								98							
								99							
							X				1/2' gravel layer, 20% gravel, sub rounded - then silty sand - sandy silt				

461BL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL

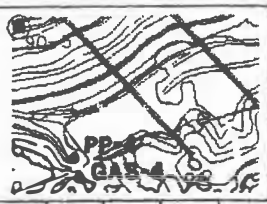
SHEET 5 OF 7

BORING: GAS-4

JOB NUMBER: 93-461 (2.2)

DATE: 7/27/93

FIELD LOCATION OF BORING:



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.

A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'

B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'

C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

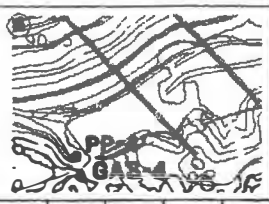
BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY	GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH				CASING CONSTRUCTION
									TIME				
									DATE				
									DESCRIPTION				C
						101		SC	Clayey Sand(stone) (SC) Dark blue gray, 40% high plasticity fines, 60% fine sand, damp - moist.				
						102							
						103							
						104							
					X	105							
						106							
						107			@ 107' scattered gravel (<5%)				
						108							
						109							
					X	110		CL	Sandy Clay(stone) (CL) Dark blue gray, 70% med. - high plasticity fines, 30% fine sand, scattered gravel well rounded, damp - stiff.				
						111							
						112							
						113							
						114							
						115							
						116							
						117							
						118			@ 118' - 122' many thin gravelly clay zones 20-30% gravel.				
						119		CL					
					X			CL					
						120		CL					
						121							
						122							
						123		CL					
						124		SC	Silty Sand(stone) (SC) Dark blue gray, 40% mod - low plasticity fines, 60% fine sand.				
					X								

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL | SHEET 6 OF 7
BORING: GAS-4
JOB NUMBER: 93-461 (2.2) | DATE: 7/27/94

FIELD LOCATION OF BORING:



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY	GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION
					X			SC			C
						126		GM		@ 125.5' Silty - Sandy Gravel (GM) 30% low plasticity fines, 20-25% fine sand, 45-50% fine gravel to 3/4" ø, well rounded, poorly consolidated, dry, sandstone & chert clasts.	
					X	127					
						128					
						129		CL-SC		Sandy Clay(stone) - Clayey Sand(stone) (CL-SC) Dark blue gray, mod. plasticity fines, fine sand, no gravel, Dry, dense - stiff.	
					X	130					
						131					
						132				@ 132' - 132.5' hard drilling.	
						133					
						134					
						135					
						136				Scattered gravel - well rounded, moist.	
						137					
						138					
						139					
						140					
					X	141					
						142				@ 141.5' - 142.5': gravelly zone.	
						143		CL-SC			
						144					
						145					
					X	146		SP		Clayey - Silty Gravelly Sand (SP) Dark blue gray, 30 - 40% low - mod plasticity fines, 50-60% fine sand, 10 - 20% fine gravel to 1/2" ø, well rounded Kjf clasts, moist - very moist, poorly consolidated.	
						147					
						148					
						149					
					X						

461BLOG.DWG

LOG OF EXPLORATORY BORING

EBA

PROJECT: UKIAH LANDFILL | SHEET 7 OF 7
JOB NUMBER: 93-461 (2.2) | BORING: GAS-4
DATE: 7/27/94

FIELD LOCATION OF BORING: N



LOGGED BY: DFB | DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10", gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY			PUSH SPLIT-SPOON SAMPLER	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION
								151		SC		grade to Clayey Sand w/ gravel - 40% high plasticity fines.	
								152					
								153					
								154					
								155		▽		@ 155' moist - very moist - stop for 1/2 hour water check. No free water.	
								156					
							X	157				Trip rod & push sample, Silty-Clayey Gravelly Sand, wet material on drill bit, very moist to saturated sampler wet 155'-157' - 1st ▽ @ 155'	
								158					
								159				TD = 157'	
								160					
								161				7/27/94 - Add bentonite to 149.5'.	
								162				7/28/94 - Add bentonite to 145'.	
								163					
								164					
								165					
								166					
								167					
								168					
								169					
								170					
								171					
								172					
								173					
								174					

461BL.DWG

LOG OF EXPLORATORY BORING

EBA

PROJECT: CITY OF UKIAH LANDFILL

SHEET 1 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

Probe A: 5 - 10', Gravel 5 - 10'

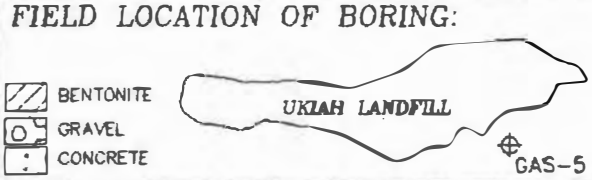
Probe B: 75 - 113', Gravel 15 - 113'

Probe C: 126 - 166', Gravel 118 - 166.5'

Probe D: 210 - 250', Gravel 171.5 - 250'

8" Direct Air

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	WATER DEPTH				CASING CONSTRUCTION A B C D	DESCRIPTION
											TIME					
											DATE					
							X	4								Silty Sandy Gravel (GM), pale olive (5Y, 6/3), dry, 75% cobbles up to 5" in diameter, cobble are predominantly 1 cm to 1" diameter, rounded to angular.
							X	7								
								9		GM						
							X	13								@ 13' becoming damp
							X	16								Silty Sand (SM), pale olive (5Y, 6/4), dry to damp, ~10% Silt, medium grained Sand, ~2% Gravel cobbles up to 2 cm ø, loose.
								20		SM					
								24		GM						Silty Gravel (GM), ~80% gravel up to 1" ø

GAS5BLDW

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 2 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

FIELD LOCATION OF BORING:



LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								WATER DEPTH			
								TIME			
								DATE			
								26		GM	
								27			
								28			Silty Sand (SM), as above, without gravel
								29		SM	
								30			Gravel bed @ 30 – 30.5'
								31			
							X	32			Silty Sand (SM), as above, with ~15% gravel, damp
								33			
								34		SM	
								35			
							X	36			Silty Sand (SM), as above, with ~1% 1 cm ø gravel
								37			
								38		SM	
								39			
								40			
								41			
								42			increasing Clay content to ~2% @ 42' to 44'
							X	43			
								44			increasing Gravel content to ~10% @ 44' to 46'
								45			
								46			Sandy Gravel (GM), olive (5Y, 5/4), damp ~80% Gravel up to 1" ø, ~5% Clay
								47		GM	
								48			
							X	49			

CASING CONSTRUCTION B C D

GAS5BLDWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 3 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



WATER DEPTH			
TIME			
DATE			

CASING CONSTRUCTION B C D

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								51			
								52		GM	
								53			
								54			Sandy Gravel (GM), yellowish brown (10YR, 5/6), damp, Gravel predominently 0.5 cm diameter, ~5% Clay, loose
								55		GM	
								56			
								57			
							X	58			becoming moist @ 58'
								59			
								60			
							X	61			Silty Sand (SM), yellowish brown (10YR, 5/6), damp, <5% Clay, 2% Gravel @ 0.5 cm ϕ, ~80% fine to coarse Sand, loose
								62		SM	
								63			
								64			
								65			Silty Sandy Gravel (GM), yellowish brown (10YR, 5/6), damp, ~5% Clay, ~50% Gravel up to 1" diameter, loose
							X	66		GM	
								67			
							X	68			
								69			Silty Sand (SM), as above
							X	70			
								71		SM	
								72			
								73			
								74			

GASSBLDWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 4 OF 10

JOB NUMBER: 93-461 (4a)

BORING: GAS-5

DATE: 9-27-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH / TIME / DATE
							X	79		SM	
							X	83		SM	Silty Sand (SM), olive (5Y, 5/3), dry to damp, ~60% Sand
							X	86		GM	Silty Gravel (GM), gray (10YR, 5/1), damp, 75% Gravel, 20% Sand, Gravel 1 cm to 1" ø, 2% Clay, loose
							X	95		GM	Sandy Gravel (GM), gray (10YR, 5/1), moist, ~50% Gravel, 40% Sand, 10% Silt, loose; large cobble encountered @ 96'
							X	97			

CASING CONSTRUCTION

B C D

GASSBLDWP

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 5 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:

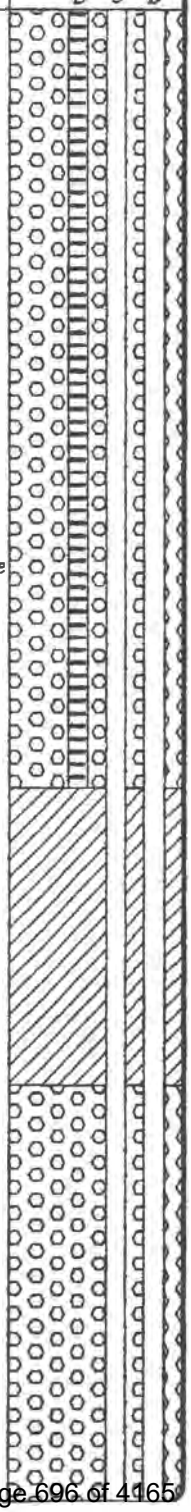


WATER DEPTH			
TIME			
DATE			

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE DEPTH / SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								101			
								102			
								103			
								104		GM	
							X	105			
								106			
								107			
								108			
							X	109			Sandy Clayey Silt (ML), gray (10YR, 5/1), 25% fine to very fine Sand
								110			
								111			
								112			
								113			
								114			
							X	115			Sandy Gravel (GM), as above, ~5% Gravel
								116			
								117			
								118			
								119			
								120			
								121			
								122			
								123			
								124			Cobble encountered @ 124'

CASING CONSTRUCTION

B C D



GAS5BL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 6 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:

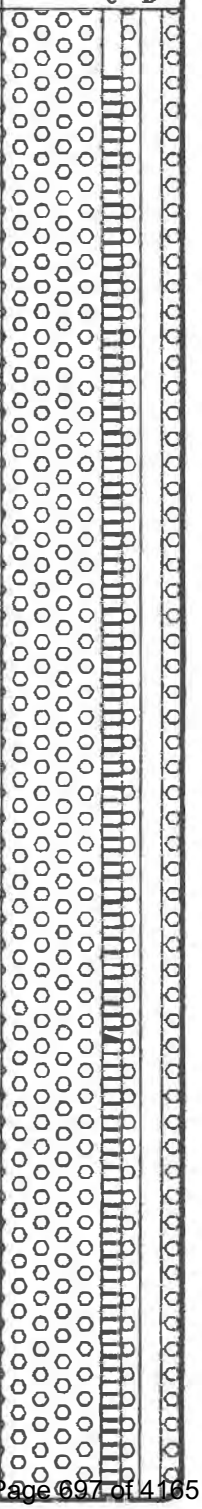


SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								126			
								127			
								128			
								129			
							X	130			
								131			
								132			
								133			
								134			
								135		GM	
							X	136			
								137			
								138			
								139			
								140			
								141			
								142			
								143			
								144			
								145			
								146			
								147			
								148			
								149			

WATER DEPTH			
TIME			
DATE			

CASING CONSTRUCTION

C D



GAS5BLDWG

FBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 7 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:

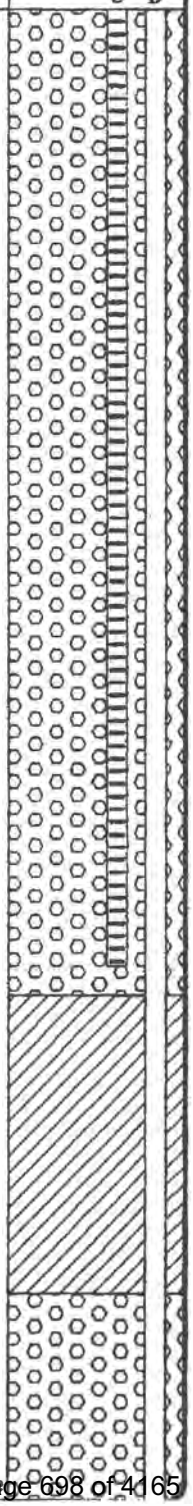


SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								151			
								152			cobble encountered @ 152'
								153			
								154			increasing Gravel content to 20% at 154'
								155			
								156			
								157			
								158			
								159			
								160			becoming moist @ 160'
								161		GM	
								162			
								163			decreasing Gravel content to ~10% @ 163', Gravel, < 2 cm ø
								164			
								165			
								166			
								167			Claystone (CL), gray (10YR, 5/1), damp
								168			
							X	169			
								170		CL	
								171			
								172			
								173			
							X	174		SM	Silty Sand (SM), gray (10YR, 5/1), 60% coarse Sand, 10% very fine Sand, 5% Gravel up to 0.5" in diameter, damp-moist, lo

WATER DEPTH	-		
TIME			
DATE			

CASING CONSTRUCTION

C D



EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 8 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1035 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH / TIME / DATE
								176			
								177			
								178			
								179			
								180			
								181			
								182			increasing Gravel content @ 182'
								183			
								184			
								185		GM	
								186			
								187			
								188			
								189			
								190			
								191			
								192			
								193			
								194			
								195			
							X	196			Claystone (CL), grayish brown (10YR, 5/2), damp, Silty, hard
							X	197		CL	
								198			Claystone (CL), as above except gray (10YR, 5/1)
								199		CL	
							X				

CASING CONSTRUCTION

D

GAS5BL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 9 OF 10

JOB NUMBER: 93-461 (4a)

BORING: GAS-5

DATE: 9-27-94

LOGGED BY: CJB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								201			
								202		CL	
								203			
								204			
							X	205			Interbedded Claystone (CL), gray (10YR, 5/1) and grayish brown (10YR, 5/2), beds vary from < 6" to 5' in thickness grayish brown from 204 - 205'
								206			
								207			
								208			
								209			
								210			grayish brown bed @ 210'
								211			
							X	212			
								213			
								214		CL	grayish brown bed @ 213.5' grayish brown bed from 214 - 215'
								215			
								216			
							X	217			mottled grayish brown to gray bed from 217 - 218', moist
							X	218			
								219			
								220			mottled, as above from 220 - 225'
								221			
							X	222			
								223			
								224			

WATER DEPTH			
TIME			
DATE			

CASING CONSTRUCTION

D

GAS5BL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 10 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
											WATER DEPTH	D
											TIME	
											DATE	
								226				
								227			rock encountered @ 227'	
								228				
							X	229				
								230				
								231		CL		
								232				
								233				
							X	234			grayish brown from 233.5 to 236'	
								235				
								236				
							X	237				
								238			Clayey Silt (ML), brown	
								239		ML		
								240		CL	Sandy Clay (CL), gray	
								241			Silty Sand (SM), grayish brown, ~5% cobbles up to 1 cm ø	
								242		SM		
								243			Silty Gravel (GM), gray, (10YR, 5/1), damp, ~60% Sand, Gravel up to ~2 cm ø, ~10% Gravel	
								244				
							X	245				
								246		GM		
							X	247			Color change to grayish brown (10YR, 5/2) @ 247 - 248'	
								248			Claystone (CL), gray as above	
								249		CL		
											Total depth = 250'	

GAS5BL.DWG

LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
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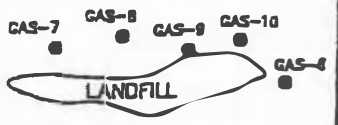
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL | SHEET 1 OF 5
HOLE #: GAS-6
JOB #: C96.06.088 | DATE: 9/23-25/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN
WELL CASING ELEVATION: APPROXIMATELY 860'
EQUIPMENT AND SPECIFICATIONS:
CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION
0			ML		0-1': CLAYEY SILT
5			CL		1-10': SILTY CLAY, STIFF, DARK YELLOWISH BROWN, (10 YR 4/2), MOIST, PLASTIC, MODERATE YELLOWISH BROWN (10 YR 5/4) BELOW 6"
10			ML		10-16': CLAYEY SILT, STIFF, LIGHT OLIVE GRAY (5 Y 5/2), SLIGHTLY MOIST, MEDIUM PLASTIC
15			CL		16-20': SILTY CLAY, MODERATE YELLOWISH BROWN (10 YR 5/4), STIFF, SLIGHTLY MOIST, PLASTIC
20			ML		20-27': SANDY, GRAVELLY SILT, WITH SOME CLAY, MEDIUM DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4), SLIGHTLY MOIST, SLIGHTLY PLASTIC
25			CL		27-30': SILTY CLAY, HARD, LIGHT OLIVE GRAY (5 Y 5/2), SLIGHTLY MOIST TO NEARLY DRY, PLASTIC
30					

STEEL RISER W/LOCKING LID
2' TO 3'
WELL CONSTRUCTION
S I D

NOTES:
D = DEEP GAS PROBE
I = INTERMEDIATE GAS PROBE
S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS
SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
3/8-INCH GRAVEL
BENTONITE SEAL
SAND-CEMENT SEAL

D:\ADCADD\P\UKIAHCTY\GAS-6.DWG D.B.I. 10/3/1996

LAWRENCE & ASSOCIATES
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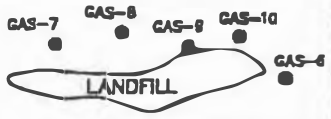
PROJECT: UKIAH LANDFILL	SHEET 2 OF 5
	HOLE #: GAS-6
JOB #: C96.06.088	DATE: 9/23-25/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 860'	
EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
30			CL		27-38': SILTY CLAY, STIFF, LIGHT OLIVE GRAY (5 Y 5/2), VERY PLASTIC, NEARLY DRY	
35						
			SM		38-40': GRAVELLY, SILTY SAND, MEDIUM DENSE, LIGHT OLIVE GRAY (5 Y 5/2), NEARLY DRY, WELL GRADED	
40			CL		40-42': CLAY, HARD, OLIVE GRAY (5 Y 4/1), MOIST, VERY PLASTIC	
			SM		42-43': SILTY, CLAYEY SAND	
45			CL		43-51.5': CLAY, STIFF, MEDIUM GRAY (N5), SLIGHTLY MOIST, VERY PLASTIC	
50					CEMENTED CLAYSTONE AT 51.5 TO 52'	
55			ML		52-61': CLAYEY SILT, STIFF, MEDIUM DARK GRAY (N4), SLIGHTLY MOIST, PLASTIC	
					CEMENTED SILTSTONE AT 55 TO 55.5', VERY HARD	
60						

NOTES:

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WELL CONSTRUCTION SYMBOLS

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- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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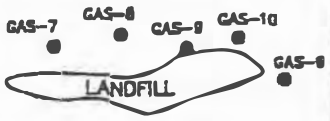
LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL	SHEET 3 OF 5
	HOLE #: GAS-6
JOB #: C96.06.088	DATE: 9/23-25/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 860'	
EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
60			ML		61-62.5': CEMENTED SILTSTONE, HARD, MEDIUM DARK GRAY	
			CL		62.5-66': SILTY CLAY, VERY STIFF, MEDIUM DARK GRAY (N4), SLIGHTLY MOIST, PLASTIC, CEMENTED LAYER AT 65 TO 65.5'	
65						
			SM		66-72': GRAVELLY SAND, MEDIUM DENSE, DARK GRAY (N4), DRY, WELL GRADED, SOME SILT AND CLAY	
70						
			ML		72-77': CLAYEY SILT, MEDIUM STIFF, MEDIUM DARK GRAY (N4), SLIGHTLY MOIST, MEDIUM PLASTIC; LOOSE AND DRY WITH GRAVEL FROM 76 TO 77'	
75			SM		77-79': GRAVELLY, SILTY SAND, MEDIUM DENSE, MEDIUM DARK GRAY (N4), DRY, WELL GRADED	
80						
			ML		79-97': CLAYEY SILT, MEDIUM STIFF, MEDIUM DARK GRAY (N4), NEARLY DRY, MEDIUM PLASTIC; STIFFER BELOW 82', LOOSE AGAIN BELOW 87'	
85						
90						

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WELL CONSTRUCTION SYMBOLS
- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- BENTONITE SEAL
- 3/8-INCH GRAVEL
- SAND-CEMENT SEAL

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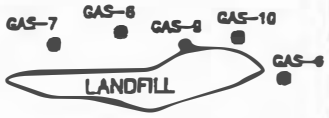
PROJECT: UKIAH LANDFILL | SHEET 4 OF 5
HOLE #: GAS-6
JOB #: C96.06.088 | DATE: 9/23-25/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN
WELL CASING ELEVATION: APPROXIMATELY 860'
EQUIPMENT AND SPECIFICATIONS:
CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
90			ML		LOOSE AT 91', CLAYEY SILT, FIRM, DARK GREENISH GRAY (5 GY 4/1), NEARLY DRY, MEDIUM PLASTIC	
95			SM		97-98.5': GRAVELLY, SILTY SAND, MEDIUM DENSE, MEDIUM BLUISH GRAY, (5 B 5/1), DRY, WELL GRADED	
			GM			
100			ML			
			GM		98.5-102.5': SILTY, SANDY GRAVEL, DENSE, MEDIUM BLUISH GRAY, DRY, WITH CEMENTED FINE-GRAINED SILTSTONE LAYER AT 100 TO 101'	
			SM		102.5-106.5': GRAVELLY, SILTY SAND, MEDIUM DENSE, MEDIUM BLUISH GRAY, SLIGHTLY MOIST, WELL GRADED	
105			GM		106.5-111': SILTY, SANDY GRAVEL, MEDIUM DENSE, MEDIUM BLUISH GRAY, SLIGHTLY MOIST	
110			ML		111-112': CEMENTED SILTSTONE	
			SM		112-117': SILTY, GRAVELLY SAND (SAME AS ABOVE INTERVALS)	
115			ML		117-123': CLAYEY SILT, MEDIUM STIFF, LIGHT OLIVE GRAY (5 Y 5/2), SLIGHTLY MOIST, MODERATELY PLASTIC	
120						

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WELL CONSTRUCTION SYMBOLS
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3/8-INCH GRAVEL
BENTONITE SEAL
SAND-CEMENT SEAL

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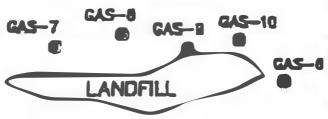
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL	SHEET 5 OF 5
	HOLE #: GAS-6
JOB #: C96.06.089	DATE: 9/23-25/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 860'	
EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
120			ML		LOOSE BELOW 121'	
			SC		123-124': CLAYEY, SILTY SAND, MEDIUM DENSE, OLIVE GRAY (5 Y 5/2), SLIGHTLY MOIST, MEDIUM PLASTICITY	
125			ML		124-126.5': CEMENTED SILTSTONE, HARD, LIGHT OLIVE BROWN (5 Y 5/6), SLIGHTLY MOIST, POORLY GRADED	
			ML		126.5-129': CLAYEY, SANDY SILT, MEDIUM STIFF, LIGHT OLIVE GRAY (5 Y 5/6), SLIGHTLY MOIST, FIRM, MEDIUM PLASTICITY	
130			CL		129-132': SILTY CLAY, STIFF, LIGHT OLIVE BROWN (5 Y 5/6), SLIGHTLY MOIST, PLASTIC	
					CEMENTED SILTSTONE AT 123 TO 133.5'	
135			ML		133.5-142': CLAYEY, SANDY SILT, MEDIUM STIFF, MEDIUM BLUISH GRAY (5/B 5/1), MEDIUM PLASTIC, SLIGHTLY MOIST	
140			CL		142-143': SILTY CLAY, HARD, MODERATE YELLOWISH BROWN (10 YR 5/4), MOIST, PLASTIC	
			ML		143-144.5': CLAYEY SILT, STIFF, GREENISH GRAY (5 G 6/1), SLIGHTLY MOIST, MEDIUM PLASTIC	
145						
150						

NOTES:

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WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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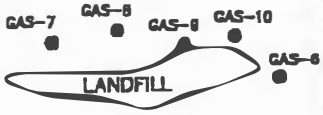
PROJECT: UKIAH LANDFILL	SHEET 1 OF 3
	HOLE #: GAS-7
JOB #: C96.06.088	DATE: 9/11-12/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 770'	
EQUIPMENT AND SPECIFICATIONS:	
CME-55 DRILLING RIG	
0-4' : 10"-HOLLOW STEM AUGER	
BELOW 4': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION
0			CL		0-12': SILTY CLAY, STIFF, LIGHT OLIVE GRAY (5 Y 5/2), MEDIUM DARK GRAY (N4), BELOW 8', MOIST, PLASTIC	STEEL RISER W/LOCKING LID; 2' TO 3'; S I D
5						
10						
12			ML		12-15': CLAYEY SILT, SOFT, LIGHT OLIVE GRAY (5 Y 5/2), MOIST	
15			SM		15-25': SILTY SAND, MEDIUM DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4), WELL SORTED, GRAVELLY FROM 16.5 -17.5', 5% GRAVEL BELOW 17.5'; ~20% GRAVEL @ 22-24', SLIGHTLY MOIST	
20						
25			GM		25-27.5': GRAVEL, VERY DENSE, MOSTLY FINE GRAVEL, POSSIBLY CEMENTED (DIFFICULT DRILLING)	
27.5			SM		27.5-38': GRAVELLY, SILTY SAND, MEDIUM DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4), SLIGHTLY MOIST	
30						

NOTES:

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WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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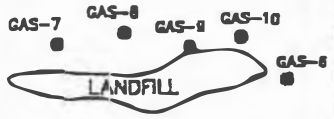
LAWRENCE & ASSOCIATES 2001 MARKET STREET, RM. 523 REDDING, CA 96001 PHONE : (916) 244-9703 FAX : (916) 244-5021	PROJECT: UKIAH LANDFILL	SHEET 2 OF 3
		HOLE #: GAS-7
	JOB #: C96.06.088	DATE: 9/11-12/96
	LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
	WELL CASING ELEVATION: APPROXIMATELY 770'	
	EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-4' : 10"-HOLLOW STEM AUGER BELOW 4': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
30			SM		27.5-38': SILTY, GRAVELLY SAND, MEDIUM DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4), SLIGHTLY MOIST, POORLY GRADED, FINE GRAINED	
35						
			ML		38-39.5': SANDY, GRAVELLY SILT, FIRM, MEDIUM BLUISH GRAY (5 B 5/1), SLIGHTLY MOIST	
40			GM		39.5-56.5': SILTY GRAVEL, DENSE, MOIST, SILTY MATRIX IS MEDIUM BLUISH GRAY; CLASTS ARE PRIMARILY SUBROUNDED; SOME SAND BY 46.5'; HARDER, SLOWER DRILLING FROM 49' TO 51' (LARGER GRAVEL)	
45						
50						
55						
			ML		56.5-57.5': CLAYEY SILT, MEDIUM BLUISH GRAY (5 B 5/1) TO 57.5', GRAYISH OLIVE, (10 Y 4/2) FROM 57.5 TO 60', SILTY CLAY, MOIST, PLASTIC	
60			CL			

NOTES:

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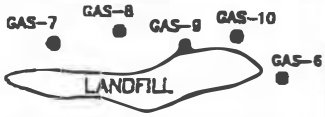
WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

D:\ADCADD\P\UKIAHCTY\GAS-7.DWG DBJ. 10/3/96

LAWRENCE & ASSOCIATES 2001 MARKET STREET, RM. 523 REDDING, CA 96001 PHONE : (916) 244-9703 FAX : (916) 244-5021	PROJECT: UKIAH LANDFILL	SHEET 3 OF 3
		HOLE #: GAS-7
	JOB #: C96.06.088	DATE: 9/11-12/96
	LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
	WELL CASING ELEVATION: APPROXIMATELY 770'	
	EQUIPMENT AND SPECIFICATIONS: WL MEASURED @ 76' ON 9/12/96 AFTER PULLING ROD STATIC WL = 56.21' (9/13/96, 15:40)	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
60			CL		57.5-64.5': SILTY CLAY, SLIGHTLY MOIST, PLASTIC, DARK GRAYISH GREEN BELOW 60' (5 GY 4/1), HARD @ 63.5 TO 64.5'	
65			ML		64.5-74': CLAYEY SILT, DARK GRAYISH GREEN, SLIGHTLY MOIST, GRAVELLY FROM 66.5 TO 67.5', PLASTIC	
70						
75			SM		74-77': SILTY SAND, MEDIUM DENSE, MEDIUM BLUISH GRAY (5 B 5/1), SLIGHTLY MOIST, SOME CLAY AND GRAVEL BELOW 75'	
80			GM		77-82': SANDY, SILTY, GRAVEL, MEDIUM DENSE, VERY MOIST (MUCH MOISTER THAT ABOVE INTERVALS), MEDIUM BLUISH GRAY (5 B 5/1), LARGER, CLEANER, VERY MOIST GRAVEL BY 82', FIRST WATER AT 83'	
			GP		82-84.5': CLEAN GRAVEL, WET AT 83', SUBROUNDED	
85						
90						

NOTES:

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I = INTERMEDIATE GAS PROBE

S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

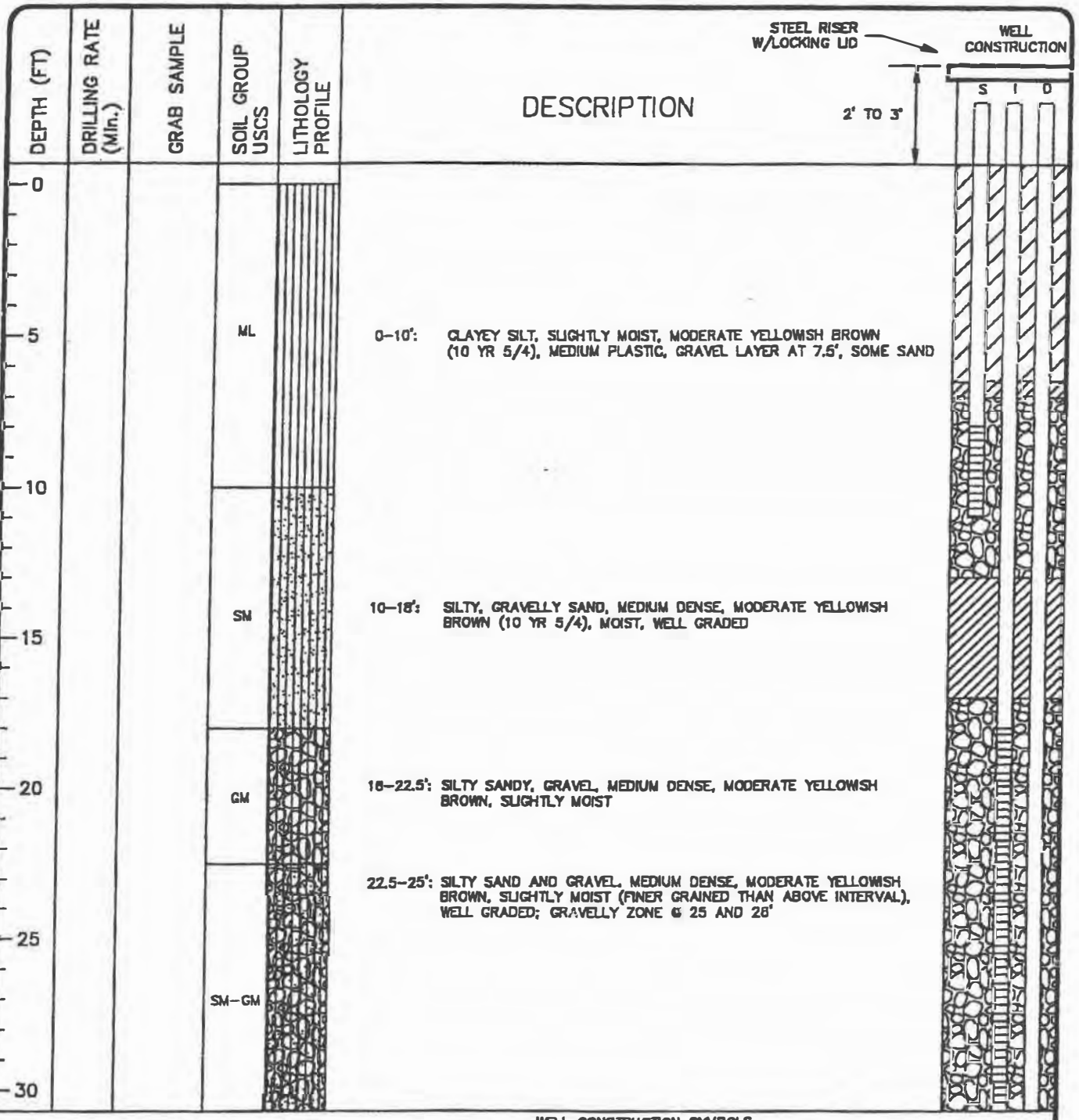
D:\ADCADD\P\UKIAHCTY\GAS-7.DWG D.B.Z.

LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL	SHEET 1 OF 6
	HOLE #: GAS-6
JOB #: C96.06.088	DATE: 9/13-20/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 922'	
EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL





NOTES:

D = DEEP GAS PROBE

I = INTERMEDIATE GAS PROBE

S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL

SHEET 2 OF 6

HOLE #: GAS-8

JOB #: C96.06.088

DATE: 9/13-20/96

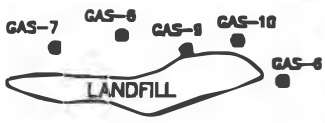
LOGGED BY: B. GARTNER DRILLER: D. JENSEN

WELL CASING ELEVATION: APPROXIMATELY 922'

EQUIPMENT AND SPECIFICATIONS:

CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
30						
			SM-GM		25'-37.5': SILTY SAND AND GRAVEL (SAME AS ABOVE), LARGER GRAVEL LENS AT 30.5'	
35						
40						
45						
			GM		37.5-59.5': SILTY, SANDY GRAVEL, SLIGHTLY MOIST, DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4) OCCASIONAL CLAY STRINGER; CLASTS INCLUDE BASALT, SCHIST, SANDSTONE, CHERT, AND OTHER ROCK TYPES	
50						
55						
60						

NOTES:

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S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS

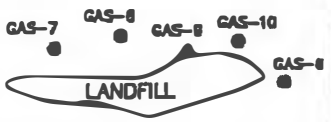
- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

O:\AOCADD\P\UKIAHCTY\GAS-8.DWG D.B.Z. 10/3/96

LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL	SHEET 3 OF 6
	HOLE #: GAS-8
JOB #: C96.06.08B	DATE: 9/13-20/96
LOGGED BY: C. COLES	DRILLER: D. JENSEN
WELL CASING ELEVATION: APPROXIMATELY 922'	

FIELD LOCATION OF GAS WELL



EQUIPMENT AND SPECIFICATIONS:

CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
60						
			SC		60.5-65': CLAYEY SAND W/OCCASIONAL GRAVEL, MEDIUM DENSE, DARK YELLOWISH ORANGE (10 YR 6/6), SLIGHTLY MOIST, SLIGHTLY PLASTIC	
65						
			SM-GM		65-70': SILTY SAND AND GRAVEL, DARK YELLOWISH ORANGE (10 YR 6/6), SOME LOOSE ZONES, SLIGHTLY MOIST	
70						
75					70-79': CEMENTED GRAVEL IN SILTY-SAND MATRIX, HARD, DRY, SAME COLOR	
			SM-GM			
80						
					79-96': SAME AS ABOVE, EXCEPT HARD AND LIGHT BROWN	
85						
90						

NOTES:
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WELL CONSTRUCTION SYMBOLS
SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
3/8-INCH GRAVEL
BENTONITE SEAL
SAND-CEMENT SEAL

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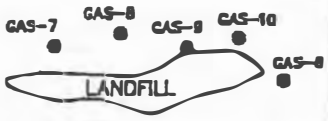
LAWRENCE & ASSOCIATES 2001 MARKET STREET, RM. 523 REDDING, CA 96001 PHONE : (916) 244-9703 FAX : (916) 244-5021	PROJECT: UKIAH LANDFILL	SHEET 4 OF 6 HOLE #: GAS-8
	JOB #: C96.06.088	DATE: 9/13-20/96
	LOGGED BY: C. COLES DRILLER: D. JENSEN	
	WELL CASING ELEVATION: APPROXIMATELY 922'	
	EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
90			SM-GM		LESS CEMENTED BELOW 92'	
95			SM		96-98': FINE SAND AND SILT, SLIGHTLY GRAVELLY	
			SM-GM		98-98.5': CEMENTED GRAVEL IN SAND/SILT MATRIX	
100			ML		98.5-102': SILT	
105			SM-GM		102-107.5': SILTY, SANDY GRAVEL, DENSE, DUSKY GREEN (5G 3/2)	
110						
115			SM-GM		107.5-174.5': CEMENTED GRAVEL IN A SAND AND SILT MATRIX, VERY HARD, DENSE, DUSKY GREEN, SOFTER ZONE AT 199'	
120						

NOTES:

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WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

LAWRENCE & ASSOCIATES 2001 MARKET STREET, RM. 523 REDDING, CA 96001 PHONE : (916) 244-9703 FAX : (916) 244-5021	PROJECT: UKIAH LANDFILL	SHEET 5 OF 6 HOLE #: GAS-8
	JOB #: C96.08.088	DATE: 9/13-20/96
	LOGGED BY: C. COLES DRILLER: D. JENSEN	
	WELL CASING ELEVATION: APPROXIMATELY 922'	
	EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
120						
125						
130					107.5-174.5': CEMENTED GRAVEL IN A SAND AND SILT MATRIX, VERY HARD, DENSE, DUSKY GREEN, SOFTER ZONE AT 199'	
135			SM-GM		BELOW 139' LESS DENSE, SMALLER GRAVEL, STILL NO CLAY	
140						
145						
150						

NOTES:
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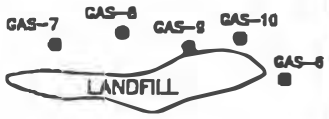
WELL CONSTRUCTION SYMBOLS
- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL	SHEET 6 OF 6
	HOLE #: GAS-8
JOB #: C96.06.088	DATE: 9/13-20/96
LOGGED BY: C. COLLINS DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 922'	
EQUIPMENT AND SPECIFICATIONS:	
WATER AT 153' AFTER PULLING DRILLING ROD	
STATIC WATER LEVEL = 149.12' FROM TOP OF CASING (10/1/96, 13:00)	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
150						
155					BACK TO CEMENTED GRAVEL, SLIGHTLY CLAYEY, ALMOST ALL DARK GREEN ROCKS, METAVOLCANIC, SOME CHERT, <5%, MORE MOIST BELOW 151'	
160			SM-GM			
165						
170					INCREASINGLY MOIST BELOW 170'	
					NATIVE MATERIALS →	
					WET AT 174.5'	
175						
180						

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WELL CONSTRUCTION SYMBOLS
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- BENTONITE SEAL
- 3/8-INCH GRAVEL
- SAND-CEMENT SEAL

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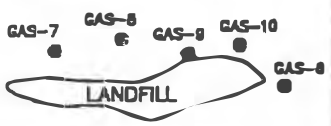
LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL | SHEET 1 OF 1
HOLE #: GAS-9
JOB #: C96.06.088 | DATE: 9/9-10/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN
WELL CASING ELEVATION: APPROXIMATELY 760'
EQUIPMENT AND SPECIFICATIONS:
CME-55 DRILLING RIG
8" O.D. HOLLOW-STEM AUGER

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION
0			ML		0-7': GRAVELLY SILT, DENSE, PALE YELLOWISH BROWN, (10 YR 6/2), SLIGHTLY MOIST
5					
10			CL		7-30': SILTY CLAY, STIFF, PALE OLIVE (10 Y 6/2), MOIST, PLASTIC STIFFER AND LIGHT OLIVE GRAY (5 Y 5/2) BELOW 14', HARD LAYER FROM 14.5 TO 17' (CEMENTED ORANGE-BROWN SILTSTONE) HARD AGAIN @ 19', STICKY, PLUGS EASILY BELOW 19'; LESS HARD BELOW 24'.
15					
20					
25					
30					

STEEL RISER W/LOCKING LID
2' TO 3'
WELL CONSTRUCTION
S I D

NOTES:
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WELL CONSTRUCTION SYMBOLS
SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
BENTONITE SEAL
3/8-INCH GRAVEL
SAND-CEMENT SEAL

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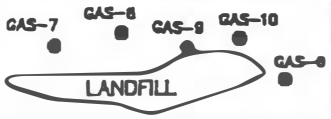
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL	SHEET 1 OF 2
	HOLE #: GAS-10
JOB #: C98.06.088	DATE: 9/10-11/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 795'	
EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION
0			CL		0-21': SILTY CLAY, STIFF, PLASTIC, MEDIUM GRAY (N5) AND OLIVE GRAY (5 Y 4/1), MOIST, PLASTIC HARD, SCRAPING @ 6'; LESS HARD @ 8.5' SWITCHED TO AIR ROTARY @ 9' MEDIUM GRAY (N-5) @ 9-12', LIGHT OLIVE GRAY (5 Y 5/2), HARD AND BOUNCING @ 14.25' MEDIUM GRAY TO LIGHT OLIVE GRAY (ALTERNATING AND VARIEGATED AT TIMES), PLASTIC, STIFF, MOIST	STEEL RISER W/LOCKING LID 2' TO 3' S I D
5						
10						
15						
20						
25			ML		21-45' CLAYEY SILT W/FINE SAND, STIFF TO HARD, MEDIUM GRAY (N5) TO LIGHT OLIVE GRAY, PLASTIC; NO SAND BELOW 26'; COBBLE AT 26.5'	
30						

NOTES:
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WELL CONSTRUCTION SYMBOLS
- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL

SHEET 2 OF 2
HOLE #: GAS-10
JOB #: C96.06.088
DATE: 9/10-11/96

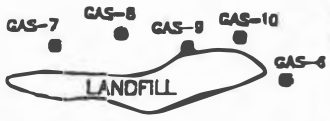
LOGGED BY: B. GARTNER DRILLER: D. JENSEN

WELL CASING ELEVATION: APPROXIMATELY 795'

EQUIPMENT AND SPECIFICATIONS:

CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION
30					31-31.5' HARD ZONE, (CEMENTED SILT)
					SAME CLAYEY SILT AS DESCRIBED ABOVE, MEDIUM GRAY TO LIGHT OLIVE GRAY, MEDIUM PLASTIC, STIFF, SLIGHTLY MOIST
35			ML		
40					LESS STIFF @ 41.5'
					GRAVEL LAYER @ 45 TO 45.5' (SILTY GRAVEL)
45			GM		45.5-55.5': SILTY CLAY, STIFF, MEDIUM DARK GRAY (N4), MOIST, PLASTIC
					EASY DRILLING @ 51.5', HARDER @ 52.5'
50			CL		EASIER BY BY 53', HARDER @ 55.5'
55			ML		55.5-56.5': CLAYEY SILT (ML) WITH A LITTLE GRAVEL, LIGHT OLIVE GRAY, VERY HARD FROM 55.5'
			SC		56.5-59': CLAYEY SILTY SAND, LIGHT OLIVE GRAY (SANDS FINE)
60					

WELL CONSTRUCTION



NOTES:

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WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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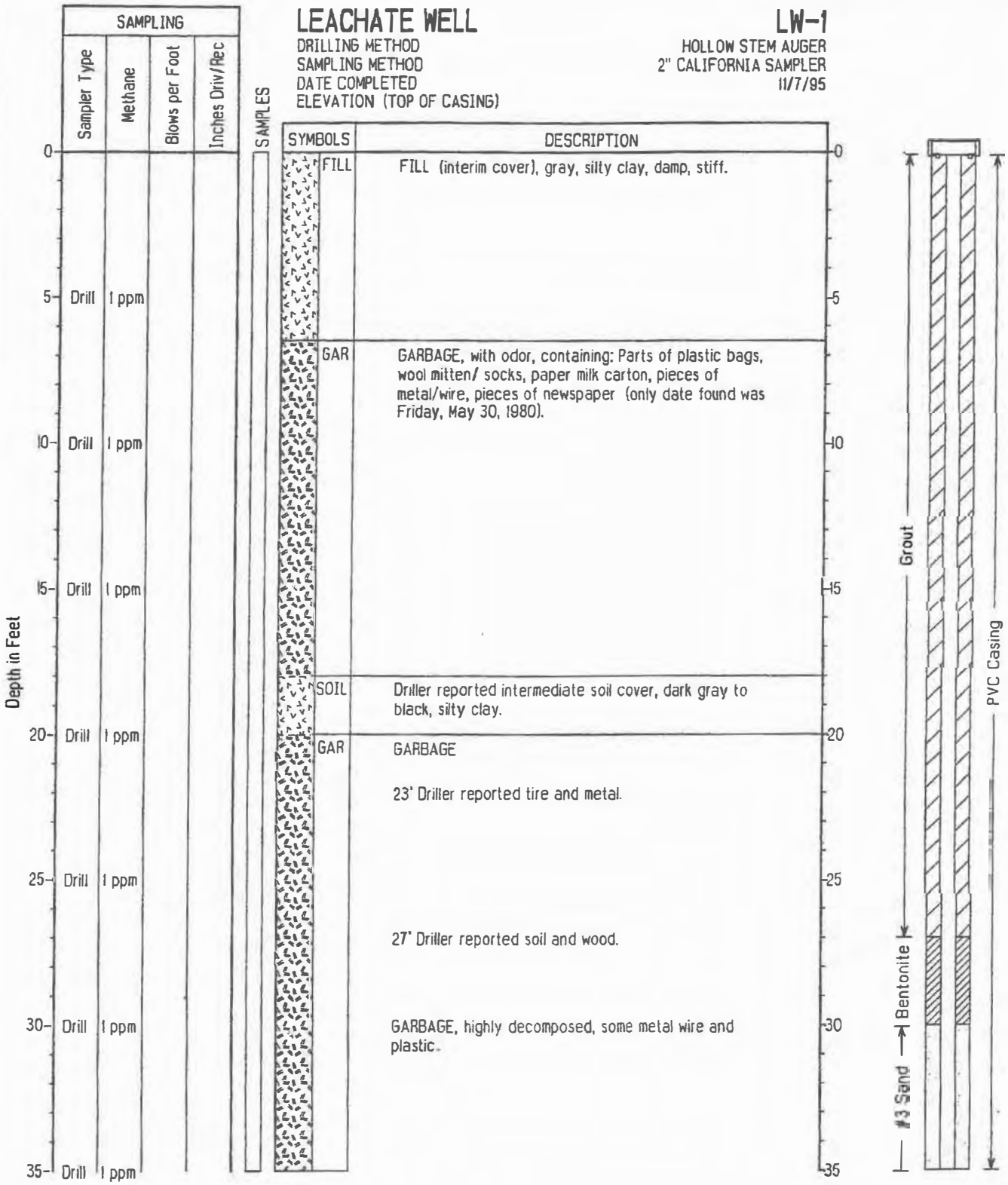
LEACHATE WELLS

LEACHATE WELL

LW-1

DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2" CALIFORNIA SAMPLER
DATE COMPLETED: 11/7/95
ELEVATION (TOP OF CASING)



LEACHATE WELL LW-1

GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT
City of Ukiah
Ukiah, California

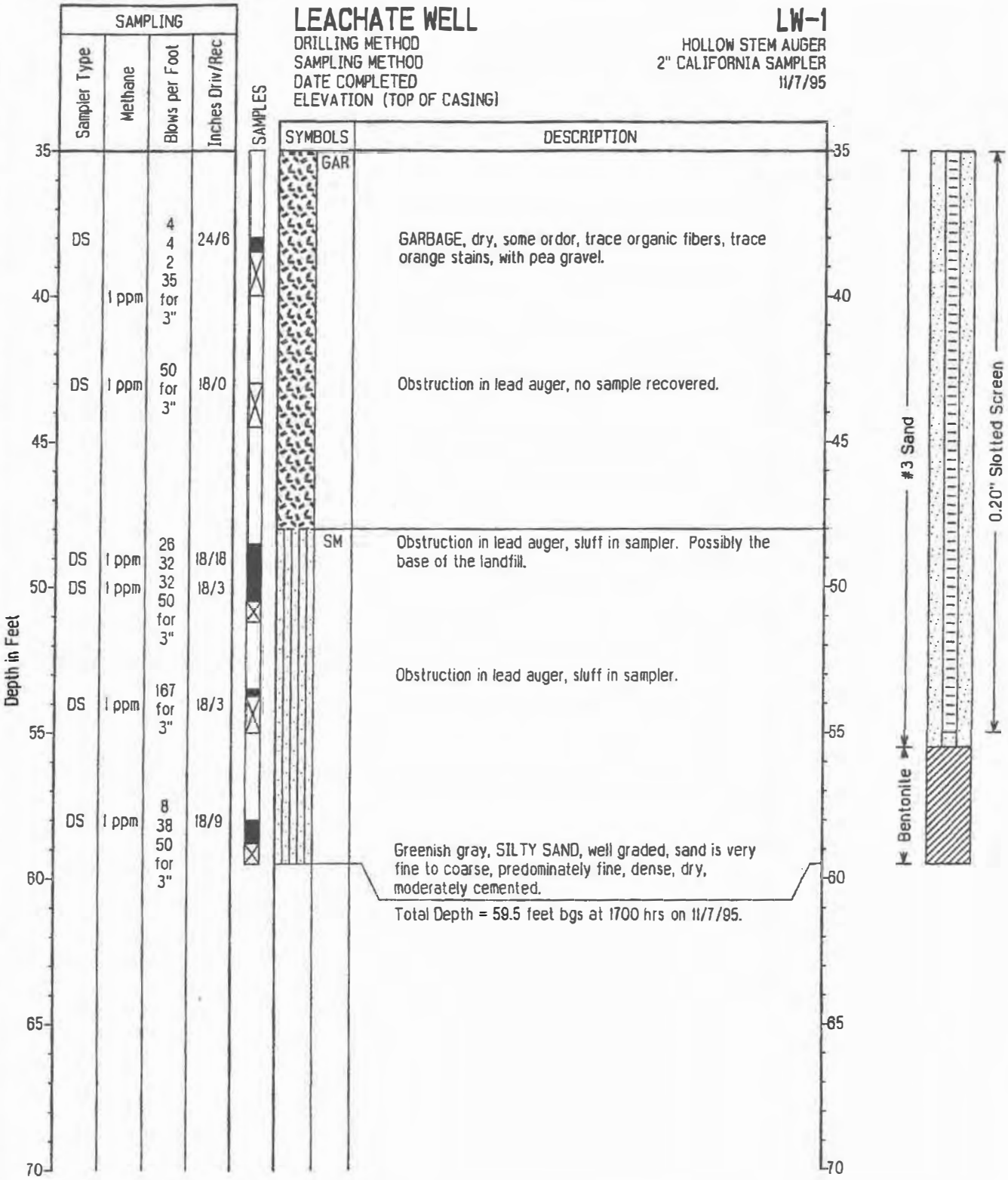
Dames & Moore

02736-0030-038 LW-1

LEACHATE WELL

LW-1

DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2" CALIFORNIA SAMPLER
DATE COMPLETED: 11/7/95
ELEVATION (TOP OF CASING)



LEACHATE WELL LW-1

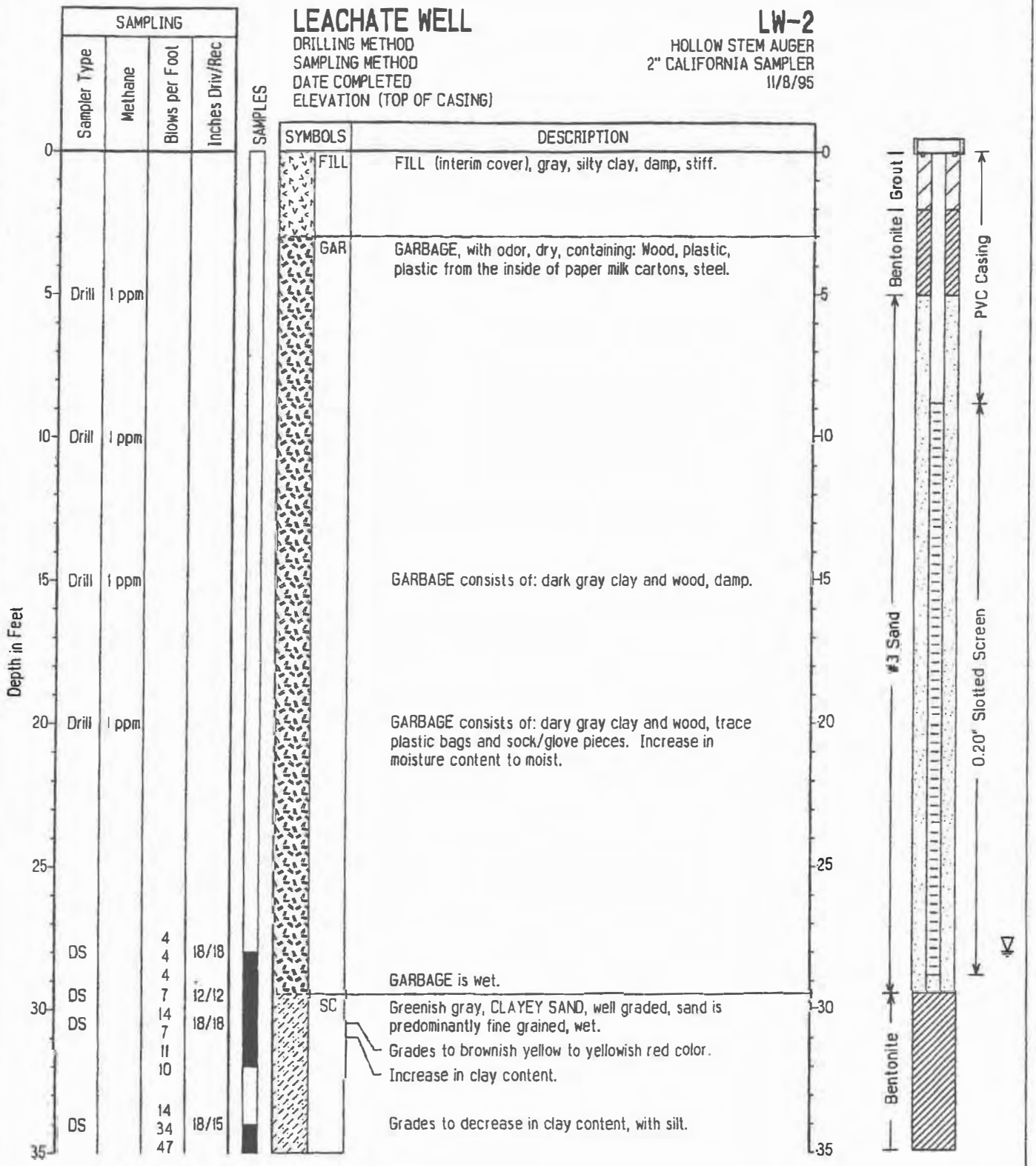
GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT
City of Ukiah
Ukiah, California

Dames & Moore

LEACHATE WELL

LW-2

DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2" CALIFORNIA SAMPLER
DATE COMPLETED: 11/8/95
ELEVATION (TOP OF CASING)



LEACHATE WELL LW-2

GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT
City of Ukiah
Ukiah, California

Dames & Moore

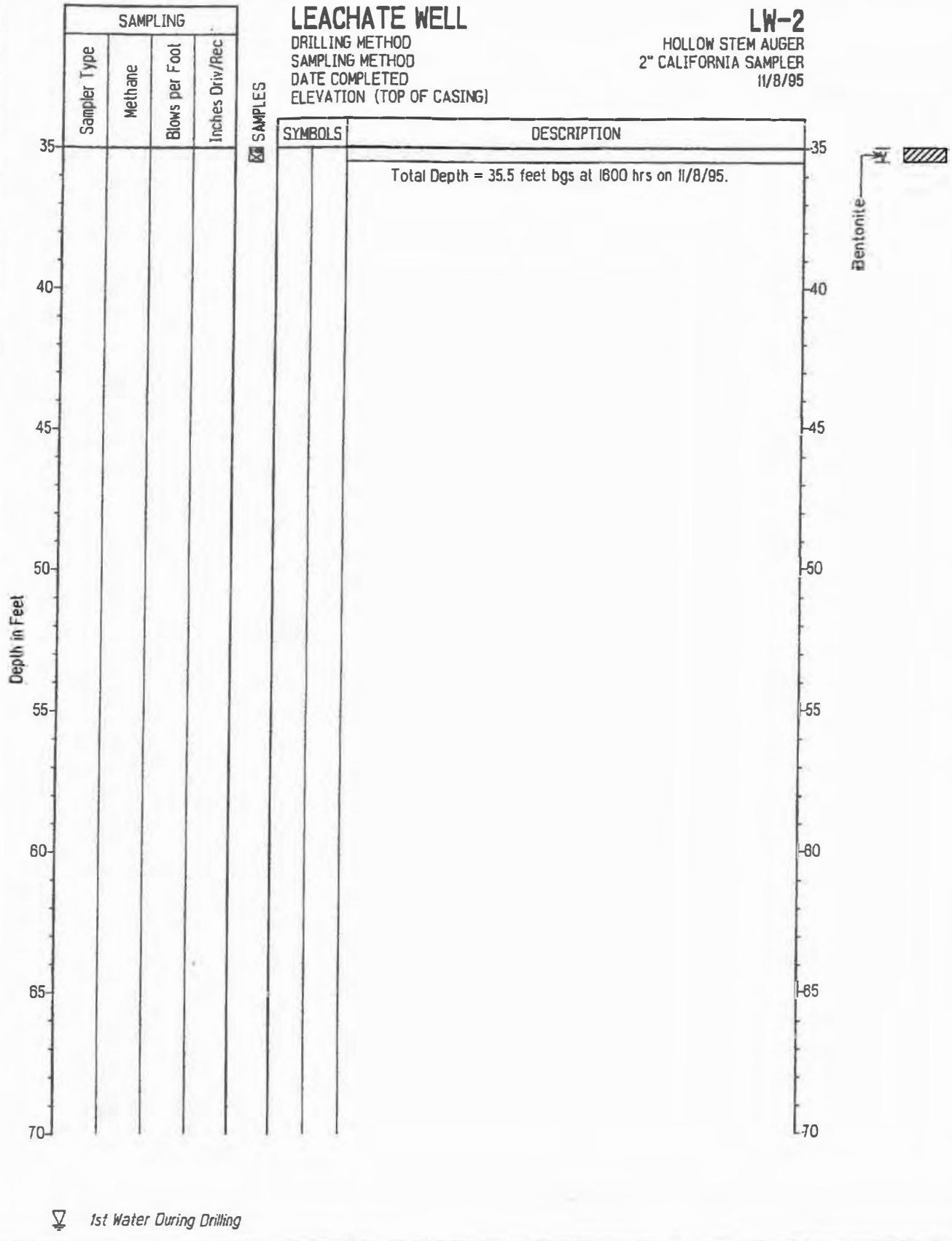
02736-0030-038 LW-2

LEACHATE WELL

DRILLING METHOD
SAMPLING METHOD
DATE COMPLETED
ELEVATION (TOP OF CASING)

LW-2

HOLLOW STEM AUGER
2" CALIFORNIA SAMPLER
11/8/95

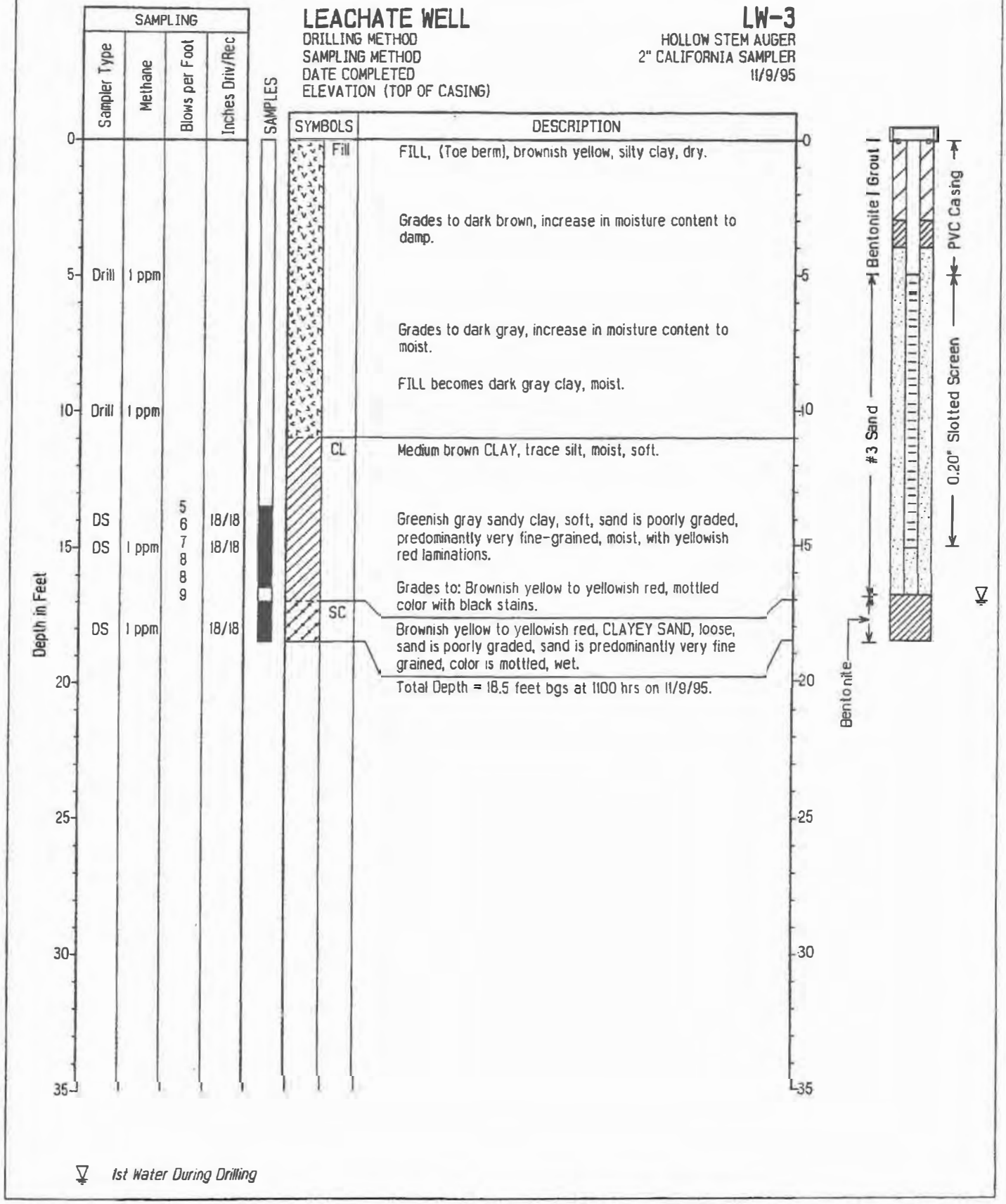


LEACHATE WELL LW-2

GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT
City of Ukiah
Ukiah, California

Dames & Moore

02736-0030-038 LW-2



LEACHATE WELL LW-3

GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT

City of Ukiah

Ukiah, California

Dames & Moore

02736-0030-038 LW-3

Page 1 of 1

GROUNDWATER MONITORING WELLS

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 90-1**

DRILLING SUPERVISOR: Stephen Lucas, CEG# 1520 | CASING: 2 in. PVC | DATE: 04/09/90

DRILLING LOGGER: Stephen Lucas | SLOT SIZE: 0.02 in. | SEAL: 2.5 ft. - 5.0 ft.

DRILLER: Clearheart Construction, Guerneville, California | PERF: 5.5 ft. - 14.0 ft. | WELL DEPTH: 15.75 ft

DRILL RIG: Failing FA-100 Truck-mount

DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger

GROUNDWATER ELEVATION: 666.18 ft. 11/27/90

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Top of casing (TOC) elevation: ~677 ft.; (2.0 ft. above existing grade) Surface Elevation: ~675 ft.	0	Annulus: Locking cover in concrete; Casing: 2" PVC BLANK CASING				
Soft medium brown clayey sandy silt with < 1% rock fragments >0.5"		Annulus: Neat Cement	1) 2"	5	ND	
-Orange brown cuttings	5	Annulus: Bentonite Pellets				
-Very damp			2) 2"	11	ND	
Medium dense brown interbedded silty sand and gravels (6" - 12" thick) ; saturated	10	Annulus: No. 3 Monterey Sand; Casing: 0.02" PERFORATED SCREEN	3) 2"	28	ND	11/27/90
BASAL CONTACT HOLOCENE ALLUVIUM						
Very stiff to hard gray and brown silty clay; Dry to damp (PLIO-PLIESTOCENE DEPOSITS)	15	Annulus: Bentonite Pellets				
Very dense gray and brown matrix supported clayey gravel conglomerate; rounded sandstone clasts < 1"; Dry to damp			4) 2"	40/9	0.5	
TOTAL DEPTH 15.75 FEET	20					

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 1

PROJECT: UKIAH CITY LANDFILL, Ukiah, California		WELL NO. 90-2
DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520	CASING: 2 in. PVC	DATE: 08/15/90
DRILLING LOGGER: Stephen Lucas	SLOT SIZE: 0.02 in.	SEAL: 14.0 - 18.0 ft.
DRILLER: Weeks Drilling, Sebastopol, California	PERF: 19.0 - 49.0 ft.	WELL DEPTH: 50.0 ft.
DRILL RIG: Schramm T-685-H Air Rotary Truck-mount		
DRILLING METHOD: 7 - 7/8 inch Air Rotary		
GROUNDWATER ELEVATION: 680.12 ft. 11/27/90		

DESCRIPTION OF MATERIALS

Top of casing (TOC) elevation: ~685.5 ft.; (2.5 ft. above existing grade)

Surface Elevation: ~683 ft.

Medium stiff yellow brown gravelly clayey silt; (clasts < 2")

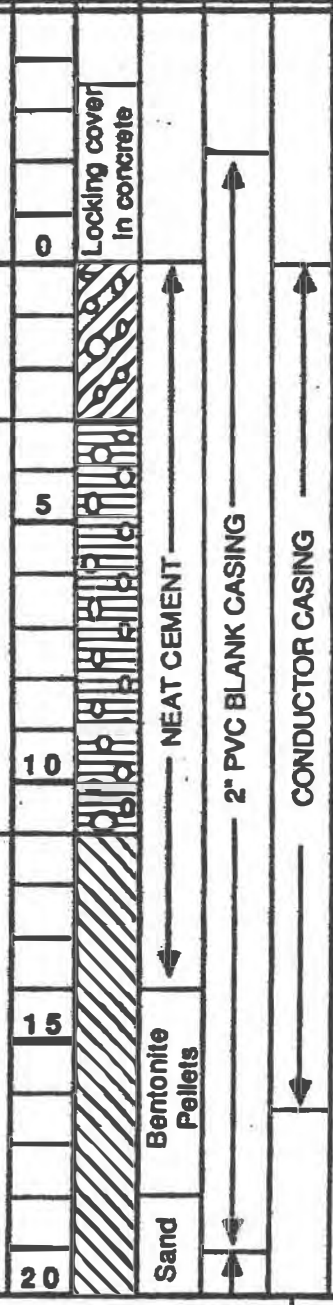
Loose to medium dense polymictic silty gravels; saturated

BASAL CONTACT HOLOCENE ALLUVIUM

PLIO-PLIESTOCENE CONTINENTAL DEPOSITS

Hard gray silty clay

continued



JOB NO. 5146-8910	HALLENBECK & ASSOCIATES	FIGURE NO. HA - 2a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-2 *Continued*

GROUNDWATER ELEVATION: 680.12 ft. 11/27/90

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Hard gray silty clay	20					
Dense gray silty gravel	25					
Hard gray silty clay						
Hard gray clayey silty sand						
Hard gray and brown silty clay	30, 35, 40					
Dense gray clayey sandy gravel; moist to wet						
Hard dark gray silty clay	45					
Hard gray silty clay	50					

No. 3 Monterey Sand

0.02" PERFORATED SCREEN

JOB NO. 5146-8910 | HALLENBECK & ASSOCIATES | FIGURE NO. HA - 2b

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-2 *Continued*

GROUNDWATER ELEVATION: 680.12 ft. 11/27/90

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	GRAPHIC WELL DESIGN: Annulus	GRAPHIC WELL DESIGN: Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Hard gray clayey silt	50		Bentonite Pellets					
	55		SLOUGH					
Dense blue gray silty sand; saturated	60							
TOTAL DEPTH 60.0 FEET	65							
	70							
	75							
	80							

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 2c

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 90-3**

DRILLING SUPERVISOR: Stephen Lucas, CEG# 1520 | CASING: 2 in. PVC | DATE: 04/11/90

DRILLING LOGGER: Stephen Lucas | SLOT SIZE: 0.02 in. | SEAL: 21.5 ft. - 24.5 ft.

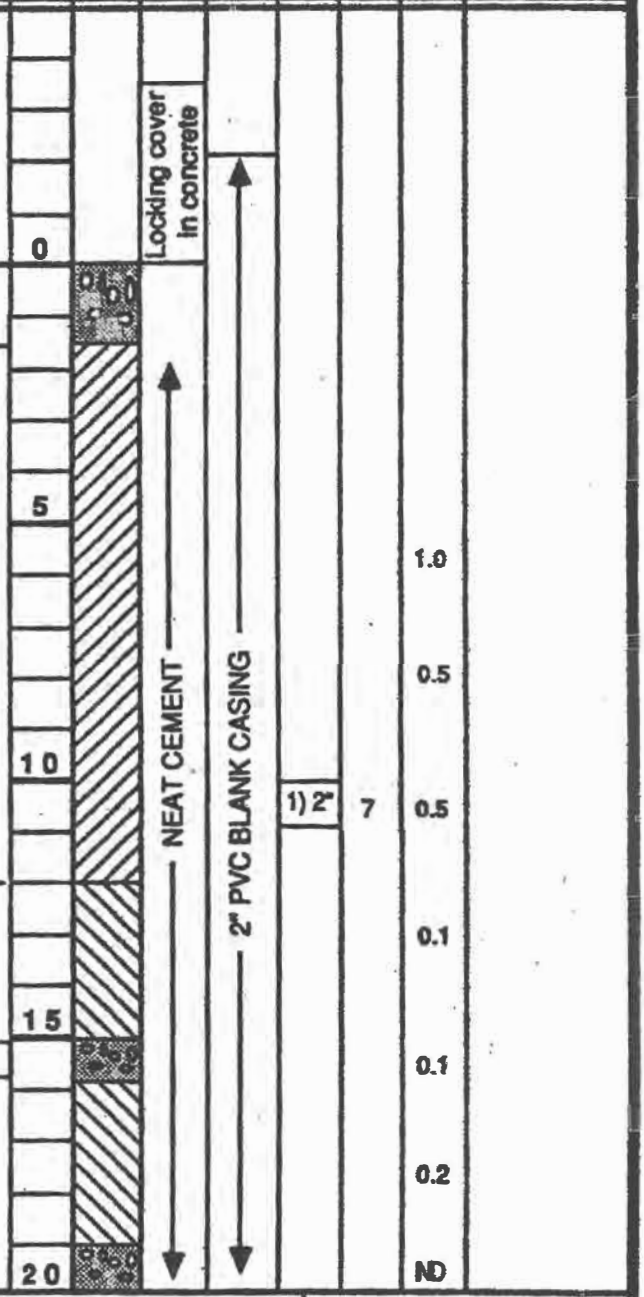
DRILLER: Clearheart Construction, Guerneville, California | PERF: 25.0 ft. - 35.0 ft. | WELL DEPTH: 35.0 ft.

DRILL RIG: Failing FA-100 Truck-mount

DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger

GROUNDWATER ELEVATION: 698.90 ft. 11/27/90

DESCRIPTION OF MATERIALS



Top of casing elevation: ~724.4 ft.; (2.4 ft. above existing grade)

Surface Elevation: ~722 ft.

Medium dense gray and brown silty sandy gravel (road fill)

Medium stiff orange brown clayey silt with ~ 25 % rock fragments; plastic sheeting, wood fragments, medium to strong refuse odor (fill)

Medium stiff gray silty clay (fill)

Medium dense gravel (native)

Medium stiff orange brown silty clay with minor gravel (<10%)

Medium dense orange brown and silty sandy gravel; (0.5" - 2.0" sandstone, chert and schist)

continued

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-3a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-3 *Continued*

GROUNDWATER ELEVATION: 698.90 ft. 11/27/90

DESCRIPTION OF MATERIALS

Depth (ft.)	Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
20			2" PVC BLANK CASING	2) 2"	28	ND	
		Bentonite Pellets					11/27/90
						ND	
25		No. 3 Monterey Sand				ND	
			0.02" PERFORATED SCREEN			ND	
30				3) 2"	26	ND	
						ND	
35						ND	
40							
45							
50							

Medium dense orange brown and gray silty sandy gravel; 0.5" - 2.0" sandstone, chert and schist rock fragments; dry

Medium stiff orange brown clayey silt to silty clay; dry

Dense silty cobbles and gravels; dry

Dense olive gray sandy gravel; saturated

TOTAL DEPTH 35.0 FT.

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 3b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 90-4**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: 04/09/90

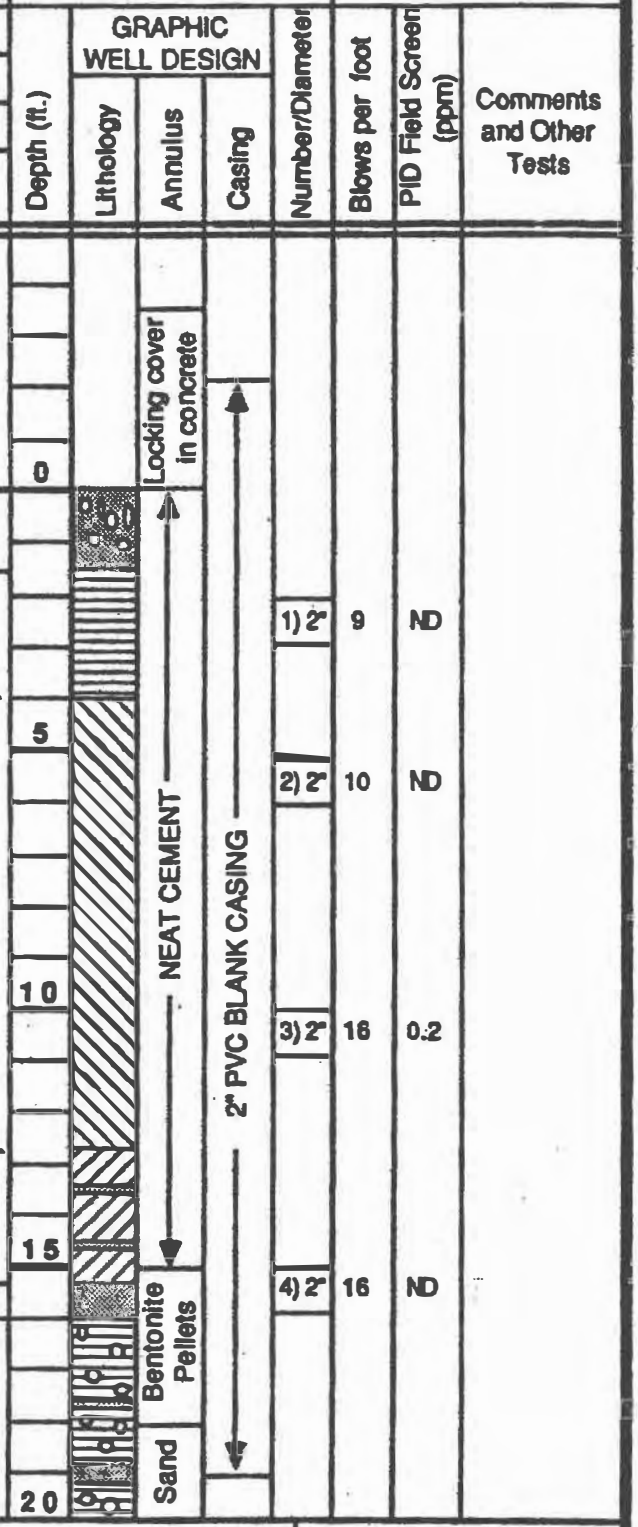
DRILLING LOGGER: Stephen Lucas | SLOT SIZE: 0.02 in. | SEAL: 15.0 ft. - 18.0 ft.

DRILLER: Clearheart Construction, Guerneville, California | PERF: 19.0 ft. - 34.0 ft. | WELL DEPTH: 34.0 ft.

DRILL RIG: Failing FA-100 Truck-mount

DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger

GROUNDWATER ELEVATION: 698.90 ft. 11/27/90



DESCRIPTION OF MATERIALS

Top of casing elevation: ~722.6 ft.; (2.6 ft. above existing grade)

Surface Elevation: ~720 ft.

Medium dense gray brown silty sandy gravel (road fill)

Medium stiff green gray silt with minor gravel; moist (fill)

Stiff dark green gray silty clay to clayey silt <5 % gravel and wood fragments; damp (fill/colluvium ?)

- Carbonized wood fragments, leaves and matted grass

Stiff blue green gray clayey silt with silty sand layers; matted, carbonized grass at bedding contacts (fill/colluvium ?)

Medium dense gray green silty sand; damp (fill)

Dense gray brown and red silty gravel with minor interbedded silty sand; moist to wet (native terrace deposit)

continued

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 4a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-4 *Continued*

GROUNDWATER ELEVATION: 698.90 ft. 11/27/90

DESCRIPTION OF MATERIALS

Depth (ft.)	Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
20				5) 2"	34	ND	
							11/27/90
25				6) 2"	9	ND	
30		No. 3 Monterey Sand	0.02" PERFORATED SCREEN				
35							
40							
45							
50							

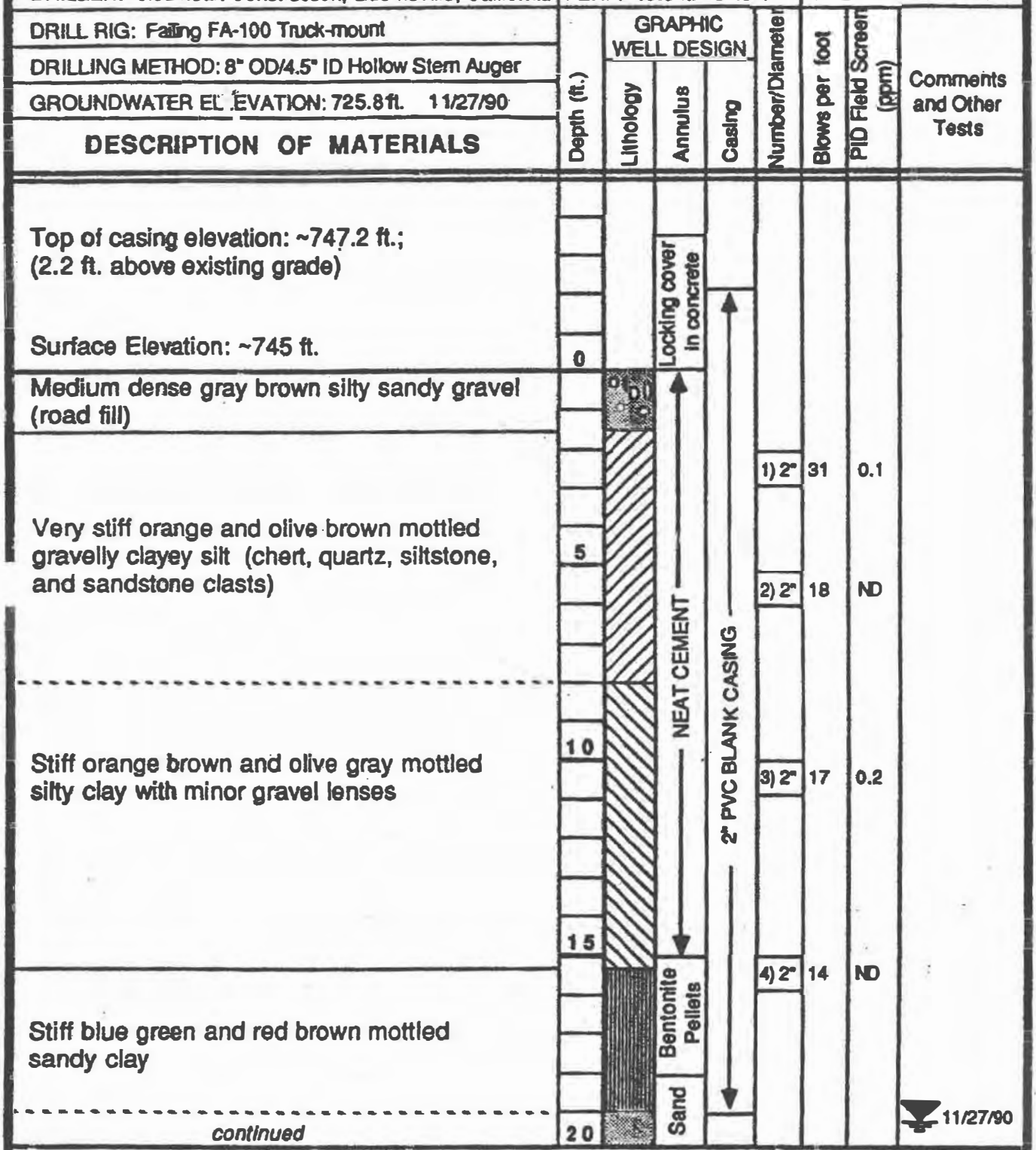
Dense gray brown and red silty gravel with minor interbedded silty sand; moist to wet

Medium stiff orange brown with blue gray mottled silty sand; < 5% rounded < 0.25" pebbles; saturated

TOTAL DEPTH 35.0 FT.

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 4b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California		WELL NO. 90-5
DRILLING SUPERVISOR: Stephen Lucas, CEG #1520	CASING: 2 in. PVC	DATE: 04/12/90
DRILLING LOGGER: Stephen Lucas	SLOT SIZE: 0.02 in.	SEAL: 15.0 ft. - 18.0 ft.
DRILLER: Clearheart Construction, Guerneville, California	PERF: 19.0 ft. - 34.0 ft.	WELL DEPTH: 34.0 ft.
DRILL RIG: Failing FA-100 Truck-mount		
DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger		
GROUNDWATER ELEVATION: 725.8 ft. 11/27/90		



JOB NO. 5146-8910	HALLENBECK & ASSOCIATES	FIGURE NO. HA - 5a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-5 *Continued*

GROUNDWATER ELEVATION: 725.81 ft. 11/27/90

DESCRIPTION OF MATERIALS

Depth (ft.)	Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
20				5) 2"	6	ND	
25				6) 2"	5 NR	ND	
				7) 2"	6	ND	
30				8) 2"	6	ND	
35						ND	
40							
45							
50							

Medium stiff blue green and orange brown mottled silty fine grained sand

Soft blue gray clayey silty fine grained sand

Medium dense blue gray silty sandy gravel matrix supported, subrounded pebbles

No. 3 Monterey Sand

0.02" PERFORATED SCREEN

TOTAL DEPTH 35.0 FT.

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 5b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 90-6**

DRILLING SUPERVISOR: Stephen Lucas, CEG# 1520 | CASING: 2 in. PVC | DATE: 04/13/90

DRILLING LOGGER: Stephen Lucas | SLOT SIZE: 0.02 in. | SEAL: 13.5 ft. - 16.5 ft.

DRILLER: Clearheart Construction, Guerneville, California | PERF: 17.5 ft. - 37.5 ft. | WELL DEPTH: 39.25 ft.

DRILL RIG: Failing FA-100 Truck-mount

DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger

GROUNDWATER ELEVATION: 737.76 ft. 11/27/90

DESCRIPTION OF MATERIALS

GRAPHIC WELL DESIGN

Depth (ft.)	Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
		Locking cover in concrete					
0							
		NEAT CEMENT	2" PVC BLANK CASING	1) 2"	18	ND	
5							
10				2) 2"	25/6"	ND	
15		Bentonite Pellets		3) 2"	53	ND	
		Sand	Screen				
20							11/27/90

Top of casing elevation: ~759.5 ft.;
(2.5 ft. above existing grade)

Surface Elevation: ~757 ft.

Stiff orange brown silt with cobbles and boulders (road fill)

Stiff gray and brown mottled silt with minor rock fragments (road fill)

Very stiff gray brown and orange brown mottled silty clay with minor rock fragments; dessication cracks; dry (native)

Hard orange brown and gray mottled clayey silt (damp)

Dense orange brown and gray silty gravel

Hard olive gray and orange brown clayey silt

continued

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 6a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-6 *Continued*

GROUNDWATER ELEVATION: 737.67 ft. 11/27/90

DESCRIPTION OF MATERIALS

Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
20							
25							
30							
35				5) 2"	6	ND	
40							
45							
50							

Hard olive gray and orange brown clayey silt

- Slightly sandier; moist to wet

Medium dense gravel; wet

Very stiff gray silty clay; moist

Very dense silty cobbles

DRILLING REFUSAL 39.25 FEET

No. 2/16 Monterey Sand

0.02" PERFORATED SCREEN

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-6b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California			WELL NO. 90-7
DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520	CASING: 2 in. PVC		DATE: 08/13/90
DRILLING LOGGER: Stephen Lucas	SLOT SIZE: 0.02 in.		SEAL: 130.0 - 135.0 ft.
DRILLER: Weeks Drilling, Sebastopol, California	PERF: 139.0 - 159.0 ft.		WELL DEPTH:160.0 ft.
DRILL RIG: Schramm T-685-H Air Rotary Truck-mount			
DRILLING METHOD: 7 - 7/8 inch Air Rotary			
GROUNDWATER ELEVATION: 727.22 ft. 11/27/90			

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	GRAPHIC WELL DESIGN: Annulus	GRAPHIC WELL DESIGN: Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Top of casing (TOC) elevation: ~835.2 ft.; (2.2 ft. above existing grade) Surface Elevation: ~833 ft.	0	Locking cover in concrete						
Stiff yellow brown silty clay with minor gravel (< 15 %, ~25% are angular Franciscan sandstone clasts)	5 10 15 20		NEAT CEMENT	2" PVC BLANK CASING				

continued

JOB NO. 5146-8910	HALLENBECK & ASSOCIATES	FIGURE NO. HA - 7a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-7 *Continued*

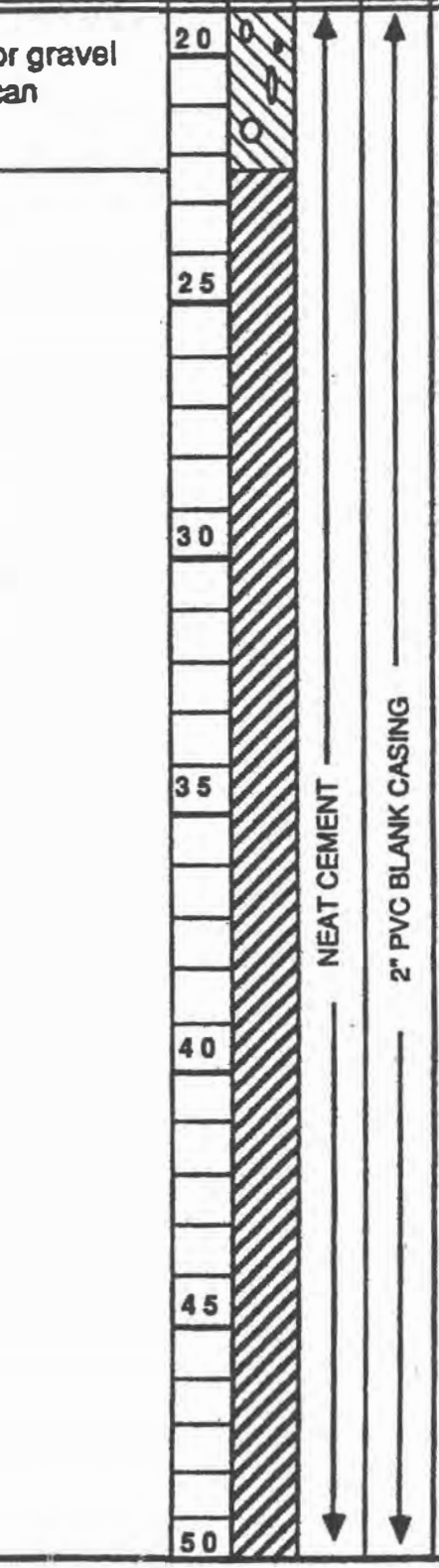
GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS

Stiff yellow brown silty clay with minor gravel (< 15 %, ~25% are angular Franciscan sandstone clasts)

Hard gray clayey silt(stone)

continued



JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 7b

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-7 *Continued*

GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Dense gray clayey silt(stone)	50		NEAT CEMENT	2" PVC BLANK CASING				
	55							
Dense gray silty gravel								
Dense blue gray clayey silt(stone); dry to very slightly moist	60							
	65							
	70							
	75							
continued	80							

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 7c

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-7 *Continued*

GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Dense blue gray clayey silt(stone); dry to very slightly moist	80					
	85					
Dense dark gray sand(stone); dry	90					
Dense dark gray silty clay(stone)	95					
Dense polymictic silty gravel (sandstone and chert clasts)	100					
Dense blue gray clayey silt(stone); dry to very slightly moist	105					11/27/90
continued	110					

NEAT CEMENT

2" PVC BLANK CASING

JOB NO. 5146-8910	HALLENBECK & ASSOCIATES	FIGURE NO. HA - 7c

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

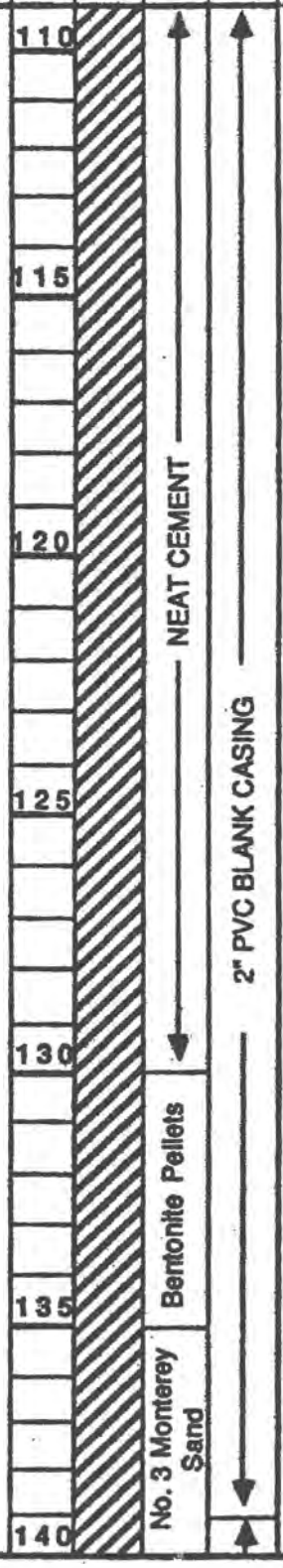
WELL NO. 90-7 *Continued*

GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS

Dense blue gray clayey silt(stone);
dry to very slightly moist

continued



JOB NO. 5146-8910 | HALLENBECK & ASSOCIATES | FIGURE NO. HA - 7d

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-7 *Continued*

GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS

Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
140							
145							
150							
155							
160							
165							
170							

Dense blue gray clayey silt(stone); dry to very slightly moist

Dense blue gray clayey silty sandy gravel; saturated

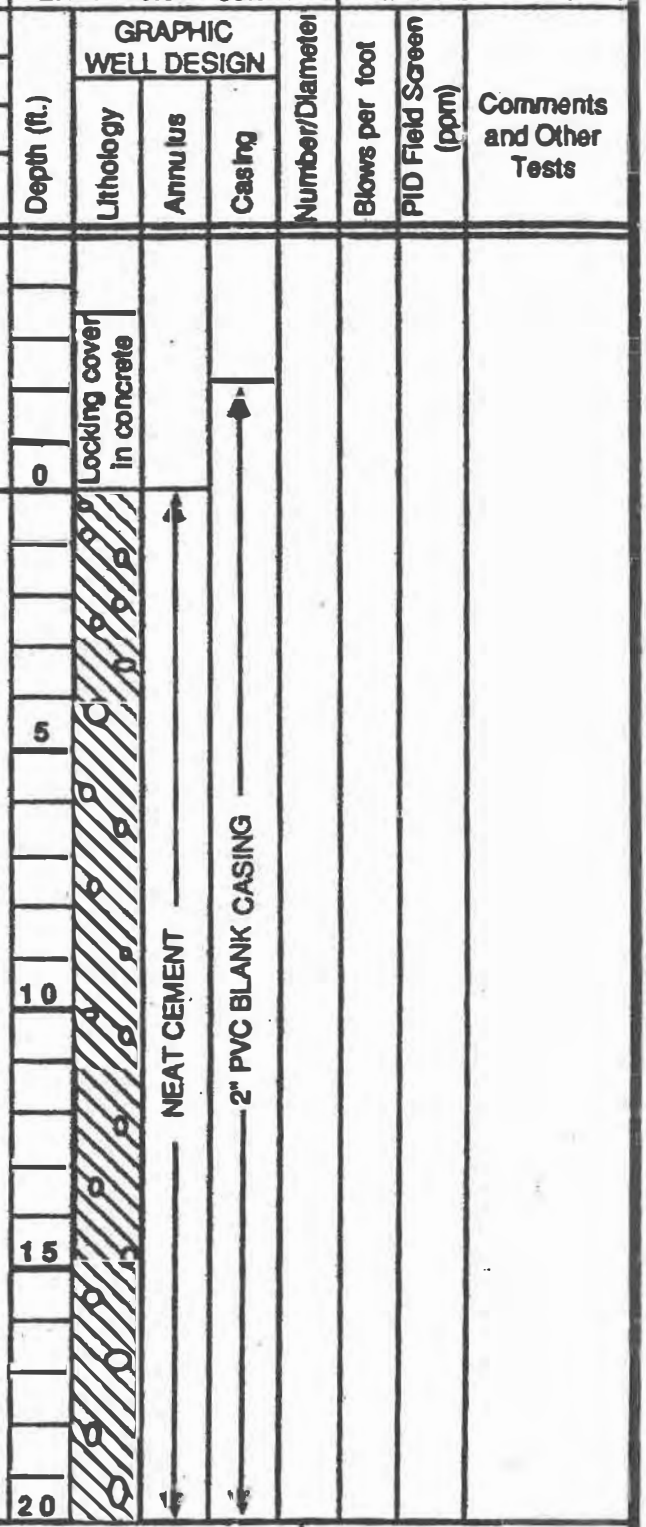
NO. 3 MONTEREY SAND

2" PVC PERFORATED SCREEN

TOTAL DEPTH 160.0 FEET

JOB NO. 5146-8910	HALLENBECK & ASSOCIATES	FIGURE NO. HA-7e

PROJECT: UKIAH CITY LANDFILL, Ukiah, California		WELL NO. 90-8
DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520	CASING: 2 in. PVC	DATE: 12/05/90
DRILLING LOGGER: Stephen Lucas	SLOT SIZE: 0.02 in.	SEAL: 92.0 - 97.0 ft.
DRILLER: Weeks Drilling, Sebastopol, California	PERF: 110.0 - 138.5 ft.	WELL DEPTH:140.0 ft
DRILL RIG: Schramm T-685-H Air Rotary Truck-mount		
DRILLING METHOD: 7 - 7/8 inch Air Rotary		
GROUNDWATER ELEVATION: 700.5 ft. * 1/9/91		



continued * Not stabilized

JOB NO. 5146-8910	HALLENBECK & ASSOCIATES	FIGURE NO. HA - 8a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-8 *Continued*

GROUNDWATER ELEVATION: 700.5 ft.* 1/9/91

DESCRIPTION OF MATERIALS

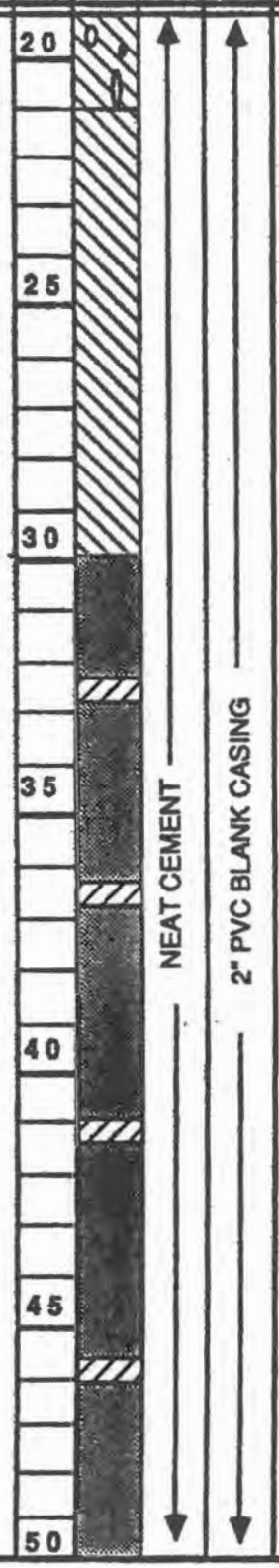
Stiff orange brown silty clay with minor gravel; damp to dry

Hard orange and gray mottled silty clay

Dense gray fine to medium grained silty sand(stone) with clayey silt interbeds

* Not stabilized

Continued



JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 8b

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-8 *Continued*

GROUNDWATER ELEVATION: 700.5 ft.* 1/9/91

DESCRIPTION OF MATERIALS

Dense gray fine to medium grained silty sand(stone) with clayey silt interbeds

Hard gray clayey silt to silty clay

* Not stabilized

Continued

Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
50		NEAT CEMENT	2" PVC BLANK CASING				
55							
60							
65							
70							
75							
80							

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 8c

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-8 *Continued*

GROUNDWATER ELEVATION: 700.5 ft.* 1/9/91

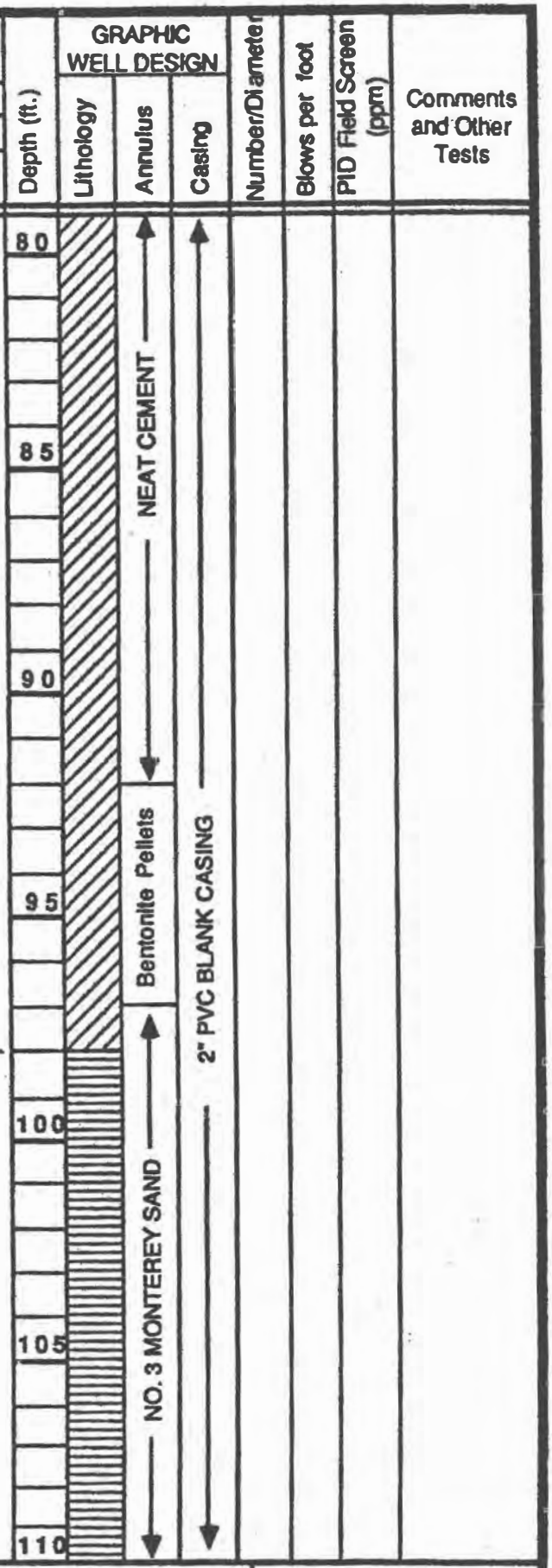
DESCRIPTION OF MATERIALS

Hard gray clayey silt to silty clay; dry

Hard gray silt with minor fine grained silty sand(stone) clasts; dry

* Not Stabilized

Continued



JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 8d

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-8 *Continued*

GROUNDWATER ELEVATION: 700.5 ft.* 1/9/91

DESCRIPTION OF MATERIALS

Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
110							
115							
120							
125							
130							
135							
140							

Hard gray silt with minor fine grained silty sand(stone) clasts; dry

NO. 3 MONTEREY SAND

2" PVC 0.02" PERFORATED SCREEN

Dark gray silt

01/09/91

*Not stabilized

TOTAL DEPTH 140.0 FEET

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-8e

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-1**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: 12-14-92

DRILLING LOGGER: Ralph Carson, Staff Geologist | SLOT SIZE: 0.01 in. | SEAL: 10.0 - 13.0 ft.

DRILLER: Clear Heart Construction, Guerneville, CA | PERF: 15.0 - 28.0 ft. | WELL DEPTH: 28 ft.

DRILL RIG: Deeprock 10K Rig

DRILLING METHOD: 8.25" ID/4.25" OD Hollow Stem Augers

GROUNDWATER ELEVATION: 689.68 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Sample Number/ Diameter	Blows per foot	PID Field screen (ppm)	Comments
Top of Casing (TOC) Elevation: 708.38 ft. (above MSL); ~2.3 ft. Above Existing Grade Surface Elevation: ~706 ft.	0	Locking cover in concrete				
Pale yellow-brown, dark yellow-brown, and moderate yellow-brown mottled silty clay with minor gravel, thin to medium-sized lenses of silty sand, upper 1 ft. very moist due to recent rains, dry soil from 1 ft. to 4 ft.		Neat Cement; 2 in. Schedule 40 Threaded Solid Casing				
moist at 5 ft.	5		1)2.5"		ND	
very moist at 10 ft.	10	Bentonite Pellets	2)2.5"		ND	
Light olive gray and moderate yellow-brown mottled silty clay with minor gravel						
Light olive gray and moderate yellow-brown mottled sandy clay with occasional thin laminations of silty sand	15				ND	18.70 BTOC 12-29-92
Moderate yellow-brown, green-gray, and light olive gray mottled sandy silt with minor gravel		No. 2/12 RMC Lonestar Sand; 0.01 in. Perforated Screen	3)2.5"			
Moderate yellow-brown, green-gray, and light olive gray mottled silty clay	20				ND	
Moderate yellow-brown and light olive gray mottled silty, fine to very coarse-grained sandy gravel; gravel is subangular to subrounded; *saturated*			4)2.5"			
Olive gray gravelly clayey silt, minor small pebbles	25				ND	

continued

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. A-1a

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-1 Continued**

GROUNDWATER ELEVATION: 689.68 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	GRAPHIC WELL DESIGN: Annulus	GRAPHIC WELL DESIGN: Casing	Sample Number	Blows per foot	PID Field screen (ppm)	Comments
Olive gray gravelly clayey silt, minr small pebbles	25		No. 2/12 Sand	0.01 in. Screen	5)2"	45	ND	
							ND	
Medium blue-gray and gray green mottled silty clay								
TOTAL DEPTH @ 28.0 FT.	30							
	35							
	40							
	45							
	50							
	55							

ND = Not Detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. A-1b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-2**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: Dec 16 & 17, 1992

DRILLING LOGGER: Ralph Carson, Staff Geologist | SLOT SIZE: 0.01 in. | SEAL: 26.0 - 28.0 ft.

DRILLER: Clear Heart Construction, Guerneville, CA | PERF: 29.5 - 49.5 ft. | WELL DEPTH: 49.5 ft.

DRILL RIG: Deeprock 10K Rig

DRILLING METHOD: 8.25" ID/4.25" OD Hollow Stem Augers

GROUNDWATER ELEVATION: > 720.92 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Sample Number	Blows per foot	PID Field screen (ppm)	Comments
Top of Casing (TOC) Elevation: 720.92 ft. (above MSL); ~1.0 ft. Above Existing Grade Surface Elevation: ~719.9 ft.	0	Locking cover in concrete				Artesian 12-29-92
Dark yellow-brown and moderate yellow-brown mottled sandy silty clay with ~10% gravel			1)2"	11	ND	
very thin laminations of silty sand	5		2)2"	7	ND	
			3)2"	13	ND	
Light olive gray, dark yellow-brown, and moderate yellow-brown mottled sandy silt with gravel, very thin laminations of silty clay, thin silty sand lenses with gravel (gravel < 1" diameter)	10		4)2"	37	ND	
Light olive gray and pale olive mottled sandy silt with gravel			5)2"	50/6"	ND	
Medium blue-gray and green-gray mottled sandy clayey silt with gravel, moist between 15 to 15.5 feet, thin to very thin laminations of silty, very fine to medium-grained sand seams and silty clay seams between 18 to 20 feet	15	Neat Cement; 2 in. Schedule 40 Threaded Solid Casing	6)2"	38/6"	ND	
			7)2"	52	ND	
	20		8)2"	37	ND	
continued	25					

JOB NO. 5146 | HALLENBECK & ASSOCIATES | FIGURE NO. A-2a

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-2 Continued**

GROUNDWATER ELEVATION: >720.92 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Sample Number	Blows per foot	PID Field screen (pp)	Comments
Medium blue-gray and green-gray mottled sandy clayey silt with gravel, moist between 15 to 15.5 feet, thin to very thin laminations of silty, very fine to medium-grained sand seams and silty clay seams between 18 to 20 feet	25	NC / BP / Solid Casing	9)2"	61	ND	
	30		10)2"	66	ND	
Medium bluish gray gravelly clayey silt	35	No. 2/12 RMC Lonestar Sand / 0.01 in. Perforated Screen				
Medium bluish gray and greenish gray mottled sandy gravelly silt interbedded with thin lenses of clayey silt and sandy gravel, sandy gravel lenses saturated, clayey silt lenses dry	40		11)2"	65	ND	
	45		12)2"	12/6"	ND	
Medium bluish gray and greenish gray mottled gravelly silty clay, dry	50		13		ND	
TOTAL DEPTH @ 50.0 FT.	55					

BP = Bentonite pellets
NC = Neat Cement
ND = Not detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. A-2b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-3**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: Dec.15 & 16, 1992

DRILLING LOGGER: Ralph Carson, Staff Geologist | SLOT SIZE: 0.01 in. | SEAL: 15.0 - 18.0 ft.

DRILLER: Clear Heart Construction, Guerneville, CA | PERF: 20.0 - 40.0 ft. | WELL DEPTH: 40 ft.

DRILL RIG: Deeprock 10K Rig

DRILLING METHOD: 8.25" ID/4.25" OD Hollow Stem Augers

GROUNDWATER ELEVATION: 724.48 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Sample Number	Blows per foot	PID Field screen (ppm)	Comments
Top of Casing (TOC) Elevation: 744.98 ft. (above MSL); ~1.0 ft. Above Existing Grade Surface Elevation: ~744.0 ft.	0	Locking cover in concrete				
Moderate yellow-brown sandy clay with ~10% gravel, sand increases with depth, abundant thin laminations of silty sand		Neat Cement; 2 in. Schedule 40 Threaded Solid Casing	1)2"	20	ND	
Dark yellow-brown and moderate brown mottled silty, fine to medium sand with ~15% gravel, lenses of abundant gravel throughout	5		2)2"	19	ND	
Dark yellow-brown and moderate brown mottled sandy silt with ~5-10% gravel, very thin to thin laminations of silty sand between ? to 9 feet	10		3)2"	18	ND	
			4)2"	15	ND	
Dark yellow-brown, moderate brown, and light olive gray mottled slightly sandy clayey silt with thin silty clay laminations	15	Bentonite Pellets	5)2"	14	ND	
			6)2"	34	ND	
Medium blue-gray sandy clayey silt with gravel several 0.5 to 1" lenses of silty fine to medium sand between 18-19 feet	20	No. 2/12 RMC Lonestar Sand; 0.01 in. Perforated Screen	7)2"	50/6"	ND	20.5 ft. BTOC 12-29-92
			8)2"	23	ND	
Medium blue-gray and green-gray mottled sandy gravelly silt to gravelly sandy silt, silty clay laminations observed around some of the larger gravel	25		9)2"	21/1"	ND	

continued

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-3a

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-3 Continued**

GROUNDWATER ELEVATION: 724.48 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Sample Number	Blows per foot	PID Field screen (ppm)	Comments
Medium bluish gray and greenish gray mottled sandy gravelly silt to gravelly sandy silt, silty clay laminations observed around some of the larger gravel	25		No. 2/12 RMC Lonestar Sand	0.01 in. Perforated Screen	10)2"	43/6"	ND	
moist at 28.5 feet	30				11)2"	10/1"	ND	
very thin to thin laminations of silty very fine to medium-grained sand between 32 to 34 feet	35				12)2"	13/2"	ND	
	40				13)2"	50/5"	ND	
					14)2"	62/9"	ND	
					15)2"	43/6"	ND	
TOTAL DEPTH @ 40.25 FT.					16)2"	12/3"	ND	
	45							
	50							
	55							

ND = Not detected

JOB NO. 5146 | HALLENBECK & ASSOCIATES | FIGURE NO. HA-3b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: 3-15-93

DRILLING LOGGER: Stephen Lucas, Project Geologist | SLOT SIZE: 0.02 in. | SEAL: 80 - 86 ft.

DRILLER: Weeks Drilling, Ukiah, CA | PERF: 90 - 130 ft. | WELL DEPTH: 130 ft.

DRILL RIG: Ingersoll-Rand TH-60 truck-mounted air rotary rig

DRILLING METHOD: Air rotary with 7-7/8" bit

GROUNDWATER DEPTH: present at 126 ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	PID Field screen (ppm)	Comments
Top of Casing (TOC) Elevation: ~802 ft. (above MSL); ~2 ft. Above Existing Grade Surface Elevation: ~800 ft.	0	Locking cover in concrete		8 inch conductor casing installed to a depth of 20 feet and backfilled with concrete on 3-15-93. Blow out protection installed at wellhead on 3-16-92. Drilled to 130 feet without encountering free water on 3-17-93. Constructed dry well on 3-18-93. We understand that free groundwater was present in this well by late April 1993 (~6 weeks later).
Pale yellow-brown to moderate yellow-brown silty clay to clayey silt	5	Neat cement with 5% bentonite; 2" diameter threaded schedule 40 PVC well casing		
moist at 12 ft.	10			
Medium olive gray clayey silt to silty sand, some partially cemented zones of silty sand (dry)	15			
	20			
Medium olive gray clayey silt to silty clay (dry to slightly damp)	25		ND	

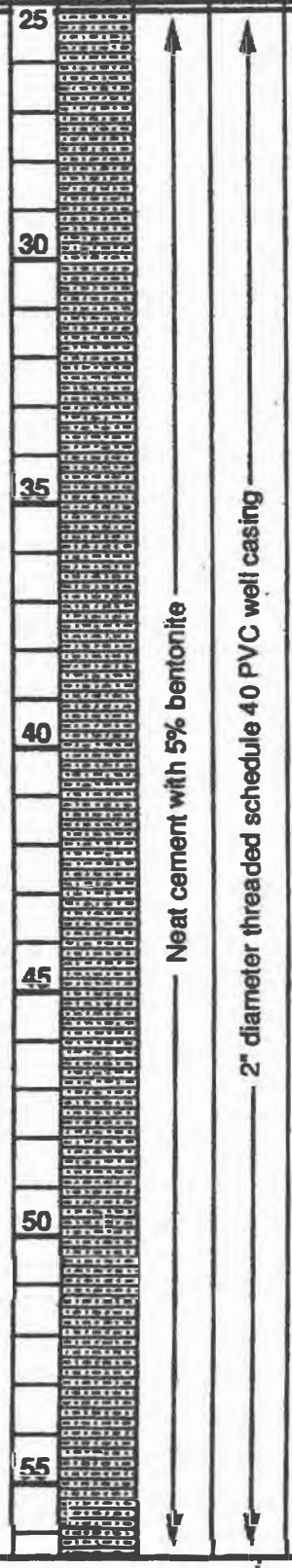
continued

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4a

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4 Continued**

GROUNDWATER DEPTH: 126 ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	PID Field screen (ppm)	Comments
Medium olive gray clayey silt to silty clay (dry to slightly damp)	25			
	30		ND	
sligtly moist zone between 34 ft. and 42 ft.	35			
	40		ND	
	45			
	50		ND	
	55			



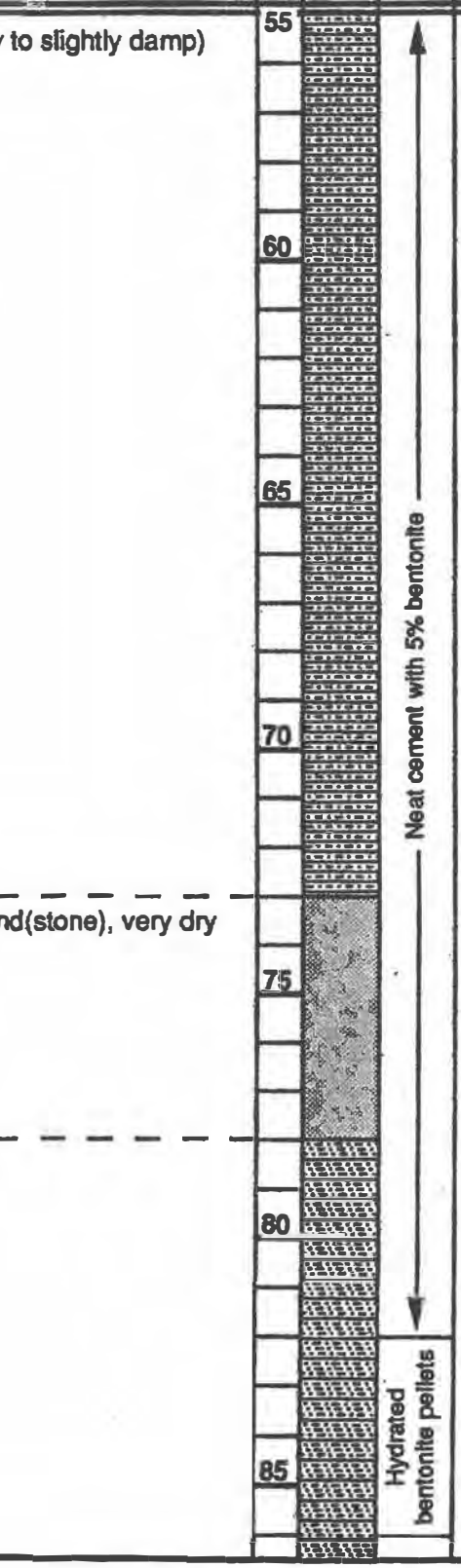
ND = Not Detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4 Continued**

GROUNDWATER DEPTH: 126 ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	PID Field screen (ppm)	Comments
Medium olive gray clayey silt to silty clay (dry to slightly damp)	55			
	60		ND	
	65			
	70		ND	
Medium blue gray silt to silty fine-grained sand(stone), very dry	75			
Dark olive gray to blue gray clayey silt (dry)	80		ND	
	85			



ND = Not Detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4c

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4 Continued**

GROUNDWATER DEPTH: 1 26ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	PID Field screen (ppm)	Comments
Dark olive gray to blue gray clayey silt (dry)	85	BP		BP = bentonite pellets
sligtly moist zone between 88 ft. to 89.5 ft.				
	90		ND	
Medium blue gray interbedded clayey silt and silty sand(stone)				
	95			
sligtly moist zone between 94 ft. to 97 ft.				
	100		ND	
sligtly moist zone between 104 ft. to 107 ft.	105			
	110		ND	
sligtly moist zone between 110 ft. to 113 ft.				
	115			

No. 3 RMC Lonestar Sand

2" schedule 40 threaded PVC well screen, 0.02" machined slots

ND = Not Detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4d

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4 Continued**

GROUNDWATER DEPTH: 126 ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	GRAPHIC WELL DESIGN: Annulus	GRAPHIC WELL DESIGN: Casing	PID Field screen (ppm)	Comments
Medium blue gray interbedded clayey silt and silty sand(stone)	120		No. 3 RMC Lonestar Sand	2" schedule 40 threaded PVC well screen, 0.02" machined slots	ND	
	125					
	130				ND	
TOTAL DEPTH @ 130 FT.	135					
	140					
	145					

ND = Not Detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4e

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 1 OF 1
BORING 94-1
DATE 9-15-94

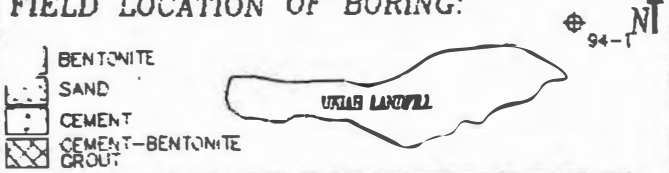
JOB NUMBER: 93-461 (1.2)

LOGGED BY: CJB DRILLER: CLEAR HEART CONSTRUCTION

WELL CASING ELEVATION ~795 MSL

EQUIPMENT AND SPECIFICATIONS:
2" SCHEDULE 40 PVC CASING
12/14 SAND 4' - 12'
0.020" SCREEN 6' - 12'

FIELD LOCATION OF BORING:



WATER DEPTH	N/A		
TIME			
DATE			

SAMPLER TYPE	RECOVERY	INITIAL WATER	BLOWS/6 in.	DEPTH	RECOVERY SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
				1		SM	SANDY SILT (SM), light yellowish brown (2.5Y, 6/4), dry	
				2				
				3				
				4				
2"	3/6			5		GM	SILTY GRAVEL (GM), olive yellow (2.5Y, 6/6), dry – damp, subrounded, 0.5 – 1" diameter, gray wacke and metamorphic.	
				6				
				7				
				8				
				9				
				10				
2"	3/18		21 24 35	11			Poorly consolidated graywacke clasts > 2" diameter. BASAL CONTACT with Plio-pleistocene deposits	
2"	18/18		8 14 17	12		CL	SILTY CLAY (CL), Mottled gray (2.5Y, N/5), and olive brown (2.5Y, 4/4), damp with <5% gravel (abundant @ 13') (~1mm to 3 cm diameter) numerous root hairs.	
				13				
				14				
			8 13 22	15			Same as above without any gravel.	
				16				
				17			NO FREE WATER ENCOUNTERED Total Depth = 15' Sampler driven to 16.5'	
				18				
				19				
				20				
				21				
				22				
				23				
				24				

LOG OF EXPLORATORY BORING

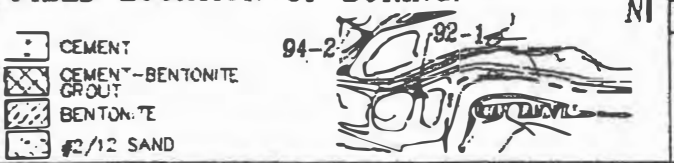
PROJECT: CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SHEET 1 OF 4
BORING: 94-2
JOB NUMBER: 93-461 (1.2)
DATE: 9-22-94

LOGGED BY: CHRIS J. BRUMMER DRILLER: WEEKS
WELL CASING ELEVATION: ~712.0

EQUIPMENT AND SPECIFICATIONS: 10" HSA with 14" Bit to 34.0'
11" Steel Conductor Casing Set to 34.5'
8" HSA 23.0' to Total Depth
2" PVC. 0.020 Screen 55.0' to 75.0'

FIELD LOCATION OF BORING:



WATER DEPTH	58'
TIME	10:00 AM
DATE	9-30-94

SAMPLER TYPE	SAMPLE COND.	RECOVERY	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	BLOWS/6 in.	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
									1		SM	SILTY SAND (SM); Reddish brown (5Y, 5/4), dry.	
									2				
									3				
									4				
									5				
									6		GM	SANDY SILTY GRAVEL (GM); Reddish brown (5Y, 5/4), dry, 1" ø sub-angular cobbles, ~5% Clay.	
									7				
									8				
									9				
								23	10				
2"		16/16						38 50/4	11		SM	GRAVELLY SILTY SAND (SM); Yellowish red (5YR, 4/6), dry coarse Sand, ~10% Gravel, <5% Clay.	
									12				
									13				
									14				
								10	15		SP	SAND (SP); Brownish yellow (10YR, 6/6), dry, medium to fine Gravel, ~2% pebbles (4mm to 1" ø)	
2"		18/18	X					15 15	16				
							▽		17				
									18				
									19				
									20		CL	SILTY CLAY (CL); Dark gray (2.5YR, N4/), wet, moderate plasticity, ~20% very fine to fine Sand.	
									21				
									22				
									23				
									24				
2"		18/18	X					2 2					

LOG OF EXPLORATORY BORING

EBA

PROJECT: CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SHEET: 2 OF 4
BORING: 94-2
DATE: 9-22-94

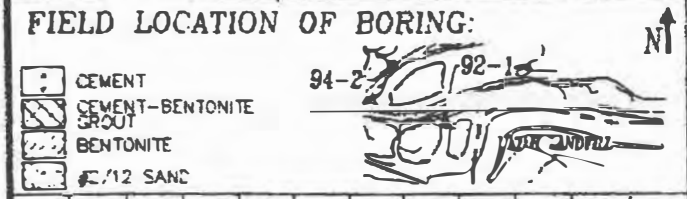
JOB NUMBER: 93-461 (1.2)

LOGGED BY: CHRIS J. BRUM MER DRILLER WE EKS

WELL CASING ELEVATION: ~712.0

EQUIPMENT AND SPECIFICATIONS: 10" HSA with 14" Bit to 34.0'
11" Steel Conductor Casing Set to 34.5'
8" HSA 23.0' to Total Depth
2" PVC, 0.020 Screen 55.0' to 75.0'

FIELD LOCATION OF BORING:



WATER DEPTH	58'	
TIME	10:00 AM	
DATE	9-30-94	

SAMPLER TYPE	SAMPLE COND.	RECOVERY	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	BLOWS/6 in.	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
2"								3				becoming very dark gray (7.5YR, N3/), moist to wet. increasing Clay content, ~2% Gravel (1mm to 1 cm ϕ) decreasing Sand content.	
									26				
									27		CL		
									28				
									29			increasing Sand content, decreasing Clay content, moist to wet.	
									30				
									31				
									32			harder drilling at 32.0' (cuttings show increasing Clay content, decreasing Sand content, damp).	
			X						33		CL		
									34				
2"		15/15	X					13 38 50/3	35			SILTY CLAY (CL); Mottled dark gray (7.5YR, N4/) and dark brown (7.5YR 4/2), damp, very hard, well consolidated, no Sand or Gravel.	
									36				
									37				
									38				
									39				
									40				
2½"								18 37 50	41			Mottled gray and olive brown (2.5Y, 4/4), damp, very hard.	
									42				
									43				
									44			SANDY SILTY CLAY (CL); Dark gray (2.5Y, N4/), damp ~20 -50% Sand, very fine to fine grained.	
									45		CL		
2½"								15 33 50/5	46				
									47			faster drilling at 47.0' - 49.0'.	
									48				
									49				

461 EB02.DWG 1522

LOG OF EXPLORATORY BORING

EBA

PROJECT: CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SHEET 3 OF 4
BORING: 94-2
JOB NUMBER: 93-461 (1.2)
DATE: 9-22-94

LOGGED BY: CHRIS J. BRUMMER DRILLER: WEEKS

WELL CASING ELEVATION: ~712.0

EQUIPMENT AND SPECIFICATIONS: 10" HSA with 14" Bit to 34.0'
11" Steel Conductor Casing Set to 34.5'
8" HSA 23.0' to Total Depth
2" PVC, 0.020 Screen 55.0' to 75.0'

FIELD LOCATION OF BORING:



WATER DEPTH	58'
TIME	10:00 AM
DATE	9-30-94

SAMPLER TYPE	SAMPLE COND.	RECOVERY	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	BLOWS/6 in.	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
2½"								50 35 50/5	51 52 53 54		CL	loose drilling at 54.0'	
2½"								25 50/5	55 56 57		SM	SILTY CLAYEY SAND (SM); Very dark gray (2.5Y, N3/), ~60% Sand (very fine Sand to medium grained Gravel), ~10% Clay, moist, very dense.	
						▼	▽		58			faster drilling at 58.0'	
2½"								20 40 50	59 60 61		SM	SILTY CLAYEY SAND (SM); with Gravel. Very dark Gray, (2.5Y, N3/), ~60% Sand and Gravel, up to 1" ø, sub-angular, wet, very dense. hard drilling at 61.0'	
2½"								21 50	62 63 64 65 66			becoming dark gray (2.5Y, N4/), increasing Sand and Gravel content, ~5% 1" ø Gravels, 60% Sand and Gravel, ~5 - 10% Clay, very hard, wet, (free water around Gravels), some brown mottling.	
									67 68 69			interbedded Sandy Silty Gravel and Silty Sand (~75% Sand), both with ~5 - 10% Clay.	
2½"								20 40 50	70 71 72 73 74			faster drilling 70.0' - 75.0'	

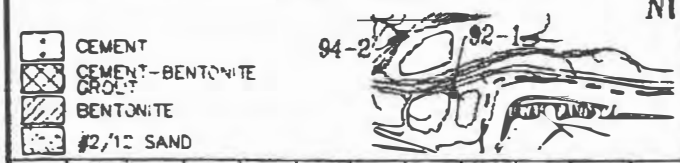
1523

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SHEET 4 OF 4
BORING: 94-2
JOB NUMBER: 93-461 (1.2)
DATE 9-22-94

FIELD LOCATION OF BORING:



LOGGED BY CHRIS J. BRUMMER DRILLER WEEKS
WELL CASING ELEVATION ~712.0
EQUIPMENT AND SPECIFICATIONS: 10" HSA with 14" Bit to 34.0'
11" Steel Conductor Casing Set to 34.5'
8" HSA 23.0' to Total Depth
2" PVC, 0.020 Screen 55.0' to 75.0'

WATER DEPTH	58'		
TIME	10:00 AM		
DATE	9-30-94		

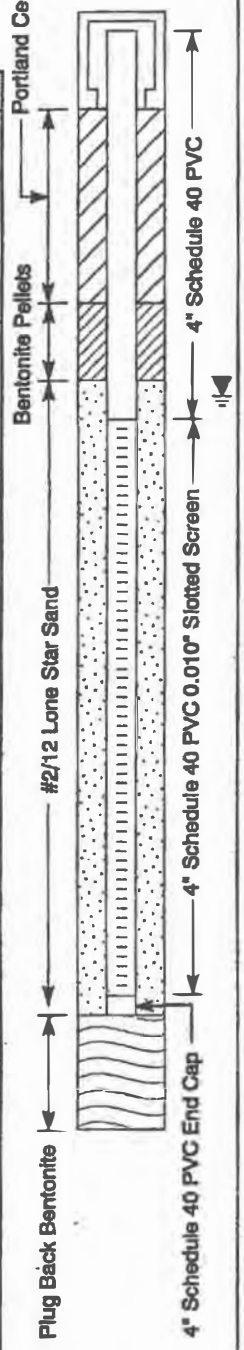
SAMPLER TYPE	SAMPLE COND.	RECOVERY	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	BLOWS/6 in.	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
2½"								30 50/5	76		SC	CLAYEY SAND (SC): Dark gray as above, ~5% Clay, medium grained Sand, Saturated rock caught in the end of the sampler. Total Depth = 75.0'	
									77				
									78				
									79				
									80				
									81				
									82				
									83				
									84				
									85				
									86				
									87				
									88				
									89				
									90				
									91				
									92				
									93				
									94				
									95				
									96				
									97				
									98				
									99				

MONITORING WELL MW-96-1

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC); Drive Sample (DS)
Date Completed: 12/20/96
Elevation (Top of Casing):

Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples	Symbols	USCS	Description
CC			60/60			GM	Reddish brown sandy clayey GRAVEL, stiff, some iron staining around clasts, rounded red chert pebbles to 2-inch diameter, dry.
CC			60/60			CL	Red-brown gravelly silty SAND, dry, poorly graded, medium sand, rounded gravel to 1/2-inch diameter, red iron oxide staining on pebbles.
CC			60/18				Sandstone pebbles to 3-inch diameter.
CC			60/24				Becomes dark brown, moist. Half-inch thick black carbonized layer, very moist.
CC			60/60			CL	Greenish gray silty CLAY, moist.
						ML	Greenish gray silty fine SAND, wet.
						CL	Greenish gray silty to fine sandy CLAY.
DS		90	18/18			ML	Greenish gray silty sandy GRAVEL, with rounded to semi-angular quartz, chert, sandstone pebbles to 2-inch diameter.

NOTES:
1. Drilled with 8-inch hollow stem auger with continuous core sampling to 26.5 feet bgs on 12/19/96 and 12/20/96. Bottom sealed with plug back bentonite to 23.5 feet bgs.
2. Reamed to 10-inch diameter to 23.5 feet bgs on 12/20/96
3. Four-inch diameter groundwater monitoring well installed on 12/20/96. Four-inch diameter Schedule 40 PVC casing from 2 feet ags to 8.0 feet bgs. Four-inch diameter Schedule 40 flush threaded PVC 0.010-inch slotted screen from 8.0 to 23.0 feet bgs. Filter pack constructed with #2/12 Lone Star sand.



MONITORING WELL MW-96-1

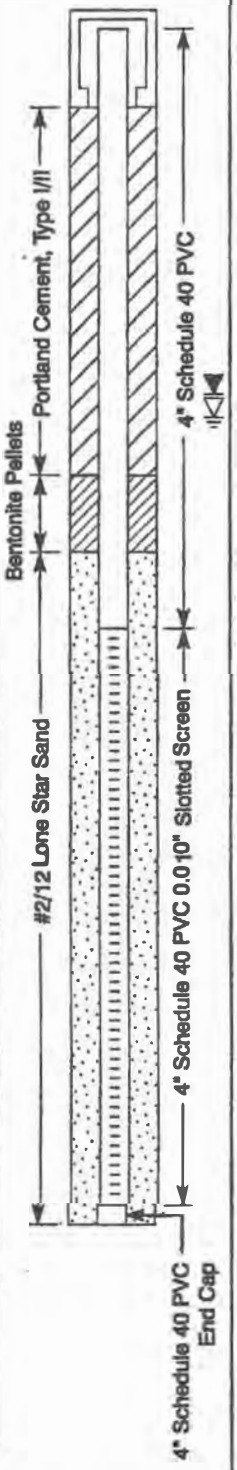
Groundwater Corrective Action Report
Ukiah Landfill
Ukiah, California

MONITORING WELL MW-96-2

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC)
Date Completed: 12/19/96
Elevation (Top of Casing):

SAMPLING						
Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples	Symbols	USCS	Description
							No recovery of initial 18 inches.
CC			30/30			SM	Brownish yellow silty CLAY, moist, micaceous.
CC			60/60			ML	Greenish gray silty fine SAND, moist. Becomes gravelly.
						CL	Greenish gray silty CLAY, some reddish staining, plastic, moist.
CC			60/60			ML	Greenish gray clayey fine SAND, plastic, moist.
CC			60/30				Black carbonized seam, 1/2-inch thick.
						GM	Greenish gray, indurated, coarse GRAVEL with reddish brown chert clasts, some well rounded, wet.
CC			60/30				
CC			60/60			ML	Greenish gray CLAY, stiff, moist, plastic.

NOTES:
1. Drilled with 8-inch hollow stem auger to 29 feet bgs on 12/19/96.
2. Reamed 10-inch diameter on 12/19/96.
3. Four-inch diameter groundwater monitoring well installed on 12/19/96. Four-inch diameter Schedule 40 PVC casing from 2 feet ags to 13.5 feet bgs. Four-inch diameter Schedule 40 flush threaded PVC 0.010-inch slotted screen from 13.5 to 28.5 feet bgs. Filter pack constructed with #2/12 Lone Star sand.



MONITORING WELL MW-96-2

Groundwater Corrective Action Report
Ukiah Landfill
Ukiah, California

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

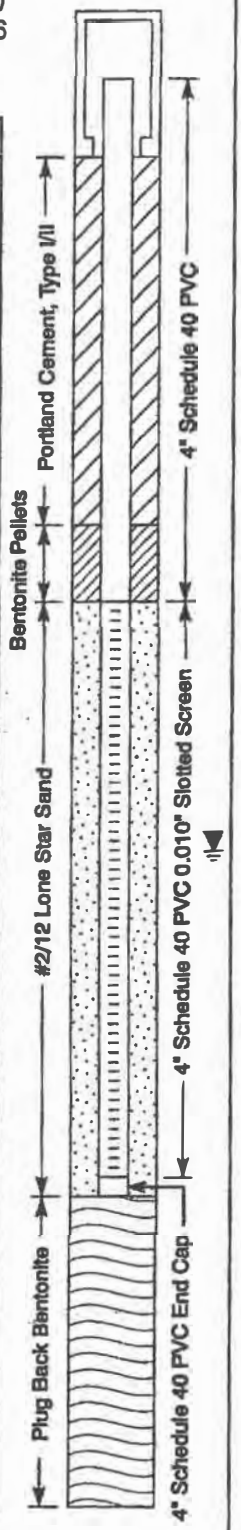
02736-004-5205-130 ah 5205B 1/13/97

MONITORING WELL MW-96-3

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC)
Date Completed: 12/21/96
Elevation (Top of Casing):

Depth	Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples
0	CC			60/60	
5	CC			60/60	
10	CC			60/60	
15	CC			60/60	
20	CC			60/30	
25	DS			18/8	
	DS		72	18/18	
30	DS		69	18/18	
	DS		63	18/18	
35	DS		60	18/18	

Symbols	USCS	Description
	GM	Greenish brown sandy to silty GRAVEL, semi-rounded pebbles to 1/2 inch, moist.
	ML	Greenish gray gravelly to CLAYEY SILT, very stiff, with iron oxide staining, moist. Decreasing gravel. Becomes gravelly.
	GM	Reddish brown silty clayey GRAVEL, rounded pebbles to 2 inches, some iron staining.
	ML	Bluish gray gravelly to clayey SILT, with semi-rounded chert/jasper pebbles to 2 inches diameter.
	ML	Greenish gray clayey SILT, very stiff. Becomes bluish gray.



MONITORING WELL MW-96-3

Groundwater Corrective Action Report
Ukiah Landfill
Ukiah, California

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

02736-003-5205-130 ah 5205C 1/13/96

MONITORING WELL MW-96-3

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC)
Date Completed: 12/21/96
Elevation (Top of Casing):

SAMPLING							
Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples	Symbols	USCS	Description
DS	00	56	18/18			ML	

35
40
45
50
55
60
65
70

NOTES:
1. Drilled with 8-inch hollow stem auger to 40 feet bgs on 12/20/96. Continuous core sampling to 25 feet bgs. Eighteen-inch dr ive samples for each 2.5 feet of boring to 40 feet bgs. Sealed with plug back bentonite to 27 feet bgs.
2. Reamed 10-inch diameter to 27 feet bgs.
3. Four-inch diameter groundwater monitoring well installed on 12/20/96. Four-inch diameter Schedule 40 PVC casing from 2 feet ags to 11.5 feet bgs. Four-inch Schedule 40 flush threaded PVC 0.010-inch slotted screen from 11.5 to 26.5 feet bgs. Filter pack constructed with #2/12 Lone Star sand.

MONITORING WELL MW-96-3

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC)
Date Completed: 12/21/96
Elevation (Top of Casing):

SAMPLING						
Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples	Symbols	USCS
DS	00	56	18/18			ML

Description

NOTES:
1. Drilled with 8-inch hollow stem auger to 40 feet bgs on 12/20/96. Continuous core sampling to 25 feet bgs. Eighteen-inch dr ive samples for each 2.5 feet of boring to 40 feet bgs. Sealed with plug back bentonite to 27 feet bgs.
2. Reamed 10-inch diameter to 27 feet bgs.
3. Four-inch diameter groundwater monitoring well installed on 12/20/96. Four-inch diameter Schedule 40 PVC casing from 2 feet ags to 11.5 feet bgs. Four-inch Schedule 40 flush threaded PVC 0.010-inch slotted screen from 11.5 to 26.5 feet bgs. Filter pack constructed with #2/12 Lone Star sand.

APPENDIX D

ENGINEERED ALTERNATIVE ANALYSIS

TECHNICAL MEMORANDUM

Project: City of Ukiah Landfill
Mendocino County, California

Project No.: 02-907

Subject: Engineered Alternative Analysis for Final Cover System

Date: August 2015

Prepared By: Damon Brown, P.G., C.E.G., C.Hg., EBA Engineering
Mike Delmanowski, P.G., C.E.G., C.Hg., EBA Engineering



FINAL COVER SYSTEM DESCRIPTION

The proposed final cover system will consist of a patented geosynthetic product identified as "ClosureTurf™". ClosureTurf™ is a three-component system comprised of a structured geomembrane, a specialized tufted geotextile, and a sand infill layer. The structured geomembrane component serves as the low-hydraulic conductivity layer (LHCL), whereas the specialized tufted geotextile and sand infill layer represent the erosion-resistant layer as defined in 27CCR. Literature for the ClosureTurf™ product is enclosed in Attachment 1 of this Technical Memorandum.

Overall, the proposed final cover system design can be summarized as follows (in ascending order):

- Minimum 1-foot thick soil foundation layer.
- 50 mil linear low-density polyethylene (LLDPE) geomembrane liner (Super Gripnet® with Spike Down).
- Specialized tufted geotextile (Engineered Turf).
- Minimum ½-inch thick sand infill layer.

In addition to the above features, the final cover system will also be equipped with a gas relief component. This component will consist of a series of 3.5-foot wide collection strips placed parallel and/or perpendicular to slopes and spaced at maximum 220-foot intervals. The collection strips, which will be constructed of the same Super Gripnet® with Spike Down material described above for the geomembrane liner component, will be connected to the LFG collection system to prevent the build-up of gas pressures beneath the final cover system. Pressure release valves will also be installed at regular intervals between the collection strips as an additional precautionary measure.

Please refer to the Technical Specifications (Appendix H), Construction Quality Assurance (CQA) Plan (Appendix I), and Construction Drawings (Appendix J) of this Final Closure and Postclosure Maintenance Plan for details regarding material and installation specifications for the respective final cover system components described above.

ENGINEERED ALTERNATIVE ANALYSIS

As outlined above, the proposed engineered alternative presented herein substitutes the patented geosynthetic product ClosureTurf™ in lieu of the LHCL prescriptive standard (i.e., CCL) required under 27CCR. Regulatory consideration of an engineered alternative is allowed under 27CCR, §20080(b), which stipulates that an engineered alternative may be considered if construction of the prescriptive standard is unreasonably and unnecessarily burdensome and will cost substantially more than the proposed alternative. Furthermore, the engineered alternative must be consistent with the performance goal addressed by the prescriptive standard and afford equivalent protection against water quality impairment. The following information has been compiled to demonstrate compliance with these criteria and includes data regarding the properties of the ClosureTurf™, as well as comparisons of performance and costs of the proposed ClosureTurf™ engineered alternative to that of the prescriptive standard and the previously proposed geosynthetic clay liner (GCL) final cover system.

Performance

One of the primary variables for demonstrating equivalency to the prescriptive standard is infiltration through the final cover system. In this regard, infiltration equivalency analyses have been performed on the ClosureTurf™ product versus a prescriptive Subtitle D cover system. The analyses have included the use of two methodologies: 1) the Hydrologic Evaluation of Landfill Performance (HELP) Model; and 2) the Giroud Method (Giroud et al., 1997). Both methods were employed for a generic landfill site in Texas. Findings from these analyses revealed the following:

INFILTRATION EQUIVALENCY ANALYSIS ClosureTurf™ vs. SUBTITLE D FINAL COVER SYSTEMS		
Methodology	***ClosureTurf™ Final Cover System***	***Prescriptive Subtitle D Final Cover System***
HELP Model for Site in Texas – Average Annual Infiltration (Cubic Feet)	8.3	347
Giroud Method with Silty-Sandy Soil below the ClosureTurf™ (Gallons per Day)	1.33	4.51
Giroud Method with Silty-Sandy Soil with Some Clay below the ClosureTurf™ (Gallons per Day)	0.24	4.51

As demonstrated in the above table, the ClosureTurf™ product exhibits substantially lower infiltration rates for the respective scenarios as compared to the prescriptive standard. This can be attributed to the lower hydraulic conductivity characteristics of the LLDPE geomembrane liner as compare to a CCL, as well as the more efficient removal of moisture above the LHCL component, thereby reducing the amount of potential infiltration into the WMU. Based on these circumstances, the ClosureTurf™ product meets the required performance goal for an engineered alternative by providing equal to or greater protection against potential water quality impairment. Other features afforded by ClosureTurf™ that demonstrate its suitability as an engineered alternative from a performance perspective can be summarized as follows:

- The slope stability characteristics of ClosureTurf™ far exceeds those provided by other geosynthetic products (including GCLs), which is very important based on the steep slopes that exist at the Landfill. The bottom spiked friction surface of the Super Gripnet® provides maximum interface friction and a high factor of safety against sliding at the liner/foundation layer soil interface.

- The Engineered Turf component eliminates the potential for soil creep and veneer failures resulting from saturation of the vegetative soil cover that is a required component of the prescriptive Subtitle D final cover and other traditional geosynthetic cover systems. As noted in the previous bullet item, this potential is exacerbated by the very steep slopes that exist at the Landfill.

- The drainage aspects of the ClosureTurf™ are designed to allow rainfall to penetrate rapidly through the sand infill layer and into the structured drain liner below which has a very high transmissivity for subsequent conveyance of the water off of the liner system. The sand infill has been demonstrated to handle over six inches per hour of rainfall intensity without erosion when applied on three horizontal to one vertical (3H:1V) slopes. Such rainfall energy conditions on a traditional vegetative soil cover would likely result in significant erosional damage.

- The drainage aspects of the ClosureTurf™ as described above promote very "clean" and low turbidity stormwater run-off, which represents a beneficial feature

since the collected run-off is subsequently discharged to the ephemeral creek that borders the northern boundary of the WMU. Achieving comparable stormwater run-off quality from a traditional vegetative soil cover would be difficult.

- ClosureTurf™ is designed to provide weathering resistance and geomembrane protection when exposed to extreme heat and ultra-violet (UV) exposure. Based on results of independent, real-world weathering tests and data from existing projects, ClosureTurf™ can provide decades of reliable performance beyond the standard 30-year postclosure maintenance period.

- ClosureTurf™ has been tested for wind uplift resistance and demonstrated no uplift when exposed to 120 miles per hour wind. As such, the ClosureTurf™ can withstand most wind conditions that could realistically be encountered at the site.

As presented in the product literature data enclosed herein as Attachment 1, ClosureTurf™ has been approved for use as an engineered alternative by the RWQCB at two sites in California. These sites correspond to the Crazy Horse Landfill and Portola Landfill located Monterey County and Plumas County, respectively. This product has also been successfully employed at a number of landfill sites throughout the United States, including sites in the southeast and east that are subject to much harsher weather conditions than would be experienced at the Landfill.

Installation

The installation and CQA testing of the ClosureTurf™ product at the Landfill would be significantly easier than for a CCL. The following provides a summary to support this position:

- In general, ClosureTurf™ deployment is very straightforward, both from a placement and seaming standpoint. Furthermore, heavy equipment requirements for ClosureTurf™ deployment are limited primarily to a rubber-tire forklift or equivalent. Conversely, CCL construction is very labor intensive with substantial reliance on heavy equipment (i.e., scrapers, dozers, compactors, etc.).

- Less CQA is required for ClosureTurf™ due to the consistency of the materials and manufacturing process. CQA testing for a CCL, in turn, is more extensive and occurs at a higher frequency to verify the consistency of borrow source materials and the contractor's ability to achieve moisture content, compaction, and hydraulic conductivity during construction.

- Installation of a sealed, double-ring infiltrometer (SDRI) is required to test the field permeability of CCLs, which is costly and time consuming. Such a provision is not required for ClosureTurf™.

In comparison to other geosynthetic liner systems, ClosureTurf™ is slightly more labor intensive due to the placement of the sand infill layer. However, this increased labor is

more than offset be the elimination of the vegetative soil layer. Similar to the CCL construction, construction of a vegetative soil layer is also very labor intensive with substantial reliance on heavy equipment. In addition, in the case of the GCL final cover system that was previously proposed for the Landfill, the gas relief layer material and labor requirements are significantly greater as compared to the ClosureTurf™. Thus, the ClosureTurf™ final cover system installation represents the least intensive approach from an installation standpoint.

Maintenance

ClosureTurf™ offers a significant maintenance advantage over a prescriptive Subtitle D final cover and any other traditional geosynthetic cover systems that require a vegetative soil cover. In essence, vegetative soil covers often require regular maintenance related to the repair of erosional damage, installation of erosion control measures (i.e., silt fences, hay bales, wattles, etc.), slope repairs, and revegetation. Erosion from the vegetative soil cover also causes siltation of drainage ditches and culverts that require subsequent repair. Such provisions are not required with the ClosureTurf™ product, thereby providing a significant cost savings over the course of the postclosure maintenance period.

Cost

The cost of the final cover system using ClosureTurf™ was compared to the GCL final cover system as previously proposed in the January 2008 JTD (EBA, 2008) and subsequent October 31, 2013 *Final Closure Construction Submittal Package* (EBA, 2013). Since the different products influence other aspects of the final cover construction (i.e., foundation layer, gas relief layer, erosion-resistant layer, drainage, access roads, etc.), the cost comparison included these variables in the analysis. Conversely, those final closure construction items not influenced by the final cover system design (i.e., mobilization, leachate control system improvements, LFG collection and control system, etc.) are not included in the analysis. The corresponding estimated construction costs for the two final cover systems are presented in the following table.

CONSTRUCTION COST COMPARISONS ClosureTurf™ vs. GCL FINAL COVER SYSTEMS		
Item	***ClosureTurf™ Final Cover System***	***GCL Final Cover System***
Foundation Layer / Engineered Fill	$594,530	$465,890
Gas Relief Layer	$86,200	$2,290,360
Low-Hydraulic Conductivity Layer (LHCL)(1)	$2,034,620	$1,493,690
Erosion-Resistant Layer(2)	$3,807,850	$1,866,300
Drainage System Components	$552,910	$695,590
Erosion Control	$100,300	$581,930
Access Roads	$172,580	$374,790
EXTENDED TOTAL	***$7,348,990***	***$7,768,550***

GCL: Geosynthetic Clay Liner

(1) The LHCL component for the ClosureTurf final cover system includes the Super Gripnet® with Spike Down, while the GCL final cover system includes the GCL.

(2) The erosion-resistant layer component for the ClosureTurf final cover system includes the Engineered Turf and sand infill layer, while the GCL final cover system includes a geonet composite drainage layer and vegetative soil layer.

As presented in the above table, the cost for the ClosureTurf™ final cover system is approximately $419,560 less than the GCL final cover system. In addition, as noted in the previous subsection, long-term maintenance associated with ClosureTurf™ is substantially less than any final cover system that requires an erosion-resistant layer comprised of a vegetative soil cover. The estimated cost savings from a maintenance perspective over the 30-year postclosure maintenance period equates to approximately $277,400. Thus, the overall cost savings resulting from replacing the previously proposed GCL final cover system with ClosureTurf™ is approximately $696,960.

CONCLUSIONS

As demonstrated by the comparative information presented herein, the proposed ClosureTurf™ engineered alternative meets or exceeds the performance criteria addressed by the prescriptive standard. Furthermore, the cost analysis comparing construction costs for the ClosureTurf™ versus the previously proposed GCL final cover system reveals that a significant cost savings can be realized through implementation of the ClosureTurf™ option. Based on these circumstances, it can be concluded that the ClosureTurf™ engineered alternative meets the qualifying criteria specified in 27CCR, §20080(b).

REFERENCES

EBA Engineering, January 2008, *Joint Technical Document for City of Ukiah Landfill, Mendocino County, California (Volumes I through III), EBA Project No. 02-907;* Prepared for City of Ukiah Department of Public Works by EBA Engineering, Santa Rosa, California.

EBA Engineering, October 31, 2013, *Final Closure Construction Submittal Package, EBA Project No. 02-907;* Prepared for City of Ukiah Department of Public Works by EBA Engineering, Santa Rosa, California.

Giroud, J.P., King, T.D., Sanglerat, T.R., Hadj-Hamou, T. and Khire, M.V., *Rate of Liquid Migration Through Defects in a Geomembrane Placed on a Semi-Permeable Medium*; Geosynthetics International 1997, Vol. 4, Nos. 3-4.

ATTACHMENT 1

ClosureTurf™
PRODUCT LITERATURE

Call Today! 770-777-0386 | Send Us An Email

WG WatershedGeo Unearthing Solutions

Search ...

Infiltration Equivalency Analysis

ClosureTurf®

ClosureTurf Links

- ClosureTurf® Main Page
- ClosureTurf®: Advantages
- ClosureTurf®: Performance Benefits
- ClosureTurf®: Financial Comparison
- ClosureTurf®: Downloads
- ClosureTurf®: Solar
- ClosureTurf®: Gas System

ClosureTurf Performance Benefits Links

- Infiltration Equivalency Analysis
- Erosion Control and Hydraulic Performance
- Longevity Testing
- Aerodynamic Evaluation
- Interface Shear/Stability
- Traffic Loading Evaluation
- Sustainability

Contact Us Today

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Send Us An Email

Infiltration Equivalency Analysis

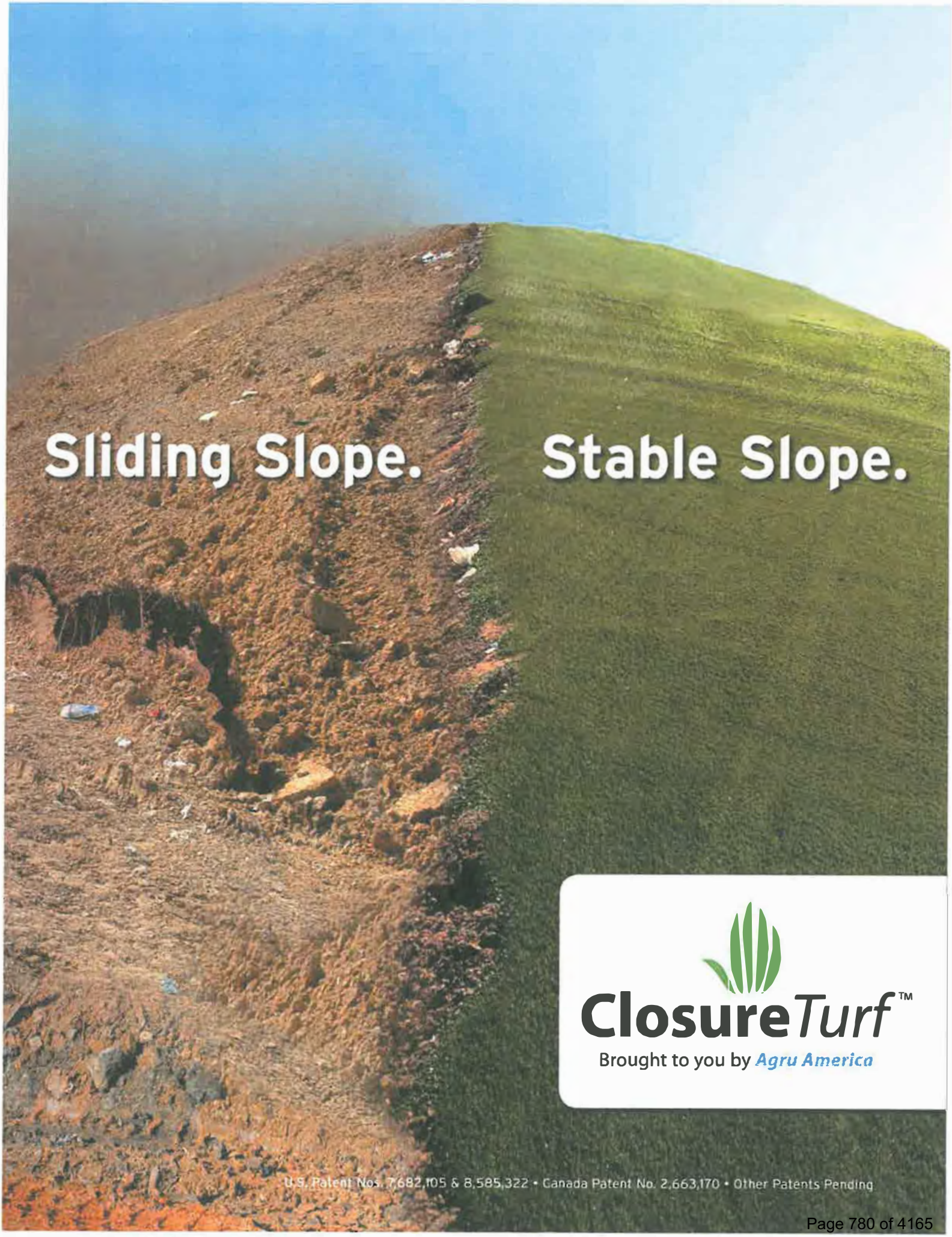
The minimum technical requirements as defined by the EPA for Subtitle D Final Cover Systems are contained in 40 CFR 258.60. This regulation allows for an alternative (performance based) cover system. One of the requirements for determining equivalency is infiltration. Typically, this is evaluated using two methodologies – (i) the Hydrologic Evaluation of Landfill Performance (HELP) Model and (ii) the Giroud Method1. Both of these methods have been used to compare the infiltration performance of the **ClosureTurf®** Final Cover System to the Prescriptive Subtitle D Cover. A comparison of infiltration rates is shown in the Table for both methodologies for a generic site in Texas.

The results demonstrate that the **ClosureTurf®** Final Cover System provides superior protection against Infiltration when compared to the Prescriptive Subtitle D Standard landfill final closure systems.

Infiltration Equivalency Analysis	ClosureTurf® Cover System	Prescriptive Subtitle D Cover System
HELP Model for Site in Texas – Average Annual Infiltration (Cubic Feet)	8.3	347
Giroud Method with Silty-Sandy Soil below the ClosureTurf® (Gallons / day)	1.33	4.51
Giroud Method with Silty-Sandy Soil with Some Clay below the ClosureTurf® (Gallons / day)	0.24	4.51

Summary of Results for Infiltration Equivalency Analyses for a Generic Site in Texas

[1] Rate Of Liquid Migration Through Defects In A Geomembrane Placed On A Semi-Permeable Medium, J.P. Giroud, T.D. King, T.R. Sanglerat, T. Hadj-Hamou and M.V. Khire, Geosynthetics International 1997, Vol. 4, Nos. 3-4.


Sliding Slope.
Stable Slope.
ClosureTurf™
Brought to you by Agru America
U.S. Patent Nos. 7,682,105 & 8,585,322 • Canada Patent No. 2,663,170 • Other Patents Pending

Soil slopes don't work, although they keep you working.

Soil erosion continually plagues the ongoing management of landfills, industrial waste sites, CCR storage areas, and other environmental containment applications requiring constant rebuilding of slopes weakened by rain and wind. In addition to ongoing maintenance headaches, traditional systems utilizing soil as their main component are costly to maintain, slow to install, and introduce unwanted slope instabilities.

There is an alternative solution available for these challenging applications which address the lessons learned by the industry since the implementation of Subtitle D. The innovative solution is called ClosureTurf™ which meets and/or exceeds the requirements set forth by the EPA in Subtitle D. A three component system, ClosureTurf is revolutionizing the way engineers, owners, government agencies and many others solve containment challenges. The ClosureTurf system offers exceptional durability and pleasing aesthetics at a lower cost than traditional practices.





ClosureTurf™ makes fast, cost-efficient erosion control so easy—it's virtually install and that's all.

ClosureTurf is a patented three component system comprised of a structured geomembrane, an engineered turf, and a specialized sand infill. The ClosureTurf system provides many advantages over a typical Subtitle D landfill cover such as:

- Reduces construction and long-term maintenance costs
- Improves short term and long term slope stability
- Excellent performance in extreme weather conditions
- Provides for enhanced gas collection (when applicable)
- Improves stormwater quality
- Incremental closures for odor control and leachate reduction (close as you go)

With several square miles of installed product, ClosureTurf has proven to be superior in performance when compared to other cover solutions—not only in the laboratory but also in real life applications where it counts. The system has a proven track record to significantly outperform traditional vegetative closure methods with regard to installation, maintenance and environmental compliance.

ClosureTurf™ delivers superior performance

Performance:

- Prevents common erosion, storm water and siltation problems–even during severe weather events.
- Utilizes the highest interface friction geomembrane available in the market which provides greater stability on steeper grades and reduces the need to rebuild slopes.
- The lifespan of the ClosureTurf system extends well beyond the required 30 year post closure maintenance period. It protects against driving forces, severe weather conditions, heat and wind uplift.



Timber Ridge Landfill

Cost Savings:

- Significantly lowers upfront capital costs.
- Dramatically reduces maintenance costs.
- Reduces the cost associated with the repair of significant failures.



Saufley Landfill



Environmental Benefits:

- Obtain control over gas collection sooner than later ("close as you go").
- Reduces environmental carbon footprint by up to 75% during construction.
- Lowers the production of leachate by allowing incremental closures.
- Durable system construction designed to safely convey internal gas pressures, reduce unwanted releases and avoid slope stability issues.
- The ClosureTurf system requires no irrigation, fertilizing, seeding or mowing.
- Provides filtration resulting in clean storm water runoff.



Crazy Horse Landfill

Other Benefits:

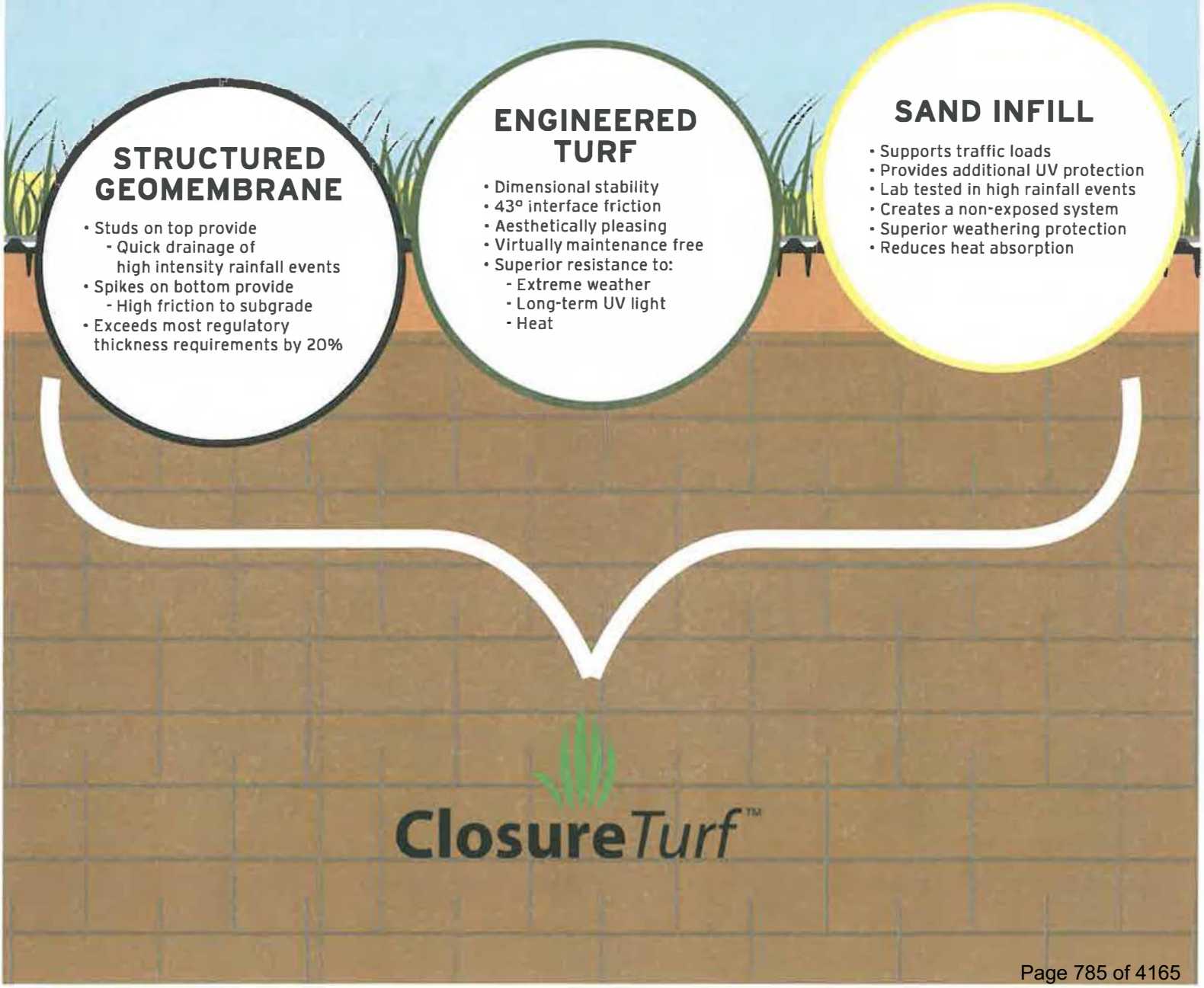
- Reduces overall surface emissions.
- Easily adapted during or after construction for solar field development.
- Rapid, low-impact construction.

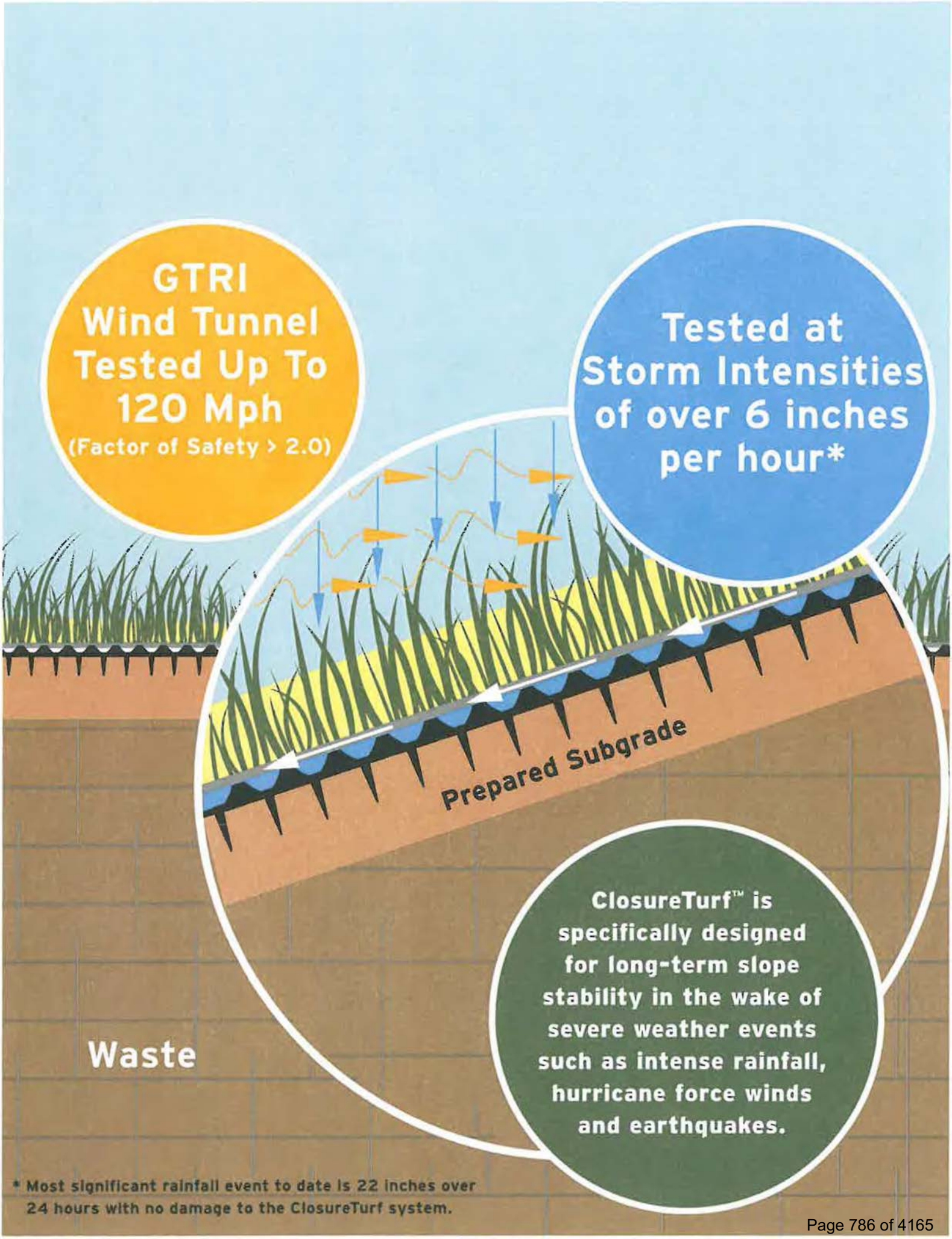


Hartford Landfill

Take a closer look at ClosureTurf™

ClosureTurf™ is a patented, three component system comprised of a structured geomembrane, an engineered turf, and a specialized sand infill. The foundation of the system is an impermeable, highly transmissive structured geomembrane. It provides for the highest interface friction values available in the market. The engineered turf component gives the system its natural look and feel of grass while protecting the geomembrane from extreme weather conditions for the long term. The specialized sand infill component is placed between the blades of the engineered turf and allows the system to be trafficked while also providing additional protection from weathering. When required, ClosureTurf's patented surficial gas system is included with the system to vent landfill gas emissions. ClosureTurf is fast and easy to install for an aesthetically pleasing, cost-effective landfill closure solution.




GTRI
Wind Tunnel
Tested Up To
120 Mph
(Factor of Safety > 2.0)
Tested at
Storm Intensities
of over 6 inches
per hour*
Prepared Subgrade
ClosureTurf™ is
specifically designed
for long-term slope
stability in the wake of
severe weather events
such as intense rainfall,
hurricane force winds
and earthquakes.
Waste
* Most significant rainfall event to date is 22 inches over
24 hours with no damage to the ClosureTurf system.

More engineered solutions...

CLOSURETURF™ SURFICIAL GAS COLLECTION SYSTEM

ClosureTurf's patented surficial gas collection system reduces, and in some cases, eliminates the need for traditional gas wells and piping. It can function as a standalone system or in conjunction with a traditional system. Underneath the ClosureTurf system, gas is generated and rises to the surface where a vacuum created by the differential pressures is vented through the surficial gas collection foot. This method provides an efficient method of gas collection while reducing the amount of condensate that needs to be managed.

The unique design of the ClosureTurf Surficial Gas Collection System resulted in one landfill winning an International Achievement Award for a combined gas collection and closure system and the Solid Waste Association of North America (SWANA) Gold Excellence Award for landfill gas collection in 2012.

VERSACAP™

VersaCap is a low-cost, intermediate landfill cover solution designed to help prevent erosion, infiltration, runoff and gas emissions during the operational phases of the landfill.

Fast and easy to install, VersaCap is a wind-resistant membrane comprised of a synthetic turf and specially-formulated polymer backing that improves the quality of surface water runoff and eliminates downstream siltation by preventing erosion of the cover soils. VersaCap does not require tires or sandbags to keep it in place and can easily be taken up and reused in future areas.

HYDROTURF™

HydroTurf is an economical, environmentally-friendly alternative revetment to rock riprap and piped channels. It is a patented three component system made up of a structured geomembrane, an engineered turf and a specialized pozzolanic infill (HydroBinder™). Created specifically for bench drains, downchutes and perimeter channels on landfill covers, HydroTurf will flex and move with typical differential settlements that occur on landfill covers. It provides superior hydraulic performance capable of handling large velocity and large flows resulting in very high velocities.

Delivering the same advantages as ClosureTurf, HydroTurf offers rapid, low impact installation that's significantly less costly than hard armor and piping, and is projected to last more than 100 years when properly maintained. Best of all, unlike hard armor riprap channels, HydroTurf improves the environment by producing cleaner storm water runoff.

SOLAR

The nature of the ClosureTurf system provides an excellent opportunity for generating environmentally friendly renewable energy through the implementation of solar panel arrays. ClosureTurf's geosynthetic cover enables panels to operate in a clean environment significantly reducing dust and erosion. The engineered turf provides an excellent surface for easy access and eliminates the risk of panel damage from mowing and maintenance required for other types of ground cover.

The exceptionally durable heavy load bearing ClosureTurf platform enables complete accessibility for installation, maintenance and replacement of PV panels.









ClosureTurf's proven technology is working hard for these landfills.

Industrial Ash and Sludge Lagoon, Southeast USA

- Saved 20 acres of land from destruction for borrow.
- Created a 70-acre watershed of clean runoff.
- Unique lightweight construction allowed for closure on soft, weak subgrade.

Crazy Horse Landfill, Salinas, CA

- Eliminated 26,000 truck trips for soil borrow (equivalent to 660,000 miles).
- Combination of soil import elimination and reduced heavy equipment needs reduced the project's carbon footprint by 70%.
- Eliminates dirty storm water run-off by replacing cover soils with a cover system that produces very clear and clean water free of fertilizer and muddy runoff.
- Provided the perfect foundation for solar panel racking system.
- Eliminated slope veneer failures high seismic loads (site is adjacent to San Andreas Fault).

LaSalle Landfill, Jena, LA

- Endured more than 330 inches of rainfall since installation in 2008.
- Survived a tornado when 70 mph winds hit across the front of landfill.
- Sand infill remained in place with no erosion when a levee broke releasing 5 acres of water across the turf.
- Eliminated annual slope rebuilding–a savings of over $300,000 to date.

Timber Ridge Landfill, Richwoods, MO

- Proprietary ClosureTurf system collected 500 SCFM of gas over a ten-acre closure with no vertical wells.
- Winner of the International Achievement Award for combined gas collection and closure system.
- Winner of the Solid Waste Association of North America (SWANA) Gold Excellence Award for landfill gas collection.

Based on these and other successes, ClosureTurf exceeds requirements of EPA Subtitle D and has been approved and installed in many states.

AFFILIATIONS:

Geosynthetic Institute (Partner)

Georgia Tech Research Institute (Partner)

Industrial Fabrics Association International (Member)

Colorado State University–Engineering Research Center (Partner)

CLOSURETURF IS TESTED IN ACCORDANCE WITH:

GTRI-SSWT - Aerodynamic Shear & Uplift
CSU USACE - Hydraulic Shear - Levee Overtop Simulation
ASTM D5261 - Mass per Unit Area
ASTM D4632 - Grab Tensile Properties
ASTM D4595 - Wide-Tensile
ASTM D2256 - Tensile and Elongation
ASTM D4716 - Hydraulic Transmissivity
ASTM D5321 - Interface Shear
ASTM D6460 - Large Scale Channel Hydraulics
ASTM D6241 - CBR Puncture
ASTM D6459 - Infill Stability
ASTM D4884 - Seam Strength
G147(02) & G145/G7 - UV Resistance & Stability
ASTM D7277/7276 Steady State Hydraulic Overtopping
UL94 Modifiers - Flammability



ClosureTurf™

The cost-efficient, compliance-driven, environmentally-friendly landfill solution.

With slope erosion and vegetative maintenance an ongoing battle, and compliance issues ever looming, choose the cover solution designed to eliminate the most common problems associated with landfill management.

ClosureTurf is specifically designed to solve soil erosion, slope instability, gas emissions, and high costs of installation and maintenance. Discover the solution that makes your job a lot easier, keeps you compliant and makes you look good in the process.

For more information on ClosureTurf, visit closureturf.com, email us at info@closureturf.com or call 800-373-2478.

ALL ClosureTurf COMPONENTS ARE PROUDLY MADE IN THE USA.



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ClosureTurf™

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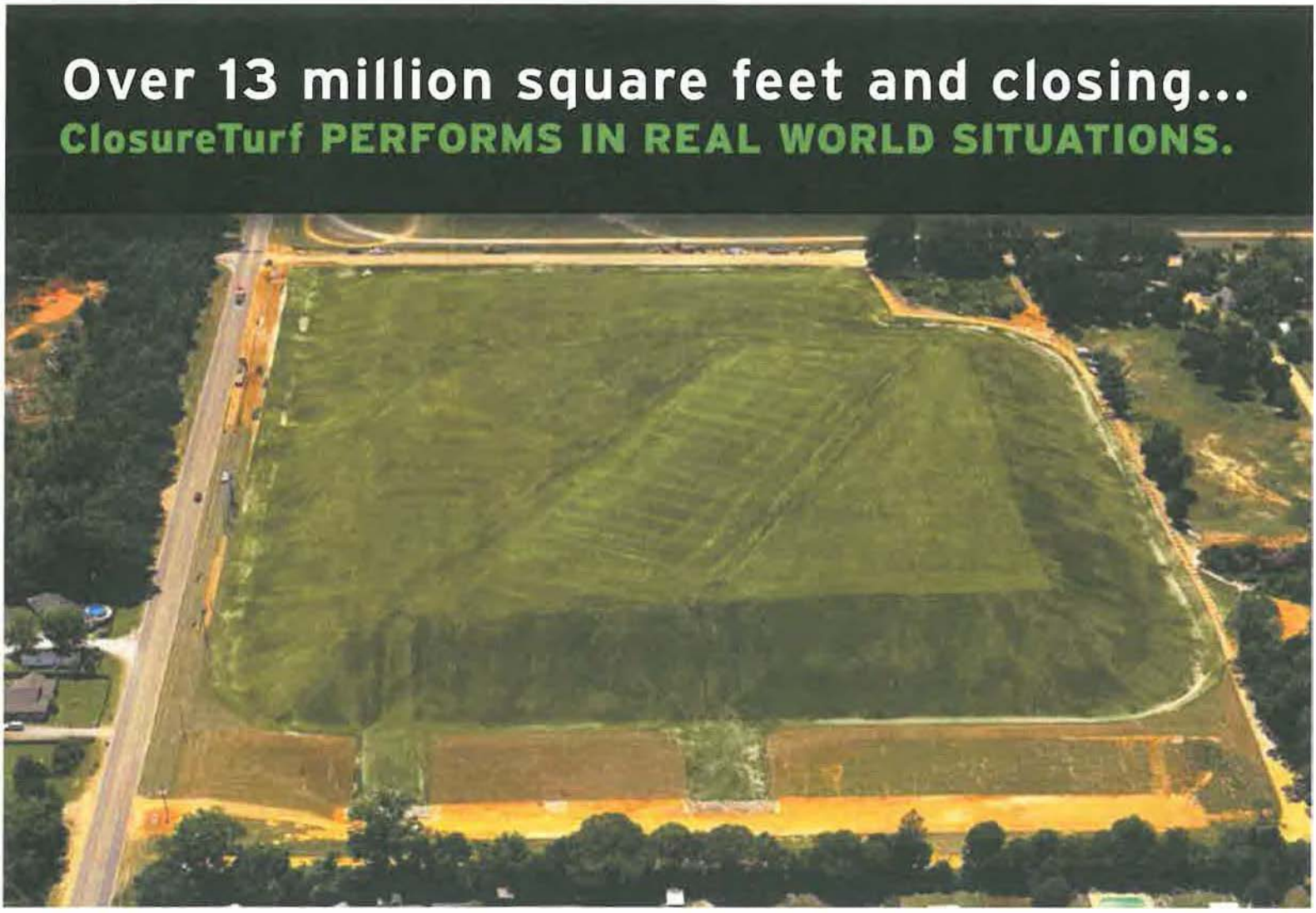
U.S. Patent Nos. 7,682,105 & 8,585,322 • Canada Patent No. 2,663,170 • Other Patents Pending



ClosureTurf™ ensures fast, cost-efficient and environmentally-friendly erosion control—even in some of the toughest applications.

ClosureTurf™ is a three component system comprised of an impermeable, highly transmissive structured geomembrane, a specialized engineered turf, and sand infill. The structured geomembrane component is the foundation of the system and provides for the highest interface friction values available in the market. The engineered turf component is placed on top of the geomembrane giving the system its natural look and feel of a grass while protecting the geomembrane component from extreme weather conditions for the long term. Finally, the sand infill placed in the engineered turf enables the system to be trafficked, while also providing for additional protection and an additional factor of safety against weathering. A virtually maintenance free technology designed to last, ClosureTurf has proven to be the most sustainable closure option available for the waste industry. See how ClosureTurf performs in some of the most demanding applications.

1

LASALLE-GRANT LANDFILL

QUICK STATS

Location: Jena, LA
Completed: 2009
Owner: Progressive Waste Solutions
Size: 9 acres



PROJECT SCOPE

The soil of the LaSalle-Grant Landfill in central Louisiana was highly erodible, had a high plasticity index, and had a natural pH of 4.0, so its characteristics weren't conducive to side slope maintenance. In fact, every spring the existing vegetative slopes required slope repair, reseeding and liming in order to remain intact. Pressure to find a more stable solution led the operator to implementing Closure Turf's 43 degree interface friction technology, which is more than a 3.0 factor of safety against sliding failure, over 10 acres of the landfill.

2

CRAZY HORSE LANDFILL

QUICK STATS

Location: Salinas, CA
Completed: 2013
Owner: Progressive Waste Solutions
Size: 68 acres



PROJECT SCOPE

Situated adjacent to the San Andreas Fault in California, the Crazy Horse Landfill in Salinas, CA, required a solution that would enable capping without modifying steep slopes of 2.25H:1V. And, since most available borrow soil was expensive and environmentally impacted with agricultural chemicals, the site was especially challenged in producing surface water quality that met the regulations. The 68-acre landfill is also situated in a residential area that demanded a final cover system that was aesthetically-pleasing and not subjected to on-going erosion and maintenance noise.

3

TIMBER RIDGE LANDFILL

QUICK STATS

Location: Richwoods, MO
Completed: 2010
Owner: Progressive Waste Solutions
Size: 10 acres



PROJECT SCOPE

Due to its location in a seismic area, concerns over slope stability that could compromise gas collection and containment was a major concern for this landfill. The lack of quality borrow soil and the high cost of procuring it made a ClosureTurf system an easy choice. Likewise, gas collection using deep wells would drastically increase installation costs and compromise speed of closure. A system that could perform effectively without deep vertical wells was greatly advantageous.

4

HARTFORD LANDFILL

QUICK STATS

Location: Hartford, CT
Completed: 2013
Owner: Connecticut Resources Recovery Authority
Size: 38 acres



PROJECT SCOPE

The vision that the owner had for the Hartford Landfill was one where they would be able support the initiatives to promote renewable energy that were consistent with both the CTDEEP and the City of Hartford, CT. ClosureTurf enabled them to do just that, by providing for the best closure technology available and is capable of incorporating traditional rigid or flexible solar photovoltaic panels.

RESULTS

Operators quickly learned of Closure Turf's ability to provide long-term erosion control as the system controlled rainfall runoff in excess of 4 inches per hour at times during it's first year in action. In fact, the system has endured more than 300 inches of rainfall since 2008. And, three months after phase one of the project was completed, a tornado producing shear winds of 70 mph hit across the front of the landfill without damaging the turf cap. Finally, the LaSalle sand infill remained in place with no erosion when a levee broke, releasing water over 5 acres of the project area.

The Closure Turf system requires no mowing, little maintenance, and has remained in tact even under the most extreme weather conditions. Low maintenance costs can relate to significant savings over the 30 year post closure period. Best of all, soil erosion, water infiltration, leachate reduction and fugitive gas emissions were immediately controlled once the ClosureTurf system was installed.

"We'd been killing ourselves working and reworking our slopes, but after we installed the Closure Turf system we didn't have to do anything to it again. The grass looks great, the sand hasn't moved and there's no erosion."

Delaney Lewis,
District Landfill Manager,
IESI Corp. A Progressive Waste Solution Company

RESULTS

Installation of the ClosureTurf system was successfully achieved with currently developed slopes under earthquake loading, eliminating 11,000 round trip truck loads (equivalent to 660,000 miles) that would have been required for soil borrow. The combination of soil import elimination and reduced heavy equipment needs reduced the project's carbon footprint by 70%.

ClosureTurf eliminated dirty storm water runoff by replacing a traditional vegetated cover with a cover system that produces very clear and clean water free of fertilizer and muddy runoff. In addition, ClosureTurf eliminated slope veneer failures from high seismic loads and reduced yearly maintenance activities for the SVSWA to essentially zero. These would have included rebuilding slopes because of erosion, revegetation, dust control efforts, mowing of weeds and grasses to reduce fire danger, and controlling rodent populations.

"We've been extremely impressed with the stability of our slopes and quality of the water runoff. Plans now include a 2 mega-watt solar array system down the road, which will mean this land will produce renewable energy source that gives back to the environment."

Dave Meza, P.E.
Project Manager
Salinas Valley Solid Waste Authority

RESULTS

ClosureTurf's patented system precluded the need for gas wells or piping. This resulted in a cost savings of $15,000 per acre that would have been required for installing deep gas wells. ClosureTurf's structured membrane reduces oxygen in the system that results in higher quality methane gas to be vented for flaring or alternative energy generation.

Under the ClosureTurf system, the gas rises to the surface due to positive pressure and generates little condensate to be collected and managed. The Timber Ridge system is consistently venting 500 SCFM of gas over a ten-acre closure with no vertical wells. This achievement has resulted in Timber Ridge winning an International Achievement Award for a combined gas collection and closure system and the Solid Waste Association of North America (SWANA) Gold Award for landfill gas collection in 2012.

"Capturing 100% of methane has provided options for carbon credits and given us more fuel to burn for generating energy. As soon as an area is closed, all emissions can be controlled which is great. And, the structured membrane protects against oxygen infiltration, eliminating that as a fire pathway."

Mike Freisen, P.E.
Regional Engineer
IESI Corp. A Progressive Waste Solution Company

RESULTS

ClosureTurf was selected for use by the owner for the following reasons: ClosureTurf's geomembrane component had a proven track record in landfill closure applications, the engineered turf with sand infill was durable and strong protecting the underlying geomembrane from ultraviolet degradation while also enabling the system to be driven across by light rubber tire vehicles without damaging the SGN required for normal solar field operations. As the best long-term solution for Hartford, ClosureTurf also provided for an aesthetically-pleasing environment in a high-profile area.

Other successful installations:

Industrial Sludge and Ash Lagoon
- **Location** Rincon, GA
- **Completed** 2013
- **Owner** GA Pacific
- **Size** 70 acres

Weatherford Landfill
- **Location** Weatherford, TX
- **Completed** 2010
- **Owner** Progressive Waste Solutions
- **Size** 8.5 acres

Berkeley County Landfill
- **Location** Moncks Corner, SC
- **Completed** 2013
- **Owner** Berkeley County
- **Size** 12 acres

Lanchester Landfill
- **Location** Narvon, PA
- **Completed** 2013
- **Owner** Chester County
- **Size** 7 acres

Tangipahoa Parish Solid Waste Facility
- **Location** Independence, LA
- **Completed** 2013
- **Owner** Tangipahoa Parish Government
- **Size** 22 acres

Timberlane Landfill
- **Location** Oakdale, LA
- **Completed** 2011
- **Owner** Progressive Waste Solutions
- **Size** 4 acres

Saufley Landfill
- **Location** Pensacola, FL
- **Completed** 2012
- **Owner** Escambia County
- **Size** 22.5 acres

Sandtown Landfill
- **Location** Sandtown, DE
- **Completed** 2013
- **Owner** Berkeley County
- **Size** 4 acres

Bi-County Landfill
- **Location** Woodlawn, TN
- **Completed** 2013
- **Owner** Montgomery County
- **Size** 5 acres

B&W Pantex Landfill
- **Location** Amarillo, TX
- **Completed** 2013
- **Owner** Department of Energy, EPA Region 6
- **Size** 5 acres

Contact Agru America for information on other successful ClosureTurf™ landfill applications across the U.S.

ClosureTurf delivers superior performance.

ClosureTurf was specifically designed to address and solve erosion, slope integrity, gas emissions, installation and maintenance cost control, EPA regulation compliance, and longevity of structure and appearance. Discover the solution that delivers on its promises. Choose ClosureTurf.

For more information on ClosureTurf, visit closureturf.com, or email us at info@closureturf.com or call 800-373-2478.

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Engineering Report

ClosureTurf™ has been extensively tested in the lab and in "real-world" applications for performance and durability.

The goal was to produce a system that performs better than current "Subtitle D" requirements and can resist the many common failure modes of today's closure covers. Traditional approaches to landfill closure have customarily involved the use of a vegetative cover. However, many of these cover systems have failed as a result of excessive erosion, gas pressure buildup, earthquake loads, poor maintenance and inadequate oversight procedures after site closure.

In response to numerous failures of these closure systems and associated rising costs, engineers have looked at new approaches in establishing a more stable and environmentally sound solution. An old solution to address cover failures and the associated environmental impacts is the implementation of exposed geomembranes. However, exposed geomembrane systems are still costly to maintain, are not wind resistant, and do not provide for an aesthetically pleasing solution. For these reasons, many state agencies do not grant final cover status to exposed geomembrane cover systems. After all, the geomembrane is still exposed to the elements for the entire duration of the application. The best approach still involves covering and protecting the underlying geomembrane, however instead of using two feet of soil to do it, it can be done with a specialized tufted geotextile ("engineered turf"), infilled with sand that has been engineered to perform better than the traditional soil cover.

Combining an engineered turf infilled with sand and a highly transmissive structured geomembrane forms a system known as ClosureTurf. The next generation closure system, ClosureTurf has proven to be environmentally protective and more stable than traditional vegetative/soil solutions as a cover system.

The engineered turf technology was originally developed for professional sports venues. Over the last decade the market has expanded greatly and technology has improved dramatically. The latest generation of polyethylene material now provides excellent residual strength and color durability against UV light.

By combining the newest technology of engineered turf with a 50 mil thick geomembrane that has the highest interface friction available in the market, and adding approximately a 0.5 inch of sand for infill, the ClosureTurf system is quickly becoming the preferred choice among the engineering community for covering landfills, mines, industrial waste sites, and CCR storage areas. The product is proven to significantly outperform current closure methods while allowing engineers to deliver a sound solution with net savings to their clients.

The driving performance criteria for the product are stability, transmissivity and durability. These criteria serve to mitigate LFG emissions and liquid infiltration for a duration that extends well beyond the post-closure period. The graphs and charts represent a summary of the performance.

U.S. Patent Nos. 7,682,105 & 8,585,322
Canada Patent No. 2,663,170
Other Patents Pending

Stability

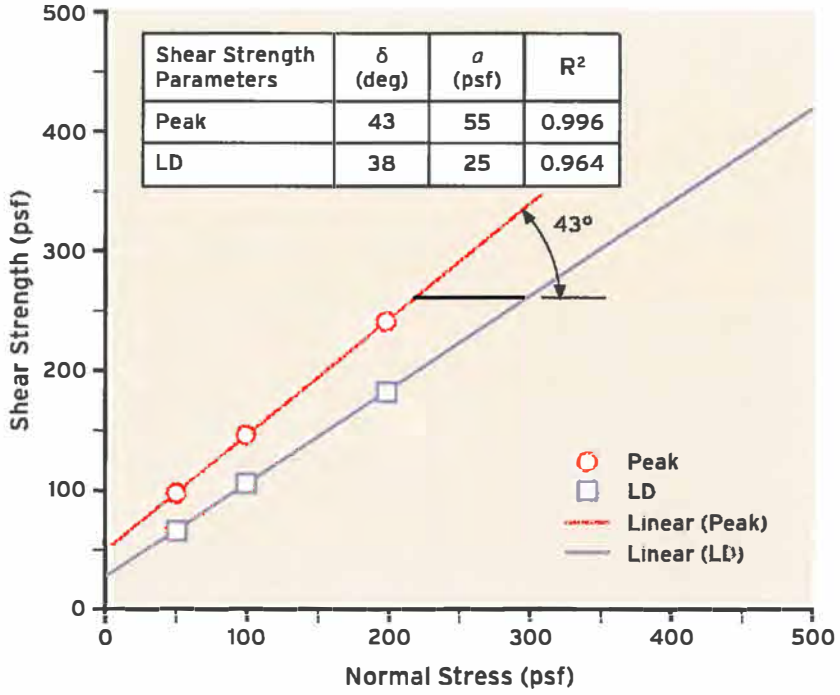
On landfills and mine piles, sliding of the soil cover along steep side slopes is of primary concern, particularly after major storm events. During a rain event, **the rainfall will penetrate quickly through the sand infill and drain directly in the drainage system below avoiding sand erosion and maintaining stability** of the sand infill. **"The infill is also held in place by the unique structure of the engineered turf** that traps the sand to anchor and ballast the engineered turf to the surface it covers. Note that:

- **ClosureTurf™ can be placed on very steep slopes**
- **Tests indicate 43 degrees interface friction value**
- **The slope stability safety factor can be calculated from the chart using the equation:**

  SF= tan φ/tan α

ClosureTurf System Interface Evaluation

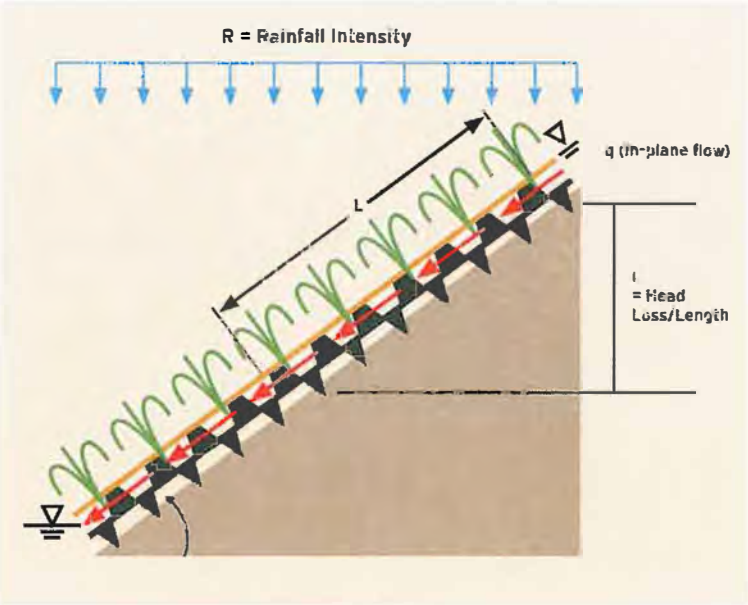
Slope angle	Slope	SF
34	1.5H: 1V	1.4
27	2.0H : 1V	1.9
18	3.0H: 1V	2.8
14	4.0H: 1V	3.7

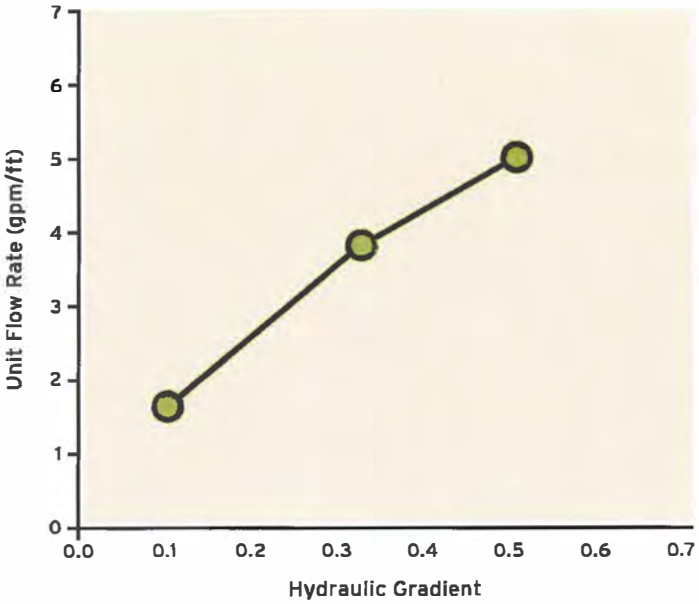


Drainage

ClosureTurf™ sand infill material is **stable on steep slopes under severe weather conditions.** The stability of the sand infill is controlled by the following product characteristics:

- **Percolation/Permeability**
- **Transmissivity**
- **Sand friction**
- **Grass interlocking grid**
- **Sand gradation**

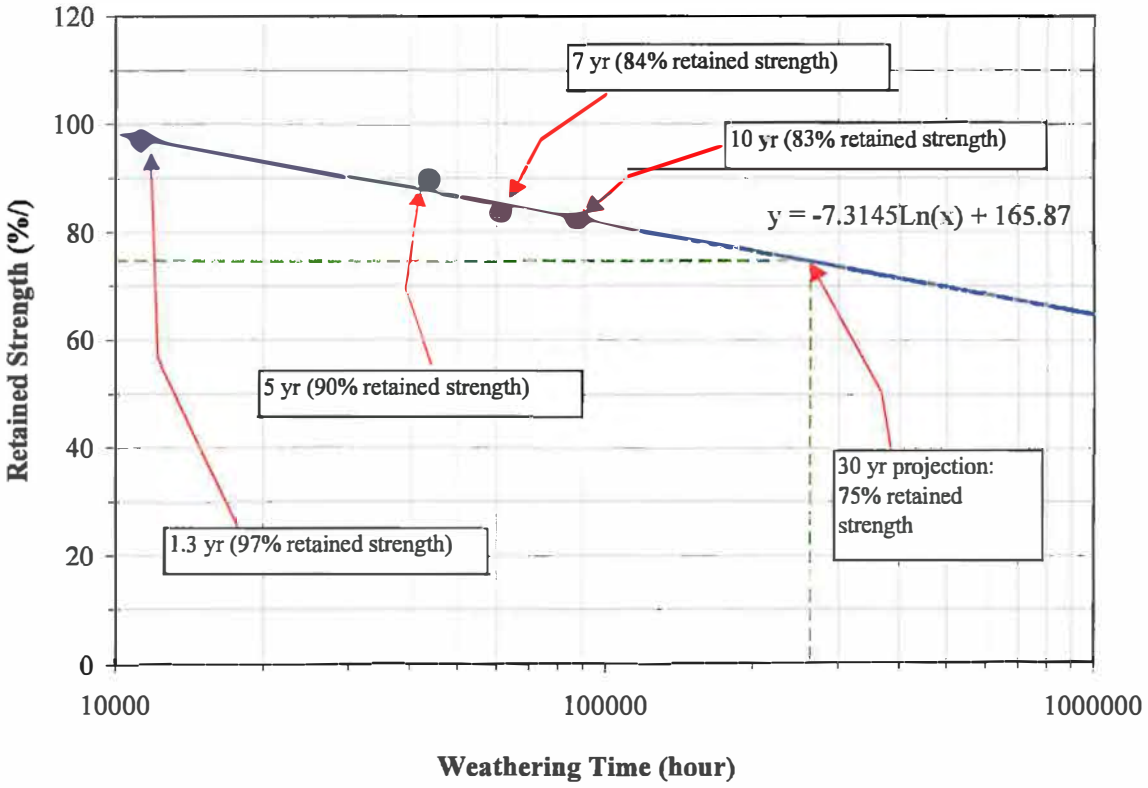




ClosureTurf was designed with the above characteristics in mind. The sand infill can handle **over six inches per hour of rainfall intensity without erosion** when applied on 3H:1V slopes.

Rainfall penetrates quickly through the sand and into the structured drain liner below which has a very high transmissivity. The energy that could cause erosion is on the structured geomembrane and not on the surface of the sand. The transmissivity is presented in the graphic at left.

Weathering Resistance For a Long Life



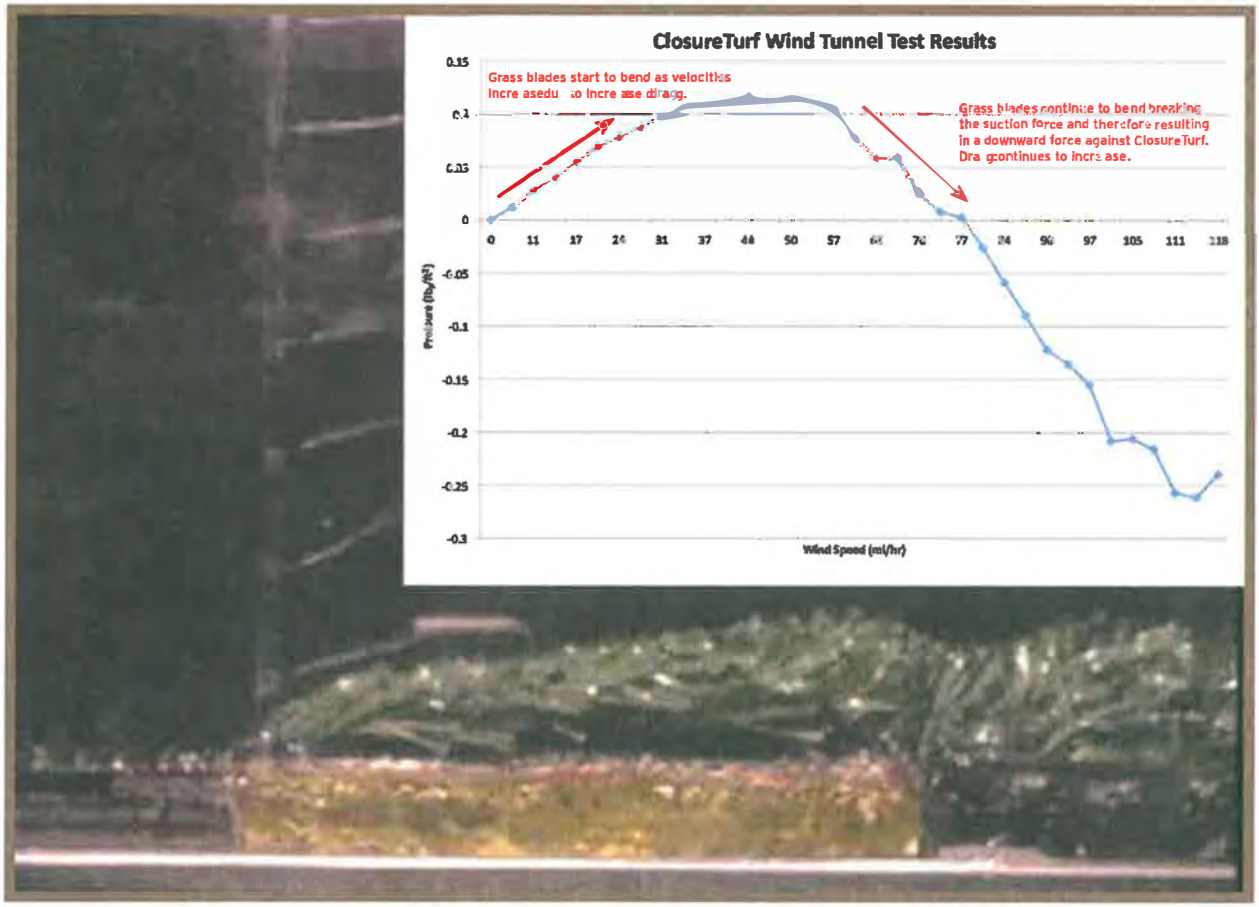
ClosureTurf™ is designed to provide weathering resistance and geomembrane protection when exposed to the **most extreme conditions**. Based on independent, real-world weathering tests performed at Atlas Material Testing Laboratories in New River, AZ. The tensile strength of the engineered turf fibers is projected to have 75% retention after 30 years. This means that with typical traffic loading forces, the material can provide over **four times the strength required after thirty years of extreme heat and UV exposure**. Based on the testing data collected and shown in the graph above, and data from many existing ClosureTurf projects, the system can **provide decades of reliable performance beyond the standard thirty-year post-closure maintenance period**.

Wind Uplift Resistance

Wind Tunnel Testing at GTRI

Since all exposed geomembranes are susceptible to damage from high winds, the technology must withstand these forces. A study was performed on the wind uplift reactions by Georgia Tech Research Institute. To complete their evaluation wind tunnel testing was performed. The ClosureTurf™ product indicated no uplift when exposed to 120 mph winds. This is in contrast with exposed geomembrane systems where extensive anchoring is required even for 30 mph winds.

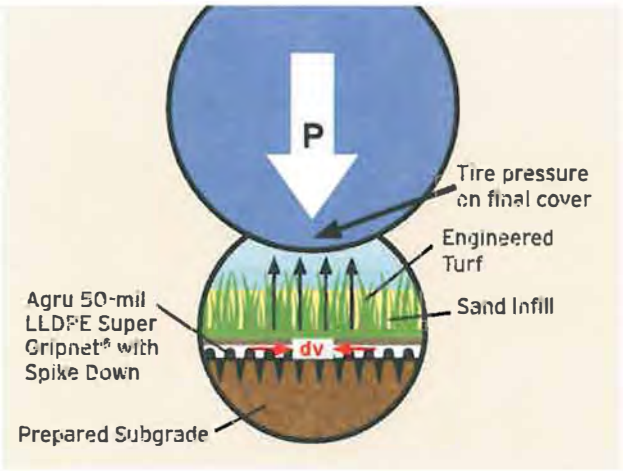
ClosureTurf technology provides features that help mitigate the forces of wind, such as a porous surface to break vacuum and engineered turf blades that will increase the aerodynamic boundary conditions and blades bending and reacting against the wind causing a resistance to the uplift.



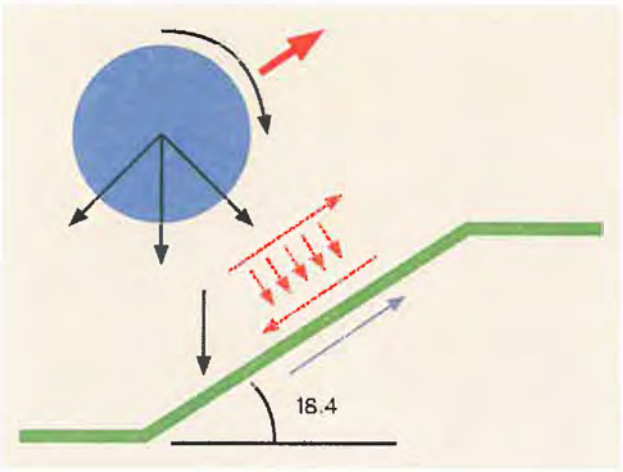
Drivability

Gas system monitoring locations or wells in the landfill will have to be accessed by persons on foot or in vehicles. The typical exposed geomembrane closures, being fully exposed, would likely be damaged during access. Further, the geomembrane can be damaged by birds or other animals. All such damage to the geomembrane would have to be continually repaired and replaced at additional costs after construction. The ClosureTurf™ is thicker, covered with sand infill that not only ballast the system but also allows for access of a 60 psi tire pressure vehicle on 3:1 slopes and up to 90 psi tire pressure in flatter areas without being susceptible to damage.



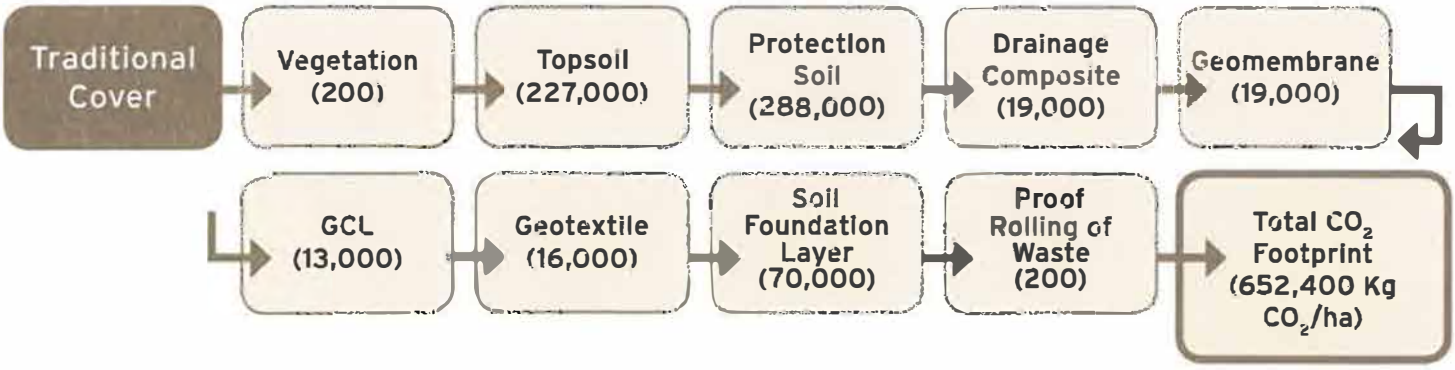


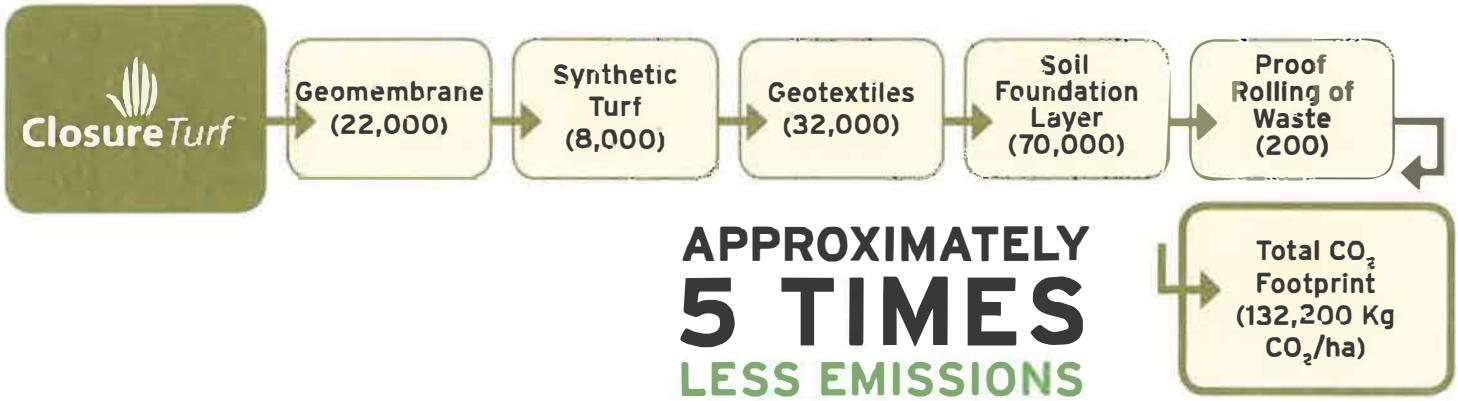




Sustainability

CO_2 Footprint: Traditional vs. ClosureTurf™ *





APPROXIMATELY
5 TIMES
LESS EMISSIONS

* Source; Koerner, R., "Traditional vs. Exposed Geomembrane Landfill Covers–Cost and Sustainability Perspectives," Geosynthetic Magazine, October 2012



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15 May 2015

José Urrutia, P.E.
Vice President of Engineering
Watershed Geosynthetics
11400 Atlantis Place, Suite 200
Alpharetta, GA 30022

Subject: Literature Review and Assessment of ClosureTurf® UV Longevity

Dear Mr. Urrutia:

Watershed Geosynthetics, Inc. (Watershed) has patented an alternative landfill closure system termed, ClosureTurf®. ClosureTurf® consists of high-density polyethylene (HDPE) grass blades tufted through a polypropylene (PP) geotextile backing which overlies Super Gripnet®, an HDPE or linear low-density polyethylene (LLDPE) geomembrane manufactured by AGRU America Inc. The addition of a layer of sand ballast during installation completes the system. The sand ballast provides cover for the lower portion of the HDPE grass blades, the PP geotextile backing, and the Super Gripnet® (Figure 1). The ClosureTurf® system, therefore, is a "hybrid" closure system in the sense that it is neither a traditional soil cover or an exposed geomembrane. ClosureTurf® has been used to close a number of landfills throughout the United States. A select list of sites where it has been used is shown in Table 1. Applications extend to other facilities as well, such as capping of coal ash ponds.

Watershed has requested that Geosyntec Consultants, Inc. (Geosyntec) provide an assessment of the longevity of the ClosureTurf® system with regard to UV degradation. Since ClosureTurf® has elements (i.e., the HDPE grass blades) that are permanently exposed to UV radiation, this assessment will be particularly focused on the exposed portion of the system. However, the UV longevity of the PP geotextile backing and HDPE geomembrane will also be addressed by reference.

Geosyntec's approach to this assessment has been to conduct a literature review of pertinent documents available (journal papers, white papers, presentations, etc.), distill the results of the review, and perform limited analysis. This report concludes with a summary of the review and analysis along with brief discussion for recommendations.

EXECUTIVE SUMMARY

The UV longevity assessment of the ClosureTurf® system (Figure 1) began with a literature review. In general, relatively little published information was discovered regarding exposed HDPE grass blade degradation. The information that is available consists of retained tensile strength test results of HDPE grass blades after exposure (1, 5, 7 and 10 years) at a field test facility in New River, Arizona (Watershed, 2014). Extrapolation of this data by Watershed (2014) resulted in a prediction of 65% retained tensile strength after 100 years of service. In addition, Richgels *et al* (2015) published half-life (i.e., 50% retained tensile strength) predictions of exposed HDPE grass blades using a laboratory data release from the Geosynthetics Institute (GSI) on HDPE geomembrane strips exposed to UV lamp irradiation. Richgels *et al* (2015) obtains an upper bound and lower bound half-life predictions of 247 years and 176 years, respectively. Extrapolation of the field data from New River, Arizona yielded a half-life of 216 years.

Geosyntec checked the calculations shown in Richgels *et al* (2015) and obtained 277 years and 214 years for the upper and lower bound estimates of HDPE grass blade half-life. Differences in the results between Geosyntec and Richgels *et al* (2015) are attributed to rounding. Geosyntec attempted to repeat these calculations for actual performance requirements (i.e., 12.5% of original tensile strength) of the HDPE grass blades rather than a randomly assigned half-life, however the predictions resulted in service lives that were too lengthy to be reasonable. The most likely explanation is that the laboratory data has not degraded enough to allow for service life predictions using 12.5% retained tensile strength. Future data releases from GSI will aid in providing more accurate predictions below the half-life.

Based on Richgels *et al* (2015) predictions, as well as the prediction given in Watershed (2014) it appears that the half-life of the HDPE grass blades exposed to Arizona-like conditions is on the order of 100 years. These results are promising; however additional field test data is needed to improve the half-life predictions, particularly since half-life predictions for exposed HDPE geomembrane are also approximately 100 years (Koerner *et al*, 2015). Understanding the differences in weathering between HDPE grass blades in a synthetic turf and an HDPE geomembrane will provide additional insight into the similar half-life predictions of the two geosynthetics. Finally, the service life of the HDPE grass blades in the ClosureTurf® system should ideally be based on its performance requirements rather than a half-life which will result in a longer service life prediction.

In addition to the HDPE grass blades, there are two unexposed elements of the ClosureTurf® system: (i) the PP geotextile backing for turf component; and (ii) the Super Gripnet® which consist of a HDPE geomembrane (see Figure 1).

Watershed has incorporated UV degradation inhibitors into the PP geotextile backing which, according to Watershed has lead to an improvement in UV resistance by a factor of 14 over the original prediction of 65% retained tensile strength after 100 years (Watershed, 2014). Koerner (2011) has estimated that covered HDPE geomembrane will have a half-life of 446 years at 20 degrees Celsius and 265 years at 25 degrees Celsius.

Therefore, the most critical component of the ClosureTurf® appears to be the exposed HDPE grass blades when it comes to UV degradation. However, degradation of the HDPE grass blades to unserviceable levels can be remediated by replacement of the turf component of the ClosureTurf® system.

BACKGROUND AND LITERATURE REVIEW SUMMARY

In total, Geosyntec has reviewed approximately 40 technical documents to date. The database is a combination of documents provided to Geosyntec by Watershed as well as documents collected by Geosyntec. A complete reference list of the documents in the database can be made available upon request.

In general, relatively little information was found on the topic of exposed HDPE grass blades with respect to degradation due to UV radiation. The documents that were obtained and reviewed are listed below.

1. Field test data provided by Watershed from the New River, Arizona testing facility on the HDPE grass blades (Watershed, 2014).

2. Testing results (Atlas-MTS) discussing the UV longevity of polyethylene and polypropylene grass used for outdoor European athletic facilities.

3. Technical paper by Richgels, *et al.* (2015a) published in the conference proceedings for Geosynthetics 2015 in Portland, Oregon.

4. Presentation by Richgels., C. at the Geosynthetics Conference for 2015 in Portland, Oregon (Richgels, 2015b).

5. Presentation by Diguilio, D. at the Northern New England SWANA Conference on 25 September 2013 (Diguilio, 2013).

The following documents on the topic of HDPE Geomembrane degradation due to UV exposure were reviewed and found to contain useful information regarding this assessment.

1. Geosynthetic Research Institute (GRI) White Paper #6 (Koerner *et al.*, 2011). This white paper contained degradation data (% retained strength and elongation) on laboratory aged samples of 1.5 mm HDPE geomembrane. Aging was completed using a UV Fluorescent device per ASTM D7238 at 70 degrees Celsius (^{o}C).

2. Geosynthetic Institute (GSI) webinar presentation by Koerner *et al.*, (2015). This presentation contained a slide that compared predicted (laboratory vs. field) half-life of geomembranes of various resins, including HDPE, as well as a suggestion for estimating lower bound half-life.

3. Journal paper authored by Rowe *et al.* (2010) published in the Journal of Geotechnical and Geoenvironmental Engineering.

DISCUSSION OF DOCUMENTS AND DATA

The data from the New River, AZ testing facility on the artificial grass component of ClosureTurf® (Watershed, 2014) appears to be the only data set of its kind in our compiled database. The data consists of tensile property testing from field samples exposed to the Arizona environment at approximate exposure periods of 1, 5, 7 and 10 years. At each of the four exposure periods, 20 samples were tested for a total of 80 tests. The average values for tensile strength retained at each corresponding time period is 97%, 90%, 84% and 83%, respectively (Figure 2).

One additional data point was found in the Atlas-MTS document. That data point indicated that approximately 90% of tensile strength of polyethylene grass would be available after 20 years of field exposure assuming average European climatic conditions (temperature, irradiance, etc.). However, the average European irradiance is approximately one-half to one-third that of Arizona (Figure 3) notwithstanding temperature effects. Therefore, the Atlas-MTS data point will be consistent with the data from the New River, AZ facility in the 7 to 10 year time frame once adjusted for the relative levels of exposure and temperature between Europe and Arizona. As such, this data point will not extend the exposure duration covered by the New River, AZ data.

The paper and corresponding presentation by Richgels (2015a, 2015b) utilized the laboratory data released from the GSI on UV degradation of HDPE samples to make upper and lower bound estimates of the field half-life of the HDPE grass blades. The upper bound method utilizes Arrhenius

modeling of lab data to project exposure times at half-life to site temperatures combined with ratios of UV irradiance between the laboratory lamp and monthly average irradiance at New River, AZ to develop half-life loss per month. A similar procedure using a linear extrapolation (rather than Arrhenius) was demonstrated for a lower bound estimate. The Watershed (2014) field data set was plotted in between the upper and lower bound estimates. This method is further discussed in the section below titled, "HDPE Grass Blade Service Life Calculations".

Koerner *et al.* (2011) discusses the UV longevity of both exposed and unexposed geomembranes made from various resins, including HDPE based on GSI's laboratory testing program. This document is particularly useful in regard to the ClosureTurf® elements that are considered non-exposed (i.e., the PP geotextile backing for the turf component and the underlying HDPE geomembrane).

The presentation by Koerner *et al.* (2015) includes estimates of half-life of exposed HDPE geomembranes as well as a recommendation for linear data extrapolation as a lower bound limit that was implemented by Richgels (2015b).

PERFORMANCE REQUIREMENTS

The definition of service life of an HDPE (or other resin) geosynthetic (grass blades and geotextiles/geomembranes) typically invokes the half-life criteria. However, the half-life criteria is arbitrary and while useful as a general indicator for comparison it does not directly relate to any aspect of field performance for ClosureTurf® or any other geosynthetic. Therefore it is more appropriate to define the service life in terms of field requirements placed on the material.

HDPE Grass Blades

For the case of the HDPE grass blades on the ClosureTurf® system, tensile strength requirements fall in the range of 2.5 to 3.5 lbs, based on applied loads of pullout forces from equipment operation and water runoff forces (Diguilo, 2013). The ClosureTurf® HDPE grass blades are manufactured with 20 lbs. of tensile strength immediately following the process (Diguilo, 2013). Therefore, without considering a factor of safety, the required tensile strength of the HDPE grass blade is equal to approximately 12.5% to 17.5% of original strength capacity.

PP Geotextile Backing and HDPE Geomembrane

Performance requirements for the PP geotextile backing and HDPE geomembrane depend on more site-specific parameters (e.g., steepness of slopes, seismicity, etc.) than the HDPE grass blades. Therefore until a parametric study is completed which will define the performance requirements over a range of expected conditions, the half-life will have to be used as a benchmark for degradation of the PP geotextile and HDPE geomembrane.

HDPE GRASS BLADE SERVICE LIFE CALCULATIONS

In order to develop a prediction for the longevity of the HDPE grass blades with respect to UV degradation, Geosyntec implemented the method found in Richgels (2015a, 2015b) for two levels of retained tensile strength. The first level is the 50% of tensile strength, or half-life, criterion that is commonly used as a benchmark for geosynthetic service life. Geosyntec performed this calculation to compare our results with the results presented by Richgels (2015a, 2015b). Once the half-life estimates were calculated, Geosyntec attempted to repeat the calculations using a retained tensile strength of 12.5% of an HPDE grass blade.

Half-Life Estimation (50% of Retained Strength)

The assessment utilized by Richgels (2015a, 2015b) begins with a laboratory data release from GSI (Figure 4). The data includes retained tensile strength of HDPE samples that have been incubated under a UV lamp at elevated temperatures, which accelerates the UV weathering process in accordance with ASTM D7238.

As mentioned, the GSI data includes samples tested at three elevated temperatures: (i) 80 degrees Celsius (^{o}C); (ii) 70°C; and (iii) 60°C. The testing program appears to have originally included only the 70°C data, with the 80 ^{o}C and 60°C testing added at a later date (therefore, weathering is not as advanced). The 70°C data set has reached approximately 66%, while the 80°C and 60°C data sets have reached approximately 78% and 86%, respectively. Nonetheless, logarithmic extrapolations to 50% retained strength were performed for each data set. The amount of exposure time (on a log scale) corresponding to the 50% retained strength plotted vs. the inverse of the corresponding temperature (80°C, 70°C and 60°C) is shown in Figure 5. Figure 5 allows for extrapolation to find the laboratory exposure time required to achieve 50% retained strength at temperatures lower than the test temperatures (i.e., actual field temperatures).

Once the curve is defined relating any temperature to a level of laboratory lamp exposure, the remaining task is to develop a relationship between laboratory exposure and field exposure for a

particular site. In this case, the testing site in New River, AZ where Watershed has performed tests on HDPE grass blades, was selected.

Richgels (2015a, 2015b) presents monthly averages at the site for: (i) peak turf temperature; and (ii) irradiance as a fraction of the laboratory lamp irradiance. Using these two values for a given month combined with the Arrhenius model, an estimate of half-life loss per month is obtained. Summation of the half-life lost per month over a year yields the annual half-life loss. The inverse of the annual half-life loss is the predicted half-life in years. Using this method, Richgels obtains a half-life of approximately 247 years, while Geosyntec obtained a half-life of 277 years using the same data (Table 2). The difference is attributable to rounding errors in the logarithmic projections.

Following the suggestion of Koerner *et al.* (2015), Richgels (2015b) treated the results of the half-life mentioned above as an upper bound estimate. For the lower bound estimate, Koerner *et al.* (2015) suggests performing a linear extrapolation of the laboratory data to lower field temperatures, rather than using the Arrhenius model.

With the linear extrapolation, the ratio of monthly irradiance to laboratory lamp irradiance is scaled linearly to calculate the number of months required to reach half-life at 80C, 70C and 60C. Linear extrapolations per month are made from the elevated temperatures to the corresponding peak turf temperature in that month. The resulting half-life loss per month is summed to obtained half-life loss per year. The inverse of that result is the half-life in years. Richgels (2015b) calculates a half-life of 176 years using this linear model. Geosyntec's calculation using the same data resulted in a half-life of 214 years (Table 3 and Figure 6). The difference in the calculations is approximately the same as with the calculation using the Arrhenius (logarithmic) model.

Figure 7 shows the calculated upper (Arrhenius - logarithmic) and lower (linear) bound curves calculated by Richgels (2015b) along with the field data on the HDPE grass blades provided by Watershed (2014). As shown in Figure 7, the trend line fit to the field data falls in between the upper and lower bound curves produced by Richgels (2015b). Note that the first point from the field data at approximately 1 year is omitted from the trend line. This is because the first data point is assumed to be within the anti-oxidant phase of degradation rather than the polymer oxidation stage as suggested by Rowe *et al.* (2010). Additional discussion regarding the stages of degradation for polyolefin materials can be found in CUR 243 (2012).

Service Life Estimation Based on Performance Requirements (12.5% of Retained Strength)

Geosyntec repeated the calculations discussed above for the estimation of half-life, but extrapolated the GSI laboratory data down to 12.5% rather than 50% at 80C, 70C and 60C. Upper bound

(Arrhenius – logarithmic) and lower bound (linear) estimates were 2,500 years and 2,043 years, respectively.

These estimates of service life are simply too large to be reasonable. A likely explanation is that the samples tested at 80C, 70C and 60C have not degraded enough to produce accurate predictions at 12.5% retained strength. As previously mentioned, the data for 80C has reached 78% retained strength; the data for 70C has reached 66% retained strength; and the data for 60C has reached 86% retained strength. Therefore, the extrapolation for each of these data sets to 50% retained strength will be much more accurate than extrapolations to 12.5%. In addition, small uncertainties in log-based extrapolations will greatly influence results.

For these reasons, it is not practical or useful at this time to quantitatively assess service life in terms of actual performance requirements when those requirements are substantially below the half-life. There is some value, however in a qualitative use of performance requirements in comparisons with half-life estimates (i.e., to establish the factor of safety remaining at 50% degradation).

SUMMARY AND CONCLUSIONS

Geosyntec's literature review of approximately 40 documents yielded few sources of UV degradation data for exposed HDPE grass blades. Relevant data that was found included the field test data from the New River, AZ testing facility provided by Watershed (2014) and one data point from Atlas-MTS. The Atlas-MTS data point indicated that HDPE grass blades in average European climatic conditions would retain approximately 90% of its original strength after 20 years of field exposure. Taking into account the differences in temperature and UV irradiance between New River, AZ and European averages, the data point is consistent with the New River, AZ test data in the 7 to 10 year range.

Following the method presented in Richgels (2015a, 2015b) for HDPE grass blades, Geosyntec calculated an upper bound half-life of 277 years compared with Richgels 247 years using the Arrhenius (semi-log) extrapolations to site temperatures and ratio of laboratory lamp to field irradiance. Geosyntec calculated a lower bound half-life based on linear temperature extrapolations, as suggested by Koerner *et al.* (2015), of 214 years compared with 176 years obtained by Richgels (2015b). The differences between Geosyntec and Richgels calculations were attributed to rounding. As shown in Figure 7, the field data from New River, AZ suggests a half-life of 216 years when considering only the last three data points (i.e., polymer oxidation stage).

Another prediction of HDPE grass blade degradation is included in Watershed (2014) using the same (New River, AZ) field data. That prediction of retained tensile strength at 100 years of service life is 65%.

Therefore, it appears that the half-life of the HDPE grass blades will be on the order of 100 years based on the existing field data set and extrapolation methods found in the literature and presented herein. The results are promising; however additional field test data is needed to improve the half-life prediction, particularly since the half-life predictions for exposed HDPE geomembranes are also approximately 100 years (Koerner, 2015). Half-life predictions presented herein will also need to be revisited when additional labratory data is released from the GSI testing program.

Geosyntec attempted to calculate the service life of the HDPE grass blades using 12.5% of retained strength, rather than an arbitrarily assigned half-life. However, the calculation resulted in unreasonably long service life. This result is likely due to uncertainties in extrapolating the laboratory data released from GSI down to the 12.5% retained strength level. The data release has degraded to 78%, 66% and 86% for the 80 ^{o}C, 70 ^{o}C, and 60 ^{o}C test temperatures. Therefore, extrapolations to 50% may be warranted while extrapolations to 12.5% may not be until additional lab data is available. That being said, it should be recognized that half-life, or 50% of retained strength, has a factor of safety of 2.8 to 4.0 when considering the tensile capacity performance requirements of HDPE grass blades.

With regard to the unexposed elements of the ClosureTurf® system, Watershed (2014) indicates that the retained tensile strength of the PP geotextile backing prior to the addition of UV inhibitors is 65% after 100 years. This estimate is based on exhumed samples of the geotextile from the LaSalle-Grant Landfill in Louisiana. According to Watershed (2014), the addition of proprietary UV inhibitors to the PP geotextile backing has led to an improvement in UV resistance by a factor of 14. The final geosynthetic in the ClosureTurf® system is the covered HDPE geomembrane. Koerner (2011) estimates that the half-life of a covered HDPE geomembrane is 446 years at 20C, and 265 years at 25C. Furthermore, the degradation of the unexposed elements of the ClosureTurf® system invoke the half-life criteria. As discussed with regard the exposed HPDE grass blades, actual performance requirements should ideally be used to determine system longevity. However, the existing testing programs need to be allowed to degrade further before projections to lower values are made.

It is worth reiterating that applications of ClosureTurf® in areas of the United States where the UV irradiance and the temperatures are lower will result in longer half-life predictions than discussed above. In some cases (e.g., the Northeastern States), the differences will likely be quite large when compared with Arizona.

Finally, once UV degradation of the most susceptible component of ClosureTurf® (i.e., the exposed HDPE grass blades) does result in a tensile break, replacement of the HDPE grass and PP geotextile backing can be performed.

CLOSING

Geosyntec appreciates the opportunity to assist Watershed in the development of its ClosureTurf® products. Questions and comments may be directed to either of the undersigned at 678-202-9500.

Sincerely,

Will Tanner, P.E.
Project Engineer

Ming Zhu, Ph.D., P.E.
Senior Engineer

Attachments: References
Tables
Figures

Copies to: Bill Gaffigan (Geosyntec)
Mike Ayers (Watershed)

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Richgels, C., Ayers, M., and Urrutia, J., (2015a) “Estimation of Geographic Ultraviolet Radiation Levels and Impact on Geosynthetic Cover Systems”. Proceedings of Geosynthetics 2015, Portland Oregon, February 15-18, 2015.

Richgels, C. (2015b) “Estimation of Geographic Ultraviolet Radiation Levels and Impact on Geosynthetic Cover Systems”. Geosynthetics 2015, Portland, Oregon, February 15-18, 2015.

Rowe, K., Islam, M., Hsuan, Y., (2010) “Effects of Thickness of the Aging of HDPE Geomembranes”. Journal of Geotechnical and Geoenvironmental Engineering, ASCE, 136(2), p.299-309.

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TABLES

Table 1. Selected Sites where ClosureTurf® has been Installed.

Select ClosureTurf® Installations				
Installation	**Type**	**Acres**	**State**	**Year**
Progressive - Weatherford	Public – MSW	8.5	Texas	2010
Progressive - Timberland	Public - MSW	4	Louisiana	2011
Crazy Horse (Salinas SWA – Monterey)	City – MSW	65	California	2012
Saufley Landfill (Escambia)	Public – C&D	22.5	Florida	2012
Georgia Pacific	Independent	70	Georgia	2013
Berkeley County Landfill	City - MSW	12	South Carolina	2013
Lanchester Landfill (Chester)	City - MSW	7	Pennsylvania	2013
Tangipahoa Parish	City – MSW	22	Louisiana	2013
Sandtown – (Berkeley County)	City – MSW	4	Delaware	2013
Si-County Landfill	EPA – Region 6	5	Texas	2014
Holcim Cement Landfill (Kiln Dust)	Independent	46	New York	2015

Table 2. HDPE Grass Blade Upper Bound Half-Life Calculations (Geosyntec)

Month	UV Lamp On[1] (hrs/day)	Peak Turf Temp[2] (C)	Peak Turf Temp (K)	Peak Turf Temp (1/K)	Reaction Rate[3]	Lab Half-Life[4] (lamp hrs)	Field Equivalent[5] (days)	Field Equivalent[6] (months)	Half Life Loss per Month[7]
January	4.00	27.99	301.14	0.0033	-15.67	6385286	1596322	51494	1.94196E-05
February	4.94	27.96	301.11	0.0033	-15.67	6401982	1296604	46307	2.15949E-05
March	6.13	33.94	307.09	0.0033	-15.11	3632197	593012	19129	5.22755E-05
April	6.94	40.58	313.73	0.0032	-14.50	1983742	285945	9531	0.000104915
May	7.25	51.21	324.36	0.0031	-13.58	792646	109330	3527	0.000283544
June	7.31	61.52	334.67	0.0030	-12.75	344593	47124	1571	0.00063662
July	6.94	66.82	339.97	0.0029	-12.34	228887	32993	1064	0.000939599
August	7.00	64.80	337.95	0.0030	-12.50	267230	38176	1273	0.000785841
September	6.94	59.43	332.58	0.0030	-12.91	406208	58553	1889	0.000529439
October	5.88	47.74	320.89	0.0031	-13.88	1062504	180852	5834	0.000171411
November	4.56	36.38	309.53	0.0032	-14.88	2899472	635501	21183	4.72069E-05
December	3.69	24.68	297.83	0.0034	-15.99	8826208	2393548	77211	1.29515E-05
Lab	20							**Yearly Half-life Loss[8]**	0.003604818
								Half-life[9] (years)	277.41

Notes:

(1) UV Lamp On (hours per day) is given in Richgels (2015a, 2015b).
(2) Peak Turf Temps for New River, AZ given in Richgels (2015a, 2015b).
(3) Reaction Rate is calculated from the regression curve shown in Figure 4 for the upper bound (logarithmic) case.
(4) Lab half-life in hours is equal to 1/e^(Reaction Rate).
(5) Field equivalent (days) is calculated by dividing the lab half-life in hours by the UV lamp on hours per day.
(6) Field equivalent in days is converted to months using the given days in that particular month.
(7) Half-life loss per month is the inverse of the corresponding field equivalent in months.
(8) The yearly half-life loss is the sum of each individual months half-life loss.
(9) The half-life in years is the inverse of the yearly half-life loss.

Table 3. HDPE Grass Blade Lower Bound Half-Life Calculations (Geosyntec)

Month	UV Lamp On[(1)] (hours/day)	Months @ 80 C[(2)]	Months @ 70 C[(2)]	Months @ 60 C[(2)]	Peak Turf Temp[(3)] (C.)	Half-life Months (from Regression)	Half-life Loss per month
January	4.00	692	1507	3078	27.99	6948	0.000143933
February	4.94	620	1352	2761	27.96	6256	0.000159849
March	6.13	452	984	2010	33.94	4059	0.00024637
April	6.94	412	898	1834	40.58	3213	0.000311281
May	7.25	382	832	1698	51.21	2248	0.000444747
June	7.31	391	852	1740	61.52	1580	0.000633027
July	6.94	399	869	1775	66.82	1237	0.00080834
August	7.00	395	861	1759	64.80	1371	0.000729293
September	6.94	412	898	1834	59.43	1826	0.000547629
October	5.88	471	1026	2095	47.74	3070	0.000325779
November	4.56	627	1365	2788	36.38	5321	0.000187929
December	3.69	750	1635	3339	24.68	7945	0.000125871
Lab	20					**Yearly Half-life Loss**	0.00466405
						Half-life (years)	214.41

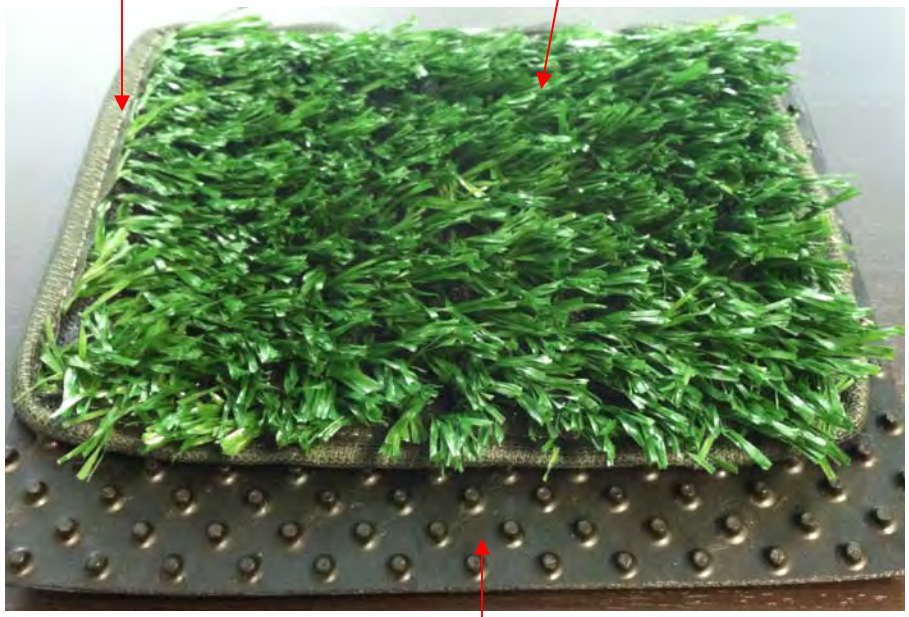
Notes:

(1) UV Lamp On (hours per day) is given in Richgels (2015a, 2015b).

(2) The months required at each temperature is calculated using the regressions from Figure 4 for each temperature, projected down to half-life, then dividing the lamp-hours at half-life by the UV lamp on hours per day for a given month. Once this calculation is done for 80, 70 and 60 C, a linear regression (as shown in Figure 5) is used to obtain the half-life months at the corresponding peak turf temp.

(3) Peak turf temperatures given in Richgels (2015a, 2015b).

FIGURES





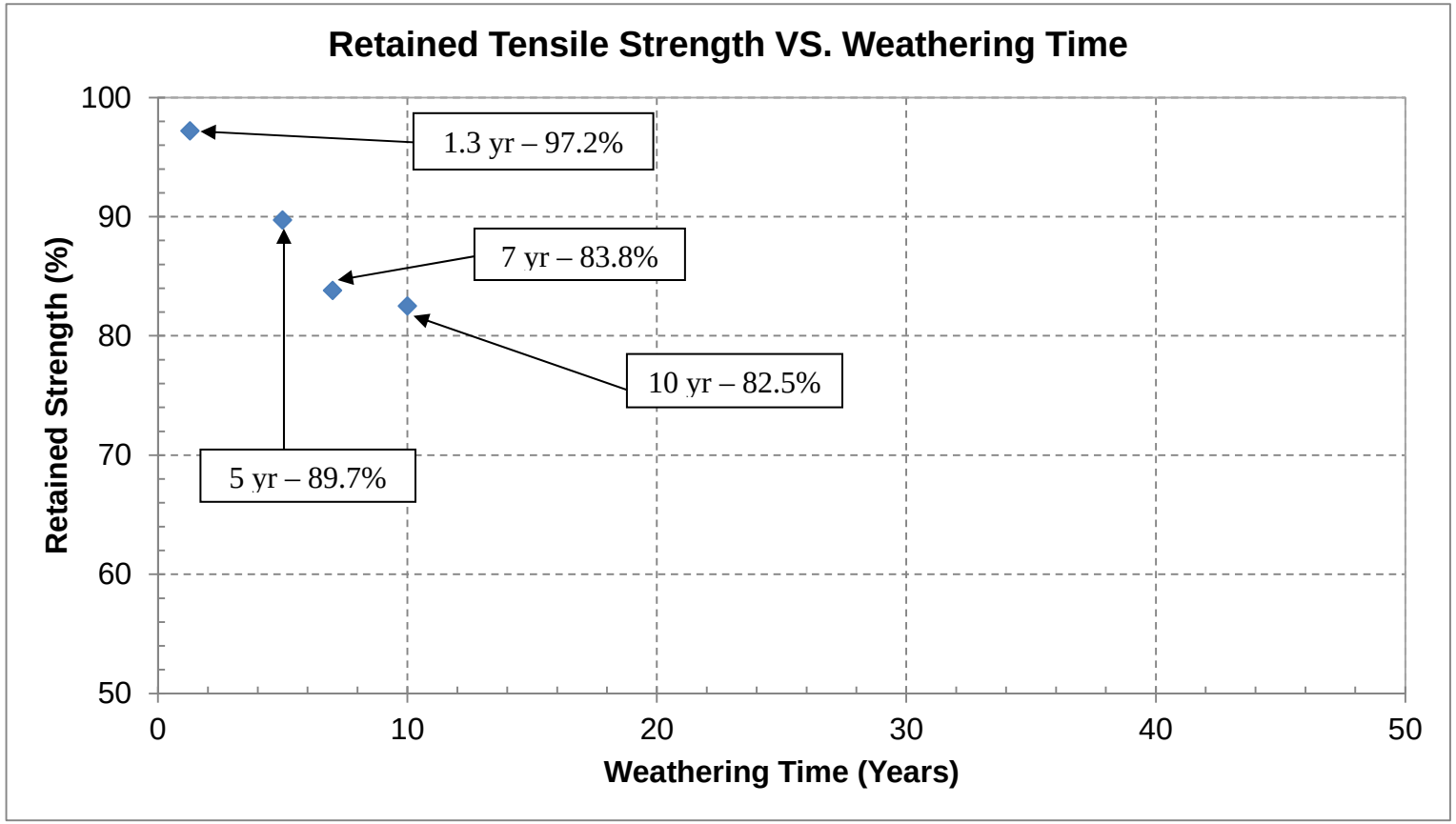
Note: The sand ballast infill is not shown in the sample photo on the left, but is shown in a field application photo on the right.

ClosureTurf®Components
Watershed Geosynthetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure **1**

Kennesaw, GA | 23-April-2015



Field Test Data (Watershed, 2014)
New River, AZ Atlas Testing Facility
Watershed Geosynthetics – ClosureTurf® UV Assessment

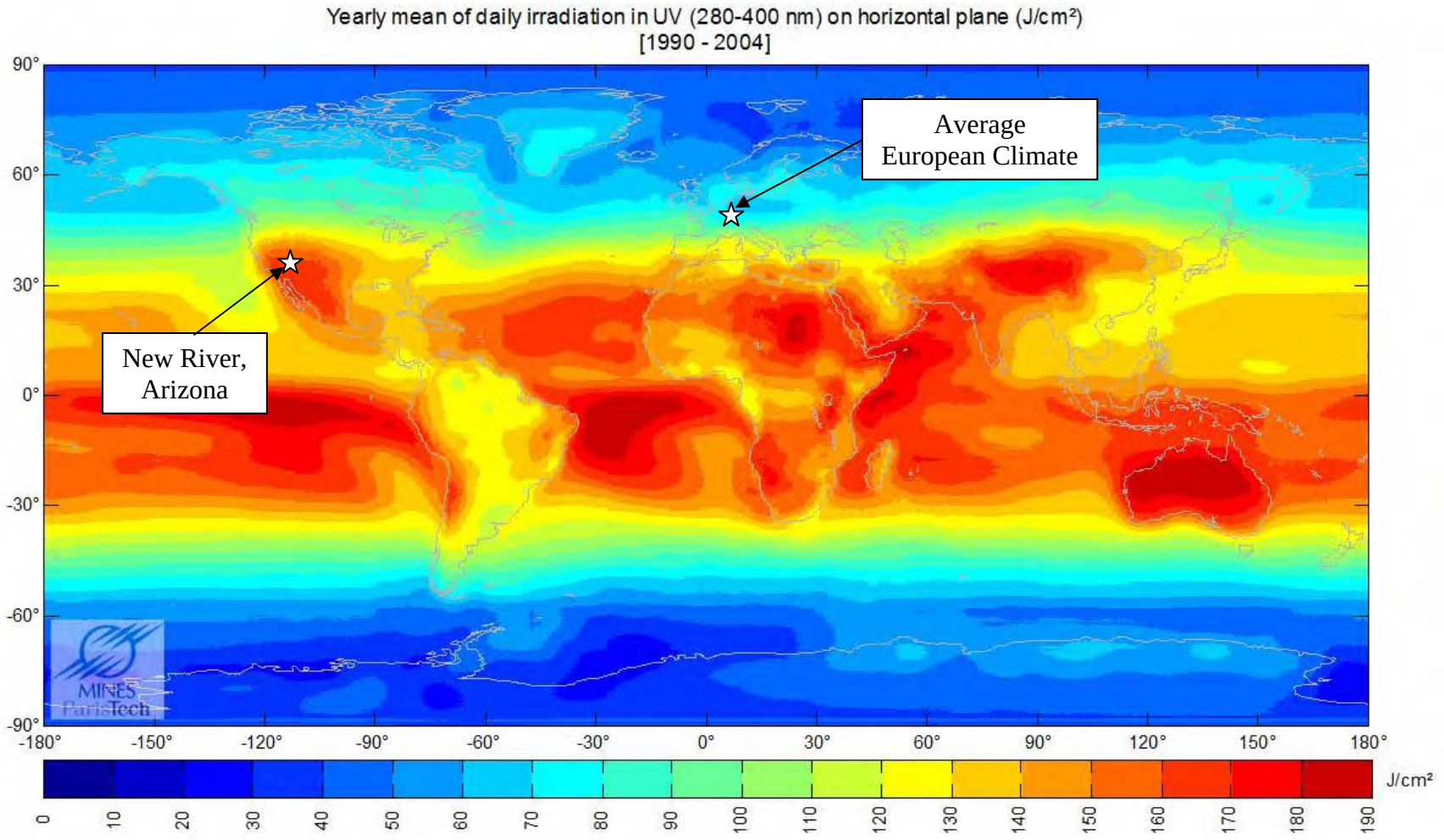
Geosyntec consultants

Kennesaw, GA | 25-April-2015

Figure **2**

Notes:

1. The first data point at Weathering Time of 1.3 years is considered to be within the initial stage of UV degradation (i.e., anti-oxidant depletion), rather than polymer oxidation which is represented by the final three data points.
2. Each data point represents the average result of 20 tensile break tests.



1 J/cm^2 = 4.755 ft-lbs/in^2

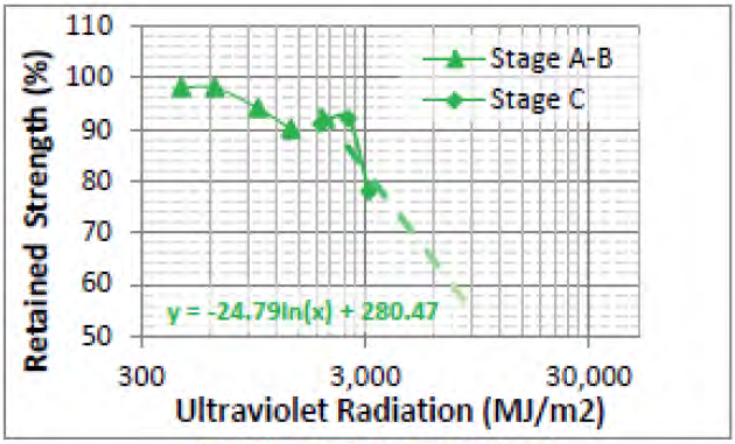
Yearly Irradiation in the Ultraviolet Range

Watershed Geosynthetics – ClosureTurf® UV Assessment

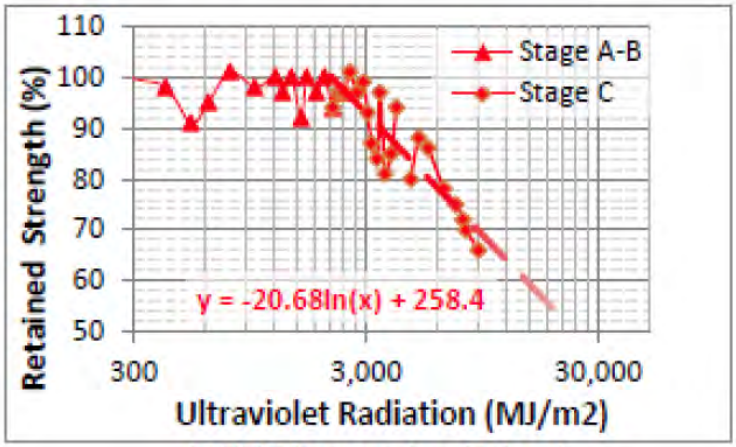
Geosyntec consultants

Figure 3

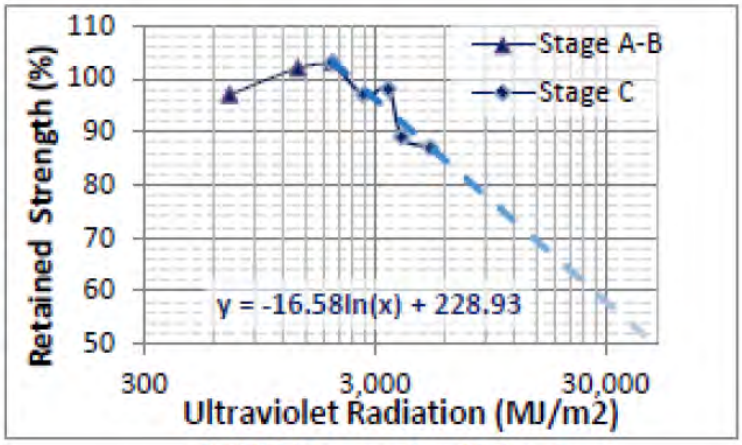
Kennesaw, GA | 23-April-2015



a) 80°C Temperature Dataset



b) 70°C Temperature Dataset



c) 60°C Temperature Dataset

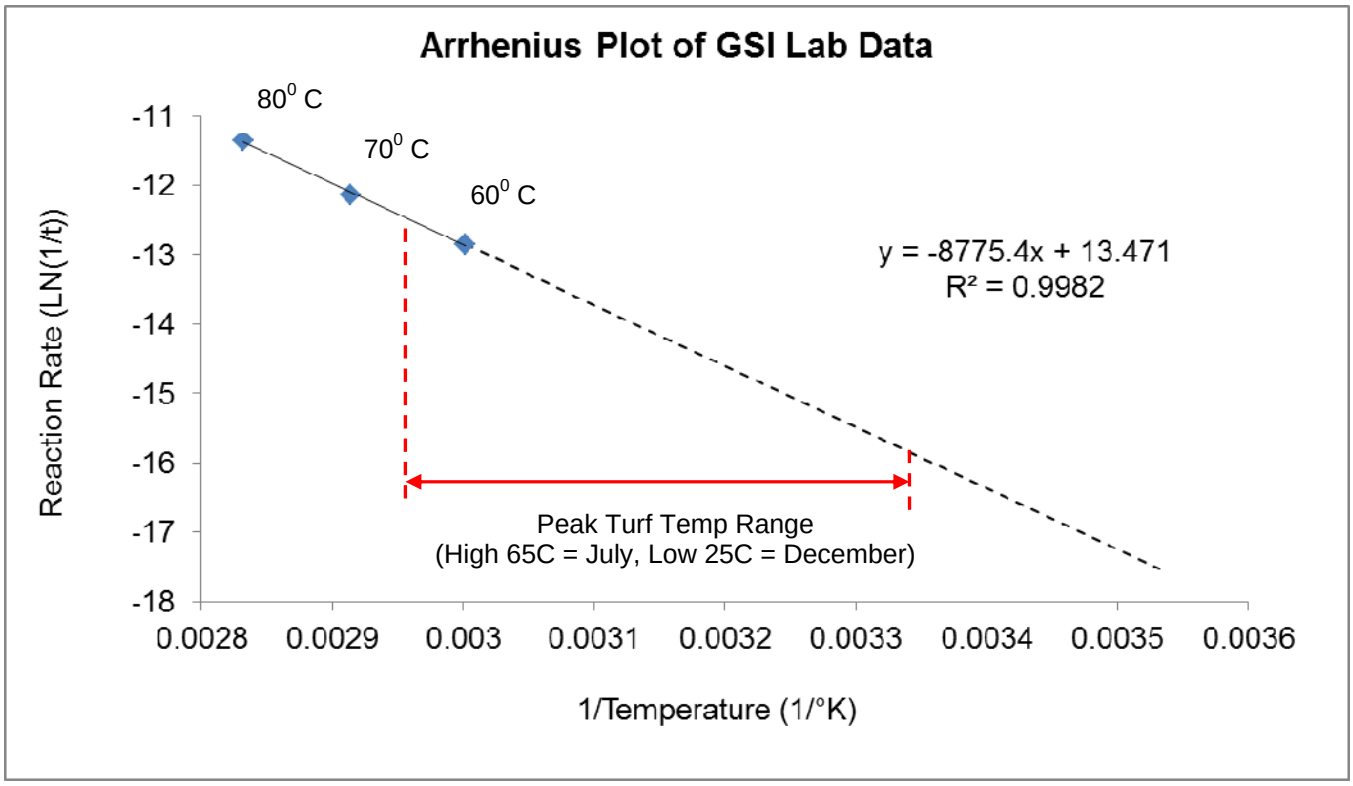
GSI Data Release - Three Stage Oxidation of HDPE for Different Temperatures

Watershed Geosynthetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure 4

Kennesaw, GA | 23-April-2015



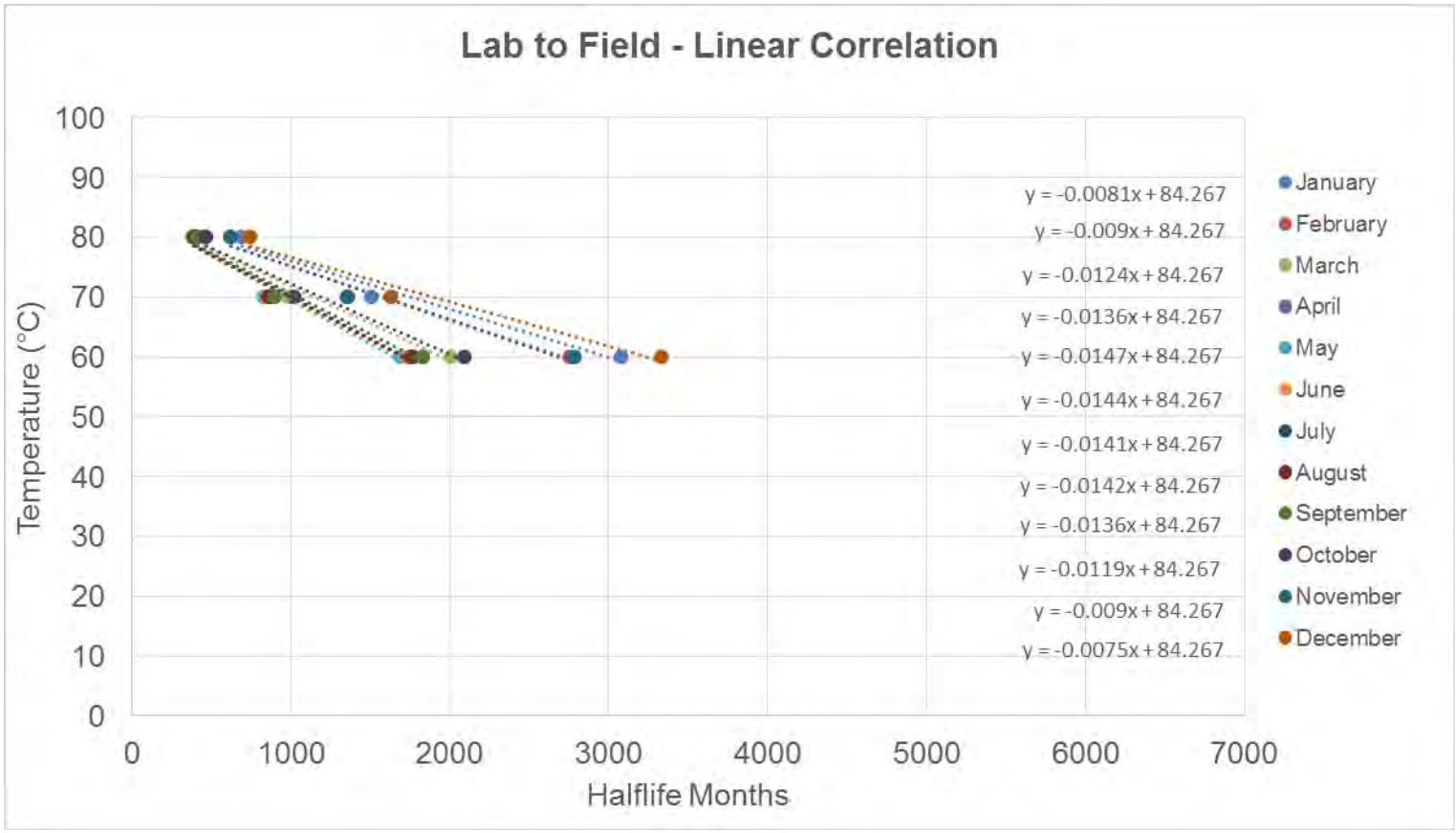
Note: Richgels (2015b) mentions that the use of peak turf temperature is conservative since it only occurs for approximately one hour per day.

Arrhenius Plot of Lab Data
Watershed Geosynthetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure 5

Kennesaw, GA | 23-April-2015



Note: Each month was projected down to the peak turf temperature given in Table 3 to get the half-life months. The inverse of half-life months is half-life loss per month. The sum of all the half-life losses for each month in a year is the yearly half-life loss, the inverse of which is the half-life.

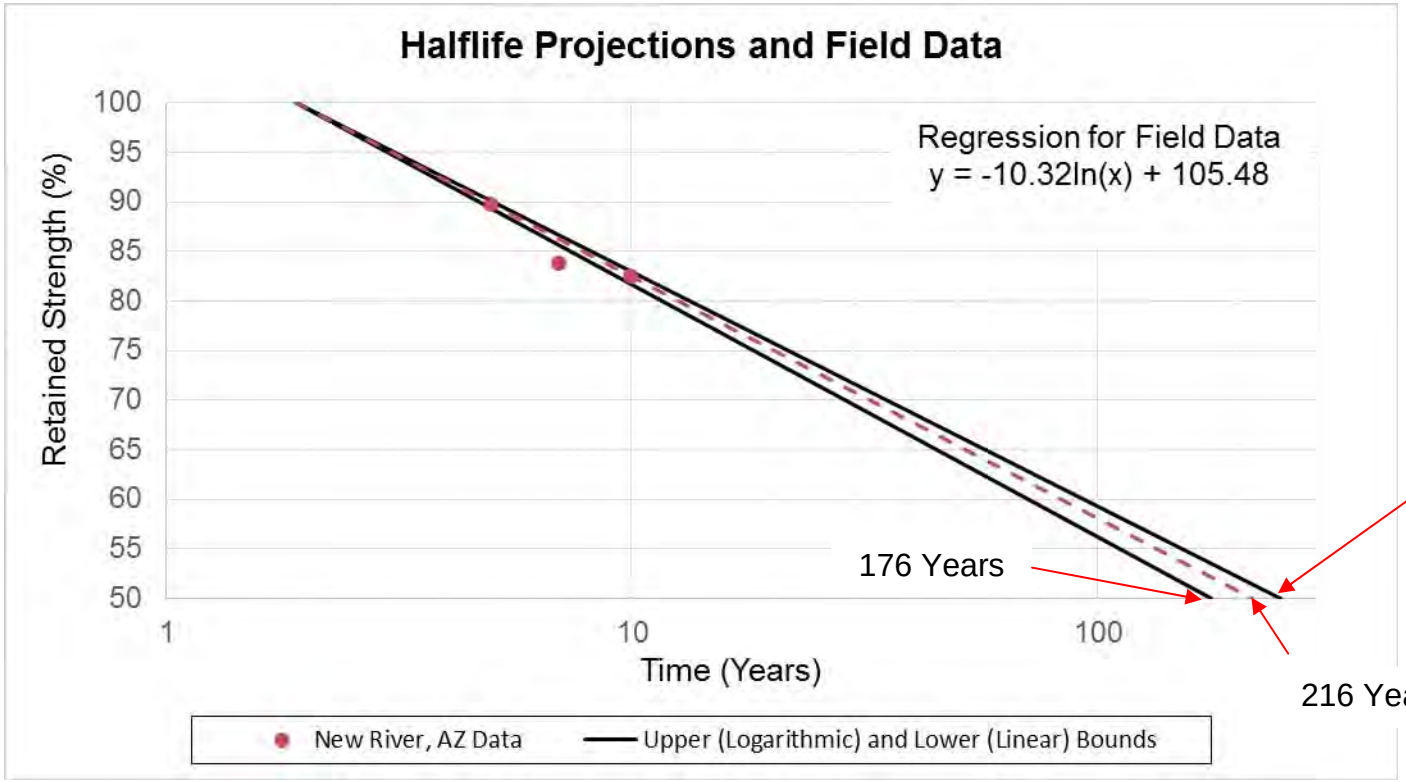
Linear Extrapolations for Half-life Months

Watershed Geosythetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure **6**

Kennesaw, GA | 23-April-2015



Note: Geosyntec calculated an upper bound half-life of 277 years and a lower bound half-life of 214 years using the same data and method. Difference between Geosyntec and Richgels calculations are attributed to rounding.

Halflife Projections (Richgels, 2015a, 2015b)
Upper and Lower Bound Estimates
Watershed Geosythetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure **7**

Kennesaw, GA | 23-March-2015

See page 20 Sub D

January 4, 2013

SUBJECT: CLOSURE TURF INFILTRATION EQUIVALENCE CALCULATION

The infiltration equivalence of Closure Turf to the Texas final cover prescriptive standard can be estimated by several methods. One method was described by J.P. Giroud et.al.[1] for assumed circular defects in geomembranes. Estimates of infiltration, Q (m^3/sec) can be found from the following equation:

$$Q = 0.976\, C_{qo}\left[1 + 0.1\left(\frac{h}{t_{UM}}\right)^{0.95}\right] d^{0.2}\, h^{0.9}\, k_{UM}^{0.74} \qquad [1]$$

Where, h = hydraulic head over the liner (m)
t_{UM} = thickness of the infiltration layer (m)
d = diameter of defect (m)
k_{UM} = permeability of infiltration layer (m/sec)

The contact coefficient C_{qo} is either 0.21 or 1.15 to account for good or poor contact conditions between the geomembrane and the infiltration layer soil. With typical CQA procedures controlling installation, the contact coefficient would be 0.21. This equation is only valid for infiltration soil permeability's less than the so-called Giroud permeability, k_G. Higher permeability values result in Bernoulli type orifice flow through the defects. The upper permeability limit is found from:

$$k_G = \left\{\frac{0.3891\, d^{1.8}}{C_{qo}\left[1 + 0.1\left(\frac{h}{t_{UM}}\right)^{0.95}\right] h^{0.4}}\right\}^{1/0.74} \qquad [2]$$

The infiltration potential of the Closure Turf final cover system is compared to the Texas prescriptive standard using Equation 1. The final cover profiles analyzed are as follows:

---

[1] *Rate Of Liquid Migration Through Defects In A Geomembrane Placed On A Semi-Permeable Medium*, J.P. Giroud, T.D. King, T.R. Sanglerat, T. Hadj-Hamou and M.V. Khire, Geosynthetics International 1997, Vol. 4, Nos. 3-4

Texas Final Cover Prescriptive Standard	Closure Turf Final Cover System
1 foot of Topsoil[2]	½" sand ballast (minimum thickness)
Geomembrane[3]	Artificial HDPE grass turf tufted into a polypropylene double-layered woven geotextile
	50-mil LLDPE Supergripnet (SGN) geomembrane
18-inch infiltration layer (k = 1x10-5 cm/sec)	12" minimum infiltration layer

The results of the Giroud analysis are shown on Table 1 below. Two scenarios for the soil layer beneath the Closure Turf system were compared against the prescriptive standard;

a. A silty sandy soil with permeability higher than the prescriptive standard for a infiltration layer, and

b. A silty, clayey sand with permeability at the prescribed level of the prescriptive standard.

It should be noted the required permeability value of $1x10^{-5}$ cm/sec in the infiltration layer is quite achievable with typical soils. Lower permeability soils require significant clay content (typically greater than 50% passing the #200 sieve). This permeability specification is basically common soil.

As can be seen on Table 1, the estimated infiltration of the Closure Turf final cover system is well below the estimated infiltration rates for the prescriptive standard final cover system for both assumed subgrade soil conditions. The assumed permeabilities of the subgrade soils are below the upper limit as calculated by Equation 2, so use of Equation 1 in performing these calculations is valid.

These results are primarily due to the much lower hydraulic head capacity of the Closure Turf system with only a ½" topsoil layer in a saturated ballast sand.

[2] The prescriptive standard only calls for 6-inches, but that is too difficult to place without damaging the liner.

[3] A drainage media (typ. Geocomposite) is also required for stability

Table 1

Landfill Final Cover Infiltration Equivalency Calculation

Soil Type: Silty-sandy soil

	Prescriptive Cover		Closure Turf	
Topsoil (h)	12 in	0.3048 m	0.5 in	0.0127 m
Infiltration Layer (t_{UM})	18 in	0.4572 m	18 in	0.4572 m
Diameter of Hole (d)	1 cm	0.01 m	1 cm	0.01 m
Area of Hole	0.79 cm^2	7.85E-05 m^2	0.79 cm^2	7.85E-05 m^2
C_{qo}		0.21		0.21
Infiltration Layer k, k_{UM}	1.00E-05 cm/sec	1.00E-07 m/sec	1.00E-04 cm/sec	1.00E-06 m/sec
Upper Permeability Limit, k_G		5.46E-05 m/sec		3.31E-04 m/sec
Flow		1.98E-07 m^3/sec		5.84E-08 m^3/sec
Estimated Infiltration, Q		**4.51 Ga/day**		**1.33 Ga/day**

Soil Type: Silty-sandy soil some clay

	Prescriptive Cover		Closure Turf	
Topsoil (h)	12 in	0.3048 m	0.5 in	0.0127 m
Infiltration Layer (t_{UM})	18 in	0.4572 m	18 in	0.4572 m
Diameter of Hole (d)	1 cm	0.01 m	1 cm	0.01 m
Area of Hole	0.79 cm^2	7.85E-05 m^2	0.79 cm^2	7.85E-05 m^2
C_{qo}		0.21		0.21
Infiltration Layer k, k_{UM}	1.00E-05 cm/sec	1.00E-07 m/sec	1.00E-05 cm/sec	1.00E-07 m/sec
Upper Permeability Limit, k_G		5.46E-05 m/sec		3.31E-04 m/sec
Flow		1.98E-07 m^3/sec		1.06E-08 m^3/sec
Estimated Infiltration, Q		**4.51 Ga/day**		**0.24 Ga/day**

The Closure Turf Final Cover System provides equivalent or better infiltration protection than the prescriptive standard for construction of landfill final closure systems.

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379 •
Fax 843 546-0516

If you have any questions regarding this matter, please call the undersigned at (916) 218-8375.

Very Truly Yours,

AGRU-America, Inc.
Christopher M. Richgels, PE
Western Region Engineer

Cc: Michael Ayers, Closure Turf, LLC
Jose Urrutia, Closure Turf LLC
Joe Viecelli, IESI- Progressive Waste Solutions
Jeff Palutis, IESI Progressive Waste Solutions
Joe Miller, IESI – Progressive Waste Solutions
Joey Miller, IESI – Progressive Waste Solutions
Nevzat Turan, Weaver Boos Consultants
Anne Steacy, Agru-America, Inc.

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:     C:\ZHELP3W\DALLAS.D4
TEMPERATURE DATA FILE:       C:\zhELP3w\DALLAS.D7
SOLAR RADIATION DATA FILE:   C:\zhELP3w\DALLAS.D13
EVAPOTRANSPIRATION DATA:     C:\zHELP3w\DALLAS.D11
SOIL AND DESIGN DATA FILE:   C:\zhELP3w\DLS-SOIL.D10
OUTPUT DATA FILE:            C:\zheLP3w\DLS-soil.OUT


TIME:  11:27     DATE:   8/ 6/2013


******************************************************************************

     TITLE:  Subtitle D with Soil Cap : Dallas, Texas

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.
```

2' vegetated Cover
geocomposite Drainage
40 mil geomembrane

```
                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   6
          THICKNESS                  =     24.00   INCHES
          POROSITY                   =      0.4530 VOL/VOL
          FIELD CAPACITY             =      0.1900 VOL/VOL
          WILTING POINT              =      0.0850 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.1968 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.720000011000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                  LAYER  2
                                  --------

                       TYPE 2 - LATERAL DRAINAGE LAYER
                         MATERIAL TEXTURE NUMBER   0
          THICKNESS                  =      0.20   INCHES
          POROSITY                   =      0.8500 VOL/VOL
          FIELD CAPACITY             =      0.0100 VOL/VOL
          WILTING POINT              =      0.0050 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.8500 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.199999996000E-12 CM/SEC
          SLOPE                      =      7.00   PERCENT
          DRAINAGE LENGTH            =    100.0    FEET
```

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

40mil Liner

THICKNESS	=	0.04	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 4

18" 1.7×10^{-5} cm/sec

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 15

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4750	VOL/VOL
FIELD CAPACITY	=	0.3780	VOL/VOL
WILTING POINT	=	0.2650	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4750	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.170000003000E-04	CM/SEC

LAYER 5

WASTE

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	600.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 6

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 3

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.0830	VOL/VOL
WILTING POINT	=	0.0330	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4570	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.310000009000E-02	CM/SEC

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL

WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0103	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	2.00000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	100.0	FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	1.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 9

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	85.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	1.212	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	4.530	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.850	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	204.378	INCHES
TOTAL INITIAL WATER	=	204.378	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
DALLAS TEXAS

STATION LATITUDE	=	32.85	DEGREES
MAXIMUM LEAF AREA INDEX	=	4.50	
START OF GROWING SEASON (JULIAN DATE)	=	63	
END OF GROWING SEASON (JULIAN DATE)	=	329	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	10.80	MPH

AVERAGE 1ST QUARTER RELATIVE HUMIDITY = 66.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 63.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 66.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.65	1.93	2.42	3.63	4.27	2.59
2.00	1.76	3.31	2.47	1.76	1.67

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
44.00	48.50	56.10	65.90	73.70	82.00
86.30	85.50	78.60	67.90	55.60	47.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS
AND STATION LATITUDE = 32.85 DEGREES

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.66	1.23	0.77	0.36	1.86	0.86
	0.41	3.84	2.04	0.96	1.04	2.67
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.001	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.506	0.866	1.221	0.464	1.953	1.078
	0.411	3.519	2.018	0.566	1.420	1.469
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.2423	0.1579	0.1263	0.0885	0.0671	0.0464
	0.0342	0.0614	0.0908	0.0669	0.0458	0.1173
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0048	0.0033	0.0028	0.0021	0.0017	0.0013
	0.0011	0.0016	0.0021	0.0017	0.0013	0.0025
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0048	0.0033	0.0028	0.0021	0.0017	0.0013
	0.0011	0.0016	0.0021	0.0017	0.0013	0.0025
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0048	0.0033	0.0028	0.0021	0.0017	0.0013
	0.0011	0.0016	0.0021	0.0017	0.0013	0.0025
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	2.949	2.183	1.632	1.237	0.961	0.744
TOP OF LAYER 3	0.587	0.897	1.265	0.959	0.737	1.530
STD. DEVIATION OF DAILY	0.276	0.180	0.144	0.095	0.075	0.053
HEAD ON TOP OF LAYER 3	0.039	0.546	0.104	0.077	0.062	1.337
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.70	60621.004	100.00
RUNOFF	0.001	2.868	0.00
EVAPOTRANSPIRATION	15.491	56232.602	92.76
DRAINAGE COLLECTED FROM LAYER 2	1.1449	4155.898	6.86
PERC./LEAKAGE THROUGH LAYER 4	0.026333	95.589	0.16
AVG. HEAD ON TOP OF LAYER 3	1.3069		
PERC./LEAKAGE THROUGH LAYER 6	0.026332	95.586	0.16
AVG. HEAD ON TOP OF LAYER 6	0.0000		
DRAINAGE COLLECTED FROM LAYER 7	0.0263	95.572	0.16
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.037	134.042	0.22
SOIL WATER AT START OF YEAR	204.378	741893.000	
SOIL WATER AT END OF YEAR	204.415	742027.062	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.013	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 2

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.43	2.38	5.84	3.33	3.03	2.24
	0.62	4.38	3.34	1.61	1.74	1.55
RUNOFF	0.000	0.000	0.133	0.095	0.177	0.000
	0.000	0.155	0.402	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.806	1.144	3.837	2.210	3.190	1.873
	1.455	3.717	1.633	2.087	1.273	1.263
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.2486	0.1567	0.5465	0.6917	0.6174	0.5250
	0.3880	0.2852	0.4867	0.3856	0.2696	0.1979
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0049	0.0032	0.0097	0.0120	0.0109	0.0093
	0.0072	0.0055	0.0087	0.0071	0.0052	0.0040
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0049	0.0033	0.0096	0.0120	0.0109	0.0094
	0.0072	0.0055	0.0087	0.0071	0.0052	0.0040
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0049	0.0033	0.0094	0.0120	0.0109	0.0094
	0.0072	0.0055	0.0087	0.0072	0.0052	0.0040
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	3.020	2.169	6.400	8.309	7.204	6.355
	4.602	3.436	5.906	4.574	3.360	2.445
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.280	0.550	2.012	0.638	0.604	0.590
	0.441	0.520	0.796	0.438	0.303	0.321
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.49	110678.703	100.00
RUNOFF	0.963	3497.404	3.16
EVAPOTRANSPIRATION	24.489	88893.891	80.32
DRAINAGE COLLECTED FROM LAYER 2	4.7988	17419.822	15.74

PERC./LEAKAGE THROUGH LAYER 4	0.087669	318.238	0.29
AVG. HEAD ON TOP OF LAYER 3	4.8150		
PERC./LEAKAGE THROUGH LAYER 6	0.087682	318.285	0.29
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.0877	318.345	0.29
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	0.151	549.241	0.50
SOIL WATER AT START OF YEAR	204.415	742027.062	
SOIL WATER AT END OF YEAR	204.566	742576.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.003	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 3

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.77	0.45	5.08	2.18	2.07	3.94
	2.38	2.75	2.65	0.35	0.55	0.47
RUNOFF	0.000	0.000	0.176	0.007	0.000	0.192
	0.049	0.001	0.082	0.000	0.000	0.000
EVAPOTRANSPIRATION	1.486	0.221	2.166	2.050	2.191	1.452
	3.160	2.879	2.302	0.350	0.501	0.262
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1906	0.1281	0.5788	0.7582	0.5605	0.3959
	0.6416	0.4579	0.3741	0.3130	0.2163	0.1596
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0039	0.0028	0.0101	0.0131	0.0099	0.0073
	0.0112	0.0083	0.0069	0.0059	0.0043	0.0034
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0039	0.0028	0.0100	0.0131	0.0100	0.0072
	0.0113	0.0083	0.0069	0.0060	0.0043	0.0034
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0039	0.0028	0.0098	0.0131	0.0100	0.0072
	0.0113	0.0083	0.0069	0.0060	0.0043	0.0034
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	2.363	1.809	6.766	9.088	6.559	4.841
	7.479	5.395	4.586	3.751	2.736	2.011

STD. DEVIATION OF DAILY	0.147	0.146	4.663	0.857	0.636	0.795
HEAD ON TOP OF LAYER 3	0.685	0.520	0.379	0.356	0.246	0.182
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	23.64	85813.195	100.00
RUNOFF	0.506	1837.062	2.14
EVAPOTRANSPIRATION	19.019	69037.484	80.45
DRAINAGE COLLECTED FROM LAYER 2	4.7747	17332.043	20.20
PERC./LEAKAGE THROUGH LAYER 4	0.087030	315.920	0.37
AVG. HEAD ON TOP OF LAYER 3	4.7820		
PERC./LEAKAGE THROUGH LAYER 6	0.087039	315.953	0.37
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.0870	315.990	0.37
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	-0.746	-2709.373	-3.16
SOIL WATER AT START OF YEAR	204.566	742576.250	
SOIL WATER AT END OF YEAR	203.820	739866.875	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.018	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 4

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.60	3.00	1.38	9.19	5.02	1.33

	0.78	1.25	5.07	0.11	1.42	1.67
RUNOFF	0.059	0.000	0.000	1.843	0.285	0.000
	0.000	0.000	0.271	0.000	0.000	0.012
EVAPOTRANSPIRATION	1.236	2.327	1.879	3.216	3.865	2.250
	0.780	1.250	2.749	1.358	1.196	1.386
LATERAL DRAINAGE COLLECTED	0.2078	0.3033	0.4371	0.7708	1.0921	0.9268
FROM LAYER 2	0.6858	0.4874	0.3470	0.4706	0.3368	0.2873
PERCOLATION/LEAKAGE THROUGH	0.0042	0.0057	0.0080	0.0132	0.0184	0.0157
LAYER 4	0.0119	0.0088	0.0065	0.0085	0.0063	0.0055
PERCOLATION/LEAKAGE THROUGH	0.0041	0.0057	0.0080	0.0131	0.0184	0.0157
LAYER 6	0.0120	0.0088	0.0064	0.0085	0.0063	0.0055
LATERAL DRAINAGE COLLECTED	0.0041	0.0057	0.0080	0.0129	0.0184	0.0158
FROM LAYER 7	0.0120	0.0088	0.0064	0.0085	0.0063	0.0055
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	2.557	3.879	5.159	9.236	12.590	11.066
TOP OF LAYER 3	7.981	5.730	4.268	5.539	4.148	3.459
STD. DEVIATION OF DAILY	0.931	0.737	0.463	3.536	1.113	1.026
HEAD ON TOP OF LAYER 3	0.778	0.554	0.654	0.468	0.295	0.142
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.82	119136.609	100.00
RUNOFF	2.470	8965.638	7.53
EVAPOTRANSPIRATION	23.492	85277.633	71.58
DRAINAGE COLLECTED FROM LAYER 2	6.3529	23060.910	19.36
PERC./LEAKAGE THROUGH LAYER 4	0.112597	408.726	0.34
AVG. HEAD ON TOP OF LAYER 3	6.3010		
PERC./LEAKAGE THROUGH LAYER 6	0.112576	408.652	0.34
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1125	408.531	0.34

PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	0.392	1423.895	1.20
SOIL WATER AT START OF YEAR	203.820	739866.875	
SOIL WATER AT END OF YEAR	204.212	741290.812	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.003	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.48	1.36	1.65	3.43	4.48	3.16
	1.52	1.72	1.94	3.11	0.73	0.81
RUNOFF	0.000	0.000	0.000	0.000	0.059	0.120
	0.000	0.001	0.005	0.010	0.000	0.000
EVAPOTRANSPIRATION	0.823	1.825	1.914	3.551	4.313	2.957
	1.520	0.895	2.759	2.021	0.719	0.652
LATERAL DRAINAGE COLLECTED	0.2396	0.1561	0.1248	0.0865	0.0687	0.0596
FROM LAYER 2	0.0833	0.0591	0.0407	0.2071	0.2396	0.1768
PERCOLATION/LEAKAGE THROUGH	0.0047	0.0032	0.0028	0.0021	0.0017	0.0016
LAYER 4	0.0020	0.0016	0.0012	0.0041	0.0047	0.0037
PERCOLATION/LEAKAGE THROUGH	0.0047	0.0032	0.0028	0.0021	0.0018	0.0016
LAYER 6	0.0020	0.0016	0.0012	0.0041	0.0047	0.0037
LATERAL DRAINAGE COLLECTED	0.0047	0.0033	0.0028	0.0021	0.0018	0.0015
FROM LAYER 7	0.0020	0.0016	0.0012	0.0040	0.0047	0.0037
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	2.918	2.161	1.616	1.214	0.980	0.899
TOP OF LAYER 3	1.145	0.870	0.677	2.549	3.009	2.206
STD. DEVIATION OF DAILY	0.273	0.178	0.142	0.100	0.069	0.279
HEAD ON TOP OF LAYER 3	0.095	0.068	0.047	1.577	0.273	0.201
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	25.39	92165.703	100.00
RUNOFF	0.194	705.830	0.77
EVAPOTRANSPIRATION	23.952	86945.367	94.34
DRAINAGE COLLECTED FROM LAYER 2	1.5420	5597.336	6.07
PERC./LEAKAGE THROUGH LAYER 4	0.033307	120.904	0.13
AVG. HEAD ON TOP OF LAYER 3	1.6871		
PERC./LEAKAGE THROUGH LAYER 6	0.033325	120.971	0.13
AVG. HEAD ON TOP OF LAYER 6	0.0000		
DRAINAGE COLLECTED FROM LAYER 7	0.0334	121.062	0.13
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.332	-1203.833	-1.31
SOIL WATER AT START OF YEAR	204.212	741290.812	
SOIL WATER AT END OF YEAR	203.881	740086.937	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.062	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 6

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.37	3.76	3.22	6.02	3.62	2.45
	1.15	1.39	2.97	5.98	3.52	0.94
RUNOFF	0.000	0.020	0.183	0.377	0.206	0.075
	0.000	0.002	0.011	0.750	0.192	0.000
EVAPOTRANSPIRATION	0.413	1.630	2.969	3.494	2.916	2.323
	1.142	1.386	1.925	2.641	1.220	1.645
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1255	0.1568	0.6489	0.6020	1.0939	0.7862
	0.5924	0.4218	0.2929	1.0431	0.9448	0.9854

PERCOLATION/LEAKAGE THROUGH	0.0028	0.0032	0.0113	0.0106	0.0184	0.0135
LAYER 4	0.0105	0.0077	0.0056	0.0175	0.0160	0.0167
PERCOLATION/LEAKAGE THROUGH	0.0028	0.0031	0.0113	0.0106	0.0184	0.0135
LAYER 6	0.0105	0.0077	0.0056	0.0174	0.0160	0.0167
LATERAL DRAINAGE COLLECTED	0.0028	0.0030	0.0113	0.0105	0.0183	0.0136
FROM LAYER 7	0.0105	0.0078	0.0056	0.0173	0.0160	0.0168
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	1.624	2.170	7.562	7.257	12.611	9.417
TOP OF LAYER 3	6.921	4.985	3.634	12.034	11.276	11.379
STD. DEVIATION OF DAILY	0.143	1.906	1.159	1.064	1.263	0.824
HEAD ON TOP OF LAYER 3	0.662	0.477	0.324	3.824	1.018	1.023
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	35.39	128465.695	100.00
RUNOFF	1.816	6591.679	5.13
EVAPOTRANSPIRATION	23.704	86045.531	66.98
DRAINAGE COLLECTED FROM LAYER 2	7.6937	27928.172	21.74
PERC./LEAKAGE THROUGH LAYER 4	0.133678	485.252	0.38
AVG. HEAD ON TOP OF LAYER 3	7.5724		
PERC./LEAKAGE THROUGH LAYER 6	0.133588	484.925	0.38
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1335	484.431	0.38
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0002		
CHANGE IN WATER STORAGE	2.043	7415.866	5.77
SOIL WATER AT START OF YEAR	203.881	740086.937	

SOIL WATER AT END OF YEAR	205.924	747502.812	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.012	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 7

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.97	2.08	1.13	0.84	1.93	4.80
	2.60	3.16	2.86	5.59	2.28	2.33
RUNOFF	0.000	0.019	0.000	0.000	0.000	0.102
	0.000	0.062	0.001	0.194	0.000	0.015
EVAPOTRANSPIRATION	2.026	1.910	0.801	1.337	1.394	4.049
	1.420	3.447	2.444	2.730	1.558	2.012
LATERAL DRAINAGE COLLECTED	0.7078	0.4755	0.4211	0.2911	0.2155	0.4339
FROM LAYER 2	0.3636	0.3964	0.3331	0.5846	0.6950	0.9266
PERCOLATION/LEAKAGE THROUGH	0.0123	0.0085	0.0077	0.0055	0.0043	0.0079
LAYER 4	0.0068	0.0073	0.0062	0.0103	0.0121	0.0157
PERCOLATION/LEAKAGE THROUGH	0.0123	0.0085	0.0077	0.0056	0.0043	0.0078
LAYER 6	0.0068	0.0073	0.0063	0.0103	0.0120	0.0157
LATERAL DRAINAGE COLLECTED	0.0124	0.0085	0.0077	0.0056	0.0043	0.0078
FROM LAYER 7	0.0068	0.0073	0.0063	0.0102	0.0120	0.0157
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	8.230	6.173	4.978	3.612	2.645	5.287
TOP OF LAYER 3	4.325	4.697	4.105	6.832	8.347	10.713
STD. DEVIATION OF DAILY	0.796	0.344	0.478	0.331	0.238	1.247
HEAD ON TOP OF LAYER 3	0.413	1.009	0.379	1.855	0.283	1.233
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	31.57	114599.102	100.00
RUNOFF	0.394	1428.910	1.25
EVAPOTRANSPIRATION	25.129	91219.961	79.60
DRAINAGE COLLECTED FROM LAYER 2	5.8441	21214.211	18.51
PERC./LEAKAGE THROUGH LAYER 4	0.104593	379.673	0.33
AVG. HEAD ON TOP OF LAYER 3	5.8286		
PERC./LEAKAGE THROUGH LAYER 6	0.104584	379.640	0.33
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1046	379.582	0.33
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	0.098	356.375	0.31
SOIL WATER AT START OF YEAR	205.924	747502.812	
SOIL WATER AT END OF YEAR	206.022	747859.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.053	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 8

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.03	2.16	0.77	5.84	1.59	2.91
	5.26	1.42	1.24	0.93	0.61	0.69
RUNOFF	0.000	0.030	0.000	0.202	0.000	0.088
	1.539	0.021	0.001	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.506	1.790	1.344	4.261	1.727	2.423
	2.282	1.391	1.063	1.106	0.375	0.431
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.7656	0.5155	0.4590	0.4551	0.5732	0.4222
	0.7889	0.6198	0.4299	0.3174	0.2193	0.1619
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0132	0.0092	0.0083	0.0082	0.0101	0.0077
	0.0136	0.0109	0.0078	0.0060	0.0044	0.0034

PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0132	0.0092	0.0083	0.0082	0.0102	0.0077
	0.0135	0.0109	0.0078	0.0060	0.0044	0.0034
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0133	0.0092	0.0083	0.0081	0.0102	0.0077
	0.0135	0.0110	0.0079	0.0060	0.0044	0.0034
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	8.886	6.452	5.407	5.536	6.703	5.149
	9.150	7.232	5.239	3.801	2.771	2.036
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.869	0.565	0.464	1.579	0.651	0.492
	1.639	0.692	0.489	0.361	0.250	0.184
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	24.45	88753.508	100.00
RUNOFF	1.881	6827.652	7.69
EVAPOTRANSPIRATION	18.698	67872.141	76.47
DRAINAGE COLLECTED FROM LAYER 2	5.7277	20791.623	23.43
PERC./LEAKAGE THROUGH LAYER 4	0.102747	372.971	0.42
AVG. HEAD ON TOP OF LAYER 3	5.6968		
PERC./LEAKAGE THROUGH LAYER 6	0.102848	373.337	0.42
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1030	373.872	0.42
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	-1.959	-7111.778	-8.01
SOIL WATER AT START OF YEAR	206.022	747859.187	
SOIL WATER AT END OF YEAR	204.063	740747.437	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	-0.009	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 9

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.12	2.45	3.05	4.91	6.34	2.02
	5.46	0.00	5.50	1.44	5.10	2.21
RUNOFF	0.000	0.036	0.000	0.713	0.123	0.000
	1.046	0.000	0.679	0.016	0.365	0.000
EVAPOTRANSPIRATION	0.637	2.077	2.993	2.436	4.495	3.038
	2.158	0.000	3.448	0.949	1.599	1.675
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1103	0.2923	0.3317	0.4248	0.6486	0.6619
	1.0356	0.8331	0.7930	0.7117	1.1294	1.0724
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0025	0.0055	0.0062	0.0077	0.0113	0.0115
	0.0175	0.0143	0.0136	0.0124	0.0189	0.0180
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0025	0.0054	0.0062	0.0076	0.0114	0.0115
	0.0174	0.0143	0.0136	0.0124	0.0188	0.0181
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0025	0.0054	0.0062	0.0076	0.0114	0.0116
	0.0173	0.0144	0.0136	0.0124	0.0187	0.0181
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	1.452	3.871	3.963	5.180	7.558	7.959
	11.949	9.652	9.496	8.274	13.441	12.367
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.284	1.271	0.323	2.253	0.534	0.708
	2.626	0.945	0.745	0.808	3.828	1.047
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT

PRECIPITATION	39.60	143748.016	100.00
RUNOFF	2.978	10811.631	7.52
EVAPOTRANSPIRATION	25.504	92579.203	64.40
DRAINAGE COLLECTED FROM LAYER 2	8.0447	29202.187	20.31
PERC./LEAKAGE THROUGH LAYER 4	0.139413	506.068	0.35
AVG. HEAD ON TOP OF LAYER 3	7.9301		
PERC./LEAKAGE THROUGH LAYER 6	0.139306	505.682	0.35
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1391	505.101	0.35
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0002		
CHANGE IN WATER STORAGE	2.934	10649.832	7.41
SOIL WATER AT START OF YEAR	204.063	740747.437	
SOIL WATER AT END OF YEAR	206.996	751397.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.048	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.69	1.43	2.01	1.22	7.68	0.24
	0.56	3.59	5.49	3.60	0.48	4.86
RUNOFF	0.000	0.000	0.008	0.000	1.533	0.000
	0.000	0.094	0.186	0.000	0.000	0.008
EVAPOTRANSPIRATION	1.537	0.809	1.890	1.831	2.293	1.404
	0.560	1.693	3.912	3.299	1.501	1.539
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.8165	0.5336	0.4281	0.3582	0.5681	0.8365
	0.6236	0.4432	0.6766	0.7812	0.5807	0.6325
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0140	0.0094	0.0078	0.0067	0.0100	0.0143
	0.0110	0.0081	0.0117	0.0135	0.0102	0.0111
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0140	0.0094	0.0078	0.0067	0.0099	0.0143
	0.0110	0.0081	0.0117	0.0134	0.0103	0.0110
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0141	0.0095	0.0078	0.0067	0.0098	0.0143
	0.0110	0.0081	0.0117	0.0134	0.0103	0.0109
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	9.464	6.902	5.056	4.399	6.645	10.006
	7.275	5.228	8.132	9.062	7.008	7.376
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.898	0.607	0.521	0.391	3.343	0.858
	0.708	0.503	1.159	0.514	0.659	2.079
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	31.85	115615.500	100.00
RUNOFF	1.829	6637.895	5.74
EVAPOTRANSPIRATION	22.269	80835.562	69.92
DRAINAGE COLLECTED FROM LAYER 2	7.2787	26421.648	22.85
PERC./LEAKAGE THROUGH LAYER 4	0.127702	463.558	0.40
AVG. HEAD ON TOP OF LAYER 3	7.2128		
PERC./LEAKAGE THROUGH LAYER 6	0.127702	463.558	0.40
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1277	463.553	0.40
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0002		
CHANGE IN WATER STORAGE	0.346	1256.841	1.09
SOIL WATER AT START OF YEAR	206.996	751397.250	
SOIL WATER AT END OF YEAR	207.343	752654.125	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.005	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.11	2.03	2.49	3.73	3.76	2.39
	2.07	2.35	3.31	2.37	1.75	1.82
STD. DEVIATIONS	0.72	0.95	1.79	2.78	2.09	1.39
	1.89	1.40	1.53	2.11	1.51	1.31
RUNOFF						
TOTALS	0.006	0.010	0.050	0.324	0.238	0.058
	0.263	0.034	0.164	0.097	0.056	0.003
STD. DEVIATIONS	0.019	0.014	0.080	0.582	0.466	0.068
	0.555	0.054	0.228	0.237	0.124	0.006
EVAPOTRANSPIRATION						
TOTALS	0.997	1.460	2.102	2.485	2.834	2.285
	1.489	2.018	2.425	1.711	1.136	1.234
STD. DEVIATIONS	0.544	0.668	0.927	1.152	1.102	0.898
	0.851	1.280	0.843	0.994	0.446	0.584
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	0.3655	0.2876	0.4102	0.4527	0.5505	0.5094
	0.5237	0.4065	0.3865	0.4881	0.4677	0.4718
STD. DEVIATIONS	0.2796	0.1639	0.1750	0.2531	0.3623	0.3026
	0.3100	0.2340	0.2313	0.2944	0.3561	0.3905
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0067	0.0054	0.0075	0.0081	0.0097	0.0090
	0.0093	0.0074	0.0070	0.0087	0.0083	0.0084
STD. DEVIATIONS	0.0045	0.0027	0.0029	0.0041	0.0059	0.0049
	0.0051	0.0039	0.0038	0.0048	0.0057	0.0063
PERCOLATION/LEAKAGE THROUGH LAYER 6						
TOTALS	0.0067	0.0054	0.0075	0.0081	0.0097	0.0090
	0.0093	0.0074	0.0070	0.0087	0.0083	0.0084
STD. DEVIATIONS	0.0046	0.0027	0.0028	0.0041	0.0059	0.0050
	0.0051	0.0039	0.0038	0.0047	0.0057	0.0063
LATERAL DRAINAGE COLLECTED FROM LAYER 7						
TOTALS	0.0068	0.0054	0.0074	0.0081	0.0097	0.0090
	0.0093	0.0074	0.0070	0.0087	0.0083	0.0084
STD. DEVIATIONS	0.0046	0.0027	0.0028	0.0041	0.0059	0.0050
	0.0050	0.0039	0.0038	0.0047	0.0057	0.0063
PERCOLATION/LEAKAGE THROUGH LAYER 9						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	4.3463	3.7767	4.8540	5.5069	6.4456	6.1722
	6.1415	4.8120	4.7309	5.7377	5.6833	5.5523
STD. DEVIATIONS	3.1720	2.0241	1.9858	2.9670	4.1109	3.5476
	3.5170	2.6549	2.7120	3.3402	4.1746	4.4304

DAILY AVERAGE HEAD ON TOP OF LAYER 6

AVERAGES	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
	0.0001	0.0000	0.0000	0.0001	0.0001	0.0001

DAILY AVERAGE HEAD ON TOP OF LAYER 8

AVERAGES	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
STD. DEVIATIONS	0.0001	0.0000	0.0000	0.0001	0.0001	0.0001
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	29.19 (6.651)	105959.7	100.00
RUNOFF	1.303 (1.0298)	4730.66	4.465
EVAPOTRANSPIRATION	22.175 (3.3189)	80493.94	75.967
LATERAL DRAINAGE COLLECTED FROM LAYER 2	5.32022 (2.37292)	19312.385	18.22616
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.09551 (0.03892)	346.690	0.32719
AVERAGE HEAD ON TOP OF LAYER 3	5.313 (2.277)		
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.09550 (0.03890)	346.659	0.32716
AVERAGE HEAD ON TOP OF LAYER 6	0.000 (0.000)		
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.09548 (0.03886)	346.604	0.32711
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (0.00000)	0.009	0.00001
AVERAGE HEAD ON TOP OF LAYER 8	0.000 (0.000)		
CHANGE IN WATER STORAGE	0.296 (1.3628)	1076.11	1.016

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 10

	(INCHES)	(CU. FT.)
PRECIPITATION	4.45	16153.499
RUNOFF	1.539	5585.1455
DRAINAGE COLLECTED FROM LAYER 2	0.04825	175.15550
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000797	2.89409
AVERAGE HEAD ON TOP OF LAYER 3	17.169	
MAXIMUM HEAD ON TOP OF LAYER 3	23.111	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	32.4 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.000795	2.88516
AVERAGE HEAD ON TOP OF LAYER 6	0.000	
DRAINAGE COLLECTED FROM LAYER 7	0.00079	2.88322
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000000	0.00003
AVERAGE HEAD ON TOP OF LAYER 8	0.000	
MAXIMUM HEAD ON TOP OF LAYER 8	0.002	
LOCATION OF MAXIMUM HEAD IN LAYER 7 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	1.00	3631.1433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3590
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0850

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

FINAL WATER STORAGE AT END OF YEAR 10

LAYER	(INCHES)	(VOL/VOL)
1	7.6884	0.3204
2	0.1700	0.8500
3	0.0000	0.0000
4	8.5500	0.4750
5	175.2001	0.2920
6	5.4840	0.4570
7	0.0022	0.0110
8	0.0000	0.0000
9	10.2480	0.4270

SNOW WATER	0.000

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**                                                                              **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                   **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                    **
**                   DEVELOPED BY ENVIRONMENTAL LABORATORY                      **
**                     USAE WATERWAYS EXPERIMENT STATION                        **
**                FOR USEPA RISK REDUCTION ENGINEERING LABORATORY               **
**                                                                              **
**                                                                              **
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PRECIPITATION DATA FILE:     C:\ZHELP3W\DALLAS.D4
TEMPERATURE DATA FILE:       C:\zhELP3w\DALLAS.D7
SOLAR RADIATION DATA FILE:   C:\zhELP3w\DALLAS.D13
EVAPOTRANSPIRATION DATA:     C:\zHELP3w\DALLAS.D11
SOIL AND DESIGN DATA FILE:   C:\zhELP3w\CT-DAL.D10
OUTPUT DATA FILE:            C:\zheLP3w\DLS-CT.OUT


TIME:  13:24     DATE:   8/ 6/2013


**********************************************************************************

     TITLE:  Closure Turf Equivalency Dallas Texas

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                     MATERIAL TEXTURE NUMBER   0
          THICKNESS                     =      0.60   INCHES
          POROSITY                      =      0.4170 VOL/VOL
          FIELD CAPACITY                =      0.0450 VOL/VOL
          WILTING POINT                 =      0.0180 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.0173 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.999999978000E-02 CM/SEC


                                LAYER  2
                                --------

                TYPE 2 - LATERAL DRAINAGE LAYER
                     MATERIAL TEXTURE NUMBER   0
          THICKNESS                     =      0.20   INCHES
          POROSITY                      =      0.8500 VOL/VOL
          FIELD CAPACITY                =      0.0100 VOL/VOL
          WILTING POINT                 =      0.0050 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.0072 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.199999996000E-12 CM/SEC
          SLOPE                         =      7.00   PERCENT
          DRAINAGE LENGTH               =    100.0    FEET
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LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.05 INCHES
POROSITY	=	0.0000 VOL/VOL
FIELD CAPACITY	=	0.0000 VOL/VOL
WILTING POINT	=	0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY	=	1.00 HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00 HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD

LAYER 4

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 15

THICKNESS	=	18.00 INCHES
POROSITY	=	0.4750 VOL/VOL
FIELD CAPACITY	=	0.3780 VOL/VOL
WILTING POINT	=	0.2650 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4750 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.170000003000E-04 CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	600.00 INCHES
POROSITY	=	0.6710 VOL/VOL
FIELD CAPACITY	=	0.2920 VOL/VOL
WILTING POINT	=	0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02 CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 3

THICKNESS	=	12.00 INCHES
POROSITY	=	0.4570 VOL/VOL
FIELD CAPACITY	=	0.0830 VOL/VOL
WILTING POINT	=	0.0330 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0830 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.310000009000E-02 CM/SEC

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.20 INCHES
POROSITY	=	0.8500 VOL/VOL
FIELD CAPACITY	=	0.0100 VOL/VOL

WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	2.00000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	100.0	FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	1.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	95.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.8	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.012	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.420	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.012	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	184.760	INCHES
TOTAL INITIAL WATER	=	184.760	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
DALLAS TEXAS

STATION LATITUDE	=	32.85	DEGREES
MAXIMUM LEAF AREA INDEX	=	4.50	
START OF GROWING SEASON (JULIAN DATE)	=	63	
END OF GROWING SEASON (JULIAN DATE)	=	329	
EVAPORATIVE ZONE DEPTH	=	0.8	INCHES
AVERAGE ANNUAL WIND SPEED	=	10.80	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	63.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	66.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.65	1.93	2.42	3.63	4.27	2.59

2.00	1.76	3.31	2.47	1.76	1.67

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
44.00	48.50	56.10	65.90	73.70	82.00
86.30	85.50	78.60	67.90	55.60	47.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS
AND STATION LATITUDE = 32.85 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.66	1.23	0.77	0.36	1.86	0.86
	0.41	3.84	2.04	0.96	1.04	2.67
RUNOFF	0.144	0.331	0.080	0.004	0.180	0.251
	0.015	1.097	0.316	0.010	0.377	1.432
EVAPOTRANSPIRATION	0.128	0.699	0.723	0.206	1.760	0.733
	0.395	2.672	1.687	0.911	0.606	1.013
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0710	0.2673	0.0501	0.0027	0.0911	0.0177
	0.0000	0.0706	0.0243	0.0512	0.0393	0.2427
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0001	0.0005	0.0002	0.0001	0.0002	0.0000
	0.0000	0.0002	0.0001	0.0002	0.0001	0.0004
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0001	0.0005	0.0002	0.0001	0.0002	0.0000
	0.0000	0.0001	0.0001	0.0001	0.0001	0.0004

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.088	0.438	0.128	0.037	0.170	0.032
	0.002	0.111	0.045	0.110	0.065	0.323
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.221	0.160	0.156	0.062	0.196	0.107
	0.007	0.204	0.125	0.166	0.156	0.311
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000

TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.70	60621.004	100.00
RUNOFF	4.237	15378.880	25.37
EVAPOTRANSPIRATION	11.533	41865.586	69.06
DRAINAGE COLLECTED FROM LAYER 2	0.9281	3368.875	5.56
PERC./LEAKAGE THROUGH LAYER 4	0.002109	7.656	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1290		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.096	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.001807	6.560	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.000	0.000	0.00
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	184.762	670685.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.006	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 2

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.43 0.62	2.38 4.38	5.84 3.34	3.33 1.61	3.03 1.74	2.24 1.55
RUNOFF	0.019 0.265	1.043 1.319	3.582 2.081	1.662 0.462	1.746 0.769	0.588 0.965
EVAPOTRANSPIRATION	0.355 0.658	1.013 3.011	2.188 0.846	1.121 1.431	1.620 0.703	1.284 0.717

LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0562	0.1933	0.2005	0.1376	0.0724	0.0338
	0.0297	0.0267	0.0278	0.1253	0.0636	0.0720
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0002	0.0004	0.0004	0.0003	0.0002	0.0001
	0.0001	0.0001	0.0001	0.0003	0.0002	0.0003
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0002	0.0003	0.0003	0.0002	0.0001	0.0001
	0.0000	0.0001	0.0000	0.0002	0.0002	0.0002

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.133	0.296	0.275	0.207	0.108	0.051
	0.041	0.050	0.041	0.188	0.133	0.176
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.164	0.279	0.280	0.245	0.189	0.150
	0.145	0.125	0.121	0.239	0.180	0.171
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.49	110678.703	100.00
RUNOFF	14.500	52633.648	47.56
EVAPOTRANSPIRATION	14.949	54264.781	49.03
DRAINAGE COLLECTED FROM LAYER 2	1.0391	3771.816	3.41
PERC./LEAKAGE THROUGH LAYER 4	0.002330	8.459	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1416		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.154	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002012	7.305	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.000	0.000	0.00
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	184.762	670685.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 3

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.77	0.45	5.08	2.18	2.07	3.94
	2.38	2.75	2.65	0.35	0.55	0.47
RUNOFF	0.128	0.000	3.719	1.094	0.662	2.605
	0.758	0.421	1.460	0.001	0.092	0.000
EVAPOTRANSPIRATION	0.595	0.203	1.339	0.902	1.474	1.213
	1.596	2.373	1.156	0.349	0.408	0.183
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0398	0.0677	0.2085	0.0616	0.0550	0.0659
	0.0224	0.0152	0.0349	0.0003	0.0498	0.0467
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0001	0.0002	0.0004	0.0001	0.0002	0.0001
	0.0000	0.0001	0.0001	0.0000	0.0002	0.0001
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0001	0.0002	0.0003	0.0001	0.0001	0.0001
	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.080	0.165	0.288	0.091	0.107	0.095
	0.035	0.040	0.061	0.008	0.109	0.079
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.159	0.164	0.285	0.189	0.168	0.202
	0.110	0.097	0.155	0.027	0.168	0.160
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	23.64	85813.195	100.00
RUNOFF	10.939	39709.516	46.27
EVAPOTRANSPIRATION	11.791	42801.902	49.88
DRAINAGE COLLECTED FROM LAYER 2	0.6678	2424.128	2.82
PERC./LEAKAGE THROUGH LAYER 4	0.001604	5.824	0.01

AVG. HEAD ON TOP OF LAYER 3	0.0966		
DRAINAGE COLLECTED FROM LAYER 7	0.0002	0.767	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.001393	5.057	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.240	871.829	1.02
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	185.002	671557.062	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.001	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 4

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.60	3.00	1.38	9.19	5.02	1.33
	0.78	1.25	5.07	0.11	1.42	1.67
RUNOFF	1.590	0.946	0.324	6.913	2.352	0.116
	0.080	0.104	2.252	0.000	0.812	1.038
EVAPOTRANSPIRATION	1.072	1.840	0.883	2.227	2.347	1.449
	0.700	1.143	2.327	0.498	0.403	0.635
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1537	0.1988	0.0990	0.1628	0.0665	0.0194
	0.0004	0.0027	0.0823	0.0201	0.1407	0.0605
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0003	0.0004	0.0003	0.0003	0.0002	0.0001
	0.0000	0.0000	0.0002	0.0000	0.0004	0.0001
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0003	0.0003	0.0002	0.0003	0.0001	0.0001
	0.0000	0.0000	0.0002	0.0000	0.0003	0.0001

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.246	0.304	0.193	0.237	0.109	0.049
	0.007	0.015	0.135	0.031	0.267	0.103
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.238	0.277	0.191	0.268	0.177	0.114
	0.028	0.047	0.203	0.121	0.216	0.185
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.82	119136.609	100.00
RUNOFF	16.526	59987.578	50.35
EVAPOTRANSPIRATION	15.525	56357.316	47.30
DRAINAGE COLLECTED FROM LAYER 2	1.0069	3655.061	3.07
PERC./LEAKAGE THROUGH LAYER 4	0.002335	8.477	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1414		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.175	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002012	7.302	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.240	-871.829	-0.73
SOIL WATER AT START OF YEAR	185.002	671557.062	
SOIL WATER AT END OF YEAR	184.762	670685.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.011	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.48	1.36	1.65	3.43	4.48	3.16
	1.52	1.72	1.94	3.11	0.73	0.81
RUNOFF	0.210	0.275	0.348	1.435	1.985	1.105
	0.092	0.375	0.487	1.690	0.002	0.104
EVAPOTRANSPIRATION	0.814	1.333	1.105	2.028	2.338	2.071
	1.428	0.934	1.823	1.214	0.483	0.696
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0895	0.1183	0.0677	0.0959	0.1052	0.0365
	0.0000	0.0029	0.0387	0.1078	0.0911	0.0817
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0002	0.0003	0.0002	0.0002	0.0002	0.0001
	0.0000	0.0000	0.0001	0.0002	0.0003	0.0002
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001
	0.0000	0.0000	0.0001	0.0002	0.0003	0.0002

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.165	0.214	0.140	0.170	0.153	0.070
	0.008	0.009	0.076	0.140	0.204	0.158
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.213	0.230	0.180	0.204	0.213	0.141
	0.023	0.029	0.148	0.251	0.166	0.194
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	25.39	92165.703	100.00
RUNOFF	8.107	29428.990	31.93
EVAPOTRANSPIRATION	16.266	59044.137	64.06
DRAINAGE COLLECTED FROM LAYER 2	0.8354	3032.486	3.29
PERC./LEAKAGE THROUGH LAYER 4	0.002088	7.579	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1256		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	0.954	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.001825	6.625	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.180	652.543	0.71
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	184.942	671337.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.029	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 6

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.37	3.76	3.22	6.02	3.62	2.45

	1.15	1.39	2.97	5.98	3.52	0.94
RUNOFF	0.001	1.963	1.489	3.266	2.327	0.941
	0.316	0.367	1.259	4.716	2.059	0.118
EVAPOTRANSPIRATION	0.386	1.642	1.601	2.345	1.529	1.482
	0.832	1.009	1.371	1.412	1.109	0.749
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0851	0.2319	0.0974	0.1543	0.0508	0.0264
	0.0025	0.0147	0.0605	0.1314	0.1604	0.0597
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0003	0.0005	0.0002	0.0003	0.0001	0.0001
	0.0000	0.0000	0.0001	0.0003	0.0003	0.0002
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0003	0.0004	0.0002	0.0003	0.0001	0.0001
	0.0000	0.0000	0.0001	0.0002	0.0003	0.0002

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.222	0.372	0.153	0.242	0.076	0.049
	0.010	0.029	0.087	0.186	0.245	0.128
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.139	0.240	0.214	0.251	0.180	0.125
	0.042	0.096	0.180	0.250	0.258	0.176
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	35.39	128465.695	100.00
RUNOFF	18.821	68318.906	53.18
EVAPOTRANSPIRATION	15.466	56143.152	43.70
DRAINAGE COLLECTED FROM LAYER 2	1.0752	3903.036	3.04
PERC./LEAKAGE THROUGH LAYER 4	0.002453	8.903	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1499		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.212	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002115	7.677	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.025	91.725	0.07
SOIL WATER AT START OF YEAR	184.942	671337.750	
SOIL WATER AT END OF YEAR	184.967	671429.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	-0.010	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 7

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.97	2.08	1.13	0.84	1.93	4.80
	2.60	3.16	2.86	5.59	2.28	2.33
RUNOFF	0.505	0.975	0.066	0.025	0.738	2.436
	0.695	1.603	0.852	3.917	0.726	1.051
EVAPOTRANSPIRATION	1.368	1.085	0.661	1.065	0.756	2.671
	1.550	1.768	1.890	1.314	1.481	1.347
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.2171	0.1045	0.1120	0.0416	0.0410	0.0880
	0.0422	0.0553	0.0664	0.1097	0.1749	0.1770
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0005	0.0003	0.0003	0.0001	0.0001	0.0002
	0.0001	0.0001	0.0001	0.0002	0.0004	0.0004
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0004	0.0002	0.0003	0.0001	0.0001	0.0002
	0.0001	0.0001	0.0001	0.0001	0.0003	0.0003

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.330	0.200	0.208	0.104	0.062	0.135
	0.059	0.081	0.109	0.144	0.268	0.267
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.241	0.224	0.202	0.147	0.159	0.224
	0.167	0.172	0.198	0.246	0.262	0.245
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	31.57	114599.102	100.00
RUNOFF	13.588	49323.684	43.04
EVAPOTRANSPIRATION	16.955	61546.156	53.71
DRAINAGE COLLECTED FROM LAYER 2	1.2297	4463.698	3.90

PERC./LEAKAGE THROUGH LAYER 4	0.002701	9.806	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1640		
DRAINAGE COLLECTED FROM LAYER 7	0.0004	1.366	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002329	8.453	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.205	-744.267	-0.65
SOIL WATER AT START OF YEAR	184.967	671429.500	
SOIL WATER AT END OF YEAR	184.762	670685.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.007	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 8

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.03	2.16	0.77	5.84	1.59	2.91
	5.26	1.42	1.24	0.93	0.61	0.69
RUNOFF	0.190	1.115	0.113	3.178	0.126	1.684
	3.843	0.652	0.371	0.026	0.000	0.080
EVAPOTRANSPIRATION	0.322	1.221	0.498	2.703	1.384	1.219
	1.439	0.741	0.687	1.041	0.331	0.377
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1093	0.1918	0.0688	0.0895	0.0172	0.0237
	0.0240	0.0261	0.0214	0.0239	0.0552	0.1518
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0003	0.0004	0.0002	0.0003	0.0001	0.0000
	0.0001	0.0001	0.0000	0.0001	0.0002	0.0004
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0002	0.0003	0.0002	0.0002	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0001	0.0002	0.0003

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.190	0.299	0.150	0.180	0.035	0.037
	0.039	0.037	0.035	0.058	0.162	0.277
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.212	0.257	0.178	0.180	0.108	0.116
	0.114	0.122	0.119	0.120	0.134	0.205
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	24.45	88753.508	100.00
RUNOFF	11.377	41300.168	46.53
EVAPOTRANSPIRATION	11.963	43425.516	48.93
DRAINAGE COLLECTED FROM LAYER 2	0.8028	2914.215	3.28
PERC./LEAKAGE THROUGH LAYER 4	0.002093	7.597	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1249		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	0.946	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.001801	6.536	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.305	1106.126	1.25
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	185.066	671791.312	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.004	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 9

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.12	2.45	3.05	4.91	6.34	2.02
	5.46	0.00	5.50	1.44	5.10	2.21
RUNOFF	0.159	0.844	1.398	3.463	2.347	0.465
	4.318	0.000	3.379	0.746	3.375	0.612
EVAPOTRANSPIRATION	1.035	1.524	1.538	1.325	3.684	1.686
	1.088	0.000	2.058	0.653	1.487	1.258
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.2203	0.0916	0.1141	0.1199	0.1341	0.0454
	0.0538	0.0000	0.0624	0.0389	0.2394	0.1491
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0005	0.0002	0.0002	0.0002	0.0003	0.0001
	0.0001	0.0000	0.0001	0.0001	0.0005	0.0004

LATERAL DRAINAGE COLLECTED	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 7	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0004	0.0002	0.0002	0.0002	0.0003	0.0001
LAYER 8	0.0001	0.0000	0.0001	0.0001	0.0004	0.0003

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.328	0.178	0.174	0.162	0.207	0.078
TOP OF LAYER 3	0.071	0.000	0.103	0.057	0.349	0.263
STD. DEVIATION OF DAILY	0.230	0.201	0.228	0.270	0.216	0.165
HEAD ON TOP OF LAYER 3	0.178	0.000	0.175	0.153	0.249	0.207
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.60	143748.016	100.00
RUNOFF	21.106	76613.125	53.30
EVAPOTRANSPIRATION	17.337	62933.484	43.78
DRAINAGE COLLECTED FROM LAYER 2	1.2689	4606.098	3.20
PERC./LEAKAGE THROUGH LAYER 4	0.002692	9.772	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1641		
DRAINAGE COLLECTED FROM LAYER 7	0.0004	1.405	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002333	8.469	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.114	-414.590	-0.29
SOIL WATER AT START OF YEAR	185.066	671791.312	
SOIL WATER AT END OF YEAR	184.952	671376.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.014	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.69	1.43	2.01	1.22	7.68	0.24
	0.56	3.59	5.49	3.60	0.48	4.86
RUNOFF	0.000	0.632	0.779	0.280	6.094	0.000
	0.054	1.682	3.357	0.914	0.032	2.838
EVAPOTRANSPIRATION	0.702	0.783	1.222	0.882	1.121	0.635
	0.505	1.480	2.009	2.560	0.712	1.420
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0303	0.0772	0.0962	0.0581	0.0560	0.0138
	0.0002	0.0452	0.0986	0.1555	0.0984	0.3793
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0002	0.0002	0.0003	0.0001	0.0001	0.0000
	0.0000	0.0001	0.0002	0.0003	0.0003	0.0006
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0002	0.0002	0.0002	0.0001	0.0001	0.0000
	0.0000	0.0001	0.0002	0.0003	0.0002	0.0005

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.112	0.151	0.195	0.084	0.077	0.023
	0.006	0.067	0.140	0.248	0.201	0.469
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.116	0.228	0.179	0.192	0.188	0.100
	0.025	0.171	0.225	0.223	0.197	0.279
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	31.85	115615.500	100.00
RUNOFF	16.661	60480.215	52.31
EVAPOTRANSPIRATION	14.030	50928.250	44.05
DRAINAGE COLLECTED FROM LAYER 2	1.1087	4024.438	3.48
PERC./LEAKAGE THROUGH LAYER 4	0.002450	8.893	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1479		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.225	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002090	7.585	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.048	173.812	0.15
SOIL WATER AT START OF YEAR	184.952	671376.750	

SOIL WATER AT END OF YEAR	185.000	671550.562	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.024	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.11	2.03	2.49	3.73	3.76	2.39
	2.07	2.35	3.31	2.37	1.75	1.82
STD. DEVIATIONS	0.72	0.95	1.79	2.78	2.09	1.39
	1.89	1.40	1.53	2.11	1.51	1.31
RUNOFF						
TOTALS	0.294	0.812	1.190	2.132	1.856	1.019
	1.044	0.762	1.581	1.248	0.824	0.824
STD. DEVIATIONS	0.478	0.550	1.396	2.139	1.738	0.938
	1.625	0.617	1.155	1.715	1.093	0.872
EVAPOTRANSPIRATION						
TOTALS	0.678	1.134	1.176	1.480	1.801	1.444
	1.019	1.513	1.585	1.138	0.772	0.840
STD. DEVIATIONS	0.395	0.489	0.515	0.799	0.822	0.601
	0.457	0.943	0.547	0.628	0.436	0.412
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	0.1072	0.1542	0.1114	0.0924	0.0689	0.0371
	0.0175	0.0259	0.0517	0.0764	0.1113	0.1421
STD. DEVIATIONS	0.0685	0.0706	0.0531	0.0520	0.0337	0.0236
	0.0199	0.0241	0.0263	0.0553	0.0656	0.1048
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0003	0.0003	0.0003	0.0002	0.0002	0.0001
	0.0000	0.0001	0.0001	0.0002	0.0003	0.0003
STD. DEVIATIONS	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002
LATERAL DRAINAGE COLLECTED FROM LAYER 7						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 8

TOTALS	0.0002	0.0003	0.0002	0.0002	0.0001	0.0001
	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003
STD. DEVIATIONS	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.1893	0.2617	0.1904	0.1515	0.1106	0.0617
	0.0278	0.0437	0.0832	0.1171	0.2004	0.2244
STD. DEVIATIONS	0.0914	0.0955	0.0547	0.0696	0.0526	0.0337
	0.0246	0.0344	0.0382	0.0779	0.0854	0.1191

DAILY AVERAGE HEAD ON TOP OF LAYER 8

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 10

	INCHES		CU. FEET	PERCENT
PRECIPITATION	29.19	(6.651)	105959.7	100.00
RUNOFF	13.586	(5.0792)	49317.47	46.544
EVAPOTRANSPIRATION	14.582	(2.1631)	52931.03	49.954
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.99625	(0.19016)	3616.385	3.41298
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00229	(0.00033)	8.296	0.00783
AVERAGE HEAD ON TOP OF LAYER 3	0.138	(0.020)		
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.00031	(0.00005)	1.130	0.00107
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00197	(0.00028)	7.157	0.00675
AVERAGE HEAD ON TOP OF LAYER 8	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.024	(0.1804)	86.53	0.082

PEAK DAILY VALUES FOR YEARS 1 THROUGH 10

	(INCHES)	(CU. FT.)

PRECIPITATION	4.45	16153.499
RUNOFF	3.802	13800.3623
DRAINAGE COLLECTED FROM LAYER 2	0.02369	86.01117
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000034	0.12353
AVERAGE HEAD ON TOP OF LAYER 3	0.800	
MAXIMUM HEAD ON TOP OF LAYER 3	1.507	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	5.3 FEET	
DRAINAGE COLLECTED FROM LAYER 7	0.00001	0.03083
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000037	0.13489
AVERAGE HEAD ON TOP OF LAYER 8	0.000	
MAXIMUM HEAD ON TOP OF LAYER 8	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 7 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	1.00	3631.1433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.5253
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0148

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 10

LAYER	(INCHES)	(VOL/VOL)
1	0.0946	0.1576
2	0.1556	0.7778
3	0.0000	0.0000
4	8.5500	0.4750
5	175.2000	0.2920
6	0.9960	0.0830
7	0.0020	0.0100
8	0.0000	0.0000
SNOW WATER	0.000	

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APPENDIX E

SEISMIC HAZARDS ASSESSMENT AND STABILITY ANALYSIS

FINAL COVER STABILITY ANALYSIS
UKIAH LANDFILL CLOSURE

WASTE MASS SLOPE STABILITY

A stability and seismic hazards analysis has been performed for the final closure of the Ukiah Landfill and is presented in the JTD Final Closure Plan (EBA, 2008). A summary of the static stability and seismic response of the final landfill waste mass configuration presented in the JTD is as follows:

- A seismic hazards analysis concluded that the design earthquake is a Maximum Credible Earthquake (MCE) with an estimated magnitude 7.1Mw occurring on the Maacama Fault, resulting in an average peak bedrock acceleration of 0.66g derived from multiple attenuation relationships.

- Slope stability of the entire waste mass was modeled by evaluating failure mechanisms passing through refuse and the base of the landfill and indicate a static factor of safety greater than 1.7 for failure through the base of the landfill.

- Pseudo-static analyses performed to determine the yield acceleration (Ky) and evaluate the stability of the waste mass under seismic conditions was also performed. The yield acceleration calculated for the entire waste mass was 0.13g.

- Seismic displacement analyses using the program YSLIP_PM (Matasovic, 1997) indicate that permanent seismically induced displacements will be less than 8 inches for failure through the base of the landfill.

SEISMIC HAZARDS ASSESSMENT

Title 27 of the California Code of Regulations (27 CCR), Section 20370 requires that Class III waste management units be designed to withstand the Maximum Probable Earthquake (MPE) without damage to the foundation or to the structures which control leachate, surface drainage, erosion, or landfill gas. The MPE is defined in 27 CCR 20164 as the maximum earthquake that is likely to occur during a 100-year interval. Using a 70% chance of non-exceedence as the definition "likely", the recurrence interval for the MPE is approximately 280 years. 27 CCR 21750 outlines requirements for the preparation of a slope stability report for a Class III landfill which includes the use of the MPE to determine the maximum expected horizontal acceleration in rock at the site.

Federal Regulations contained in 40 CFR Part 258.14 (Subtitle D) require owners and operators of waste management units located within seismic hazard zones to design the unit to resist the maximum horizontal acceleration in lithified material for the site. Seismic hazard zones are defined as areas having a 10 percent or greater probability that the maximum expected horizontal acceleration in lithified earth material will exceed 0.10g in 250 years. The project site is located

in a seismic hazard zone, as is most of the western United States. Therefore, Subtitle D regulations require that the maximum horizontal acceleration in bedrock be determined either from seismic probability maps prepared by the USGS, or from a detailed site-specific analysis. A site-specific analysis was performed for the project site.

As noted previously, in California, site-specific analyses for municipal solid waste sites are performed using the MPE. Landfills that accept hazardous or designated wastes are required to be designed to the more strict Maximum Credible Earthquake (MCE). The MCE is defined in 27 CCR 20164 as the maximum earthquake that appears capable of occurring under the presently known geologic framework and is considered the upper bound earthquake for a given seismic source. The California Division of Mines and Geology (CDMG) provides additional guidance for deriving MPE and MCE estimates (CDMG, 1975).

A deterministic seismic hazards assessment was performed to estimate the peak bedrock acceleration to be used in the final closure design. The site is located in a region characterized by moderate to high seismicity. In this region, earthquakes occur on northwest-southeast trending strike-slip and oblique faults in response to sudden releases of dextral shear stress that dominates the North Coast Ranges Geomorphic Province. Seismic sources located within 100 km of the site were compiled by EBA and evaluated for this report in order to determine the peak bedrock acceleration for the site. The Maacama Fault, with an estimated MCE of 7.1 (CDMG, 1996) is located 0.6 miles (1.0 km) west of the site and is expected to generate the highest peak bedrock acceleration. An average peak bedrock acceleration of 0.66g was calculated for a magnitude 7.1 earthquake on the Maacama Fault using attenuation relationships developed by Abrahamson & Silva (1997); Campbell (1997); Idriss (1991); and Geomatrix (1991).

Far-field sources such as the San Andreas fault located 30 miles (48 km) southwest of the site, may also be capable of generating moderate ground shaking motions at the site. The combination of long period (low frequency) ground motion (which may correspond to the landfill's fundamental period) and longer duration ground shaking associated with a large, far-field event suggest that such an event, even though characterized by a smaller peak ground acceleration than near-field sources, could represent a significant seismic event for the site.

The target spectrum developed for a far-field seismic event (MCE) on the San Andreas Fault suggests that the period of ground motion is in the range of 0.15 to 0.30 seconds which is lower than the fundamental period of the landfill (0.3 to 0.4 seconds) and not significantly higher than the period of ground motion generated by the Maacama Fault (0.15 to 0.25 seconds). Therefore, due to its close proximity, the Maacama Fault represents the most significant seismic source.

As discussed above, 27 CCR requires that, at a minimum, Class III landfills be designed to withstand strong ground motions associated with the MPE. However, the final closure configuration for the Ukiah Municipal Solid Waste Disposal Site has been designed using the higher bedrock acceleration (0.66g) associated with the larger MCE occurring on the Maacama Fault. The estimated recurrence interval for the Maacama Fault and other potential seismic sources in the region is approximately 220 years (Table 1). This is comparable to the recurrence interval of approximately 280 years calculated for the MPE. Since earthquakes comparable in size to the MCE are absent from the historic seismic record for the region, the use of the more

stringent MCE as the design earthquake provides a more realistic and conservative estimate of the maximum expected horizontal bedrock acceleration at the site.

Table 1
Potential Seismic Sources

Source	Distance (km)	(1) MCE	(2) Recurrence Interval (years)	(3) Fundamental Period (seconds)	(4) PGA (g)
Maacama	1 - 78	7.1	220	0.15 - 0.25	0.66
San Andreas	48 - 100+	7.9	210	0.15 - 0.30	0.14
Bartlett Springs	21 - 48	7.1	218	0.15 - 0.30	0.21
Healdsburg-Rodgers Creek	48 - 100+	7.0	222	0.15 - 0.25	0.07

Notes:

(1) MCE=Maximum Credible Earthquake (CDMG, 1996) as moment magnitude.
(2) CDMG, 1996.
(3) Based on attenuation relationships (Abrahamson & Silva, 1997; Geomatrix, 1991; Idriss, 1991; Campbell, 1997).
(4) PGA=Peak Ground Acceleration based on attenuation relationships.

FINAL COVER SYSTEM SLOPE STABILITY

The shear strength of the various interfaces present in the proposed alternative final cover system were evaluated and the resulting static and psuedo-static slope stability analyzed. The design characteristics of the current proposed alternative final cover system includes the following components (in descending order):

- An engineered synthetic turf cover with sand infill ballast.
- A linear low-density polyethylene structured geomembrane liner
- A landfill gas pressure relief layer consisting of strip drains, pressure relief values, and associated collection piping components; and
- A 12-inch-thick (minimum) foundation layer moisture conditioned and compacted to 90 percent relative compaction.

Shear Strength Properties

Geosynthetic material interfaces, whether between two geosynthetic materials or between a geosynthetic and native or compacted soil material are typically the weakest interfaces in a final

cover system, causing block-type or wedge failures to occur. Table 1 presents the shear strength properties use in the slope stability analysis

Table 1
Slope Stability Properties and Stability Results

INTERFACE[1]	FRICTION ANGLE (Φ°)	COHESION/ADHESION (PSF)	STATIC (FS)[4,5]	PSEUDO-STATIC (FS)[4,5]	SEISMIC PERMANENT DISPLACEMENT (Inch)
Foundation Soil/LLDPE	32°[2]/28°[3]	3[2]/3[3]	2.8[3]	1.0[3]	<1
Internal shear strength[6]	35°[3]	3°[3]	3.3[3]	1.2[3]	<1

Notes:

(1) LLDPE = linear low-density polyethylene geomembrane;
(2) Peak shear strength
(3) Post-peak shear strength (large displacement)
(4) Factor of Safety
(5) For maximum sideslope of 2:1 (26.5°)
(6) Interface of combined geosynthetic components (LLDPE/turf/sand ballast)

Stability Analysis

Slope stability of the proposed final cover system was modeled using the infinite slope method. This method provides a conservative approach to the evaluation of the stability of shallow failures of constant thickness along a defined interface. This method assumes the failure block is infinitely long and neglects resisting forces at the toe and along the sides. Analyses were performed for a LLDPE geomembrane/artificial turf with sand infill ballast cover system using a critical slope angle of 26.5 degrees (2H:1V).

The stability analysis was performed using a spreadsheet based on the principles and equations of the infinite slope stability analysis. Results of the infinite slope stability analysis indicate a minimum static factor of safety of 2.8 for failure at the LLDPE/subgrade interface and a minimum static factor of safety of 3.3 for failure above the LLDPE geomembrane (see Table 1). Spreadsheet files and equations used in the analysis are appended to this technical memorandum.

A pseudo-static analysis was performed to determine the yield acceleration (K_y) for the cover. The yield acceleration was determined using a trial and error procedure in which the seismic coefficient was varied until a factor of safety of 1.0 was obtained. The lowest yield acceleration calculated for the LLDPE geomembrane/artificial turf cover system was 0.70g. Because the maximum horizontal acceleration of 0.66g predicted by the site response analysis does not exceed the calculated yield acceleration, permanent seismic displacements of the LLDPE geomembrane/artificial turf cover system are highly unlikely. The stability of slopes subject to seismic loading conditions can be further evaluated in terms of permanent displacements (deformations) that are expected to occur. The Newmark Method (1965) is commonly used to

evaluate slopes under seismic loading conditions. The method evaluates the stability of slopes in terms of permanent deformations that result when seismically induced ground accelerations exceed the yield acceleration of the slope mass. The total amount of slope deformation is estimated by summing only the down-slope displacements that occur during each brief period of time when the yield acceleration of the slope mass is exceeded. As stated above, a pseudo-static analysis of the site determined that the yield acceleration is not exceeded by seismically induced strong ground motions, therefore no permanent displacements of the final cover system are predicted by the Newmark Method.

CONCLUSIONS

Results of the slope stability analysis using the infinite slope method indicate a minimum factor of safety of 2.8 for failure of the cover system utilizing a LLDPE geomembrane/artificial turf engineered alternative cover system constructed on maximum 2H:1V slopes under static conditions. These results suggest that the final landfill configuration will be stable throughout the postclosure maintenance period following closure in accordance with the Final Closure Plan Drawings and Technical Specifications.

The yield acceleration calculated for failure of the cover system is greater than the PGA predicted by the site response analysis, indicating that permanent seismic displacements of the LLDPE geomembrane/artificial turf cap are highly unlikely.

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Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
Subgrade Soil Against LLDPE Microspike
Static Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	110.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	28.0 °	tan ø =	**0.5317**
seismic coeff.	K_h =	0.00		
driving stress	τ =	**1.7570** PSF		
normal stress	σ =	**3.5240** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**3.5240** PSF		
resisting stress	S =	**4.8737** PSF		

Factor of Safety FS = 2.77

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
Subgrade Soil Against LLDPE Microspike
Pseudo-static Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	110.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	28.0 °	tan ø =	**0.5317**
seismic coeff.	K_h =	0.66		
driving stress	τ =	**4.0828** PSF		
normal stress	σ =	**2.3644** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**2.3644** PSF		
resisting stress	S =	**4.2572** PSF		

Factor of Safety FS = 1.04

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
LLDPE Microspike Against Turf
Static Saturated Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	100.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	35.0 °	tan ø =	**0.7002**
seismic coeff.	K_h =	0.00		
driving stress	τ =	**1.5973** PSF		
normal stress	σ =	**3.2036** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**3.2036** PSF		
resisting stress	S =	**5.2432** PSF		

Factor of Safety FS = 3.28

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
LLDPE Microspike Against Turf
Pseudo-static Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	100.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	35.0 °	tan ø =	**0.7002**
seismic coeff.	K_h =	0.66		
driving stress	τ =	**3.7117** PSF		
normal stress	σ =	**2.1494** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**2.1494** PSF		
resisting stress	S =	**4.5050** PSF		

Factor of Safety FS = 1.21

APPENDIX F

DRAINAGE ANALYSIS

DRAINAGE ANALYSIS
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

I. INTRODUCTION

The City of Ukiah Landfill is located in Mendocino County approximately 2.5 miles east of the City of Ukiah near the end of Vichy Springs Road. The site address is 3100 Vichy Springs Road, Ukiah, CA 95482.

Title 27 of the California Code of Regulations (27CCR), §20260(c) requires that the final closure to be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency. The potential for inundation and washout from the 100-year flood event was evaluated by examination of the 100-year floodplain shown on the Flood Insurance Rate Map (FIRM) prepared for the Mendocino County by the Federal Emergency Management Agency (FEMA), Map Number 06045C1516F, 2011. The FIRM map indicates the landfill is located within OTHER AREAS (outside the 500-year flood boundary) and outside the 100-year flood hazards area.

All on-site drainage control facilities will be designed to prevent inundation of landfill or impairment of environmental control systems resulting from a 100-year storm event in accordance with 27CCR, §20320(e) that outlines construction standards for Class III landfills.

II. HYDROLOGY/HYDRAULIC ANALYSIS

A surface water hydrology analysis was conducted in accordance with 27CCR, §21150 for determining design parameters for the final closure drainage facilities.

A. CONFIGURATION

Figure F-1 shows watersheds “A” through “M”, used to model surface water runoff for the landfill and its facilities. Watersheds “A” and “K” will capture storm water from a portion of the landfill and drain towards the east into an existing sedimentation basin before outletting into an unnamed tributary to the Russian River. Watersheds “B” through “F” will capture storm water from their respective areas of the landfill and outlet through existing locations into the unnamed tributary. These outlets will be reconstructed in order to reduce the potential for erosion to the unnamed tributary. Watershed “G” will capture storm water and outlet into an existing sedimentation basin located on the northwestern edge of the landfill. Watersheds “I”, “J”, and “L” will capture storm water off the adjacent areas of the landfill and route the water around the landfill into their current drainage patterns. Watershed “M” will capture storm water from the borrow area and route the waters through an existing sedimentation pond. The existing sedimentation basins outlets will be upgraded with new outlet structures to reduce the potential erosion to the unnamed tributary.

B. METHODOLOGY

The storm water control system is designed to accommodate peak surface water flows for 100-year, 24-hour precipitation in accordance with 27CCR, §20365, and occurring during the most critical stage of site development when runoff is anticipated to be a maximum.

The surface water hydrology analysis was conducted using the rational method as outlined in the County of Mendocino Road and Development Standards. Rainfall intensity for design of the drainage facilities was calculated from the 100-year recurrence interval rainfall intensity-duration chart for Mendocino County, Ukiah-Lake Mendocino Dam (Standard D11G). A runoff coefficient of 0.90 was used for areas of the landfill receiving closure and 0.45 was used for areas outside of the landfill as average slopes at the site exceed 25% (Standard D12). A minimum value of 1.0 was used for the K-factor and an initial time of concentration of 15 minutes was used. Watershed areas, hydraulic distances, and slopes were measured from Figure F-1. Discharges were calculated at the points of concentration shown on Figure F-1. Channel velocities were calculated using the computer program Hydraflow Extensions.

C. RESULTS

Surface water hydrology calculations for 100-year storm flows are presented in Tables F-1 and F-2. Hydraulic results for the proposed ditches and storm drains are presented in Tables F-3 and F-4. Results show that the proposed improvements are sized adequately to handle the 100 year storm event.

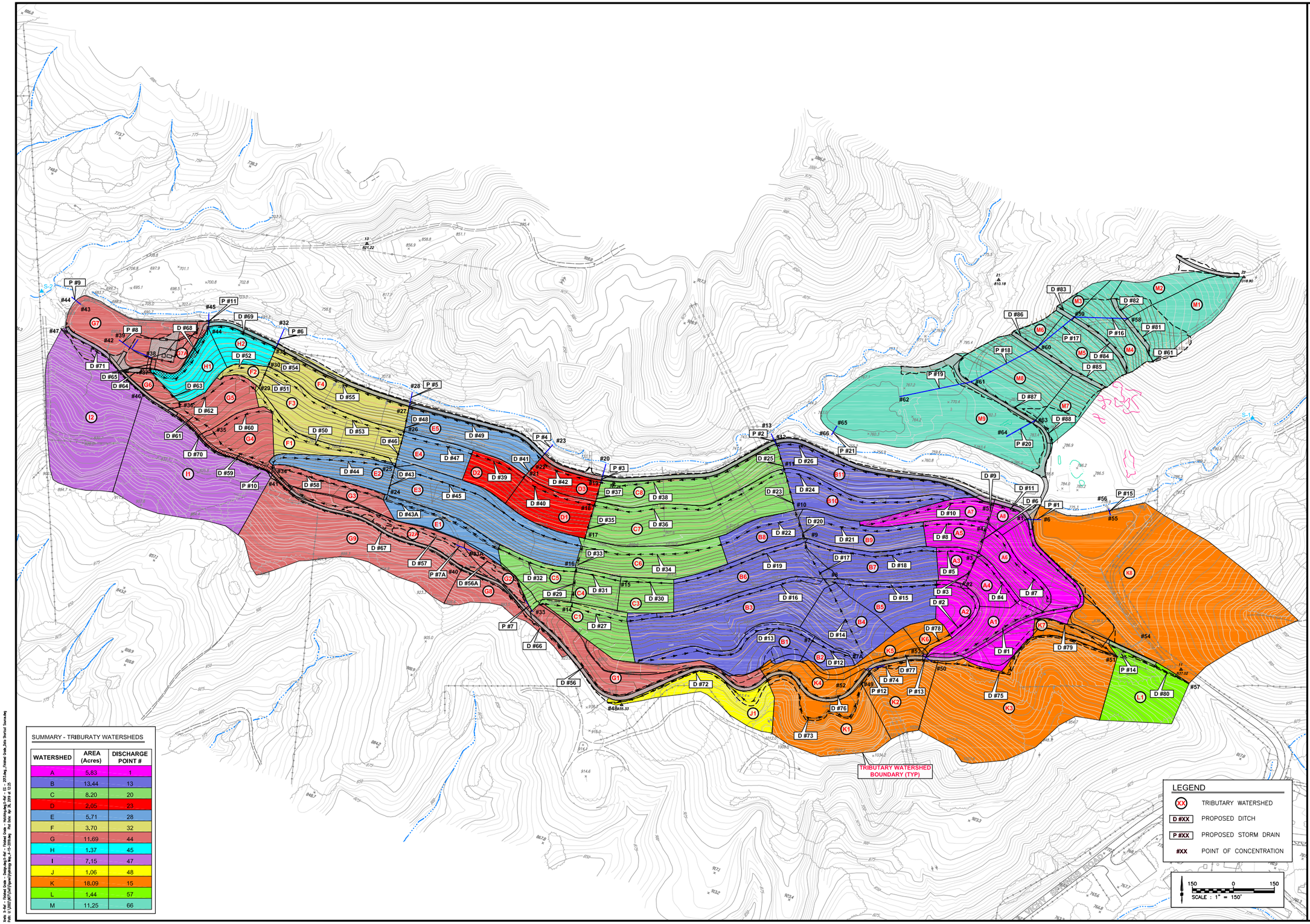
ATTACHMENTS

Figures

F-1: Hydrology Map
F-2: FEMA Firm Map
F-3: Rainfall Intensity-Duration-Frequency Chart
F-4: Runoff Coefficients

Tables

Table F-1: Storm Drain Hydrology Calculations
Table F-2: Ditch Hydrology Calculations
Table F-3: Storm Drain Hydraulic Calculations
Table F-4: Ditch Hydraulic Calculations
Tables F-5.1 through F-5.11: Time of Concentration Calculations



SUMMARY - TRIBURATY WATERSHEDS

WATERSHED	AREA (Acres)	DISCHARGE POINT #
A	5.83	1
B	13.44	13
C	8.20	20
D	2.05	23
E	5.71	28
F	3.70	32
G	11.69	44
H	1.37	45
I	7.15	47
J	1.06	48
K	18.09	15
L	1.44	57
M	11.25	66

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

HYDROLOGY MAP

UKIAH LANDFILL
3100 VICHY SPRINGS ROAD
UKIAH, CA

Submittal / Revision:

1	
2	
3	
4	
5	
6	
7	

Job No: 02-907
Drawn By: KDH
Checked By: DFB
Date: 2019-04-30

Sheet Number
F-1

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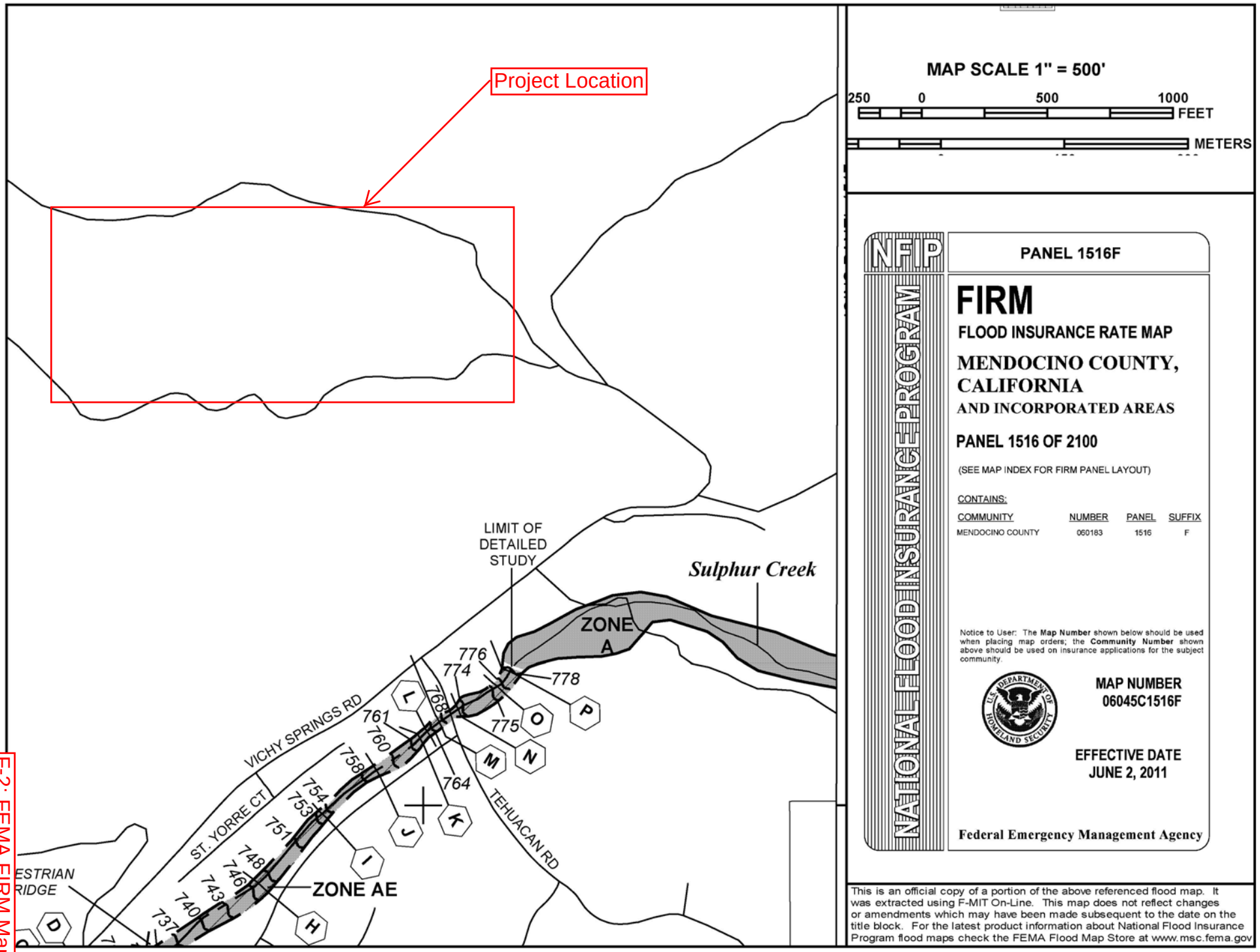

F-2: FEMA FIRM Map

Table F-1: Storm Drain Hydrology Calculations
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Total Time (min) *	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
P #1											
1	A1,A2,A3, A4,A5,A6, A7,A8	18.1	1.98	0.90	5.83	5.83	1.00	5.24	5.24	10.4	Design Flow for Storm Drain P #1
P #2											
12	B4,B5,B6, B7,B8, B9,B10,B1 1	18.6	1.95	0.90	13.44	13.44	1.00	12.10	12.10	23.6	Design Flow for Storm Drain P #2
P #3											
19	C1,C2,C3, C4,C5,C6, C7, C8	16.2	2.10	0.90	8.20	8.20	1.00	7.38	7.38	15.5	Design Flow for Storm Drain P #3
P #4											
22	D1,D2,D3	15.3	2.16	0.90	2.05	2.05	1.00	1.84	1.84	4.0	Design Flow for Storm Drain P #4
P #5											
27	E1,E2,E3, E4,E5	15.7	2.13	0.90	5.71	5.71	1.00	5.13	5.13	10.9	Design Flow for Storm Drain P #5
P #6											
31	F1,F2,F3,F4	15.5	2.15	0.90	3.70	3.70	1.00	3.33	3.33	7.1	Design Flow for Storm Drain P #6
P #7											
33	G1	15.0	2.18	0.90	1.71	1.71	1.00	1.54	1.54	3.4	Design Flow for Storm Drain P #7
P #7A											
33A	G1,G2	15.0	2.18	0.90	2.04	2.04	1.00	1.83	1.83	4.0	Design Flow for Storm Drain P #7
P #8											
38	G1,G2,G2A ,G3, G4,G5,G6, G7A	19.5	1.91	0.79	6.00	6.00	1.00	4.74	4.74	9.0	Design Flow for Storm Drain P #8
P #9											
43	G1,G2,G2A ,G3, G4,G5,G6, G7,G7A,G8 ,G9	19.8	1.89	0.66	11.69	11.69	1.00	7.72	7.72	14.6	Design Flow for Storm Drain P #9
P #10											
41	G8,G9	15.0	2.18	0.45	2.04	2.04	1.00	0.92	0.92	2.0	Design Flow for Storm Drain P #10
P #11											
44	H1,H2	15.0	2.18	0.90	1.37	1.37	1.00	1.23	1.23	2.7	Design Flow for Storm Drain P #11
P #12											
52	K4	15.0	2.18	0.90	0.62	0.62	1.00	0.56	0.56	1.2	Design Flow for Storm Drain P #12
P #13											
53	K5,K6	15.0	2.18	0.90	0.87	0.87	1.00	0.79	0.79	1.7	Design Flow for Storm Drain P #13
P #14											
51	K1,K2,K3, K4,K5,K6, K7	17.1	2.04	0.52	10.06	10.06	1.00	5.23	5.23	10.7	Design Flow for Storm Drain P #14
P #15											
55	K1-K8, A1-A8	18.3	1.97	0.49	23.92	23.92	1.00	11.72	11.72	23.1	Design Flow for Storm Drain P #15
P #16											
58	M1,M2	15.0	2.18	0.45	2.09	2.09	1.00	0.94	0.94	2.1	Design Flow for Storm Drain P #16
P #17											
59	M1,M2,M3 M4	15.2	2.17	0.45	3.19	3.19	1.00	1.43	1.43	3.1	Design Flow for Storm Drain P #17
P #18											
60	M1,M2,M3 M4,M5,M6	15.3	2.16	0.45	4.50	4.50	1.00	2.02	2.02	4.4	Design Flow for Storm Drain P #18
P #19											
61	M1,M2,M3 M4,M5,M6 ,M8	15.3	2.16	0.45	6.28	6.28	1.00	2.82	2.82	6.1	Design Flow for Storm Drain P #19
P #20											
63	M7	15.0	2.18	0.45	0.45	0.36	1.00	0.20	0.20	0.4	Design Flow for Storm Drain P #20
P #21											
65	M1,M2,M3 M4,M5,M6 M7,M8,M9	15.8	2.13	0.45	11.25	11.25	1.00	5.06	5.06	10.8	Design Flow for Storm Drain P #21

* See Tables F-5.1 - F-5.11 for t_c calculations (minimum t_c=15 min.)
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$$I=8.8428/(T_c)^{-0.5166}$$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.
Flow depths,velocities & top widths determined using Hydraflow Express

Table F-2: Ditch Hydrology Calculations
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Total Time (min)*	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
D #1											
	A1	15.0	2.18	0.90	2.27	2.27	1.00	2.04	2.04	4.5	Design Flow for Ditch D #1
D #2											
	A2	15.0	2.18	0.90	0.54	0.54	1.00	0.49	0.49	1.1	Design Flow for Ditch D #2
D #3											
	A2	15.0	2.18	0.90	0.54	0.54	1.00	0.49	0.49	1.1	Design Flow for Ditch D #3
D #4											
	A4	15.0	2.18	0.90	0.50	0.50	1.00	0.45	0.45	1.0	Design Flow for Ditch D #4
D #5											
	A3	15.0	2.18	0.90	0.37	0.37	1.00	0.34	0.34	0.7	Design Flow for Ditch D #5
D #6											
	A2,A3,A4	15.9	2.12	0.90	1.42	1.42	1.00	1.27	1.27	2.7	Design Flow for Ditch D #6
D #7											
	A6	15.0	2.18	0.90	0.72	0.72	1.00	0.65	0.65	1.4	Design Flow for Ditch D #7
D #8											
	A5	15.0	2.18	0.90	0.52	0.52	1.00	0.47	0.47	1.0	Design Flow for Ditch D #8
D #9											
	A2,A3,A4, A5,A6	16.0	2.11	0.90	2.65	2.65	1.00	2.39	2.39	5.0	Design Flow for Ditch D #9
D #10											
	A7	15.0	2.18	0.90	0.64	0.64	1.00	0.58	0.58	1.3	Design Flow for Ditch D #10
D #11											
	A2,A3,A4, A5,A6,A7, A8	18.1	1.98	0.90	3.56	3.56	1.00	3.20	3.20	6.3	Design Flow for Ditch D #11
D #12											
	B1,B2	15.0	2.18	0.90	1.56	1.56	1.00	1.40	1.40	3.1	Design Flow for Ditch D #12
D #13											
	B1	15.0	2.18	0.90	1.26	1.26	1.00	1.14	1.14	2.5	Design Flow for Ditch D #13
D #14											
	B1,B2,B4	17.4	2.02	0.90	2.75	2.75	1.00	2.47	2.47	5.0	Design Flow for Ditch D #14
D #15											
	B5	15.0	2.18	0.90	1.04	1.04	1.00	0.93	0.93	2.0	Design Flow for Ditch D #15
D #16											
	B3	15.0	2.18	0.90	2.53	2.53	1.00	2.28	2.28	5.0	Design Flow for Ditch D #16
D #17											
	B1,B2,B3, B4, B5	18.1	1.98	0.90	6.31	6.31	1.00	5.68	5.68	11.3	Design Flow for Ditch D #17
D #18											
	B7	15.0	2.18	0.90	1.18	1.18	1.00	1.06	1.06	2.3	Design Flow for Ditch D #18
D #19											
	B6	15.0	2.18	0.90	1.54	1.54	1.00	1.39	1.39	3.0	Design Flow for Ditch D #19
D #20											
	B1,B2,B3, B4,B5,B6 B7	18.3	1.97	0.90	8.81	8.81	1.00	7.93	7.93	15.6	Design Flow for Ditch D #20
D #21											
	B9	15.0	2.18	0.90	1.02	1.02	1.00	0.92	0.92	2.0	Design Flow for Ditch D #21
D #22											
	B8	15.0	2.18	0.90	0.77	0.77	1.00	0.69	0.69	1.5	Design Flow for Ditch D #22
D #23											
	B1,B2,B3, B4,B5,B6 B7,B8,B9	18.5	1.96	0.90	10.83	10.83	1.00	9.74	9.74	19.1	Design Flow for Ditch D #23
D #24											
	B10	15.0	2.18	0.90	1.09	1.09	1.00	0.98	0.98	2.1	Design Flow for Ditch D #24
D #25											
	B1,B2,B3, B4,B5,B6 B7,B8,B9 B10	18.6	1.95	0.90	11.92	11.92	1.00	10.72	10.72	20.9	Design Flow for Ditch D #25
D #26											
	B11	15.0	2.18	0.90	1.52	1.52	1.00	1.37	1.37	3.0	Design Flow for Ditch D #26
D #27											
	C1	15.0	2.18	0.90	0.87	0.87	1.00	0.78	0.78	1.7	Design Flow for Ditch D #27
D #28											
	C1	15.0	2.18	0.90	0.87	0.87	1.00	0.78	0.78	1.7	Design Flow for Ditch D #28
D #29											
	-	15.3	2.16	0.90	0.00	0.00	1.00	0.00	0.00	0.0	Design Flow for Ditch D #29
D #30											
	C3	15.0	2.18	0.90	0.58	0.58	1.00	0.53	0.53	1.1	Design Flow for Ditch D #30

* See Tables F-5.1 - F-5.11 for t_c calculations (minimum t_c=15 min.)

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

Table F-2: Ditch Hydrology Calculations
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Total Time (min)*	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
D #31											
	C3 C4	15.7	2.13	0.90	1.08	1.08	1.00	0.97	0.97	2.1	Design Flow for Ditch D #31
D #32											
	C5	15.0	2.18	0.90	0.77	0.77	1.00	0.70	0.70	1.5	Design Flow for Ditch D #32
D #33											
	C1,C3 C4,C5	16.0	2.11	0.90	2.72	2.72	1.00	2.45	2.45	5.2	Design Flow for Ditch D #33
D #34											
	C6	15.0	2.18	0.90	1.40	1.40	1.00	1.26	1.26	2.8	Design Flow for Ditch D #34
D #35											
	C1,C3 C4,C5,C6	16.1	2.11	0.90	4.12	4.12	1.00	3.71	3.71	7.8	Design Flow for Ditch D #35
D #36											
	C7	15.0	2.18	0.90	2.42	2.42	1.00	2.18	2.18	4.7	Design Flow for Ditch D #36
D #37											
	C1,C3 C4,C5,C6 C7	16.2	2.10	0.90	6.54	6.54	1.00	5.88	5.88	12.4	Design Flow for Ditch D #37
D #38											
	C8	15.0	2.18	0.90	1.67	1.67	1.00	1.50	1.50	3.3	Design Flow for Ditch D #38
D #39											
	D2	15.0	2.18	0.90	0.55	0.55	1.00	0.50	0.50	1.1	Design Flow for Ditch D #39
D #40											
	D1	15.0	2.18	0.90	0.92	0.92	1.00	0.83	0.83	1.8	Design Flow for Ditch D #40
D #41											
	D1,D2	15.2	2.17	0.90	1.48	1.48	1.00	1.33	1.33	2.9	Design Flow for Ditch D #41
D #42											
	D3	15.0	2.18	0.90	0.57	0.57	1.00	0.51	0.51	1.1	Design Flow for Ditch D #42
D #43											
	E1	15.0	2.18	0.90	0.72	0.72	1.00	0.65	0.65	1.4	Design Flow for Ditch D #43
D #44											
	E2	15.0	2.18	0.90	0.80	0.80	1.00	0.72	0.72	1.6	Design Flow for Ditch D #44
D #45											
	E3	15.0	2.18	0.90	2.24	2.24	1.00	2.02	2.02	4.4	Design Flow for Ditch D #45
D #46											
	E1,E2,E3	15.6	2.14	0.90	3.76	3.76	1.00	3.38	3.38	7.2	Design Flow for Ditch D #46
D #47											
	E4	15.0	2.18	0.90	0.68	0.68	1.00	0.61	0.61	1.3	Design Flow for Ditch D #47
D #48											
	E1,E2,E3,E4	15.7	2.13	0.90	4.44	4.44	1.00	3.99	3.99	8.5	Design Flow for Ditch D #48
D #49											
	E5	15.0	2.18	0.90	1.27	1.27	1.00	1.14	1.14	2.5	Design Flow for Ditch D #49
D #50											
	F1	15.0	2.18	0.90	0.63	0.63	1.00	0.56	0.56	1.2	Design Flow for Ditch D #50
D #51											
	F1	15.0	2.18	0.90	0.63	0.63	1.00	0.56	0.56	1.2	Design Flow for Ditch D #51
D #52											
	F2	15.0	2.18	0.90	0.18	0.18	1.00	0.16	0.16	0.4	Design Flow for Ditch D #52
D #53											
	F3	15.0	2.18	0.90	1.59	1.59	1.00	1.43	1.43	3.1	Design Flow for Ditch D #53
D #54											
	F1,F2,F3	15.5	2.15	0.90	2.40	2.40	1.00	2.16	2.16	4.6	Design Flow for Ditch D #54
D #55											
	F4	15.0	2.18	0.90	1.30	1.30	1.00	1.17	1.17	2.6	Design Flow for Ditch D #55
D #56											
	G1	15.0	2.18	0.90	1.71	1.71	1.00	1.54	1.54	3.4	Design Flow for Ditch D #56
D #56A											
	G1,G2	15.0	2.18	0.90	2.04	2.04	1.00	1.83	1.83	4.0	Design Flow for Ditch D #56A
D #57											
	G1,G2,G2A	16.1	2.10	0.90	2.93	2.93	1.00	2.64	2.64	5.5	Design Flow for Ditch D #57
D #58											
	G3	15.0	2.18	0.90	0.65	0.65	1.00	0.59	0.59	1.3	Design Flow for Ditch D #58
D #59											
	G1,G2,G3	17.8	2.00	0.90	3.59	3.59	1.00	3.23	3.23	6.4	Design Flow for Ditch D #59
D #60											
	G4	15.0	2.18	0.90	0.92	0.92	1.00	0.83	0.83	1.8	Design Flow for Ditch D #60
D #61											
	G1,G2,G3 G4	18.9	1.94	0.90	4.50	4.50	1.00	4.05	4.05	7.9	Design Flow for Ditch D #61
D #62											
	G5	15.0	2.18	0.90	0.87	0.87	1.00	0.78	0.78	1.7	Design Flow for Ditch D #62

* See Tables F-5.1 - F-5.11 for t_c calculations (minimum t_c=15 min.)

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

Table F-2: Ditch Hydrology Calculations
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Total Time (min)*	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
D #63											
	G1,G2,G3 G4,G5	19.1	1.92	0.90	5.37	5.37	1.00	4.83	4.83	9.3	Design Flow for Ditch D #63
D #64											
	G6	15.0	2.18	0.90	0.33	0.33	1.00	0.30	0.30	0.7	Design Flow for Ditch D #64
D #65											
	G1,G2,G3 G4,G5,G6	19.2	1.92	0.90	5.70	5.70	1.00	5.13	5.13	9.9	Design Flow for Ditch D #65
D #66											
	G8	15.0	2.18	0.45	0.66	0.66	1.00	0.30	0.30	0.7	Design Flow for Ditch D #66
D #67											
	G8,G9	15.0	2.18	0.45	4.12	4.12	1.00	1.86	1.86	4.1	Design Flow for Ditch D #67
D #68											
	H1	15.0	2.18	0.90	0.74	0.74	1.00	0.67	0.67	1.5	Design Flow for Ditch D #68
D #69											
	H2	15.0	2.18	0.90	0.63	0.63	1.00	0.56	0.56	1.2	Design Flow for Ditch D #69
D #70											
	I1	15.0	2.18	0.45	3.61	3.61	1.00	1.62	1.62	3.5	Design Flow for Ditch D #70
D #71											
	I1,I2	15.7	2.13	0.45	7.15	7.15	1.00	3.22	3.22	6.9	Design Flow for Ditch D #71
D #72											
	J1	15.0	2.18	0.45	1.06	1.06	1.00	0.48	0.48	1.0	Design Flow for Ditch D #72
D #73											
	K1	15.0	2.18	0.45	1.98	1.98	1.00	0.89	0.89	1.9	Design Flow for Ditch D #73
D #74											
	K1,K2,K4	15.8	2.13	0.45	3.81	3.81	1.00	1.71	1.71	3.6	Design Flow for Ditch D #74
D #75											
	K1,K2,K3 K4,K5,K6	17.1	2.04	0.50	9.70	9.70	1.00	4.85	4.85	9.9	Design Flow for Ditch D #75
D #76											
	K4	15.0	2.18	0.90	0.62	0.62	1.00	0.56	0.56	1.2	Design Flow for Ditch D #76
D #77											
	K5	15.0	2.18	0.90	0.57	0.57	1.00	0.52	0.52	1.1	Design Flow for Ditch D #77
D #78											
	K6	15.0	2.18	0.90	0.30	0.30	1.00	0.27	0.27	0.6	Design Flow for Ditch D #78
D #79											
	K7	15.0	2.18	0.45	0.36	0.36	1.00	0.16	0.16	0.4	Design Flow for Ditch D #79
D #80											
	L1	15.0	2.18	0.45	1.44	1.44	1.00	0.65	0.65	1.4	Design Flow for Ditch D #80
D #81											
	M1	15.0	2.18	0.45	1.42	1.42	1.00	0.64	0.64	1.4	Design Flow for Ditch D #81
D #82											
	M2	15.0	2.18	0.45	0.67	0.67	1.00	0.30	0.30	0.7	Design Flow for Ditch D #82
D #83											
	M3	15.0	2.18	0.45	0.22	0.22	1.00	0.10	0.10	0.2	Design Flow for Ditch D #83
D #84											
	M4	15.0	2.18	0.45	0.88	0.88	1.00	0.39	0.39	0.9	Design Flow for Ditch D #84
D #85											
	M5	15.0	2.18	0.45	1.06	1.06	1.00	0.48	0.48	1.0	Design Flow for Ditch D #85
D #86											
	M6	15.0	2.18	0.45	0.25	0.25	1.00	0.11	0.11	0.2	Design Flow for Ditch D #86
D #87											
	M7	15.0	2.18	0.45	0.66	0.66	1.00	0.30	0.30	0.7	Design Flow for Ditch D #87
D #88											
	M8	15.0	2.18	0.45	1.78	1.78	1.00	0.80	0.80	1.7	Design Flow for Ditch D #88

* See Tables F-5.1 - F-5.11 for t_c calculations (minimum t_c=15 min.)
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$$I=8.8428/(T_c)^{-0.5166}$$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.
Flow depths,velocities & top widths determined using Hydraflow Express

Table F-3: Storm Drain Hydraulic Calculations
100-Year Storm Event

Point of Conc. (POC)	Pipe	Q_{100} (cfs)	Slope	Diameter (in)	Manning's "n"	Velocity (ft/s)	Flow Depth (ft)
#1	Storm Drain P #1						
		10.4	0.0402	18	0.014	11.14	0.78
#12	Storm Drain P #2						
		23.6	0.1828	18	0.014	24.13	0.81
#19	Storm Drain P #3						
		15.5	0.1166	18	0.014	18.38	0.72
#22	Storm Drain P #4						
		4.0	0.1408	18	0.014	13.21	0.34
#27	Storm Drain P #5						
		10.9	0.2176	18	0.014	20.97	0.50
#31	Storm Drain P #6						
		7.1	0.1753	18	0.014	16.96	0.43
#33	Storm Drain P #7						
		3.4	0.1372	18	0.014	12.16	0.32
#33A	Storm Drain P #7A						
		4.0	0.0223	18	0.014	6.95	0.54
#38	Storm Drain P #8						
		9.0	0.0500	18	0.014	11.51	0.68
#43	Storm Drain P #9						
		14.6	0.0200 (min)	24	0.024	6.16	1.41
#44	Storm Drain P #10						
		2.0	0.2292	18	0.014	12.26	0.22
#45	Storm Drain P #11						
		2.7	0.0200 (min)	18	0.024	4.09	0.60
#52	Storm Drain P #12						
		1.2	0.0117	18	0.024	3.67	0.45
#53	Storm Drain P #13						
		1.7	0.0100	18	0.024	4.60	0.57
#51	Storm Drain P #14						
		10.7	0.0200 (min)	24	0.024	7.64	0.91
#55	Storm Drain P #15						
		23.1	0.0500 (min)	2-18"	0.024	8.11	1.13
#58	Storm Drain P #16						
		2.1	0.0500 (min)	18	0.024	5.31	0.41
#59	Storm Drain P #17						
		3.1	0.0500 (min)	18	0.024	5.80	0.51
#60	Storm Drain P #18						
		4.4	0.0500 (min)	18	0.024	6.50	0.61
#61	Storm Drain P #19						
		6.1	0.1340	18	0.024	12.34	0.88
#63	Storm Drain P #20						
		0.4	0.0446	18	0.024	3.49	0.23
#65	Storm Drain P #21						
		10.8	0.0500 (min)	18	0.024	7.06	0.75

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

Mannings "n" value CMP - 0.024

HDPE- 0.014

Table F-4: Ditch Hydraulic Calculations
100-Year Storm Event

Ditch	Q_{100} (cfs)	Slope	Left Side Slope	Right Side Slope	Bottom Width (ft)	Manning's "n" erosion mat 0.020 / riprap 0.035 / liner 0.020	Maximum Top Width (ft)	Maximum Velocity (ft/s)	Design Depth (ft)	Maximum Flow Depth (ft)
D #1										
	4.5	.1494 max.	2:1 max.	10:1 max.	0	0.020	4.32	5.79	1.2	0.38
D #2										
	1.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	2.88	3.47	1.2	0.31
D #3										
	1.1	0.3243	1.5:1 max.	1.5:1 max.	5	0.020	5.18	3.80	1.0	0.06
D #4										
	1.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.12	2.47	1.2	0.26
D #5										
	0.7	0.02 min.	2:1 max.	10:1 max.	0	0.020	2.76	2.21	1.2	0.23
D #6										
	2.7	0.3571	1.5:1 max.	1.5:1 max.	5	0.020	5.27	5.19	1.0	0.09
D #7										
	1.4	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.48	2.77	1.2	0.29
D #8										
	1.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.12	2.47	1.2	0.26
D #9										
	5.0	0.3846	1.5:1 max.	1.5:1 max.	5	0.020	5.30	7.40	1.0	0.13
D #10										
	1.3	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.36	2.76	1.2	0.28
D #11										
	6.3	0.0250	2:1 max.	2:1 max.	0	0.035	3.72	3.64	1.5	0.93
D #12										
	3.1	0.0900	2:1 max.	10:1 max.	0	0.020	4.08	4.47	1.2	0.34
D #13										
	2.5	0.0723	2:1 max.	10:1 max.	0	0.020	3.96	3.83	1.2	0.33
D #14										
	5.0	0.2080	1.5:1 max.	1.5:1 max.	46	0.020	46.18	2.30	1.0	0.04
D #15										
	2.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.32	3.22	1.2	0.36
D #16										
	5.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	5.76	3.91	1.2	0.48
D #17										
	11.3	0.1666	1.5:1 max.	1.5:1 max.	27	0.020	27.40	4.05	1.0	0.11
D #18										
	2.3	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.32	3.09	1.2	0.36
D #19										
	3.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.68	3.29	1.2	0.39
D #20										
	15.6	0.2719	1.5:1 max.	1.5:1 max.	5	0.020	5.90	10.28	1.0	0.30
D #21										
	2.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.96	3.06	1.2	0.33
D #22										
	1.5	0.1486	2:1 max.	10:1 max.	0	0.020	2.88	4.34	1.2	0.24
D #23										
	19.1	0.1783	1.5:1 max.	1.5:1 max.	5	0.020	6.11	9.78	1.0	0.37
D #24										
	2.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.08	3.03	1.2	0.34
D #25										
	20.9	0.3605	1.5:1 max.	1.5:1 max.	5	0.020	5.96	12.60	1.0	0.32
D #26										
	3.0	0.01 min.	2:1 max.	2:1 max.	0	0.035	6.36	4.88	1.2	0.58
D #27										
	1.7	0.0250	2:1 max.	10:1 max.	0	0.020	4.20	2.31	1.2	0.35
D #28										
	-	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.60	2.78	1.2	0.30
D #29										
	1.7	0.3909	1.5:1 max.	1.5:1 max.	5	0.020	5.21	4.76	1.0	0.07
D #30										
	1.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.511.91	1.2	0.31

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

n value - .020-liner per Manufacturer

-.020 - erosion mat

- .035 - rock riprap

ump Calculator used to check

https://www.omnicalculator.com/physics/hydraulic-jump#calculating-the-hydraulic-jump-properties

Omni Calculator

Table F-4: Ditch Hydraulic Calculations
100-Year Storm Event

Ditch	Q_{100} (cfs)	Slope	Left Side Slope	Right Side Slope	Bottom Width (ft)	Manning's "n" erosion mat 0.020 riprap 0.035 liner 0.020	Maximum Top Width (ft)	Maximum Velocity (ft/s)	Design Depth (ft)	Maximum Flow Depth (ft)
D #31										
	2.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.77	1.2	0.34
D #32										
	1.5	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.77	1.2	0.30
D #33										
	5.2	0.3636	1.5:1 max.	1.5:1 max.	5	0.020	5.36	9.81	1.0	0.12
D #34										
	2.8	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.56	3.23	1.2	0.38
D #35										
	7.8	0.3050	1.5:1 max.	1.5:1 max.	5	0.020	5.45	11.10	1.0	0.15
D #36										
	4.7	0.02 min.	2:1 max.	10:1 max.	0	0.020	5.52	3.78	1.2	0.46
D #37										
	12.4	0.3286	1.5:1 max.	1.5:1 max.	5	0.020	5.69	10.01	1.2	0.23
D #38										
	3.3	0.0150	2:1 max.	2:1 max.	0	0.035	3.44	5.26	1.2	0.86
D #39										
	1.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.24	2.51	1.2	0.27
D #40										
	1.8	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.84	2.93	1.2	0.32
D #41										
	2.9	0.4505	1.5:1 max.	1.5:1 max.	5	0.020	5.27	6.28	1.0	0.09
D #42										
	1.1	0.01 min.	2:1 max.	2:1 max.	0	0.035	2.28	1.69	1.2	0.57
D #43A										
	1.4	0.0225	2:1 max.	10:1 max.	0	0.020	4.32	2.19	1.0	0.36
D #43										
	1.4	0.3704	1.5:1 max.	1.5:1 max.	5	0.020	5.18	5.57	1.0	0.06
D #44										
	1.6	0.02 min.	2:1 max.	10:1 max.	0	0.020	2.20	2.64	1.2	0.55
D #45										
	4.4	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.20	3.44	1.2	0.80
D #46										
	7.2	0.5000	1.5:1 max.	1.5:1 max.	5	0.020	5.42	10.42	1.0	0.14
D #47										
	1.3	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.36	2.76	1.2	0.28
D #48										
	8.5	0.5111	1.5:1 max.	1.5:1 max.	5	0.020	5.51	9.85	1.0	0.17
D #49										
	2.5	0.0172	2:1 max.	2:1 max.	0	0.035	2.64	4.81	1.2	0.66
D #50										
	1.2	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.36	2.55	1.2	0.28
D #51										
	1.2	0.2500	1.5:1 max.	1.5:1 max.	5	0.020	5.15	4.73	1.0	0.05
D #52										
	0.4	0.02 min.	2:1 max.	10:1 max.	0	0.020	2.16	2.06	1.2	0.18
D #53										
	3.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.68	3.40	1.2	0.39
D #54										
	4.6	0.3108	1.5:1 max.	1.5:1 max.	5	0.020	5.33	8.10	1.0	0.11
D #55										
	2.6	.0136.	2:1 max.	2:1 max.	0	0.035	5.76	1.88	1.2	0.53
D #56										
	3.4	0.0500	2:1 max.	2:1 max.	0	0.035	4.92	3.37	1.2	0.41
D #56A										
	4.0	0.0223	2:1 max.	2:1 max.	0	0.020	4.92	3.37	1.2	0.41
D #57										
	5.5	.0223 min	2:1 max.	2:1 max.	0	0.020	3.32	10.62*	1.0	0.83
D #58										
	1.3	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.48	2.77	1.2	0.29
D #59										
	6.4	0.1811	1.5:1 max.	1.5:1 max.	5	0.020	5.57	6.07	1.0	0.19
D #60										
	1.8	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.96	1.2	0.31
D #61										
	7.9	0.1571	1.5:1 max.	1.5:1 max.	5	0.020	5.66	6.48	1.0	0.22

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

* Max Slope 35%

n value - .020-liner

- .035 - rock riprap

-.020 - erosion mat

Table F-4: Ditch Hydraulic Calculations
100-Year Storm Event

Ditch	Q_{100} (cfs)	Slope	Left Side Slope	Right Side Slope	Bottom Width (ft)	Manning's "n" erosion mat 0.020 / riprap 0.035 / liner 0.020	Maximum Top Width (ft)	Maximum Velocity (ft/s)	Design Depth (ft)	Maximum Flow Depth (ft)
D #62										
	1.7	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.77	1.2	0.31
D #63										
	9.3	0.1026	1.5:1 max.	1.5:1 max.	5	0.020	5.63	7.71	1.0	0.21
D #64										
	0.7	0.0300	2:1 max.	2:1 max.	0	0.035	3.12	2.21	1.0	0.26
D #65										
	9.9	0.4237	1.5:1 max.	1.5:1 max.	5	0.020	6.20	9.39	1.2	0.30
D #66										
	0.7	0.0968	2:1 max.	2:1 max.	0	0.035	1.32	3.67	1.0	0.33
D #67										
	4.1	0.0684	2:1 max.	2:1 max.	0	0.035	2.64	4.82	1.0	0.66
D #68										
	1.5	0.0176	2:1 max.	2:1 max.	0	0.035	2.32	2.23	1.0	0.58
D #69										
	1.2	0.0200	2:1 max.	2:1 max.	0	0.035	2.08	2.22	1.0	0.52
D #70										
	3.5	0.1504	2:1 max.	2:1 max.	0	0.035	2.16	6.34	1.0	0.54
D #71										
	6.9	0.1065	2:1 max.	2:1 max.	0	0.035	2.28	2.55	1.0	0.57
D #72										
	1.0	0.0380	2:1 max.	2:1 max.	0	0.035	1.72	2.70	1.0	0.43
D #73										
	1.9	0.0399	2:1 max.	2:1 max.	0	0.035	2.20	3.31	1.0	0.55
D #74										
	3.6	0.0954	2:1 max.	2:1 max.	0	0.035	2.36	5.17	1.0	0.59
D #75										
	9.9	0.0140	2:1 max.	2:1 max.	0	0.035	3.48	5.19	1.5	1.25
D #76										
	1.2	0.0525	2:1 max.	2:1 max.	0	0.035	2.04	3.57	1.0	0.51
D #77										
	1.1	0.0543	2:1 max.	2:1 max.	0	0.020	1.60	3.44	1.0	0.40
D #78										
	0.6	0.0260	2:1 max.	10:1 max.	0	0.020	2.88	2.50	1.0	0.38
D #79										
	0.4	0.0699	2:1 max.	10:1 max.	0	0.020	2.04	2.31	1.0	0.17
D #80										
	1.4	0.0500	2:1 max.	2:1 max.	0	0.020	1.76	3.62	1.0	0.44
D #81										
	1.4	0.01 min.	2:1 max.	10:1 max.	0	0.020	4.92	1.39	1.0	0.41
D #82										
	0.7	0.01 min.	2:1 max.	10:1 max.	0	0.020	3.84	1.14	1.0	0.32
D #83										
	0.2	0.01 min.	2:1 max.	10:1 max.	0	0.035	2.40	0.83	1.0	0.20
D #84										
	0.9	0.01 min.	2:1 max.	10:1 max.	0	0.020	4.20	1.22	1.0	0.35
D #85										
	1.0	0.01 min.	2:1 max.	10:1 max.	0	0.020	4.32	1.29	1.0	0.36
D #86										
	0.2	0.01 min.	2:1 max.	10:1 max.	0	0.020	2.40	0.83	1.0	0.20
D #87										
	0.7	0.01 min.	2:1 max.	2:1 max.	0	0.020	1.84	1.42	1.0	0.46
D #88										
	1.7	0.01 min.	2:1 max.	2:1 max.	0	0.020	2.68	1.89	1.0	0.67

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

n value - .030-liner .025-erosion mat

- .035 - rock riprap
riprap
hydraulic jump
erosion mat

Table F-5.1: Time of Concentration Calculations for Tributary A
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary A															
2	A2					15.0	2.18	0.90	0.54	0.54	1.00	0.49	0.49	1.06	t_c @ POC #2, Initial Area
		143	0.3243	3.80	0.6	15.6									D #3
3	A2,A3,A4					15.6	2.14	0.90	0.88	1.42	1.00	0.79	1.27	2.72	t_c @ POC #3, Add A3,A4
		112	0.3571	6.83	0.3	15.9									D #6
4	A2,A3,A4 A5,A6					15.9	2.12	0.90	1.24	2.65	1.00	1.11	2.39	5.06	t_c @ POC #4, Add A5,A6
		68	0.3846	9.24	0.1	16.0									D #9
5	A2,A3,A4 A5,A6,A7,A8					16.0	2.11	0.90	0.90	3.56	1.00	0.81	3.20	6.75	t_c @ POC #5, Add A7,A8
		136	0.0300	1.07	2.1	18.1									D #11
1	A1,A2,A3,A4 A5,A6,A7,A8					18.1	1.98	0.90	2.27	5.83	1.00	2.04	5.24	10.37	t_c @ POC #1, Add A1
		58	0.0402	11.04	0.1	18.2									P #1

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.2: Time of Concentration Calculations for Tributary B
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary B															
7	B1					15.0	2.18	0.90	1.26	1.26	1.00	1.14	1.14	2.48	t_c @ POC #7, Initial Area, Add B1
		175	0.0500	3.58	0.8	15.8									D #12
7A	B1,B2					15.8	2.12	0.90	0.29	0.29	1.00	0.26	0.26	0.56	t_c @ POC #7A, Add B2
		315	0.2000	3.29	1.6	17.4									D #14
8	B1,B2,B3 B4,B5					17.4	2.02	0.90	4.76	6.02	1.00	4.28	5.42	10.95	t_c @ POC #8, Add B3,B4,B5
		164	0.1666	4.05	0.7	18.1									D #17
9	B1,B2,B3,B4, B5,B6,B7					18.1	1.98	0.90	2.72	8.74	1.00	2.45	7.87	15.60	t_c @ POC #9, Add B6,B7
		102	0.2719	10.28	0.2	18.3									D #20
10	B1,B2,B3,B4, B5,B6,B7,B8, B9					18.3	1.97	0.90	1.79	10.53	1.00	1.61	9.48	18.70	t_c @ POC #10, Add B8,B9
		157	0.1783	9.78	0.3	18.5									D #23
11	B1,B2,B3,B4, B5,B6,B7,B8, B9,B10					18.5	1.96	0.90	1.09	11.62	1.00	0.98	10.46	20.48	t_c @ POC #11, Add B10
		81	0.3605	12.60	0.1	18.6									D #25
12	B1,B2,B3,B4, B5,B6,B7,B8, B9,B10,B11					18.6	1.95	0.90	1.52	13.15	1.00	1.37	11.83	23.10	t_c @ POC #12, Add B11
		50	0.1828	24.31	0.0	18.7									P #2
13						18.7									t_c @ POC #13

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.3: Time of Concentration Calculations for Tributary C
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary C															
14	C1					15.0	2.18	0.90	0.87	0.87	1.00	0.78	0.78	1.70	t_c @ POC #14, Initial Area
		127	0.3909	7.47	0.3	15.3									D #29
16	C1,C3,C4,C5					15.3	2.16	0.90	1.85	2.72	1.00	1.67	2.45	5.29	t_c @ POC #16, Add C3,C4,C5
		111	0.3636	4.12	0.4	15.7									D #33
17	C1,C3,C4,C5, C6					15.7	2.13	0.90	1.40	4.12	1.00	1.26	3.71	7.90	t_c @ POC #17, Add C6
		141	0.3050	9.89	0.2	16.0									D #35
18	C1,C3,C4,C5, C6,C7					16.0	2.11	0.90	2.42	6.54	1.00	2.18	5.88	12.43	t_c @ POC #18, Add C7
		72	0.3286	10.46	0.1	16.1									D #37
19	C1,C3,C4,C5, C6,C7,C8					16.1	2.11	0.90	1.67	8.20	1.00	1.50	7.38	15.55	t_c @ POC #19, Add C8
		71	0.3286	13.23	0.1	16.2									P #3
20						16.2									t_c @ POC #20

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.4: Time of Concentration Calculations for Tributary D
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary D															
21	D1,D2					15.0	2.18	0.90	1.48	1.48	1.00	1.33	1.33	2.90	t_c @ POC #21, Initial Area
		93	0.4505	7.01	0.2	15.2									D #41
22	D3					15.2	2.17	0.90	0.57	2.05	1.00	0.51	1.84	3.99	t_c @ POC #22, Add D3
		66	0.1408	13.21	0.1	15.3									P #4
23						15.3									t_c @ POC #23

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.5: Time of Concentration Calculations for Tributary E
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary E															
24	E1					15.0	2.18	0.90	0.72	0.72	1.00	0.65	0.65	1.41	t_c @ POC #24, Initial Area
		123	0.3704	5.60	0.4	15.4									D #43
25	E1,E2,E3					15.4	2.16	0.90	3.04	3.76	1.00	2.74	3.38	7.29	t_c @ POC #25, Add E2,E3
		134	0.5000	10.47	0.2	15.6									D #46
26	E1,E2,E3,E4					15.6	2.14	0.90	0.68	4.44	1.00	0.61	3.99	8.55	t_c @ POC #26, Add E4
		90	0.5111	13.15	0.1	15.7									D #48
27	E1,E2,E3,E4, E5					15.7	2.13	0.90	1.27	5.71	1.00	1.14	5.13	10.95	t_c @ POC #27, Add E5
		58	0.2176	20.97	0.0	15.7									P #5
28						15.7									t_c @ POC #28

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.6: Time of Concentration Calculations for Tributary F
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary F															
29	F1					15.0	2.18	0.90	0.63	0.63	1.00	0.56	0.56	1.23	t_c @ POC #29, Initial Area
		100	0.2500	4.81	0.3	15.3									D #51
30	F1,F2,F3					15.3	2.16	0.90	1.77	2.40	1.00	1.59	2.16	4.66	t_c @ POC #30, Add F2,F3
		69	0.3108	8.10	0.1	15.5									D #54
31	F1,F2,F3,F4					15.5	2.15	0.90	1.30	3.70	1.00	1.17	3.33	7.14	t_c @ POC #31, Add F4
		79	0.1753	16.96	0.1	15.5									P #6
32						15.5									t_c @ POC #32

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.7: Time of Concentration Calculations for Tributary G
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary G															
33	G1					15.0	2.18	0.90	1.71	1.71	1.00	1.54	1.54	3.36	t_c @ POC #33, Initial Area
		53	0.1372	12.16	0.1	15.1									P #7
		280	0.0567	4.34	1.1	16.1									D #56A
33A	G1,G2					16.1	2.10	0.90	0.33	2.04	1.00	0.29	1.83	3.85	t_c @ POC #33A, Add G2
		59	0.0223	6.95	0.1	16.3									P #7A
		742	0.0223	8.09	1.5	17.8									D #57
34	G1,G2,G2A, G3					17.8	2.00	0.90	1.55	3.59	1.00	1.39	3.23	6.45	t_c @ POC #34, Add G2A,G3
		280	0.1811	6.07	0.8	18.6									D #59
35	G1,G2,G3,G4					18.6	1.95	0.90	0.92	4.50	1.00	0.83	2.66	5.20	t_c @ POC #35, Add G4
		140	0.1571	8.12	0.3	18.9									D #61
36	G1,G2,G3,G4 ,G5					18.9	1.94	0.90	0.87	5.37	1.00	0.78	3.44	6.67	t_c @ POC #36, Add G5
		218	0.1026	13.49	0.3	19.1									D #63
37	G1,G2,G3,G4 ,G5,G6					19.1	1.92	0.90	0.33	5.70	1.00	0.30	3.74	7.20	t_c @ POC #37, Add G6
		38	0.4237	9.39	0.1	19.2									D #65
38	G1,G2,G3,G4 ,G5,G6,G7A					19.2	1.92	0.90	0.30	6.00	1.00	0.27	4.01	7.70	t_c @ POC #38, Add G7A
		214	0.0500	11.81	0.3	19.5									P #8
39	G1,G2,G3,G4 ,G5,G6,G7					19.5	1.91	0.90	1.57	7.57	1.00	1.41	5.42	10.32	t_c @ POC #39, Add G7
		135	0.0311	10.19	0.2	19.7									
43	G1,G2,G3,G4 ,G5,G6,G7,G 8,G9					19.7	1.89	0.66	4.12	11.69	1.00	2.72	6.46	12.24	t_c @ POC #43, Add G8,G9
		44	0.0100	7.16	0.1	19.8									P #9
						19.8									t_c @ POC #44

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.8: Time of Concentration Calculations for Tributary H
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary H															
	H1,H2					15.0	2.18	0.90	1.37	1.37	1.00	1.23	1.23	2.69	t_c @ POC #44, Initial Area
		56	0.2292	13.39	0.1	15.1									P #11
						15.1									t_c @ POC #45

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.9: Time of Concentration Calculations for Tributary I
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary I															
46	I1,I2					15.0	2.18	0.45	7.15	7.15	1.00	3.22	3.22	7.02	t_c @ POC #46, Initial Area
		388	0.1065	9.41	0.7	15.7									D #71
47						15.7									t_c @ POC #47

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.10: Time of Concentration Calculations for Tributary K
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary K															
49	K1					15.0	2.18	0.45	1.98	1.98	1.00	0.89	0.89	1.94	t_c @ POC #49, Initial Area
		307	0.0954	6.75	0.8	15.8									D #74
50	K1,K2,K4, K5,K6					15.8	2.13	0.70	2.71	4.68	1.00	1.89	2.78	5.92	t_c @ POC #50, Add K2,K4,K5,K6
		753	0.0779	9.22	1.4	17.1									D #75
51	K1,K2,K3, K4,K5,K6					17.1	2.04	0.45	5.02	9.70	1.00	2.26	5.04	10.28	t_c @ POC #51, Add K3
	K1,K2,K3, K4,K5,K6, K7					17.1	2.04	0.45	0.36	10.06	1.00	0.16	5.21	10.61	Add K7
		110	0.1909	19.60	0.1	17.2									P #14
54						17.2									t_c @ POC #54
		480	0.0833	7.11	1.1	18.3									Overland
55	K1,K2,K3, K4,K5,K6, K7,K8					18.3	1.97	0.45	8.03	18.09	1.00	3.61	8.82	17.35	t_c @ POC #55, Add K8
		50	0.0100	7.42	0.1	18.5									t_c @ POC #56

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.11: Time of Concentration Calculations for Tributary M
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary M															
58	M1,M2					15.0	2.18	0.45	2.09	2.09	1.00	0.94	0.94	2.05	t_c @ POC #58, Initial Area
		194	0.0500	16.90	0.2	15.2									P #16
59	M1,M2,M3, M4					15.2	2.17	0.45	1.10	3.19	1.00	0.49	1.43	3.11	t_c @ POC #59, Add M3,M4
		172	0.5000	19.06	0.2	15.3									P #17
60	M1,M2,M3, M4,M5,M6					15.3	2.16	0.45	1.31	4.50	1.00	0.59	2.02	4.37	t_c @ POC #60, Add M5,M6
		193	0.5000	21.25	0.2	15.5									P #18
61															
		268													
62															
		269	0.1340	13.36	0.3	15.8									P #19
65	M1,M2,M3, M4,M5,M6, M7					15.8	2.12	0.45	6.09	10.58	1.00	2.74	4.76	10.11	t_c @ POC #62, Add M8,M9
		37	0.0500	10.52	0.1	15.9									P #21
						15.9									t_c @ POC #66

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

APPENDIX G

APRIL 2019
UPDATED DESIGN PLAN FOR LANDFILL GAS COLLECTION AND CONTROL SYSTEM
(EBA, 2019)

UPDATED DESIGN PLAN
FOR
LANDFILL GAS COLLECTION AND CONTROL SYSTEM

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

October 2015
Revised May 2016
Revised April 2019

Prepared For:

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SECTION 1

INTRODUCTION

This Updated Design Plan (Updated Plan) presents background information, design criteria, and a landfill gas (LFG) collection and control system design for the City of Ukiah Landfill (Landfill), in Ukiah, California. The design and installation of a LFG collection and control system is being required to comply with the *Methane Emissions from Municipal Solid Waste Landfill* requirements associated with Title 17 of the California Code of Regulations (17CCR), Subchapter 10, Article 4, Subarticle 6, also identified as Assembly Bill 32 (AB32). Specifically, this submittal has been prepared to address the design plan requirements stipulated in 17CCR, §95464(a)(1) for the design and installation of a LFG collection and control system. Compliance with these requirements was prompted by the detection of methane emissions from the waste management unit (WMU) surface exceeding the 200 parts per million by volume (ppmv) threshold criteria as determined during a field monitoring event conducted on August 8, 2013 (EBA Engineering [EBA], 2013b).

In response to aforementioned emissions findings, the Mendocino County Air Quality Management District (MCAQMD) originally requested in a letter dated August 23, 2013 that the City of Ukiah, Department of Public Works (City) prepare a Design Plan for a LFG collection and control system to comply with AB32 regulations. A Design Plan (EBA, 2013c) was subsequently prepared and submitted to the MCAQMD in October 2013 and included a target completion date for having the LFG collection and control system installed and operational by December 31, 2014. The installation was to be integrated with the final closure construction project for the Landfill, which was scheduled for implementation in the spring and summer of 2014.

Since submittal of the original Design Plan as described above, the Landfill's final closure construction project has been delayed on multiple occasions due to changes to the final cover system design and associated negotiations with California Regional Water Quality Control Board, North Coast Region (RWQCB), California Department of Resources Recycling and Recovery (CalRecycle), and Mendocino County Health & Human Services Agency (Local Enforcement Agency (LEA), as well as the City's decision to prepare an Environmental Impact Report (EIR) as a mechanism to support the project. As part of these efforts, two updated versions of the Design Plan were submitted in August 2015 (EBA, 2015) and May 2016 (EBA, 2016) at different stages of the final cover redesign in order to bring the Design Plan current. Neither of those versions included substantive changes to the original LFG system design.

This version of the Design Plan has been prepared to account for modifications to the Landfill's final cover system that influenced the previous LFG system design. Overall, the revisions presented herein are primarily limited to modifications to the routing and/or locations of collection system piping and condensate drop-outs to compensate for changes in grade breaks and drainage channel configurations. Aside of these changes, the remaining LFG system design components, sizing,

construction materials, monitoring and reporting, proposed alternatives, and temporary mitigation measures are the same as previously outlined in the prior Design Plan versions.

SECTION 2

BACKGROUND INFORMATION

The purpose of this section is to summarize background information used in the development and design of the LFG collection and control system. The primary topics discussed in this section include general site characteristics and findings from previous LFG investigations. Each of these topics is discussed separately in the following subsections.

2.1 SITE LOCATION AND DESCRIPTION

The Landfill is located at 3100 Vichy Springs Road, approximately three miles east of Ukiah in Mendocino County, California. A site location map showing the location of the Landfill is presented as Figure 1 (Appendix A). The Landfill's WMU occupies approximately 40 acres of permitted landfill area on a 283.5-acre parcel having a maximum width of approximately 1,000 feet in the north-south direction and a maximum length of about 3,500 feet in the east-west direction. Existing ground surface elevations for the WMU range from approximately 710 feet above mean sea level (MSL) near the western footprint, to about 970 feet MSL along the southeast footprint. The WMU has been graded to form a series of flat terraces stepping down from south to north. The WMU surface is covered with seasonal grasses. A site plan illustrating the WMU topography and adjoining areas is presented as Figure 2 (Appendix A).

Land adjacent to the Landfill property is zoned primarily as rangeland and is used for grazing. Dwellings within 1,000 feet of the landfill property include a group of structures owned by the Vichy Springs Investment Group that are located within 500 feet of the Landfill's south property line and a single-family residence located approximately 900 feet west of the Landfill's western property boundary. A rural residential development is located approximately ¼-mile west of the Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000 feet southward of the Landfill property boundary and is separated from the Landfill by an intervening ridge.

It should be noted that the City owns an approximate 97-acre parcel that adjoins a portion of the Landfill's southern property boundary. This property, which has been previously identified as the "Gun Club Parcel", was purchased as a buffer zone to limit future development adjacent to the Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the Landfill property.

2.2 LANDFILL HISTORY AND DEVELOPMENT

Waste disposal operations at the Landfill began in 1955 at the eastern end of the WMU footprint and progressed upslope and westward. Prior to 1971, the Landfill was operated as a burn dump, with most of the burn-dump activities reportedly occurring in areas east of the power lines. After 1971, the method of operation transitioned to a fill and cover approach in a canyon/gully terrain. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the WMU to separate the waste from the realigned creek channel. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing Ukiah and the surrounding area. The Landfill ceased operations in September 2001.

2.3 PREVIOUS LANDFILL GAS (LFG) INVESTIGATIONS

2.3.1 Perimeter LFG Monitoring

The Landfill has been equipped with a perimeter LFG monitoring system since September 1994. The original system consisted of five LFG monitoring points (GAS-1 through GAS-5), followed by the installation of five additional LFG monitoring (GAS-6 through GAS-10) in September 1996. The locations of the LFG monitoring points are shown on Figure 2 (Appendix A). Each of the LFG monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter polyvinyl chloride (PVC) casing and capped with labcock valves. The monitoring probes range in depth from approximately 9 to 250 feet below ground surface (BGS).

The LFG monitoring points are monitored on a quarterly basis to fulfill monitoring requirements set forth in Title 27 of the California Code of Regulations (27CCR), §20921. Historical findings from this monitoring initially identified LFG migration in the area of GAS-3 and GAS-4, which prompted the installation of a partial perimeter LFG collection system in 1997 (see following subsection). Following its installation, methane was only detected sporadically in GAS-3 and/or GAS-4, mostly during periods when the partial perimeter LFG collection system was experiencing mechanical or operational issues. However, since the spring of 2017, elevated methane has been consistently detected in GAS-4. The only other historical perimeter methane detections corresponds to GAS-6 (sporadic) and GAS-10 (consistent). However, these detections have been determined to represent gas of natural thermogenic origin and are not related to the Landfill (Lawrence & Associates [L&A], 1998).

2.3.2 Partial Perimeter LFG Collection

As outlined in the previous subsection, subsurface LFG migration was identified along the southwestern edge of the WMU in the area of perimeter LFG monitoring points GAS-3 and GAS-4 following installation of the perimeter LFG monitoring system. Methane concentrations measured in these perimeter LFG monitoring points consistently exceeded the regulatory threshold for methane of 5 percent by volume (%vol). In response to these conditions, a partial perimeter LFG collection system was installed between the southwestern edge of the WMU and the property line in the summer and fall of 1997 (see Figure 2, Appendix A). In general, the system consists of 17 vertical

extraction points installed in native geologic materials and completed at depths ranging from 35 to 133 feet BGS. The extraction points are connected to a buried 6-inch diameter, high-density polyethylene (HDPE) header pipe that leads to a vacuum blower located at the western end of the WMU. The vacuum blower creates a vacuum in the header pipe that draws the LFG from the soil through the extraction points and header pipe, whereupon the collected LFG (diluted) is vented to the atmosphere via a 4-foot tall, 4-inch diameter stack. The system, which was designed by L&A, works on the premise that the extraction well field creates a barrier against migration while simultaneously mixing the collected LFG with "clean" soil pore gas that dilutes the LFG to concentrations that can be discharged directly to the atmosphere.

2.3.3 New Source Performance Standards (NSPS) Monitoring

In July 1999, a Tier 2 sampling program was implemented at the Landfill by EBA to comply with NSPS regulations. The program entailed the advancement of 26 soil borings to depths of five feet BGS along existing benches within the WMU and the collection of LFG samples for chemical analysis. The LFG samples were composited in the laboratory at a 3:1 ratio and analyzed for non-methane organic compounds (NMOCs) using United States Environmental Protection Agency (US EPA) Method 25C. The corresponding results revealed NMOC concentrations ranging from 290 to 2,900 ppmv. Field monitoring for methane from the soil borings revealed concentrations ranging from nondetect to 59 %vol, with an average concentration of approximately 40 %vol. Hydrogen sulfide was also monitored in the field and revealed concentrations ranging from nondetect to greater than 200 ppmv, with an average concentration of approximately 12 ppmv.

The overall purpose of the Tier 2 sampling program was to determine a site-specific NMOC concentration that could be used to calculate the total NMOC emission rate for the Landfill. The corresponding results revealed a total NMOC emission rate of approximately 6 megagrams per year (Mg/yr)(EBA, 1999). As this concentration was well below the regulatory action limit of 50 Mg/yr, installation of a LFG collection and control system was not required under the NSPS regulations.

2.3.4 Assembly Bill 32 (AB32) Emissions Monitoring

AB32 methane emissions monitoring was performed at the Landfill by EBA on August 8, 2013 to comply with 17CCR, §95463(b)(2)(B) and to establish if methane emissions of 200 ppmv or greater are currently being emitted from the WMU surface. The field work was performed using the instantaneous surface monitoring procedures specified in 17CCR, §95471(c)(1) and §95471(c)(2). The corresponding results from this monitoring identified a total of nine locations in which methane was detected above the 200 ppmv threshold. The concentrations detected ranged from 277 to 89,000 ppmv (8.9 %vol) and were primarily located in the southernmost portion of the WMU. Average readings for the remainder of the WMU ranged from approximately 10 to 20 ppmv (EBA, 2013b).

SECTION 3

LFG COLLECTION AND CONTROL SYSTEM DESIGN CRITERIA

Design of a LFG collection and control system is contingent upon a number of parameters ranging from the quantity, composition, and age of the refuse, as well as site-specific subsurface characteristics. Since a substantial portion of LFG parameters can be highly variable and difficult to quantitate, the criteria used for design purposes were based primarily on characteristics observed during previous site investigations and the use of theoretical parameters/models in which reasonable assumptions and calculations could be made based on existing data, available literature, and relative experience. Parameters used to develop design criteria included: refuse composition and quantity; LFG generation rates; LFG quality; LFG condensate generation; and LFG migration characteristics. Further details regarding these parameters are summarized in the following subsections.

3.1 REFUSE COMPOSITION AND QUANTITY

The Landfill was in operation from 1955 to September 2001 and operated as a nonhazardous Class III solid waste disposal site. Composition of the waste reportedly received at the Landfill included paper products, food wastes, glass, metal, wood, plastic, cloth, rubber, synthetics and inert waste such as soil, ashes, rock, etc. No high liquid content wastes, designated wastes, or hazardous wastes were accepted for disposal. Previous estimates of the waste stream by category identified approximately 27 percent of the waste as residential, 32 percent commercial, 14 percent industrial, and 27 percent self-haul (City, 1999). As previously outlined in Subsection 2.2 (*Landfill History and Development*) of this Updated Plan, the Landfill was operated as a burn dump prior to 1971. Thus, it is possible that the bulk of the waste in the WMU prior to 1971 is primarily inert.

Several previous estimates have been reported with regard to the quantity of waste in-place at the Landfill. In a technical memorandum prepared by Pacific Waste Services, Inc. (PWS) for the City in December 2009, the in-place tonnage was estimated at 1,499,300 tons (PWS, 2009). This estimate was not based on any weigh scale records and assumed a constant 550-ton increase per year of waste placement over the period of 1955 through 2001. In June 2013, the City generated a revised estimate as part of the *Landfill Heat Input Capacity Report* that was prepared to comply with AB32 reporting requirements. As part of the City's revised estimate, actual tonnage data was compiled for the period 1990 through 2001. For years prior to 1990, the City reduced the annual waste placement tonnage by 550 tons per year (same incremental rate assumed by PWS) through 1955. The corresponding total in-place tonnage resulting from this revised calculation equated to 1,039,116 tons (City, 2013).

3.2 LFG GENERATION AND RECOVERY ESTIMATES

Several LFG generation models were evaluated to establish LFG generation estimates for the Landfill and to develop design parameters for the LFG collection and control system. These models included the first-order decay model from the 2006 Intergovernmental Panel on Climate Change (IPCC) as required by 17CCR, §95464(a)(1)(F), as well as miscellaneous first order generation models developed by SCS Engineers (1998) for the Solid Waste Association of North America (SWANA). Multiple models and scenarios were employed to evaluate the range of generation rates calculated by the respective models, which in turn was factored into the determination of potential turndown ratios for the flare design. This use of multiple models is considered appropriate to compensate for the number of variables that are difficult to define with any certainty (i.e., historical disposal rates, historical waste composition, waste moisture content, etc.).

As part of the aforementioned models, the two (2) variables that most strongly influence the corresponding results are the methane generation potential (Lo) and/or the methane generation rate constant (k). Lo represents the total amount of methane that a unit mass of refuse will produce if given enough time to fully decompose. The k constant, in turn, corresponds to the fraction of refuse that decays and generates methane in a given year. Based on the average rainfall in the Ukiah area (approximately 38 inches per year), Lo and k values of 1.6 cubic feet per pound of refuse (ft^3/lb) and 0.038/year (IPCC default value for areas with average rainfall between 20 and 40 inches per year), respectively, were selected for modeling LFG generation rates for the Landfill.

Using the resources and information described herein, LFG generation modeling was performed for four (4) different scenarios. These scenarios included the following:

- *Scenario 1:* A total refuse tonnage of 1,499,300 tons placed between 1955 and 2001 as estimated by PWS.

- *Scenario 2:* A total refuse tonnage of 1,039,116 tons placed between 1955 and 2001 as estimated by the City.

- *Scenario 3:* An adjusted refuse tonnage of 1,125,300 tons based on PWS estimate placed between 1971 and 2001 to account for potential inert refuse resulting from former burn-dump operations.

- *Scenario 4:* An adjusted refuse tonnage of 809,644 tons based on City estimate placed between 1971 and 2001 to account for potential inert refuse resulting from former burn-dump operations.

A summary of the LFG generation modeling results is presented in Table 1. Copies of the corresponding spreadsheets and graphs for the respective model results are presented in Appendices B-1 through B-4, which coincide with Scenarios 1 through 4 described above. Please note that the LFG generation rates presented in Table 1 assume a methane composition of 50 percent by volume. In addition, since the collection and control system cannot capture all of the LFG generated in the WMU due to a variety of factors (i.e., WMU geometry, hydraulic conductivity of the cover, degree

of saturation of the refuse, degree to which air infiltration can be tolerated, etc.), a collection efficiency of 75 percent has been assumed for design purposes. This collection efficiency is consistent with the recovery rate stipulated in the AB32 regulations.

TABLE 1
LFG GENERATION ESTIMATES AND RECOVERY
YEAR 2019

Model	*Lo (ft^3/lb)*	*k (1/year)*	*Methane Generation Rate (SCFM)*	*LFG Generation Rate (1) (SCFM)*	*Potential LFG Recovery (2) (SCFM)*
Scenario 1: PWS Tonnage Estimate for Period 1955 -2001					
IPCC Model	----	0.038	----	----	139
Simple First Order - Median (3)	1.6	0.038	93	186	140
Modified First Order (3)	1.6	0.038	97	194	146
First Order Multi-Phase (3)	1.6	0.038	67	134	101
Scenario 2: City Tonnage Estimate for Period 1955 -2001					
IPCC Model	----	0.038	----	----	98
Simple First Order - Median (3)	1.6	0.038	67	134	101
Modified First Order (3)	1.6	0.038	69	138	104
First Order Multi-Phase (3)	1.6	0.038	48	96	72
Scenario 3: PWS Adjusted Tonnage Estimate for Period 1971 -2001					
IPCC Model	----	0.038	----	----	122
Simple First Order - Median (3)	1.6	0.038	82	164	123
Modified First Order (3)	1.6	0.038	86	172	129
First Order Multi-Phase (3)	1.6	0.038	63	126	95
Scenario 4: City Adjusted Tonnage Estimate for Period 1971 -2001					
IPCC Model	----	0.038	----	----	88
Simple First Order - Median (3)	1.6	0.038	59	118	89
Modified First Order (3)	1.6	0.038	61	122	92
First Order Multi-Phase (3)	1.6	0.038	46	92	69

Lo: Methane Generation Potential
k: Methane Generation Rate Constant
LFG: Landfill Gas
ft^3/lb: Cubic Feet per Pound (of refuse)
SCFM: Standard Cubic Feet per Minute
PWS: Pacific Waste Systems, Inc. (2009)
IPCC: Intergovernmental Panel on Climate Change (2006)
City: City of Ukiah, Department of Public Works (2013)

(1): Assumes an average methane concentration of 50 percent by volume.
(2): Assumes a 75 percent collection efficiency.
(3): SCS Engineers, 1998

The current LFG generation rate for the Landfill based on all the modeling scenarios ranges from 92 to 194 standard cubic feet per minute (SCFM), with potential LFG recoveries ranging from 69 to 146 SCFM. As presented in Table 1, the biggest variable influencing the generation rates is the amount of in-place waste. Scenarios 1 and 3 which assume a higher in-place waste tonnage yield LFG generation rates and recoveries ranging from 126 to 194 SCFM and 95 to 146 SCFM, respectively.

In contrast, the lower in-place tonnage assumed by Scenarios 2 and 4 yield LFG generation rates and recoveries ranging from 92 to 138 SCFM and 69 to 104 SCFM, respectively.

As presented in the various methane/LFG generation graphs presented in Appendix B, the Landfill is on the downward side of the generation curve and will continue along this pattern until the generation potential of the refuse is completely exhausted.

3.3 LFG QUALITY CHARACTERISTICS

Table 3 provides a summary of the estimated LFG quality characteristics at the Landfill. This summary is based on field and laboratory test results on LFG samples collected by EBA on September 12 and 16, 2013. The LFG sampling was performed using two (2) shallow hand-augered boreholes (GP-1 and GP-2) completed at depths of approximately six feet BGS, as well as from existing leachate wells LW-1 and LW-2. Please refer to Figure 2 (Appendix A) for the corresponding locations. Dedicated samples were collected from LW-1 and GP-1, while a two-part composite sample was collected using LW-2 and GP-2. In addition to retaining samples for chemical analysis, the respective locations were monitored in the field for methane, oxygen, carbon dioxide, and hydrogen sulfide using portable meters. These results are also presented in Table 3 below. The laboratory testing was performed by K Prime, Inc. (K Prime), a California State-certified analytical laboratory located in Santa Rosa, California. A copy of the Certified Analytical Report (CAR) prepared by K Prime is enclosed in Appendix C.

TABLE 3
ESTIMATED LANDFILL GAS COMPOSITION

Parameter	*Laboratory Test Results*			*Field Monitoring Results*
	LW-1 (Dedicated)	*GP-1 (Dedicated)*	*LW-2 and GP-2 (Composite)*	
Primary Gases:				
Methane	47.8 % vol	55.2 % vol	57.5 % vol	37 to 67 % vol
Carbon Dioxide	33.2 % vol	35.7 % vol	34.9 % vol	33 to 40 % vol
Oxygen	<1.00 % vol	2.48 % vol	<1.00 % vol	3.4 to 6.7 % vol
Nitrogen	18.3 % vol	6.66 % vol	7.22 % vol	NA
Hydrogen Sulfide	NA	NA	NA	0 to 16 ppmv
VOCs:				
Dichlorodifluoromethane	0.572 ppmv	NA	<1.00 ppmv	NA
Dichlorotetrafluoroethane	0.103 ppmv	NA	<1.00 ppmv	NA
Vinyl Chloride	5.83 ppmv	NA	1.54 ppmv	NA
Methylene Chloride	0.147 ppmv	NA	<1.00 ppmv	NA
cis-1,2-Dichloroethene	2.06 ppmv	NA	<1.00 ppmv	NA
Benzene	0.161 ppmv	NA	<1.00 ppmv	NA
Trichloroethene	0.241 ppmv	NA	<1.00 ppmv	NA
Toluene	0.390 ppmv	NA	7.01 ppmv	NA
Tetrachloroethene	0.819 ppmv	NA	<1.00 ppmv	NA
Chlorobenzene	<0.100 ppmv	NA	1.95 ppmv	NA

(Continued)

TABLE 3 *(Continued)*
ESTIMATED LANDFILL GAS COMPOSITION

Parameter	*Laboratory Test Results*			*Field Monitoring Results*
	LW-1 (Dedicated)	*GP-1 (Dedicated)*	*LW-2 and GP-2 (Composite)*	
VOCs *(continued)*:				
Ethylbenzene	<0.100 ppmv	NA	159 ppmv	NA
Xylene (M+P)	0.409 ppmv	NA	123 ppmv	NA
Xylene (O)	0.144 ppmv	NA	136 ppmv	NA
1,3,5-Trimethylbenzene	<0.100 ppmv	NA	6.02 ppmv	NA
1,2,4-Trimethylbenzene	<0.100 ppmv	NA	6.29 ppmv	NA
Total Volatile Hydrocarbons[(1)]	33.7 ppmv	80.6 ppmv	1,120 ppmv	NA

% vol: Percent by Volume
ppmv: Parts per Million by Volume
NA: Not Analyzed

(1): Total Volatile Hydrocarbons is synonymous to Non-Methane Organic Compounds (NMOCs).

It should be noted that the concentrations presented in Table 3 are considered to be conservative in nature and will likely decrease over time. Since LFG has been generating within the refuse mass for at least 40 years, a surplus of highly concentrated LFG may be currently present within the WMU. However, upon removal of this surplus by the active collection efforts, coupled with the age of the refuse and dilution effects resulting from the influx of atmospheric air, it is estimated that methane concentrations could stabilize somewhere in the 35 to 45 percent by volume range. Carbon dioxide and volatile organic hydrocarbon/NMOC concentrations will also likely exhibit similar reductions, whereas nitrogen concentrations will likely increase. Whereas the length of time it will take for such reductions to occur is unknown, prior experience at similar sites suggest that it could occur within two to six months of system start-up.

3.4 LFG CONDENSATE GENERATION ESTIMATES

Condensate generation was approximated based on temperature and vapor pressure differentials of the LFG. Calculations were performed for flow rates of 53 and 210 SCFM, which correspond to the design flow range for the proposed LFG collection and control system (see Section 4 [*LFG Collection and Control System Design*]). In addition, final inlet LFG temperatures of 36°F and 59°F were also considered to simulate extreme and average temperature conditions indicative of the Ukiah area. Results of the condensate generation calculations are presented below in Table 4. Please refer to Appendix D for copies of individual spreadsheets that summarize the respective calculations.

TABLE 4
CONDENSATE GENERATION CACULATIONS

Flow Rate (SCFM)	*Temperature (°F)*		*Vapor Pressure (psia)*		*Average Vacuum Pressure (psia)*	*Condensate Generation (gpd)*
	Initial	*Final*	*Initial*	*Final*		
53	120	36	1.6927	0.0999	13.797	50 to 52
53	120	59	1.6927	0.2561	13.797	45 to 52
210	120	36	1.6927	0.0999	13.797	199 to 207
210	120	59	1.6927	0.2561	13.797	179 to 207

SCFM: Standard Cubic Feet per Minute
°F: Degrees Fahrenheit
psia: Pounds per Square Inch (Actual)
gpd: Gallons per Day

As summarized in Table 4, the condensate generation rate at the site may range from approximately 45 to 210 gallons per day (GPD) based on the given temperature and flow scenarios. Please note that 36 degrees Fahrenheit (°F) corresponds to the average ambient temperature during the coldest month of the year (December), and therefore represents the period of greatest condensate generation. Since the average ambient temperature over the entire year is 59°F, the average volume of condensate generated over the course of 12 months will be less.

3.5 LFG MIGRATION CHARACTERISTICS

The two primary components of LFG migration correspond to surface emissions and subsurface migration through subgrade soils and rock formations. As a general rule, LFG migration can be expected to follow a path of least resistance in response to pressure differentials. Surface emissions typically occur when vapor pressures within the WMU exceed atmospheric pressure and can vary during the course of the day due to fluctuations in atmospheric conditions. Similarly, increased vapor pressures within the WMU can induce lateral and vertical LFG migration through subsurface soils and rock formations, including preferential migration through permeable zones (i.e., sand and gravel deposits, fractures, etc.). Finally, concentration gradients between LFG within the refuse mass and surrounding soil-pore gas in the vadose zone can result in the diffusion of LFG both laterally and vertically.

It should be noted that the surface of the WMU is currently comprised of interim cover soil. However, a low-permeability final cover system will be installed over the entire WMU as part of the final closure construction operations. Since the final cover system will include a geomembrane component, the new final cover system should serve to reduce potential surface emissions on its own. Conversely, the low-permeability nature of the final cover system could increase vapor pressures within the WMU, thereby increasing the potential for lateral and/or vertical LFG migration through the subsurface soils and/or rock formations, similar to what is currently being observed in

the area of GAS-4. Thus, whereas the LFG collection and control system is being mandated to address fugitive surface emissions, it will also serve the dual purpose of mitigating the area of existing migration (GAS-4) and minimizing the potential for increased subsurface LFG migration elsewhere around the WMU.

SECTION 4

LFG COLLECTION AND CONTROL SYSTEM DESIGN

This section presents the various components of the LFG collection and control system design. The design has been developed to meet the requirements of 17CCR, §95464(b). Based on the current and projected LFG recovery rates presented in Subsection 3.2 (*LFG Generation and Recovery Estimates*), the design flow rate for the system has been established at 53 to 210 SCFM (at 50 percent methane). This range covers the highest anticipated LFG recovery rate based on the most conservative generation model. In addition, the design range can accommodate lower flows to account for future operations as the generation rate continues to decreases over time. Overall, the LFG collection and control system will consist of a series of perimeter and interior LFG extraction wells, associated above ground collection system piping, condensate collection provisions, and a flare station. Further details regarding each of these components are summarized in the following subsections.

Construction drawings illustrating the LFG collection and control system design are enclosed in Appendix E. Sheets 600 through 602 provide plan views of the system layout. Sheets 700 through 706, in turn, provide details of the various system components.

4.1 LFG EXTRACTION WELLS

4.1.1 Well Field Layout and Rationale

Since the WMU is comprised mostly of steep slopes, the well field layout is primarily dictated by the location of benches, which provide access by a truck- or track-mounted drilling rig. With that constraint in play, the well field for LFG extraction has been designed to create a series of perimeter and interior extraction well locations. Sheets 600 through 602 (Appendix E) show the proposed well field configuration. As presented on these sheets, a total of 18 extraction wells (EW-1 through EW-18) will be installed as part of the proposed construction. The rationale for the well field layout is as follows:

- The perimeter extraction wells located near the edges of the WMU will be used for migration control in response to the anticipated increase in lateral and vertical pressures induced by the installation of the final cover system;

- The interior extraction wells will be used to collect methane-rich LFG for the purpose of operating the flare and to deplete the LFG generation source;

- The overall extraction well configuration will serve to provide coverage of the entire WMU as a means of minimizing the potential for fugitive surface emissions, including areas of exceedances identified during the August 8, 2013 emissions monitoring event; and

- LFG extraction well EW-9 is intended to target the LFG migration observed in GAS-4, although other LFG extraction wells may also serve this purpose depending upon the migration pathway responsible for the conditions exhibited in GAS-4.

For design purposes, it is assumed that the operating flow rates for the extraction wells will initially range from approximately 5 to 8 SCFM, which equates to a total flow of 90 to 144 SCFM. This flow range encompasses the estimated maximum 2019 LFG recovery rate of 146 SCFM as presented earlier in Subsection 3.2 (*LFG Generation and Recovery Rates*) of this Updated Plan. It should be noted, however, that the actual flow rates will be contingent upon LFG quality at the respective locations. The aggressiveness upon which the well field is operated will be dictated by the extent of atmospheric air intrusion and the ability to attain flows that will not compromise the safety of site operations (i.e., subsurface fires).

4.1.2 Well Completion Depths

The extraction wells will be completed to depths of approximate 10 to 15 feet above the base of refuse. Based on a previous seismic refraction survey performed at the Landfill in 1993 (Norcal Geophysical Consultants, Inc., 1993), it was estimated that the base of refuse ranges from approximately 700 feet MSL (north) to 880 feet MSL (south), with refuse thicknesses ranging from 40 to 65 feet. However, additional refuse was placed in the southern portion of the WMU following the seismic refraction survey, thereby increasing the refuse thickness in some areas to greater than 80 feet. Based on these characteristics, the proposed extraction well depths will range from 25 to 80 feet BGS as measured from the top of the completed final cover system surface, with an overall average depth of approximately 50 feet BGS. Ideally, a minimum perforation depth (i.e., depth to top of perforated interval) of 15 to 20 feet BGS will be maintained to minimize the potential for atmospheric air intrusion during system operations. In the event shallow auger refusal conditions are encountered that do not allow adherence to this specification, consideration will be given to either reducing the minimum perforation depth or adjusting the corresponding well location.

The extraction wells will be drilled using a truck- or track-mounted drilling rig equipped with 24-inch diameter solid stem augers or bucket auger (see following subsection for further details). A qualified drilling contractor with a current C57 contractor's license will provide the drilling services, under the direct supervision of a California Registered Geologist. The field geologist will be responsible for logging the respective boreholes, making determinations in the field regarding the completion characteristics noted above, and preparing well completion logs. This individual will also perform field monitoring during drilling to evaluate individual borehole conditions and for health and safety purposes. The scope of field monitoring will include selected gases (i.e., methane, oxygen, carbon dioxide, and hydrogen sulfide) and volatile organic compounds (VOCs) using a portable LFG analyzer and photoionization detector (PID), respectively. Refuse spoils generated by the drilling operations will either be temporarily stockpiled on visqueen (and covered) or placed in roll-off bins, whereupon the material will be transported off-site to a permitted solid waste disposal facility.

4.1.3 Well Construction Characteristics

The well casings for the extraction wells will be constructed of 4-inch diameter, Schedule 80 polyvinyl chloride (PVC) pipe. As noted in the previous subsection, the perforated interval for each well will start at 15 to 20 feet BGS and extend downward to the completion depth of the well. The annulus around the well casing will be backfilled with gravel pack material consisting of 1- to 2-inch diameter, non-calcareous washed rock and will extend 12 inches above the perforated casing. The gravel pack, in turn, will be capped with a 3-foot-thick hydrated bentonite seal, followed by soil to a depth of 1 foot below the refuse/final cover interface. A second hydrated bentonite seal (1.5 feet in thickness) will then be placed across this interface, followed by compacted soil to the base of the final cover system's geomembrane. Finally, a PVC well bore seal will be placed beneath and across the geomembrane as a protection provision against atmospheric air intrusion during system operations. Please refer to Sheet 700 (Appendix E) for a typical LFG extraction well construction detail and a tabulated summary of the proposed completion characteristics for the respective extraction wells.

4.1.4 Wellhead Completion

The wellheads for the extraction wells will be completed above ground. The wellheads will be equipped with 1.5-inch diameter PVC gate valves and fittings to regulate and control LFG flow. Each wellhead will also be equipped with a sample port, differential pressure ports, and an orifice plate to allow for the monitoring of LFG quality, temperature, vacuum conditions, and flow. PVC flex hose will be used to connect the wellheads to the collection system piping. Please refer to Sheet 700 (Appendix E) for the wellhead completion characteristics.

4.2 COLLECTION SYSTEM PIPING

4.2.1 Piping Layout and Rationale

Extracted LFG will be conveyed to the flare station via above ground collection system piping (i.e., laterals and headers). The proposed layout of the collection system piping is shown on Sheets 600 through 602 (Appendix E). As shown on these sheets, most of the collection system piping is aligned along the outside edges of the benches to allow for future operation and maintenance access. Other design features and considerations include the following:

- The layout has a modified "loop" configuration that allows for a more even distribution of flow throughout the system.

- The system is segmented and equipped with valve assemblies that will allow for portions of the system to be isolated for repair and maintenance while the remainder of the system remains operational.

- The system has been designed for the removal of LFG condensate at various locations within the well field by promoting gravity drainage of the condensate towards low points within the

collection system piping, whereupon the condensate is drained via dedicated drainage lines that convey the collected condensate to an existing leachate drain located along the northern toe of the WMU.

4.2.2 Sizing of Primary Header Pipe

Head loss calculations were performed using the Darcy Formula to determine sizing requirements for the primary header pipe. A copy of the corresponding head loss calculations is presented in Appendix F. Based on a proposed blower vacuum rating of 35 inches of water column ("wc), a desired wellhead vacuum inducement of 10"wc at the extraction wells furthest from the flare station (EW-17 and EW-18), and a maximum flow rate of 210 SCFM, the corresponding head loss for a 8-inch diameter header pipe is approximately 2.2"wc. This translates to an available residual vacuum of 22.8"wc, which should be more than sufficient to compensate for any unforeseen performance losses related to potential surging effects or flow reversals (i.e., LFG versus condensate flow).

4.2.3 Construction of Collection System Piping

The collection system piping will be constructed of Schedule 40 PVC pipe ranging in size from 4 to 8 inches in diameter. The PVC piping and fitting components will be joined using solvent welding methods and painted to provide ultra-violet (UV) light protection. As outlined in the previous subsection, 8-inch diameter pipe is proposed for the primary header pipe to accommodate anticipated flows and promote condensate drainage. Six-inch and 4-inch diameter piping is proposed for selected header and LFG extraction well lateral segments, respectively. Other pertinent components of the collection system piping will include the following:

- Isolation valves will be installed at major junctions and other strategic points within the primary header (see Sheets 600 through 602, Appendix E) to provide for greater flexibility from an operations and maintenance standpoint. This provision will allow sections of the primary header to be isolated while the remaining sections remain operational.

- Flexible couplings will be installed within the header segments to accommodate thermal expansion and contraction of the pipe due to ambient temperature fluctuations.

- Pipe anchors will be installed within the header segments to secure and restrict pipe movement at pertinent points within the system. The majority of the proposed pipe anchor locations will correspond to header-to-header and lateral-to-header connections and condensate drainage lines.

- Pipe supports for selected above ground PVC piping segments will be installed to allow for the passage of surface water drainage beneath the pipe and to adjust pipe slopes where needed.

4.3 CONDENSATE COLLECTION PROVISIONS

LFG condensate generated with the LFG collection and control system will be collected and removed at various points within the collection system piping. Condensate will also be removed at the flare station at a point just prior to the blowers. The locations and type of equipment to be used to remove the condensate can be summarized as follows:

- *Condensate Drop-Outs:* Condensate drop-outs will be installed at various locations within the well field area (see Sheets 600 through 602, Appendix E). The condensate drop-outs are located at various low points within the collection system piping. The condensate drop-outs are designed to collect and convey condensate by gravity flow via dedicated drainage lines to the existing leachate drain located along the northern toe of the WMU. The condensate drainage lines will be comprised of HDPE pipe and will include U-traps to isolate the drainage lines from the LFG stream. The removal of condensate from these areas is necessary to avoid potential problems related to LFG flow blockages and surging effects.

- *Gas-Liquid Separator:* A gas-liquid separator will be installed at the flare station directly upflow from the blowers. The purpose of this component is to remove moisture from the LFG air stream prior to entering the blowers and flare. Removal of the moisture is achieved by centrifugal force created within the gas-liquid separator.

Condensate removed by the drop-outs and discharged to the existing leachate drain will be managed in the same manner that the leachate currently is managed; i.e., the leachate drain discharges to a vault located near the west end of the WMU, whereupon the leachate is pumped to an existing leachate above ground storage tank (AST) for subsequent disposal at the City's publicly-owned treatment works (POTW) facility. Condensate collected by the gas-liquid separator will also be handled in a similar manner. This condensate will either be gravity fed to the aforementioned vault or pumped directly to the existing leachate AST. Provisions will be made to line the vault with a solids epoxy resin-based coating to provide waterproofing, sealing, and corrosion protection.

4.4 FLARE STATION

The major components of the flare station are the blowers and the flare. Other pertinent equipment and features include: a gas-liquid separator for removing condensate and particulates from the LFG stream; LFG flow control and miscellaneous monitoring mechanisms to evaluate flare performance and compliance; and automatic safety control features. Further details regarding each of these components are summarized in the following subsections.

It should be noted that the flare station will be comprised of a skid-mounted packaged combustion system. In general, a packaged combustion system consists of a pre-piped and pre-wired unit in which all the system components (i.e., gas-liquid separator, blowers, flare, control panel, etc.) are mounted on two separate skids. This type of system is proposed as a mechanism to reduce field installation costs. In addition, the packaged combustion system can be trouble-shooted and tested at the factory following fabrication to ensure proper operation.

4.4.1 Gas-Liquid Separator

The gas-liquid separator is designed to remove moisture for the LFG stream prior to entering the blowers and flare. Removal of the moisture is achieved by centrifugal force created within the gas-liquid separator. Free liquids generated by this process are collected at the base of the unit and will be discharged to either the leachate vault or leachate AST as described in the previous subsection. This unit will be located on the packaged combustion system at a point upstream of the blower inlet.

4.4.2 Blowers

The function of the blowers is to induce a vacuum in the LFG extraction wells and collection system piping and convey the LFG generated from these sources to the flare. The desired vacuum for the LFG collection and control system is set at 35"wc. This vacuum will be sufficient to induce a minimum vacuum of 10"wc in the LFG extraction wells furthest from the blower, extract LFG intercepted by the final cover system's gas relief component, and to overcome associated head losses in the collection system piping. As outlined in Subsection 4.2.2 (*Sizing of Primary Header Pipe*) of this report, a residual vacuum of 22.8"wc will be available in the primary header system under the aforementioned conditions. The design flow rates for the entire LFG collection and control system are 53 to 210 SCFM. Two blowers will be installed at the flare, with the second blower intended for secondary standby requirements or to allow for alternating use of the blowers.

The blowers will consist of centrifugal-type blowers equipped with 7.5 horsepower, 3-phase, totally-enclosed fan cooled (TEFC) motors. Flexible connections will be installed on both inlet and outlet sides of the blowers to absorb vibrations during operation. A summary of the blower performance parameters is presented in Table 5.

TABLE 5
BLOWER PERFORMANCE SPECIFICATIONS

Parameter	*Specification*
Fuel	Landfill Gas
Fuel Specific Gravity	0.97 pounds per cubic foot
Fuel Temperature (Range)	100ºF to ambient
Design Flow Rate (Range)	53 to 210 standard cubic feet per minute
Blower Turndown Ratio	4:1
Inlet Vacuum Pressure	35 inches of water column
Discharge Positive Pressure	10 inches of water column

°F: Degrees Fahrenheit

4.4.3 Totally-Enclosed Vertical Ground Flare

A totally-enclosed vertical ground flare (flare) will be utilized for the thermal destruction of LFG collected by the LFG collection and control system. In general, LFG extracted from the LFG extraction wells is diverted to the flare station where it is combusted in the presence of oxygen to carbon monoxide, sulfur dioxide, oxides of nitrogen (NOx), and other related gases. The flare will be specified to meet all requirements of the MCAQMD and AB32 regulations, and will be equipped with a series of operational mechanisms, safety controls and monitoring devices (see following subsections). Table 6 below provides a summary of applicable performance standards for the flare.

TABLE 6
FLARE PERFORMANCE STANDARDS

Parameter	*Specification*
Fuel	Landfill Gas
Fuel Composition (estimated)	Methane (30 to 55 percent) Carbon Dioxide (20 to 45 percent) Nitrogen (5 to 12 percent) Oxygen (0 to 3 percent) Hydrogen (0 to 1 percent) Trace Compounds (<1 percent)
Fuel Specific Gravity	0.97 pounds per cubic foot
Fuel Temperature Range	100ºF to ambient
Design Flow Rate (range at 50 percent methane)	53 to 210 standard cubic feet per minute
Pilot Fuel	Propane
Fuel Pressure to Flare	10 inches of water column
Minimum/Maximum LFG Heating Value	269 to 492 BTU/scf
Minimum/Maximum LFG Heat Release	0.9 to 6.2 MMBTU/hr
Flare Turndown Ratio	4:1
Minimum LFG Retention Time	0.7 seconds
Minimum Combustion Temperature	1,400ºF
Design Operating Temperature	1,400ºF to 1,800ºF
Destruction Efficiency	Overall = >98 percent by weight Oxides of Nitrogen (NOx) = 0.06 lbs/MMBTU Carbon Monoxide (CO) = 0.20 lbs/MMBTU

°F: Degrees Fahrenheit
BTU/scf: British Thermal Units per Standard Cubic Foot
MMBTU/hr: Million British Thermal Units per Hour
lbs/MMBTU: Pounds per Million British Thermal Units

4.4.4 LFG Flow Control and Monitoring Mechanisms

The flare will be equipped with automatic flow control capabilities and miscellaneous monitoring devices. The two primary components of the LFG flow equipment are the flame switch assembly and an actuated LFG inlet valve. The flame switch assembly is the source mechanism for activating the LFG inlet valve and includes such equipment as a UV flame detector and miscellaneous electronic relay components. The LFG inlet valve, in turn, shuts down flow to the flare in case of a system failure or emergency and is controlled by an electric or pneumatic actuator.

The flare station will also be equipped with a variety of sensors and gauges to monitor system parameters, with the most prominent parameters being flow and temperature. Flow will be measured using a differential pressure or thermal mass flow meter. Temperature within the flare will be monitored using thermocouple transducers and temperature sensors. These devices are wired to a flame temperature controller unit that will be capable of regulating flare temperatures (through activation of an automatic damper[s]) and/or shutting down the flare station in cases of minimum/excessive temperatures.

4.4.5 Automatic Safety Control Systems

In addition to the aforementioned safety control measures, the flare will be equipped with a flame arrestor and miscellaneous automatic shutdown devices. The flame arrestor is a safety mechanism designed to stop propagation of the flame. This device is equipped with an internal multi-plate bank assembly that absorbs and dissipates the heat from the LFG, which in turn lowers the temperature of the LFG below its ignition point, thereby quenching the flame. The flame arrestor will be installed in the inlet pipeline, just prior to entering the flare. The automatic shutdown devices, in turn, provide oversight of system operations and terminate operations if pre-set conditions are not satisfied. Conditions to be programmed for automatic shutdown will include, but not necessarily limited to, the following: pilot light failure; low/high temperature conditions; flame-out conditions; high condensate level in gas-liquid separator; and power outage.

4.4.6 Control Station Assembly

The overall collection and control system will be operated by a programmable logic control (PLC) housed inside a self-supporting, weatherproof control panel. The PLC will be responsible for overall system operation and control. In addition to the PLC, the control panel will contain the following control/safety components and features:

- Automatic start/re-start control system
- Pilot gas control system
- Modules for low/high temperature shut-down and automatic temperature controls integrated with the flare's damper system
- Motor starter panels, including variable frequency drive (VFD) provisions
- Power transformer and miscellaneous relay mechanisms
- Indicating lights showing system operation and status
- A continuous chart recorder for temperature and flow

- Autodialer alarm system

The control station assembly will be mounted directly onto the packaged combustor system unit. All electrical components for the control station assembly and flare station will be Underwriters Laboratory (UL) approved.

4.5 PERMITTING

Permitting of the proposed LFG collection and control system will entail the acquisition of an Authority to Construct (ATC)/Permit to Operate (PTO) from the MCAQMD. The ATC/PTO process will be coordinated by EBA with the MCAQMD. Upon issuance of the ATC by the MCAQMD and subsequent installation of the LFG collection and control system, provisions will be made to coordinate a final system inspection with MCAQMD and perform any source testing that may be required to satisfy applicable PTO requirements.

Other local permits that may be required as part of the installation process include a drilling permit for installation of the LFG extraction wells, as well as building and electrical permits. The acquisition of these types of permits (as applicable), and any other local permits that may be required, will be obtained by the construction contractor selected to implement the final closure construction project.

SECTION 5

MONITORING AND REPORTING

The LFG collection and control system will be monitored throughout the course of operation to evaluate the performance and effectiveness of system operations. The proposed scope and frequency of monitoring activities are designed to maintain system efficiency and safety, and to comply with federal, state, and local regulatory requirements, including AB32 regulations. Details regarding the proposed monitoring and reporting provisions are summarized in the following subsections.

5.1 FLARE STATION

Upon commencement of system operations, the flare station will be monitored initially on a daily basis to assure safe and efficient system operations, and to confirm compliance with applicable regulatory performance standards. Since the flare station is responsible for inducing sufficient vacuum pressures for the entire WMU and subsequent combustion of the LFG, it is imperative that the equipment components are operating at optimal efficiency at all times. Upon stabilization of system operations, the frequency of monitoring will be adjusted accordingly. In order to monitor system performance and identify potential hazards, the following parameters will be monitored and recorded:

- Ambient temperature
- Blower inlet vacuum pressure and differential pressure
- Blower operating hours
- LFG inlet temperature and pressure
- LFG flow rate
- LFG quality (methane, carbon dioxide, oxygen and balance [nitrogen] concentrations)
- Flare temperature
- Flame arrestor pressure and differential pressure

The parameters outlined herein will be recorded on an entry log. All completed entry logs will be maintained on file at the City's office and will be made available to the MCAQMD, CalRecycle, and LEA upon either verbal or written request.

5.2 WELL FIELD

LFG parameters will be monitored at each of the wellheads. Data compiled at these locations provide the greatest source of information regarding LFG collection and control system performance. Parameters to be included in the data collection will be as follows:

- *LFG Quality*: Monitoring of the four primary LFG components (methane, carbon dioxide, oxygen and nitrogen) and the associated ratios of these compounds plays an important role with regard to operation of the LFG collection and control system. Methane concentrations provide an indication of the overall decomposition rate of the refuse and the overall health of the methogenic (anaerobic) organisms. Nitrogen and oxygen concentrations, in turn, provide indications of excessive flows and the influx of atmospheric air. The influx of atmospheric air into the WMU can be detrimental to anaerobic decomposition (thereby eliminating methane production), and can also increase the potential for subsurface fires. Individual extraction wells will be adjusted accordingly to maintain the highest methane content as practical, while still maintaining adequate migration and emissions control.

- *LFG Temperature:* Excessive LFG temperatures provide an indication of potential subsurface fires. LFG temperatures typically range from ambient to approximately 130°F. Temperatures approaching the high end of this range will be used as a precautionary warning of potentially adverse operating conditions.

- *LFG Flow:* Flow rates provide an indication of the performance of the respective LFG extraction wells. In addition, individual flow data can be useful in diagnosing problem areas in cases where decreases in overall flow rates are observed at the flare station. Finally, flow data can be used to monitor whether the well field is operating within the LFG generation design parameters.

- *LFG Pressure:* Pressure data is used to evaluate whether an individual LFG extraction well is maintaining a negative pressure (vacuum). In some cases, excessive negative pressure conditions may also provide an indication that the well is clogged or damaged.

Data compiled from the aforementioned monitoring will be used to evaluate conditions in proximity of each source location, and to make necessary flow adjustments at the respective wellheads. The monitoring of LFG extraction wells will be conducted initially on a weekly basis (minimum) until system operations stabilize, whereupon the monitoring frequency will be reduced to either bimonthly or monthly, as appropriate. Consistent with the recording procedures outlined above for the flare station, all data will be recorded on an entry log and maintained on file at the City's office. The corresponding entry logs will be made available to the MCAQMD, CalRecyle and LEA upon either verbal or written request.

5.3 TITLE 27 PERIMETER LFG MONITORING

Monitoring of the perimeter LFG monitoring points will be conducted on a quarterly basis in accordance with 27CCR, §20921 and the Landfill's Final Postclosure Maintenance Plan. In addition to fulfilling the aforementioned regulatory requirements, the monitoring of perimeter probes will provide pertinent information regarding the overall performance of the LFG collection and control system. As previously noted in Subsection 4.1.1 (*Well Field Layout and Rationale*), installation of the final cover system could increase lateral and vertical pressures within the WMU, thereby potentially inducing subsurface migration of LFG. Thus, the perimeter monitoring will assist in

determining whether the LFG collection and control system is providing adequate subsurface migration control, including whether ongoing operation of the existing partial perimeter LFG collection system is necessary if the historical LFG migration in that area can be abated by the new system. In accordance with 27CCR, §20934, the results of the monitoring will be reported within 90 days from when the monitoring was performed and submitted to the LEA, MCAQMD, and RWQCB.

5.4 AB32 MONITORING

5.4.1 Monitoring

The LFG collection and control system and WMU surface will be monitored to comply with AB32 requirements in accordance with 17CCR, §95469. The scope of monitoring will include the following:

- Instantaneous surface monitoring will be conducted on a quarterly basis to determine if surface emissions of 500 ppmv or greater, other than non-repeatable, momentary readings, are present at any location on the WMU surface. The monitoring will be accomplished using a portable gas detector while walking in a designated 25-foot spacing interval pattern where practical (see Section 6 [*Proposed Alternatives*] of this Updated Plan for noted exceptions). As required by the regulations, the WMU surface will be separated into grids approximately 50,000 square feet in size to delineate individual monitoring areas. Please refer to Appendix G for an illustration of the designated grid pattern.

- Integrated surface monitoring will be conducted on a quarterly basis to determine if the average methane concentration within the individual grids exceeds 25 ppmv. The instrumentation and walking pattern will be consistent with those described above for the instantaneous surface monitoring.

- Any components of the LFG control and collection system that are under positive pressure will be monitored on a quarterly basis to determine if any leaks are present at methane concentrations exceeding 500 ppmv. The only components under pressure will correspond to the conveyance piping between the blower and flare, as well as the flame arrestor and automatic block valve. There will be no components under pressure in the well field. The monitoring will be performed using a portable gas detector.

- The wellhead for each extraction well will be monitored on a monthly basis to determine whether the extraction well is being operated under vacuum conditions (i.e., negative pressure). The monitoring will be performed using a Magnehelic pressure gauge. This monitoring requirement is redundant to that previously described in Subsection 5.2 (*Well Field*) of this Updated Plan.

- The flare will be monitored for temperature and flow rate using dedicated instrumentation and the corresponding data documented using a continuous recorder. In addition, the flare will be source tested on an annual basis to verify compliance with emissions and destruction efficiency criteria.

The test methods and procedures employed to perform the respective monitoring provisions outlined above will be in accordance with the applicable subsections of 17CCR, §95471. This includes portable gas meter instrumentation and calibration, emissions monitoring procedures, wind speed data collection, and precipitation documentation (i.e., no measurable precipitation 72 hours prior to emissions monitoring). In addition, in the event that an emissions and/or operating threshold is identified, corresponding corrective actions will be implemented within the time frames specified in the AB32 regulations.

In accordance with 17CCR, §95469(a)(1)(C) and §95469(a)(2)(C), if no exceedances of the 500 ppmv (instantaneous) and 25 ppmv (integrated) emission thresholds are encountered for four consecutive quarters, the quarterly emissions monitoring frequency specified herein will be extended to annually. In addition, if the flare remains in compliance after three consecutive source tests, the annual source test frequency specified herein will be extended to every three years per 17CCR, §95464(b)(4)(A).

5.4.2 Recordkeeping

Records will be maintained for the respective monitoring activities and will be made available for regulatory review at the City's office. The types of records to be maintained will comply with 17CCR, §95470(a) and include the following (as applicable):

- All LFG collection and control system downtime exceeding five calendar days, including individual well shutdown and disconnection times, and the reason for the downtime.

- All LFG collection and control system downtime in excess of one hour, the reason for the downtime, and the length of time the system was shutdown.

- Expected LFG generation flow rate for the applicable calendar year.

- Records of all instantaneous surface readings of 200 ppmv or greater associated with the LFG collection and control system and surface emissions monitoring, including specific details of the findings, corrective actions, and subsequent re-monitoring.

- Records of any positive wellhead gauge pressure measurements, the date of the measurement, the well identification number, and the corrective action taken.

- Results of flare source tests.

- Records describing the mitigation measures taken to prevent the release of methane or other emissions into the atmosphere during periods of shutdown or repair of the LFG collection and control system.

- Records of any construction activities, including description of reason and associated details of the construction and mitigation measures taken to minimize methane emissions and other potential air quality impacts.

- Records of the equipment operating parameters for the flare, including all 3-hour periods of operation during which the average temperature difference was more than 50°F below the average combustion temperature during the most recent source test, as well any other parameter boundaries that were exceeded.

The aforementioned monitoring records will be maintained and be made available for regulatory review for a minimum of five years. In addition, the following records will be maintained for the life of the flare: vendor specifications; expected gas generation flow rate; and percent reduction of methane achieved by the flare.

5.4.3 Reporting

An annual report will be prepared and submitted to the MCAQMD and/or the California Air Resources Board (CARB) by March 15 of each calendar year. The report will cover the period of January 1 through December 31 of the previous calendar year. The contents of the report will include all the information stipulated in 17CCR, §95470(b)(3), including much of the records information outlined in the previous subsection (as applicable).

SECTION 6

PROPOSED ALTERNATIVES

Alternative compliance options to the various requirements stipulated in the AB32 regulations are allowed for consideration under 17CCR, §95468. In this regard, the following sections outline three options as part of this Updated Plan to account for site-specific topographic features and design characteristics of the final cover system.

6.1 ALTERNATIVE WALKING PATTERN

As previously discussed in Subsection 5.4 (*AB32 Monitoring*) of this Updated Plan, 17CCR, §95471(c)(1)(B) requires that the walking pattern for emissions monitoring be no more than a 25-foot spacing interval within each 50,000-square foot monitoring grid. Whereas the uppermost (southern) portions of the WMU surface readily allow for the implementation of this procedure, the majority of the WMU surface is comprised of steep slopes that present safety issues. A formal written request for authorization of an alternate walking pattern was submitted to the MCAQMD on July 18, 2013 (EBA, 2013a). A copy of this request is enclosed in Appendix G of this Updated Plan. As presented in Appendix G, several of the concerns originally raised corresponded to logistical and safety issues associated with the vegetative cover (i.e., need for cutting of vegetation to facilitate emissions monitoring and potential safety hazards related to rattlesnake harborage). These concerns no longer apply based on the nature of the revised final cover system (i.e., synthetic closure turf in lieu of a vegetative cover). However, the safety issue of slip and fall hazards remain due to the steepness of the slopes. The majority of the landfill surface is at a slope of approximately 2.5:1 (horizontal to vertical). Slopes of this magnitude covered by a synthetic surface can be slippery when trying to traverse by foot, regardless if the synthetic surface is wet or dry. This potential hazard is further heightened when considering the sampler is carrying a 30- to 40-pound instrument on his or her back/shoulder and holding the detector probe in one hand, while simultaneously trying to focus on both the monitoring device and the ground surface.

As part of the previous exemption request presented in Appendix G, it was recommended that only those grids with flat or shallow slope conditions (i.e., grids G6, G7, G10, G11, G14, G18, G19, G26, G27, G38 and G39 [see Appendix G]) be subject to the 25-foot spacing interval walking pattern, while surface emissions monitoring for the primary slope areas would target the respective benches. Under this approach, both the inside and outside edges of each bench would be monitored in accordance with the instantaneous surface emissions monitoring procedures described in the regulations. This approach was considered to offer a means of monitoring for surface emissions within the primary slope areas as a whole while promoting a safe monitoring procedure for the individuals responsible for implementing the program in the field. This overall walking pattern was verbally approved by the MCAQMD on July 31, 2013.

Once the LFG collection and control system is installed and operational, it is recommended that the same alternative walking pattern as described above and approved by the MCAQMD be implemented as part of subsequent surface emissions monitoring. While the previous request focused on instantaneous surface emissions monitoring, the same walking pattern is also proposed for the integrated surface emissions monitoring.

Please note that whereas the final WMU grades will be adjusted nominally as part of the final cover system construction, the bench locations and slope angles will generally mimic the existing configurations. Thus, the number, orientation and pattern of the existing grids as presented in the previous submittal (Appendix G) will not change appreciably and is still valid.

6.2 WELLHEAD GAUGE PRESSURE

17CCR, §95464(c) requires that each wellhead must be operated under a vacuum (negative pressure), unless the final cover system is constructed with a geomembrane or synthetic cover. Under this circumstance, an acceptable pressure limit for the wellheads must be specified in the design plan. Since the final cover system for the WMU will include a geomembrane component, the Landfill qualifies for an alternative wellhead gauge pressure limit. In this regard, it is proposed that the maximum wellhead gauge pressure limit be set at +2.0 inches of water column (positive pressure).

Please be advised that the wellhead gauge pressure is indicative of pressure conditions at depth, not at the near surface. Just because a positive pressure exists at a wellhead, it does not necessarily mean that surface emissions will be the result of such conditions. Ideally, the wellhead gauge pressure should be dictated by the LFG quality as inducing too much vacuum can cause in the inducement of atmospheric air into the refuse mass and increase the potential for subsurface fires. Thus, in the absence of surface emissions within proximity of an extraction well, no adjustment to the vacuum is recommended regardless of the wellhead gauge pressure conditions, provided the maximum LFG quality conditions have been attained at that particular extraction well. In fact, it would be better to disconnect and cap the extraction well as opposed to risking a subsurface fire for the sole purpose of maintaining a negative wellhead gauge pressure. Under this scenario, replacement of the disconnected extraction well is not recommended unless surface emissions exceeding the regulatory thresholds are detected, whereupon a new extraction well(s) should be installed within the time frames stipulated in 17CCR, §95469(c).

6.3 PROVISIONAL GAS RELIEF COMPONENT VENTING

The gas relief component associated with the final cover system will be connected to the LFG collection and control system and maintained under vacuum to eliminate the potential build-up of LFG pressure beneath the geomembrane. This provision is important as excessive LFG pressures beneath the geomembrane could compromise the structural integrity of the geomembrane. Whereas the LFG collection and control system is designed to operate on a continuous basis, there may be unforeseen instances where the system shuts down due to equipment failure or power outages. If

such shutdowns last for an extended period of time, temporary mitigation measures will be necessary to avoid excessive pressure build-up beneath the geomembrane. In this regard, the gas relief component will be equipped with pressure relief valves to allow for temporarily venting to the atmosphere LFG that may collect beneath the geomembrane during shutdown periods. The valves will be pressure activated if appreciable pressures buildup beneath the geomembrane. While such conditions may result in point source emissions exceeding the AB32 regulatory threshold of 500 ppmv, such emissions would only be temporary in nature and would cease upon reinstatement of LFG collection and control system operations.

SECTION 7

TEMPORARY MITIGATION MEASURES

Per 17CCR, §95464(a)(1)(D), the design plan must include temporary mitigation measures to prevent the release of methane or other pollutants into the atmosphere during the installation or preparation of extraction wells, piping, or other equipment; during repairs or the temporary shutdown of LFG collection and control system components; or when solid waste is excavated and moved. The following provides a summary of the temporary mitigation measures that will be employed to meet these objectives:

- New LFG extraction wells will be required to be drilled and installed in a single day. Installation must include placement of casing, gravel pack, and surface seal (including lower and upper hydrated bentonite seals). The top of the casing will be capped. Partially drilled or partially installed extraction wells will not be allowed to remain open overnight.

- During the installation or repair of collection system piping, the ends of piping that could be susceptible to emitting LFG will be capped when not actively being worked on. No pipe ends will be allowed to remain open overnight.

- As outlined in Subsection 4.2.1 (*Piping Layout and Rationale*) of this Updated Plan, the collection system piping is segmented and equipped with valve assemblies that will allow for portions of the system to be isolated for repair and maintenance while the remainder of the system remains operational. This provision will minimize the size of areas subject to potential fugitive surface emissions during repairs.

- When practical, any planned shutdowns of the LFG collection and control system will be scheduled for the morning hours when barometric pressure conditions are typically high, thereby minimizing the potential for fugitive surface emissions.

- Other than solid waste excavated during the drilling of LFG extraction wells, the only excavation of solid waste may take place during construction of the final cover system since the Landfill is closed. Under this scenario, any exposed in-place waste will be required to be covered with soil as soon as practical, or at the end of each work day, whichever occurs first. In regards to the solid waste that has been excavated (during final closure construction or drilling), this material will be stockpiled and covered, or placed in a truck or roll-off bin and covered, as soon as practical. No excavated waste will allowed to remain uncovered overnight and will be covered during transport off-site.

SECTION 8

SCHEDULE

Installation of the LFG collection and control system will be conducted as part of the Landfill's final closure construction project that is scheduled to commence in the spring of 2020. The target completion date for having the LFG collection and control system installed and operational is December 2020.

SECTION 9

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Pacific Waste Services, Inc., December 17, 2009, *Technical Memorandum, U.S. EPA Greenhouse Gas Reporting, Ukiah Landfill, Project 305-1.2,* Prepared for C$S Waste Solutions and City of Ukiah, Department of Public Works by Pacific Waste Services, Inc., San Ramon, California.

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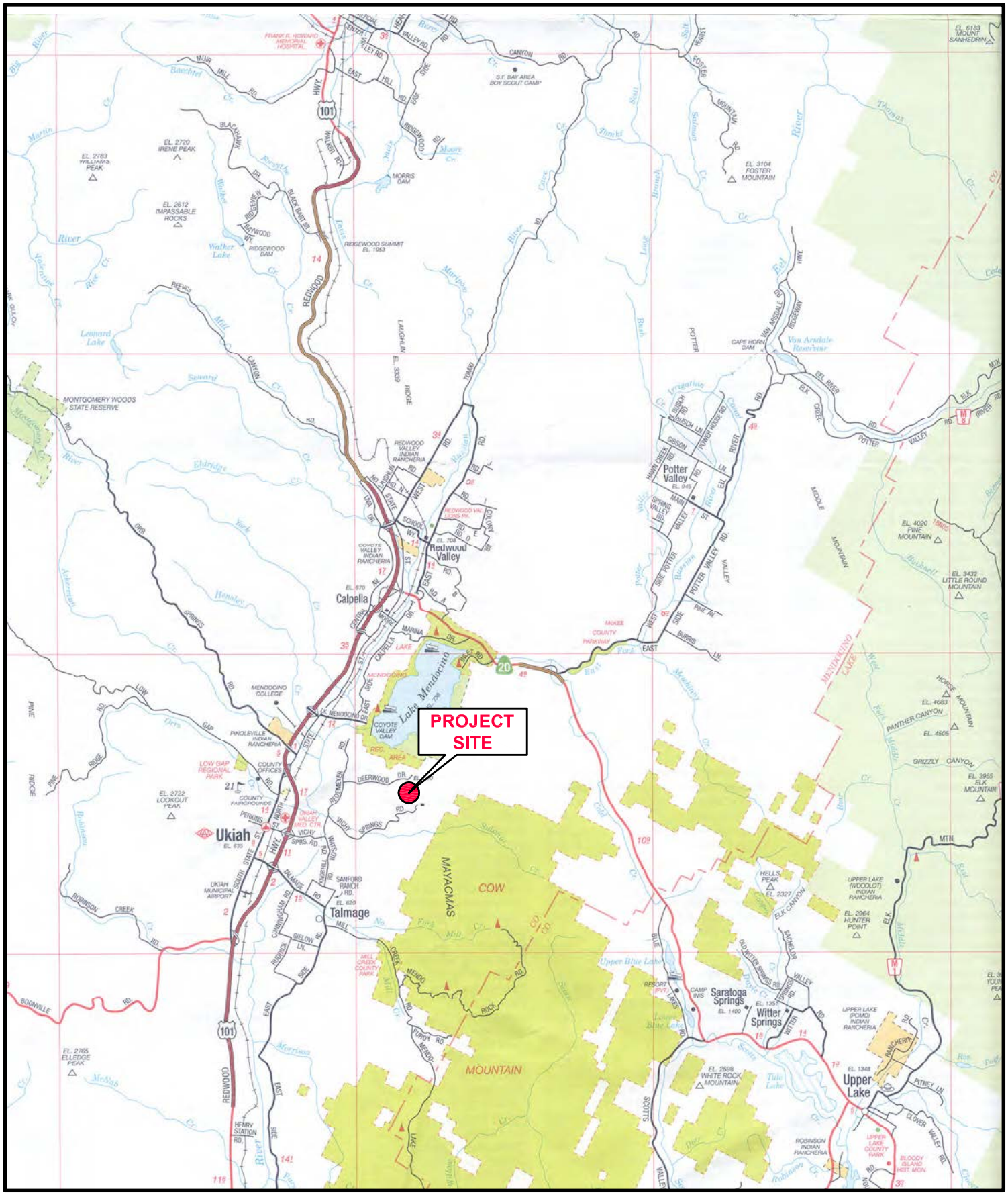
APPENDIX A

FIGURES



EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

LOCATION MAP

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

FIGURE
1
02–907

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LEGEND

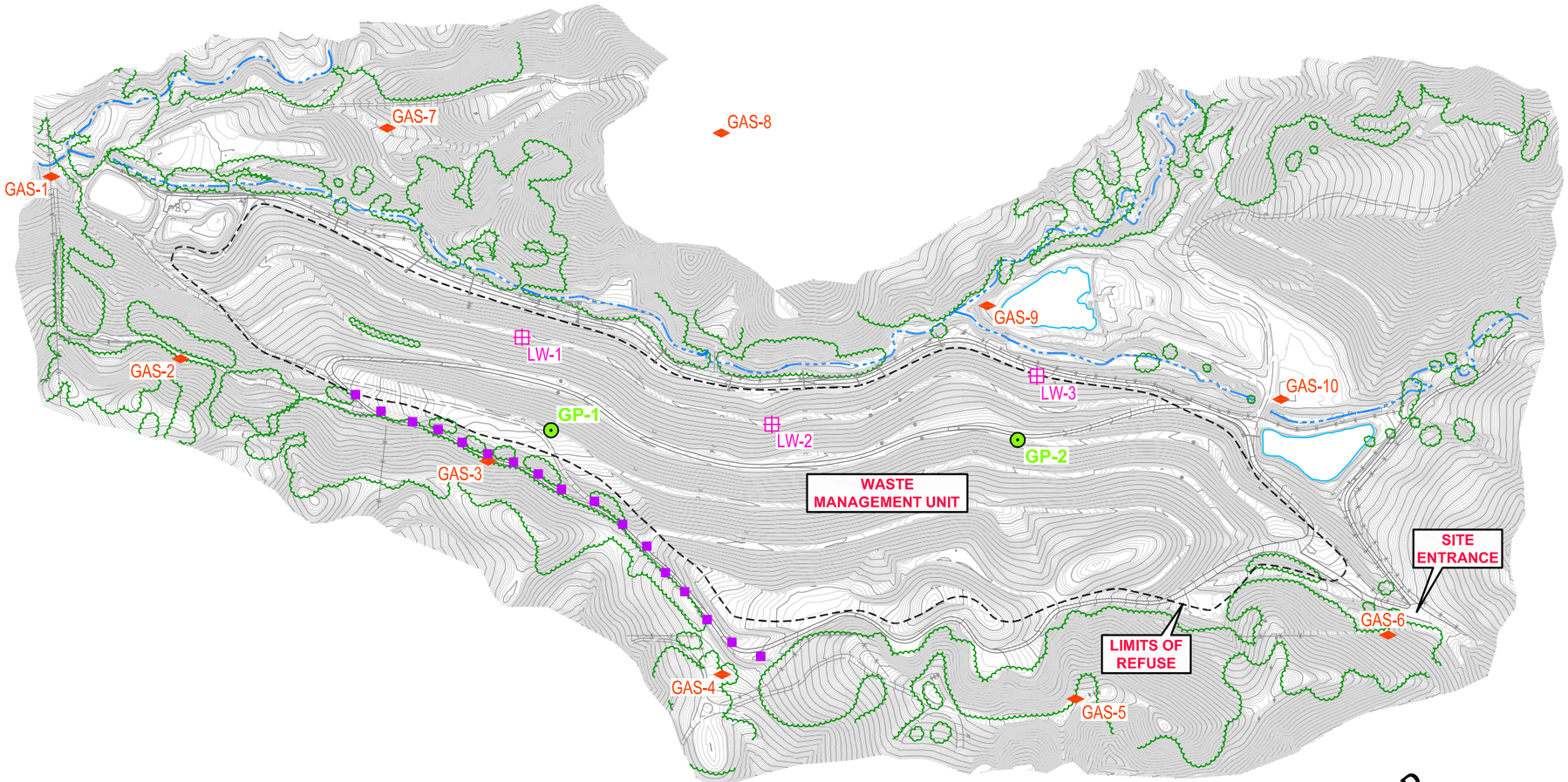
GP-1 — LANDFILL GAS SAMPLE BOREHOLE (SEPTEMBER 16, 2013)

GAS-1 — PERIMETER LANDFILL GAS MONITORING POINT

PERIMETER LANDFILL GAS EXTRACTION POINT

LW-1 — LEACHATE WELL

DATE OF AERIAL PHOTOGRAPHY: JUNE 28, 2013



400 0 400

SCALE : 1" = 400'

FIGURE 2 02-907

SITE PLAN

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

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APPENDIX B

LFG GENERATION MODELING RESULTS

APPENDIX B-1

SCENARIO 1

IPCC MODEL

Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1900		
1901		
1902		
1903		
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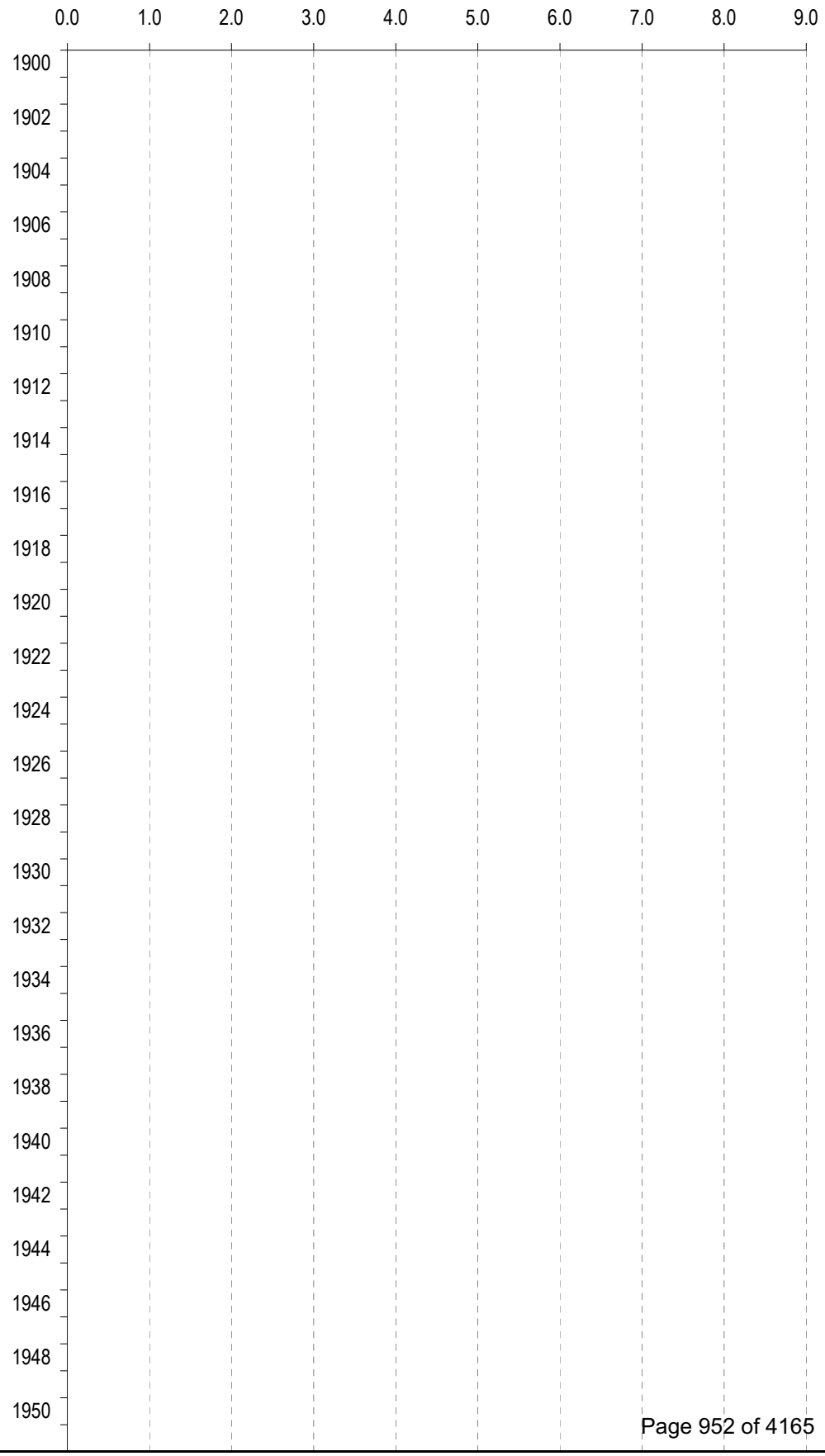
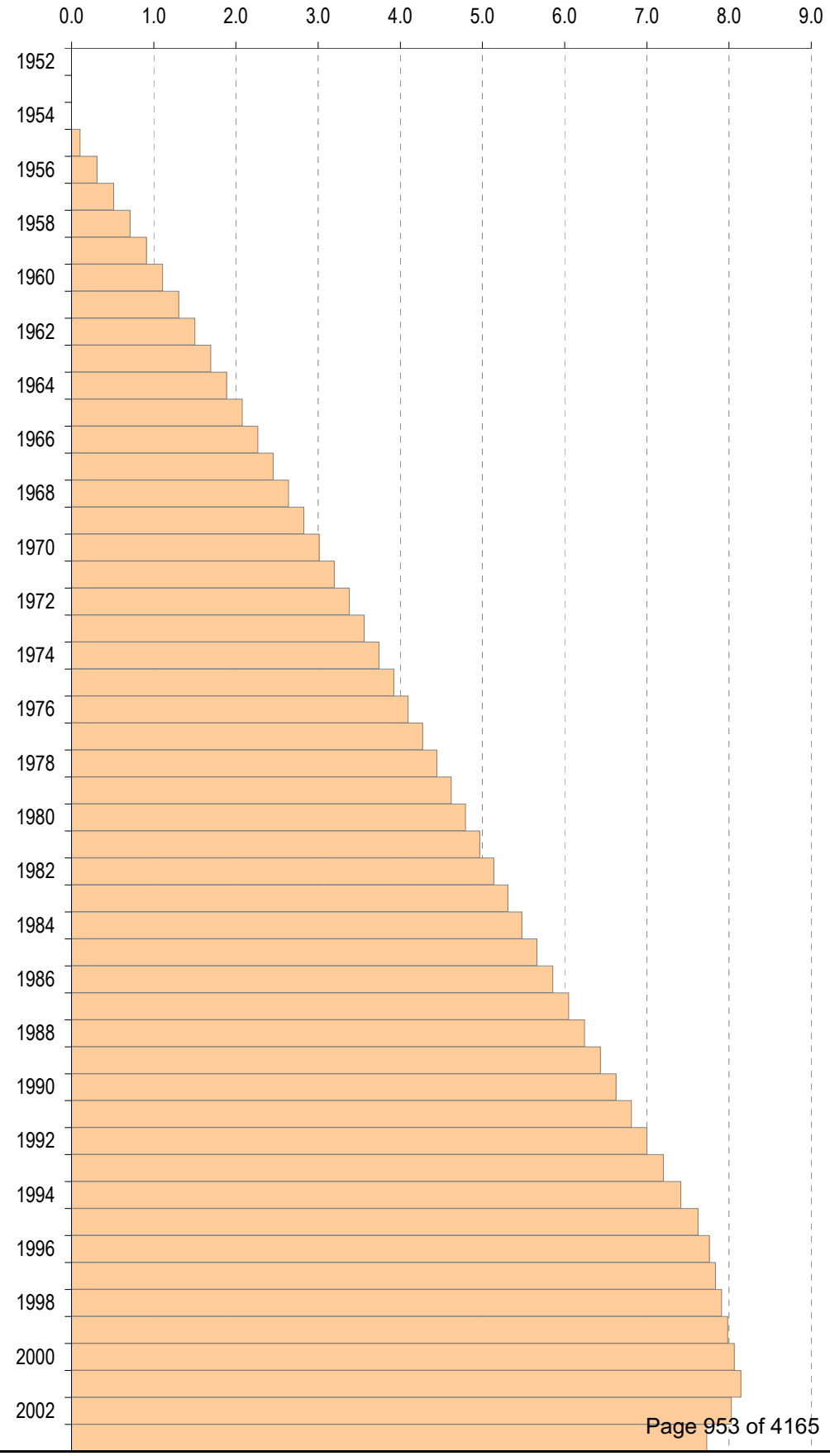


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1952		
1953		
1954		
1955	3	0.1
1956	10	0.3
1957	17	0.5
1958	23	0.7
1959	30	0.9
1960	37	1.1
1961	43	1.3
1962	49	1.5
1963	56	1.7
1964	62	1.9
1965	68	2.1
1966	75	2.3
1967	81	2.5
1968	87	2.6
1969	93	2.8
1970	99	3.0
1971	105	3.2
1972	111	3.4
1973	117	3.6
1974	123	3.7
1975	129	3.9
1976	135	4.1
1977	141	4.3
1978	146	4.4
1979	152	4.6
1980	158	4.8
1981	164	5.0
1982	169	5.1
1983	175	5.3
1984	180	5.5
1985	187	5.7
1986	193	5.9
1987	199	6.0
1988	206	6.2
1989	212	6.4
1990	218	6.6
1991	224	6.8
1992	231	7.0
1993	237	7.2
1994	244	7.4
1995	251	7.6
1996	256	7.8
1997	258	7.8
1998	260	7.9
1999	263	8.0
2000	266	8.1
2001	268	8.1
2002	264	8.0
2003	255	7.7

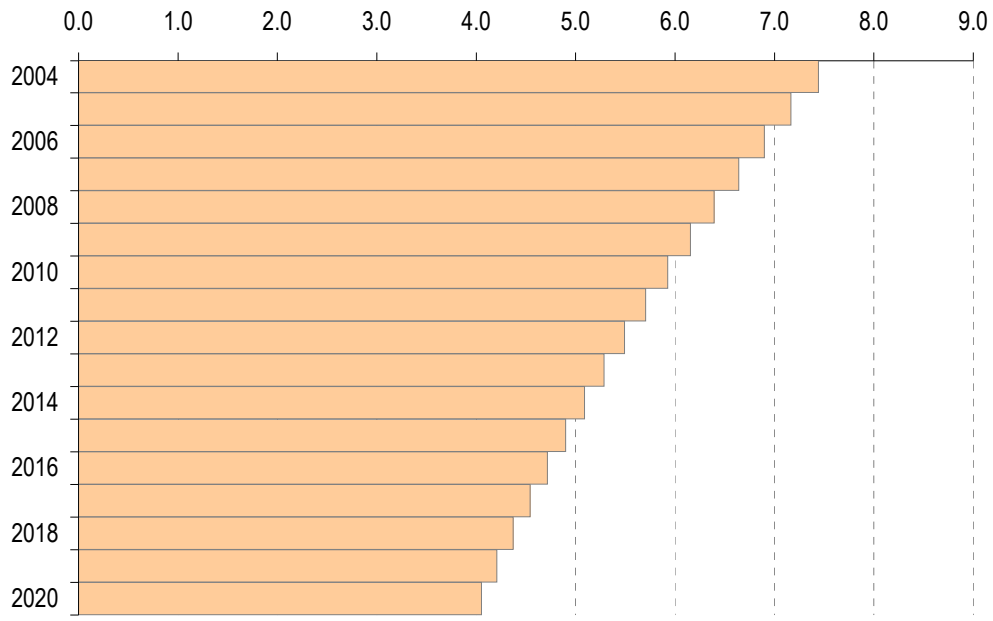


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
2004	245	7.4
2005	236	7.2
2006	227	6.9
2007	219	6.6
2008	211	6.4
2009	203	6.2
2010	195	5.9
2011	188	5.7
2012	181	5.5
2013	174	5.3
2014	168	5.1
2015	161	4.9
2016	155	4.7
2017	150	4.5
2018	144	4.4
2019	139	4.2
2020	133	4.1



SIMPLE FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 2: Parameters
Simple First Order

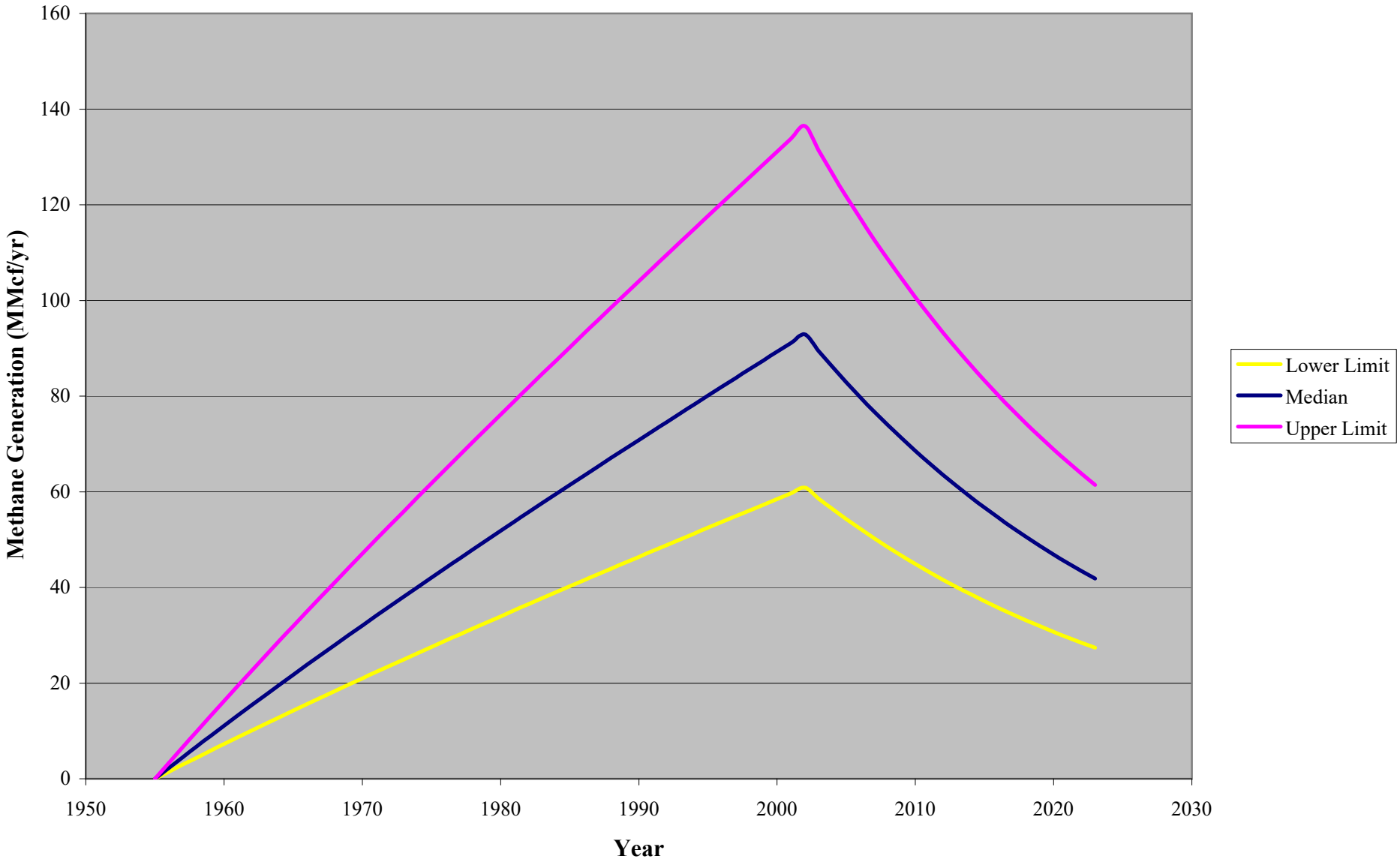
Lo: **3,200** cubic feet Methane/ton refuse
k: **0.038** /year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year) Lower Limit	Median	Upper Limit
1955	**19,250**	0	0	0
1956	**19,800**	1	2	3
1957	**20,350**	3	4	7
1958	**20,900**	4	7	10
1959	**21,450**	6	9	13
1960	**22,000**	7	11	16
1961	**22,550**	9	13	19
1962	**23,100**	10	15	23
1963	**23,650**	11	18	26
1964	**24,200**	13	20	29
1965	**24,750**	14	22	32
1966	**25,300**	16	24	35
1967	**25,850**	17	26	38
1968	**26,400**	18	28	41
1969	**26,950**	20	30	44
1970	**27,500**	21	32	47
1971	**28,050**	22	34	50
1972	**28,600**	24	36	53
1973	**29,150**	25	38	56
1974	**29,700**	26	40	59
1975	**30,250**	28	42	62
1976	**30,800**	29	44	65
1977	**31,350**	30	46	68
1978	**31,900**	31	48	70
1979	**32,450**	33	50	73
1980	**33,000**	34	52	76
1981	**33,550**	35	54	79
1982	**34,100**	36	56	82
1983	**34,650**	38	58	85
1984	**35,200**	39	60	87
1985	**35,750**	40	61	90
1986	**36,300**	41	63	93
1987	**36,850**	43	65	96
1988	**37,400**	44	67	99
1989	**37,950**	45	69	101
1990	**38,500**	46	71	104
1991	**39,050**	48	73	107
1992	**39,600**	49	75	109
1993	**40,150**	50	76	112
1994	**40,700**	51	78	115
1995	**41,250**	52	80	118
1996	**41,800**	54	82	120
1997	**42,350**	55	84	123
1998	**42,900**	56	86	126
1999	**43,450**	57	87	128
2000	**44,000**	58	89	131
2001	**44,550**	60	91	134
2002	**0**	61	93	136
2003	**0**	59	89	131
2004	**0**	56	86	126
2005	**0**	54	83	122
2006	**0**	52	80	117
2007	**0**	50	77	113
2008	**0**	48	74	109
2009	**0**	47	71	105
2010	**0**	45	69	101
2011	**0**	43	66	97
2012	**0**	42	64	93
2013	**0**	40	61	90
2014	**0**	39	59	86
2015	**0**	37	57	83
2016	**0**	36	55	80
2017	**0**	34	53	77
2018	**0**	33	51	74
2019	**0**	32	49	72
2020	**0**	31	47	69
2021	**0**	30	45	66
2022	**0**	28	43	64
2023	**0**	27	42	61

SIMPLE FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATES



MODIFIED FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 3: Parameters
Modified First Order

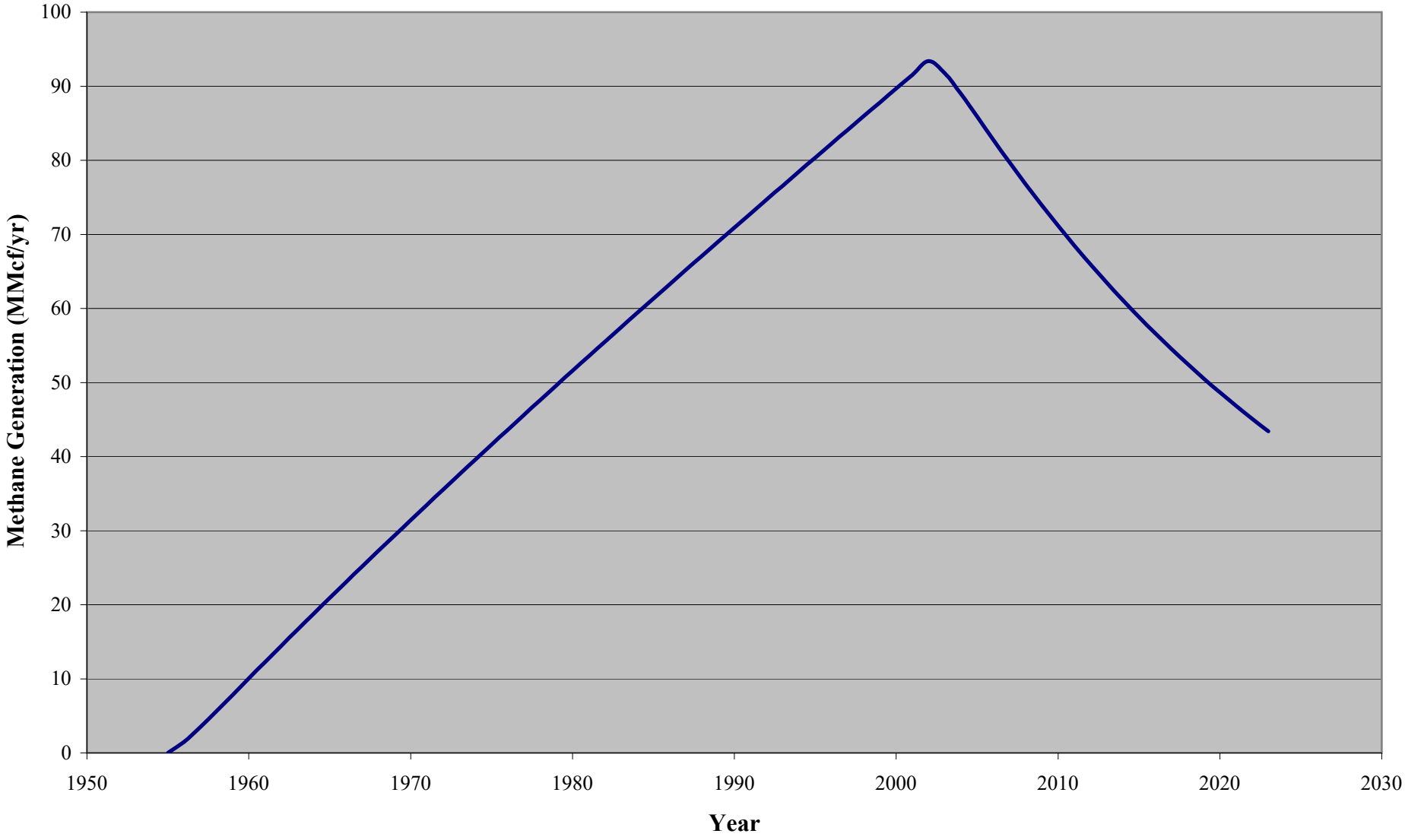
s:	1.00	
Lo:	3,200	cubic feet Methane/ton refuse
k:	0.038	/year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	19,250	0
1956	19,800	1
1957	20,350	3
1958	20,900	6
1959	21,450	8
1960	22,000	10
1961	22,550	12
1962	23,100	14
1963	23,650	17
1964	24,200	19
1965	24,750	21
1966	25,300	23
1967	25,850	25
1968	26,400	27
1969	26,950	29
1970	27,500	31
1971	28,050	33
1972	28,600	36
1973	29,150	38
1974	29,700	40
1975	30,250	42
1976	30,800	44
1977	31,350	46
1978	31,900	48
1979	32,450	50
1980	33,000	52
1981	33,550	54
1982	34,100	56
1983	34,650	57
1984	35,200	59
1985	35,750	61
1986	36,300	63
1987	36,850	65
1988	37,400	67
1989	37,950	69
1990	38,500	71
1991	39,050	73
1992	39,600	75
1993	40,150	77
1994	40,700	78
1995	41,250	80
1996	41,800	82
1997	42,350	84
1998	42,900	86
1999	43,450	88
2000	44,000	90
2001	44,550	92
2002	0	93
2003	0	92
2004	0	89
2005	0	86
2006	0	83
2007	0	80
2008	0	77
2009	0	74
2010	0	71
2011	0	69
2012	0	66
2013	0	63
2014	0	61
2015	0	59
2016	0	57
2017	0	55
2018	0	53
2019	0	51
2020	0	49
2021	0	47
2022	0	45
2023	0	43

MODIFIED FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



FIRST ORDER MULTI-PHASE MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 4: Parameters
First Order Multi-Phase

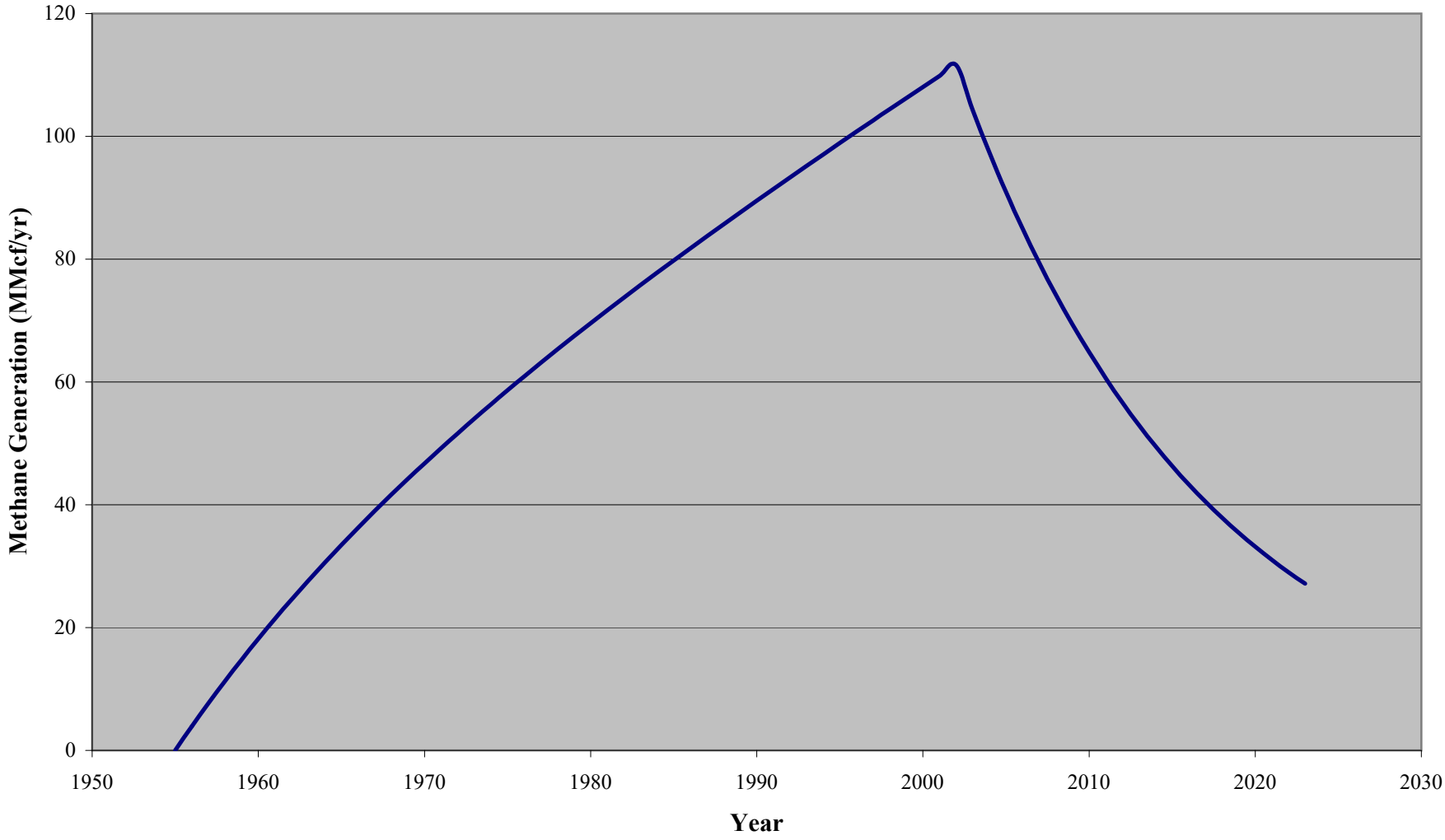
k-Constant (for rapid)	0.08	Decay Rate of Rapidly Decomposables
k-Constant (for slow)	0.06	Decay Rate of Slowly Decomposables
Fraction rapid decomposing	40%	Fraction of Rapidly Decomposing Waste
Fraction slow decomposing	60%	Fraction of Slowly Decomposing Waste
Lo-Constant	3,200	cubic feet Methane/ton refuse

Lag time between initial placement of refuse and start of generation
is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	19,250	0
1956	19,800	4
1957	20,350	8
1958	20,900	11
1959	21,450	15
1960	22,000	18
1961	22,550	21
1962	23,100	25
1963	23,650	28
1964	24,200	31
1965	24,750	33
1966	25,300	36
1967	25,850	39
1968	26,400	42
1969	26,950	44
1970	27,500	47
1971	28,050	49
1972	28,600	52
1973	29,150	54
1974	29,700	56
1975	30,250	59
1976	30,800	61
1977	31,350	63
1978	31,900	65
1979	32,450	67
1980	33,000	70
1981	33,550	72
1982	34,100	74
1983	34,650	76
1984	35,200	78
1985	35,750	80
1986	36,300	82
1987	36,850	84
1988	37,400	86
1989	37,950	88
1990	38,500	90
1991	39,050	91
1992	39,600	93
1993	40,150	95
1994	40,700	97
1995	41,250	99
1996	41,800	101
1997	42,350	103
1998	42,900	104
1999	43,450	106
2000	44,000	108
2001	44,550	110
2002	0	112
2003	0	104
2004	0	97
2005	0	91
2006	0	85
2007	0	79
2008	0	74
2009	0	69
2010	0	65
2011	0	61
2012	0	57
2013	0	53
2014	0	50
2015	0	46
2016	0	43
2017	0	41
2018	0	38
2019	0	35
2020	0	33
2021	0	31
2022	0	29
2023	0	27

FIRST ORDER MULTI-PHASE (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



APPENDIX B-2

SCENARIO 2

IPCC MODEL

Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1900		
1901		
1902		
1903		
1904		
1905		
1906		
1907		
1908		
1909		
1910		
1911		
1912		
1913		
1914		
1915		
1916		
1917		
1918		
1919		
1920		
1921		
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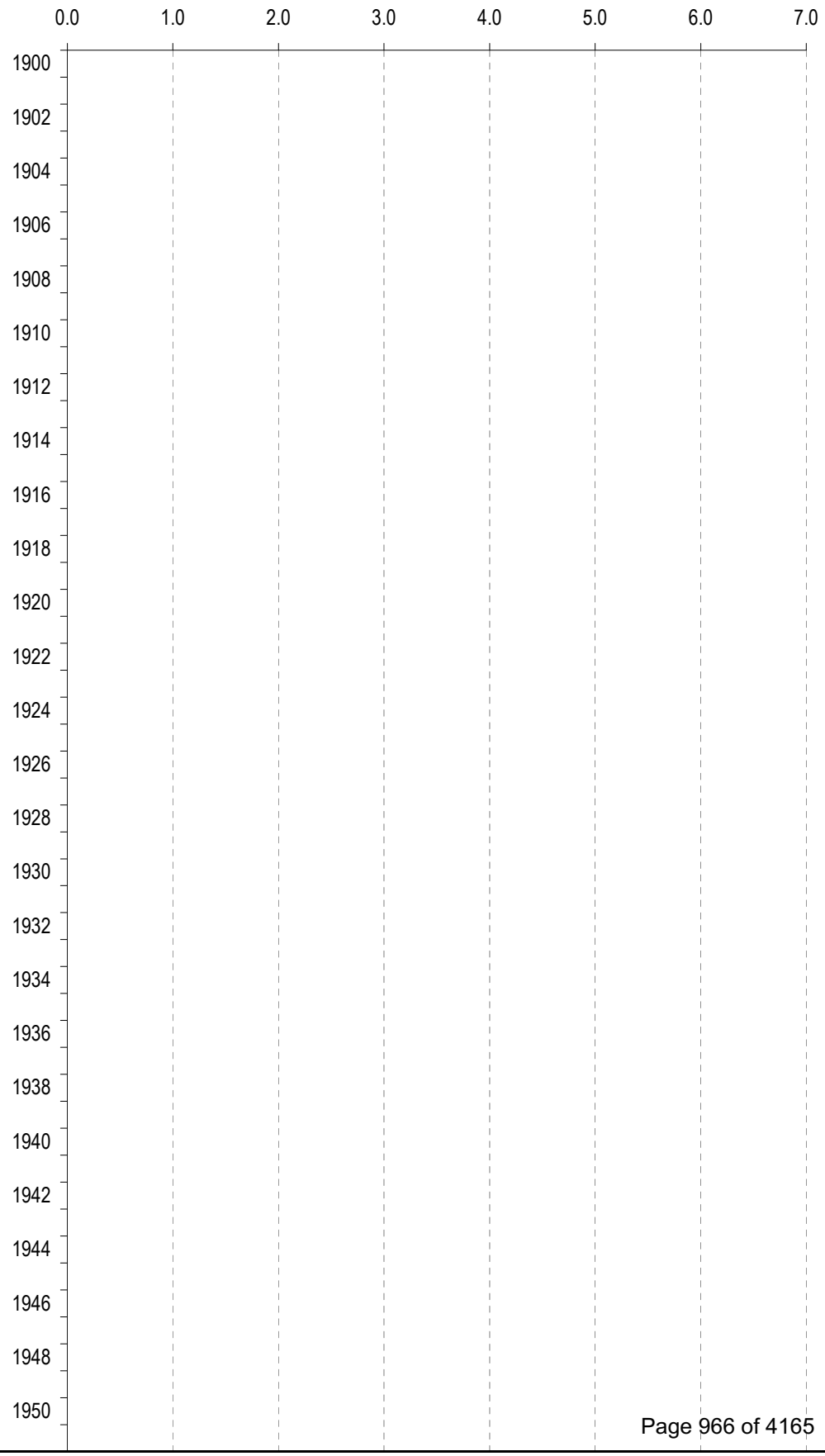
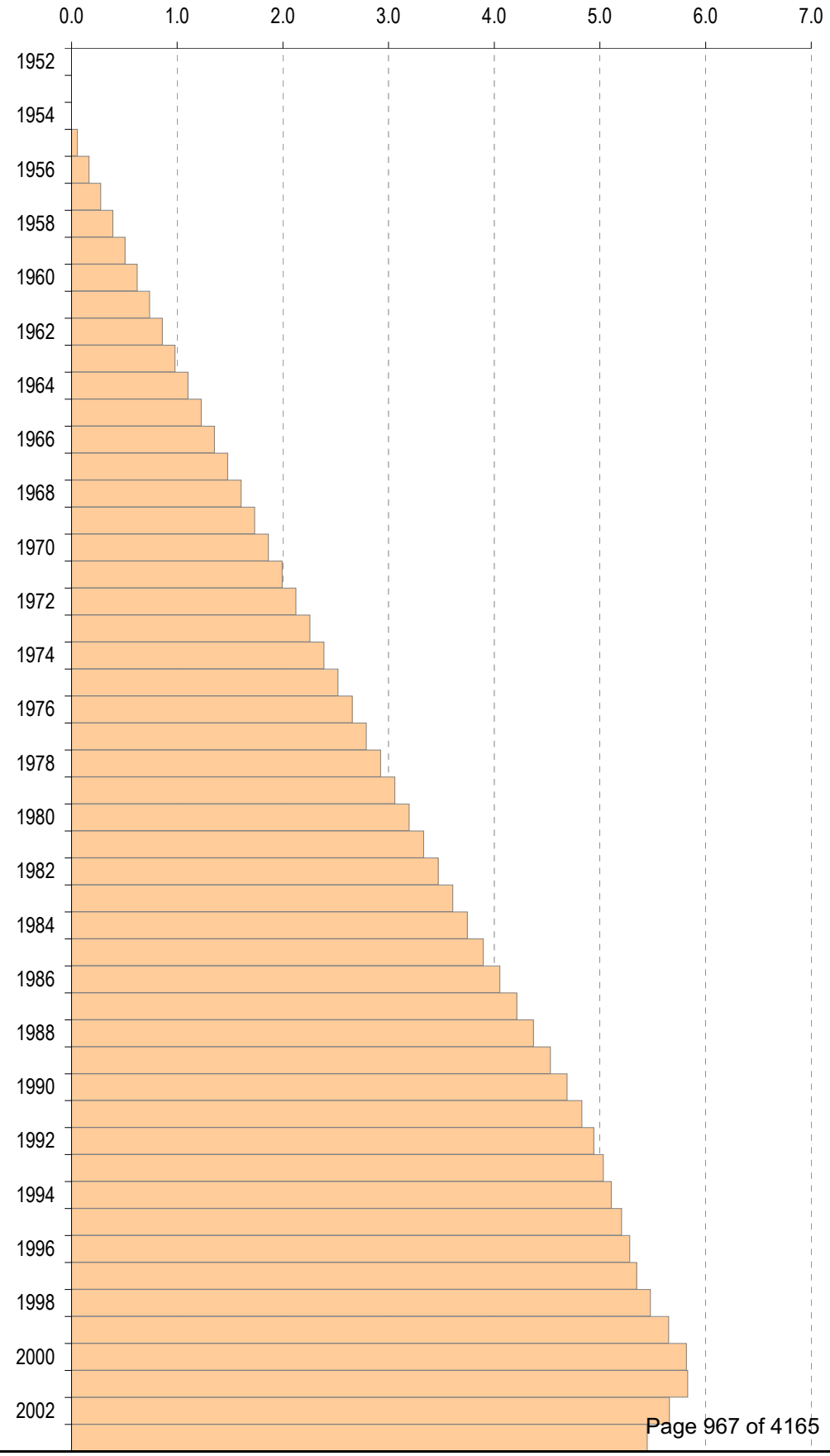


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1952		
1953		
1954		
1955	2	0.1
1956	5	0.2
1957	9	0.3
1958	13	0.4
1959	17	0.5
1960	20	0.6
1961	24	0.7
1962	28	0.9
1963	32	1.0
1964	36	1.1
1965	40	1.2
1966	44	1.4
1967	49	1.5
1968	53	1.6
1969	57	1.7
1970	61	1.9
1971	66	2.0
1972	70	2.1
1973	74	2.3
1974	79	2.4
1975	83	2.5
1976	87	2.7
1977	92	2.8
1978	96	2.9
1979	101	3.1
1980	105	3.2
1981	110	3.3
1982	114	3.5
1983	119	3.6
1984	123	3.7
1985	128	3.9
1986	134	4.1
1987	139	4.2
1988	144	4.4
1989	149	4.5
1990	154	4.7
1991	159	4.8
1992	163	4.9
1993	166	5.0
1994	168	5.1
1995	171	5.2
1996	174	5.3
1997	176	5.3
1998	180	5.5
1999	186	5.7
2000	192	5.8
2001	192	5.8
2002	186	5.7
2003	179	5.4

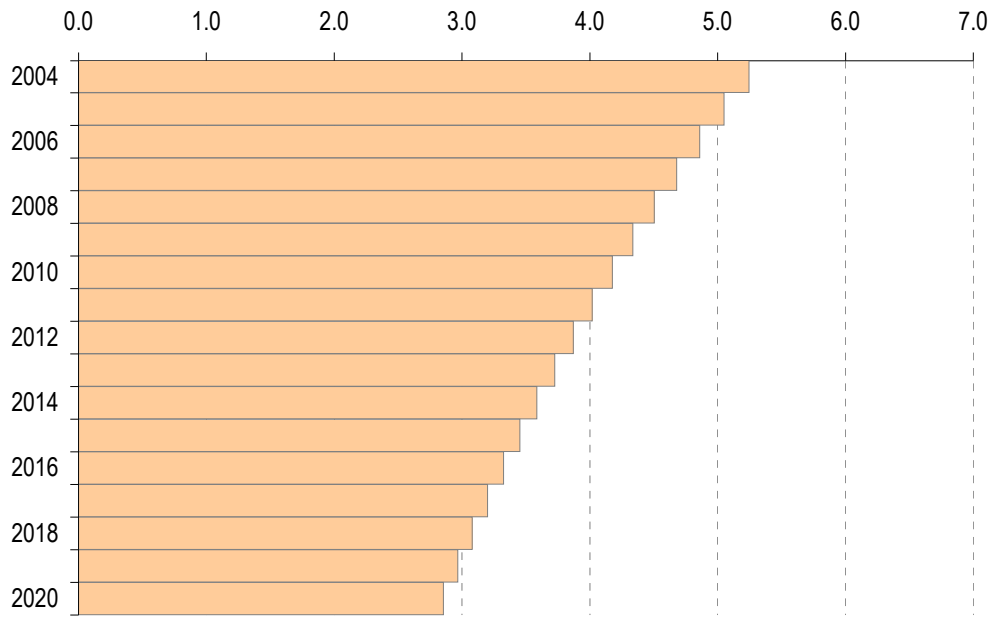


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
2004	173	5.2
2005	166	5.0
2006	160	4.9
2007	154	4.7
2008	148	4.5
2009	143	4.3
2010	138	4.2
2011	132	4.0
2012	127	3.9
2013	123	3.7
2014	118	3.6
2015	114	3.5
2016	109	3.3
2017	105	3.2
2018	101	3.1
2019	98	3.0
2020	94	2.9



SIMPLE FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 2: Parameters
Simple First Order

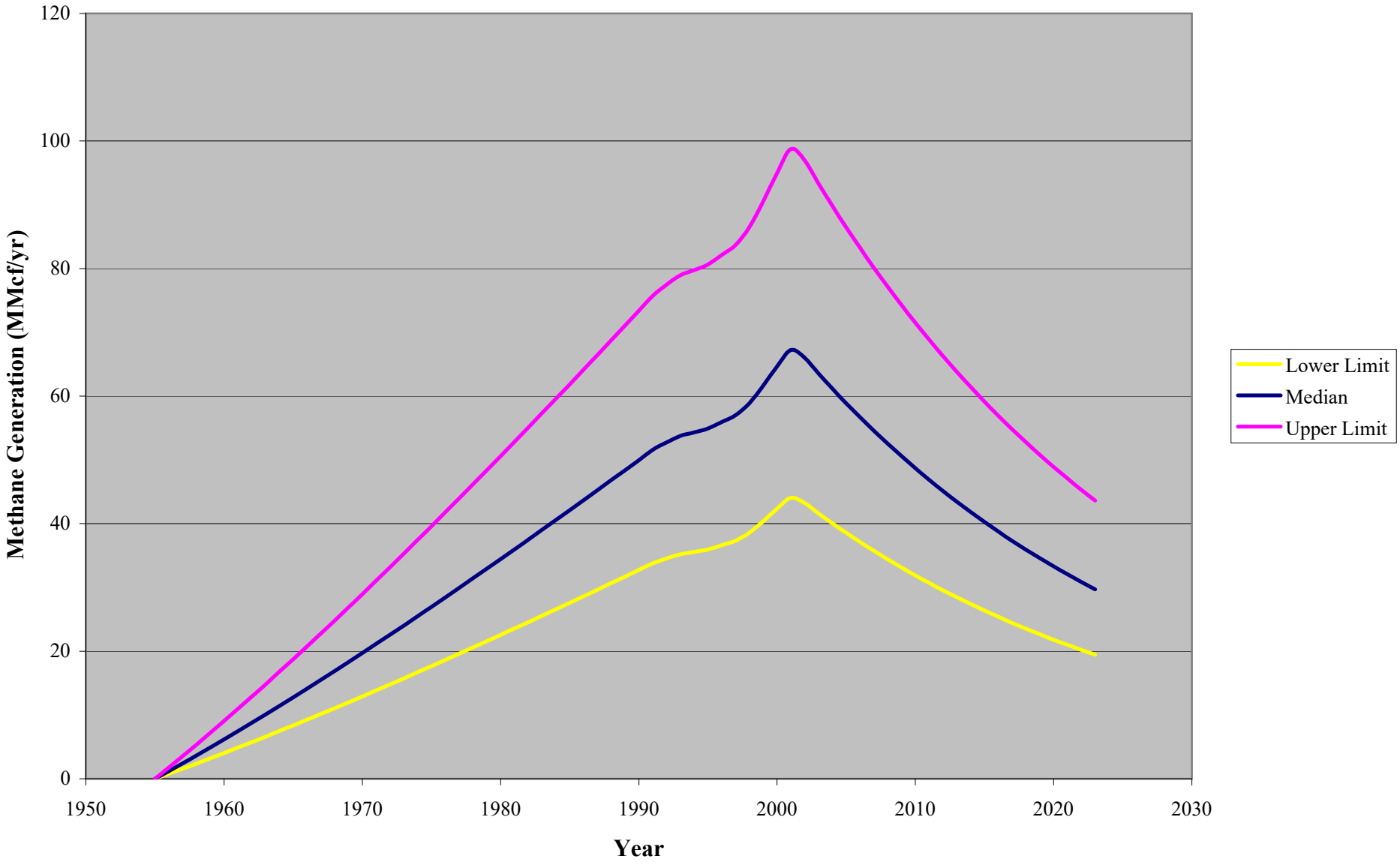
Lo: **3,200** cubic feet Methane/ton refuse
k: **0.038** /year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year) Lower Limit	Median	Upper Limit
1955	**10,217**	0	0	0
1956	**10,767**	1	1	2
1957	**11,317**	2	2	4
1958	**11,867**	2	4	5
1959	**12,417**	3	5	7
1960	**12,967**	4	6	9
1961	**13,517**	5	7	11
1962	**14,067**	6	9	13
1963	**14,617**	7	10	15
1964	**15,167**	7	11	17
1965	**15,717**	8	13	19
1966	**16,267**	9	14	21
1967	**16,817**	10	16	23
1968	**17,367**	11	17	25
1969	**17,917**	12	18	27
1970	**18,467**	13	20	29
1971	**19,017**	14	21	31
1972	**19,567**	15	23	33
1973	**20,117**	16	24	35
1974	**20,667**	17	25	37
1975	**21,217**	18	27	40
1976	**21,767**	19	28	42
1977	**22,317**	20	30	44
1978	**22,867**	21	31	46
1979	**23,417**	22	33	48
1980	**23,967**	23	34	51
1981	**24,517**	24	36	53
1982	**25,067**	25	37	55
1983	**25,617**	26	39	57
1984	**26,167**	27	41	60
1985	**26,717**	28	42	62
1986	**27,267**	29	44	64
1987	**27,817**	30	45	66
1988	**28,367**	31	47	69
1989	**28,917**	32	48	71
1990	**29,467**	33	50	73
1991	**26,540**	34	52	76
1992	**25,444**	35	53	77
1993	**21,986**	35	54	79
1994	**22,255**	36	54	80
1995	**26,330**	36	55	81
1996	**27,001**	37	56	82
1997	**34,184**	37	57	84
1998	**42,489**	39	59	86
1999	**44,995**	40	62	91
2000	**42,856**	42	65	95
2001	**10,724**	44	67	99
2002	**0**	43	66	97
2003	**0**	42	64	93
2004	**0**	40	61	90
2005	**0**	39	59	86
2006	**0**	37	57	83
2007	**0**	36	55	80
2008	**0**	34	53	77
2009	**0**	33	51	74
2010	**0**	32	49	72
2011	**0**	31	47	69
2012	**0**	30	45	66
2013	**0**	28	43	64
2014	**0**	27	42	61
2015	**0**	26	40	59
2016	**0**	25	39	57
2017	**0**	24	37	55
2018	**0**	24	36	53
2019	**0**	23	35	51
2020	**0**	22	33	49
2021	**0**	21	32	47
2022	**0**	20	31	45
2023	**0**	19	30	44

SIMPLE FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATES



MODIFIED FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 3: Parameters
Modified First Order

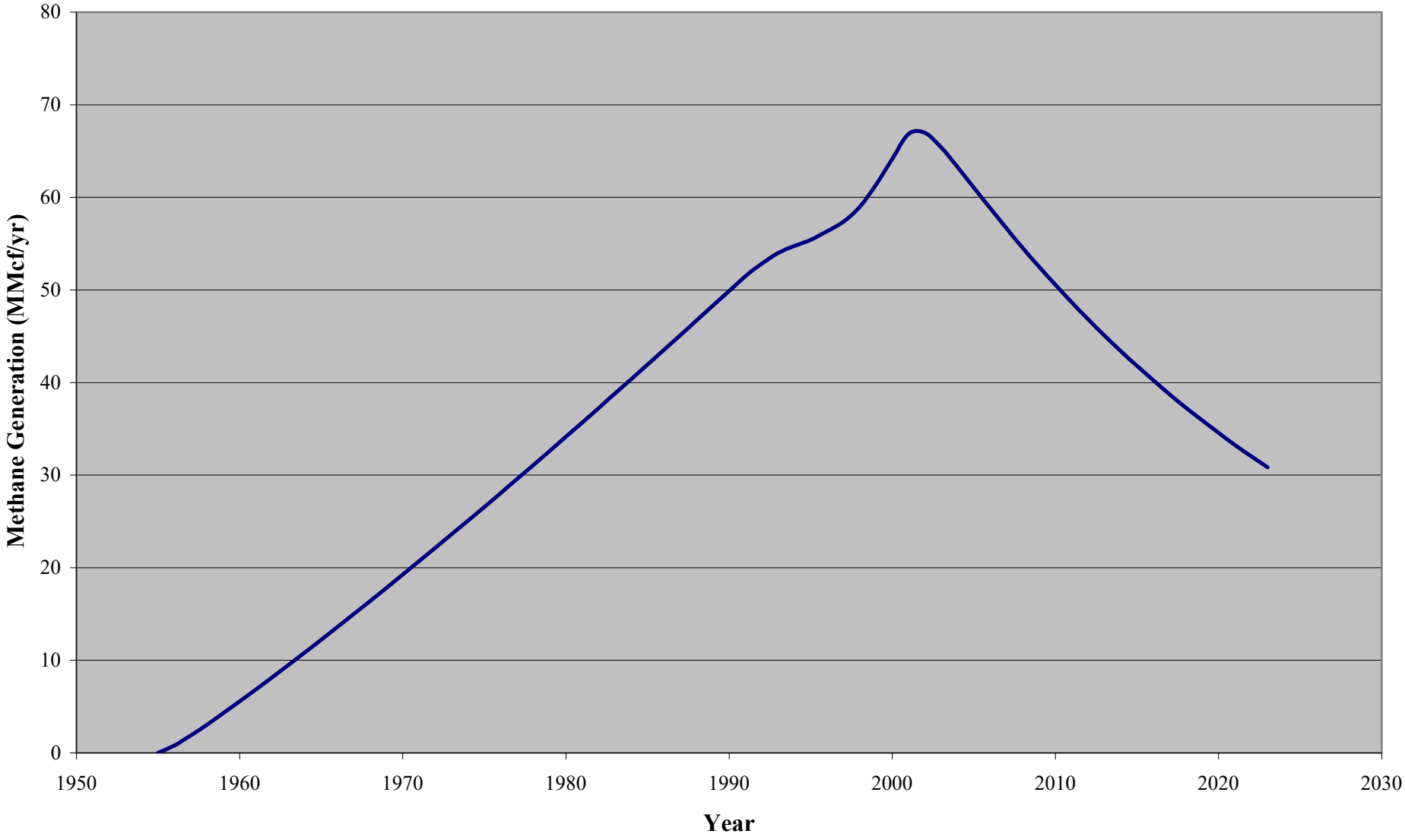
s:	1.00	
Lo:	3,200	cubic feet Methane/ton refuse
k:	0.038	/year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	10,217	0
1956	10,767	1
1957	11,317	2
1958	11,867	3
1959	12,417	4
1960	12,967	6
1961	13,517	7
1962	14,067	8
1963	14,617	10
1964	15,167	11
1965	15,717	12
1966	16,267	14
1967	16,817	15
1968	17,367	16
1969	17,917	18
1970	18,467	19
1971	19,017	21
1972	19,567	22
1973	20,117	24
1974	20,667	25
1975	21,217	27
1976	21,767	28
1977	22,317	30
1978	22,867	31
1979	23,417	33
1980	23,967	34
1981	24,517	36
1982	25,067	37
1983	25,617	39
1984	26,167	40
1985	26,717	42
1986	27,267	44
1987	27,817	45
1988	28,367	47
1989	28,917	48
1990	29,467	50
1991	26,540	51
1992	25,444	53
1993	21,986	54
1994	22,255	55
1995	26,330	55
1996	27,001	56
1997	34,184	57
1998	42,489	59
1999	44,995	61
2000	42,856	64
2001	10,724	67
2002	0	67
2003	0	65
2004	0	63
2005	0	61
2006	0	59
2007	0	57
2008	0	55
2009	0	52
2010	0	51
2011	0	49
2012	0	47
2013	0	45
2014	0	43
2015	0	42
2016	0	40
2017	0	39
2018	0	37
2019	0	36
2020	0	35
2021	0	33
2022	0	32
2023	0	31

MODIFIED FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



FIRST ORDER MULTI-PHASE MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 4: Parameters
First Order Multi-Phase

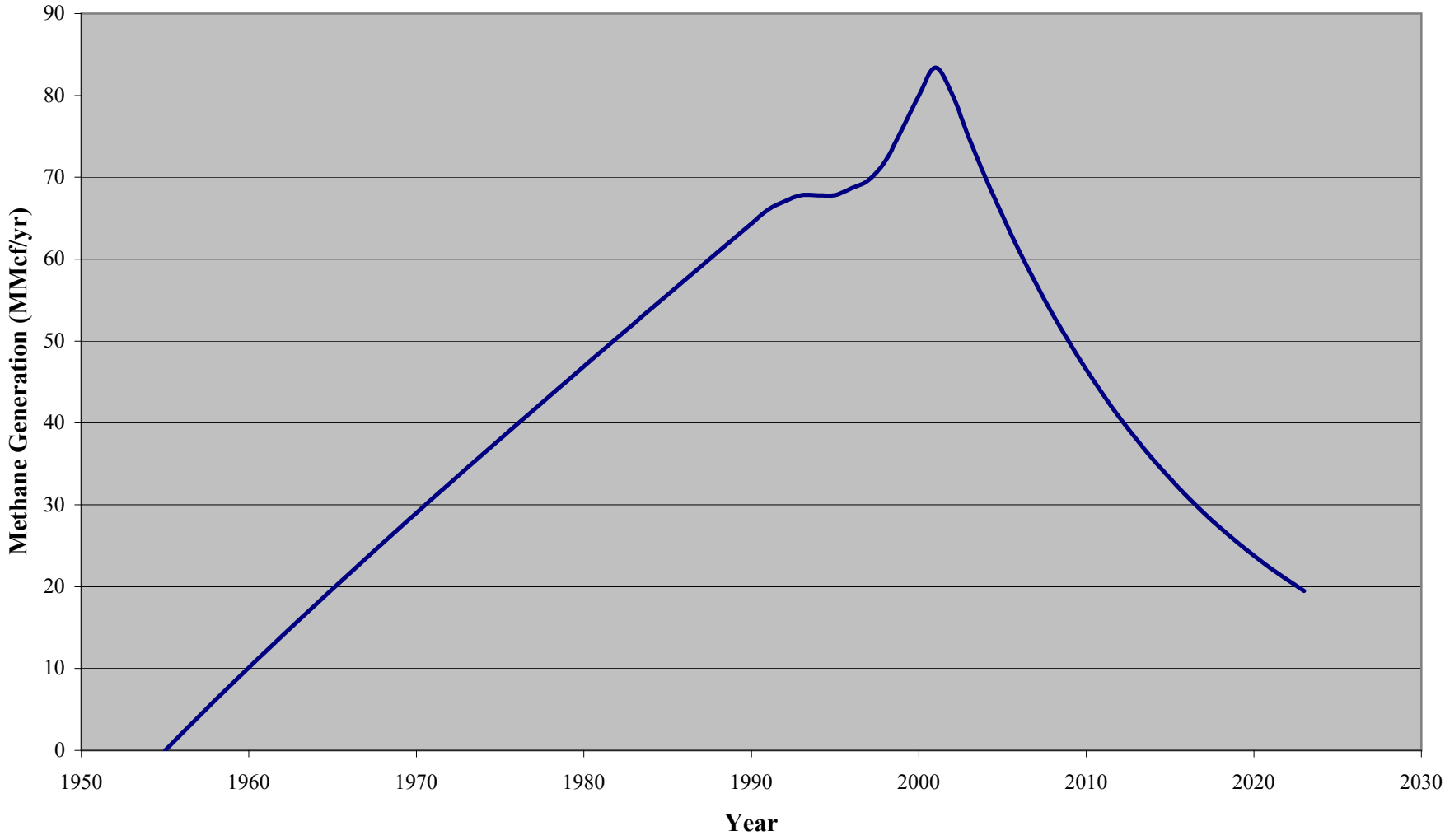
k-Constant (for rapid)	0.08	Decay Rate of Rapidly Decomposables
k-Constant (for slow)	0.06	Decay Rate of Slowly Decomposables
Fraction rapid decomposing	40%	Fraction of Rapidly Decomposing Waste
Fraction slow decomposing	60%	Fraction of Slowly Decomposing Waste
Lo-Constant	3,200	cubic feet Methane/ton refuse

Lag time between initial placement of refuse and start of generation
is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	10,217	0
1956	10,767	2
1957	11,317	4
1958	11,867	6
1959	12,417	8
1960	12,967	10
1961	13,517	12
1962	14,067	14
1963	14,617	16
1964	15,167	18
1965	15,717	20
1966	16,267	22
1967	16,817	23
1968	17,367	25
1969	17,917	27
1970	18,467	29
1971	19,017	31
1972	19,567	33
1973	20,117	34
1974	20,667	36
1975	21,217	38
1976	21,767	40
1977	22,317	42
1978	22,867	43
1979	23,417	45
1980	23,967	47
1981	24,517	49
1982	25,067	50
1983	25,617	52
1984	26,167	54
1985	26,717	56
1986	27,267	57
1987	27,817	59
1988	28,367	61
1989	28,917	63
1990	29,467	64
1991	26,540	66
1992	25,444	67
1993	21,986	68
1994	22,255	68
1995	26,330	68
1996	27,001	69
1997	34,184	70
1998	42,489	72
1999	44,995	76
2000	42,856	80
2001	10,724	83
2002	0	80
2003	0	75
2004	0	70
2005	0	65
2006	0	61
2007	0	57
2008	0	53
2009	0	50
2010	0	47
2011	0	43
2012	0	41
2013	0	38
2014	0	36
2015	0	33
2016	0	31
2017	0	29
2018	0	27
2019	0	25
2020	0	24
2021	0	22
2022	0	21
2023	0	19

FIRST ORDER MULTI-PHASE (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



APPENDIX B-3

SCENARIO 3

IPCC MODEL

Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1900		
1901		
1902		
1903		
1904		
1905		
1906		
1907		
1908		
1909		
1910		
1911		
1912		
1913		
1914		
1915		
1916		
1917		
1918		
1919		
1920		
1921		
1922		
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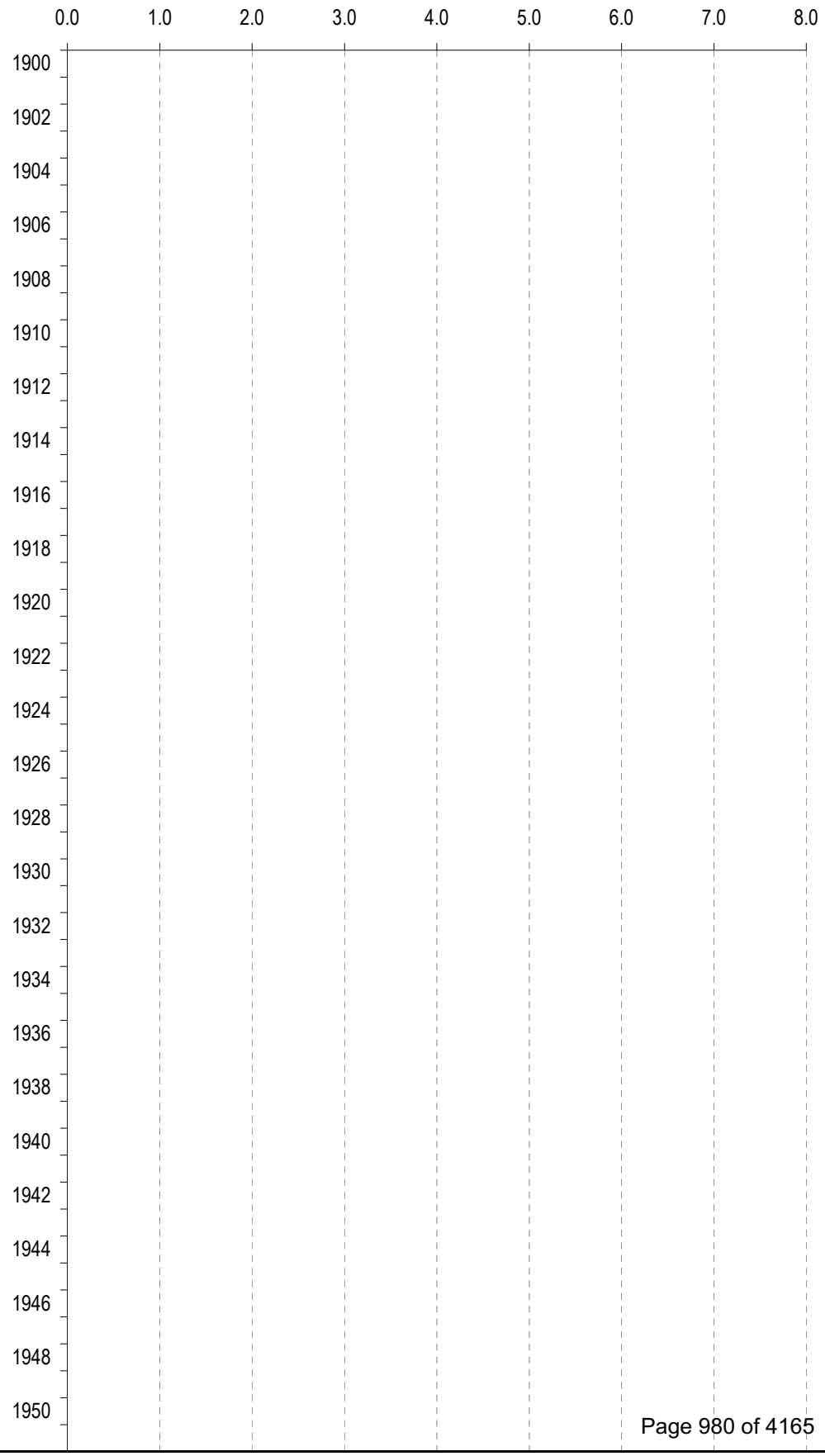
1951		

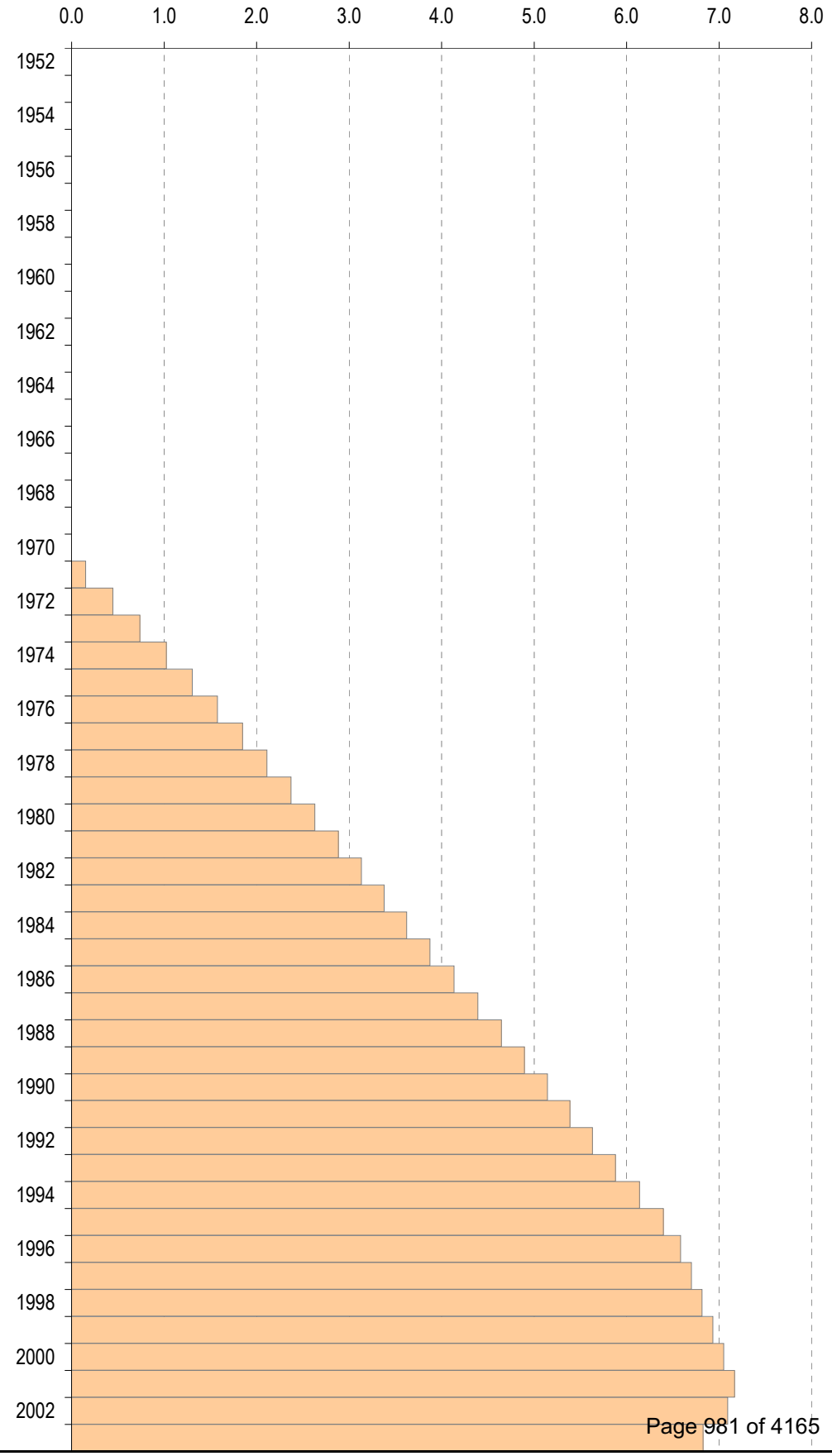


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		
1968		
1969		
1970		
1971	5	0.2
1972	15	0.4
1973	24	0.7
1974	34	1.0
1975	43	1.3
1976	52	1.6
1977	61	1.8
1978	70	2.1
1979	78	2.4
1980	87	2.6
1981	95	2.9
1982	103	3.1
1983	111	3.4
1984	119	3.6
1985	128	3.9
1986	136	4.1
1987	145	4.4
1988	153	4.6
1989	161	4.9
1990	169	5.1
1991	177	5.4
1992	185	5.6
1993	194	5.9
1994	202	6.1
1995	211	6.4
1996	217	6.6
1997	221	6.7
1998	225	6.8
1999	228	6.9
2000	232	7.1
2001	236	7.2
2002	234	7.1
2003	225	6.8

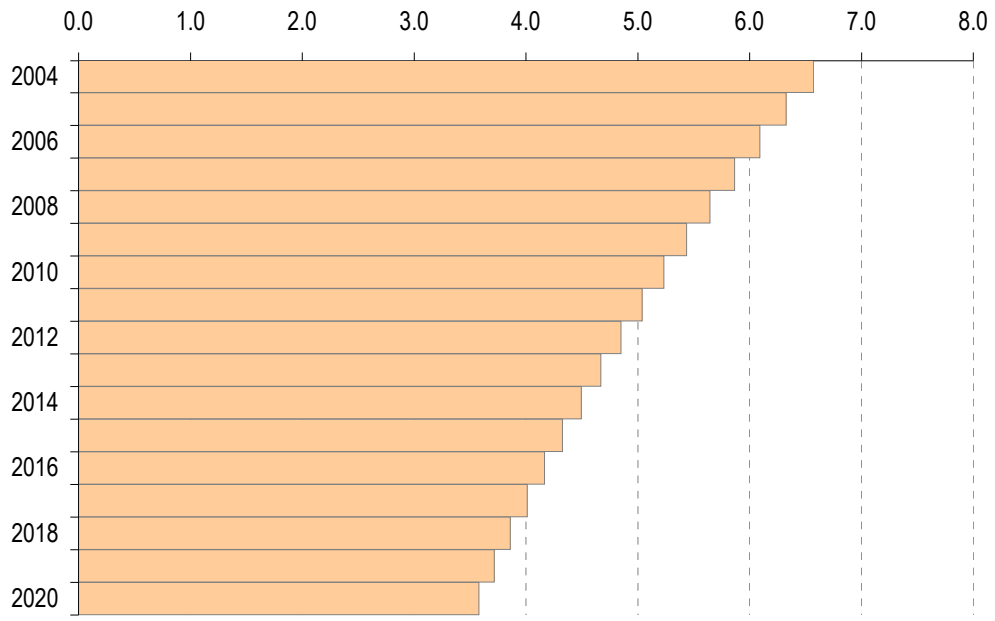


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
2004	216	6.6
2005	208	6.3
2006	201	6.1
2007	193	5.9
2008	186	5.6
2009	179	5.4
2010	172	5.2
2011	166	5.0
2012	160	4.8
2013	154	4.7
2014	148	4.5
2015	143	4.3
2016	137	4.2
2017	132	4.0
2018	127	3.9
2019	122	3.7
2020	118	3.6



SIMPLE FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 2: Parameters
Simple First Order

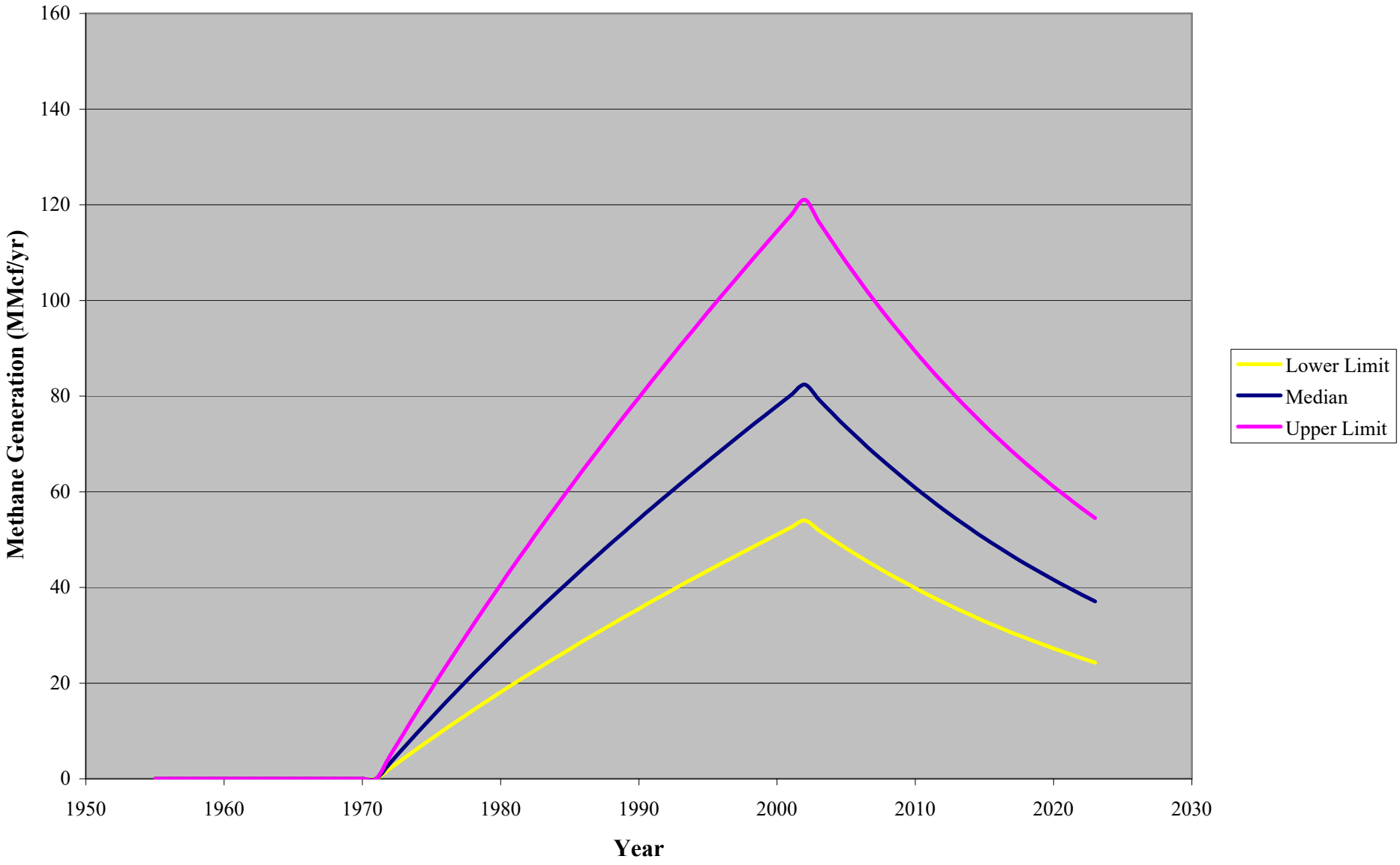
Lo: **3,200** cubic feet Methane/ton refuse
k: **0.038** /year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year) Lower Limit	Median	Upper Limit
1955	**0**	0	0	0
1956	**0**	0	0	0
1957	**0**	0	0	0
1958	**0**	0	0	0
1959	**0**	0	0	0
1960	**0**	0	0	0
1961	**0**	0	0	0
1962	**0**	0	0	0
1963	**0**	0	0	0
1964	**0**	0	0	0
1965	**0**	0	0	0
1966	**0**	0	0	0
1967	**0**	0	0	0
1968	**0**	0	0	0
1969	**0**	0	0	0
1970	**0**	0	0	0
1971	**28,050**	0	0	0
1972	**28,600**	2	3	5
1973	**29,150**	4	7	10
1974	**29,700**	6	10	14
1975	**30,250**	8	13	19
1976	**30,800**	10	16	23
1977	**31,350**	12	19	28
1978	**31,900**	14	22	32
1979	**32,450**	16	25	36
1980	**33,000**	18	28	41
1981	**33,550**	20	30	45
1982	**34,100**	22	33	49
1983	**34,650**	24	36	53
1984	**35,200**	25	39	57
1985	**35,750**	27	41	61
1986	**36,300**	29	44	65
1987	**36,850**	31	47	69
1988	**37,400**	32	49	72
1989	**37,950**	34	52	76
1990	**38,500**	36	54	80
1991	**39,050**	37	57	83
1992	**39,600**	39	59	87
1993	**40,150**	40	62	91
1994	**40,700**	42	64	94
1995	**41,250**	44	66	98
1996	**41,800**	45	69	101
1997	**42,350**	47	71	104
1998	**42,900**	48	73	108
1999	**43,450**	50	76	111
2000	**44,000**	51	78	114
2001	**44,550**	53	80	118
2002	**0**	54	82	121
2003	**0**	52	79	117
2004	**0**	50	76	112
2005	**0**	48	74	108
2006	**0**	46	71	104
2007	**0**	45	68	100
2008	**0**	43	66	96
2009	**0**	41	63	93
2010	**0**	40	61	89
2011	**0**	38	59	86
2012	**0**	37	56	83
2013	**0**	36	54	80
2014	**0**	34	52	77
2015	**0**	33	50	74
2016	**0**	32	48	71
2017	**0**	31	47	68
2018	**0**	29	45	66
2019	**0**	28	43	63
2020	**0**	27	42	61
2021	**0**	26	40	59
2022	**0**	25	39	57
2023	**0**	24	37	55

SIMPLE FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATES



MODIFIED FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 3: Parameters
Modified First Order

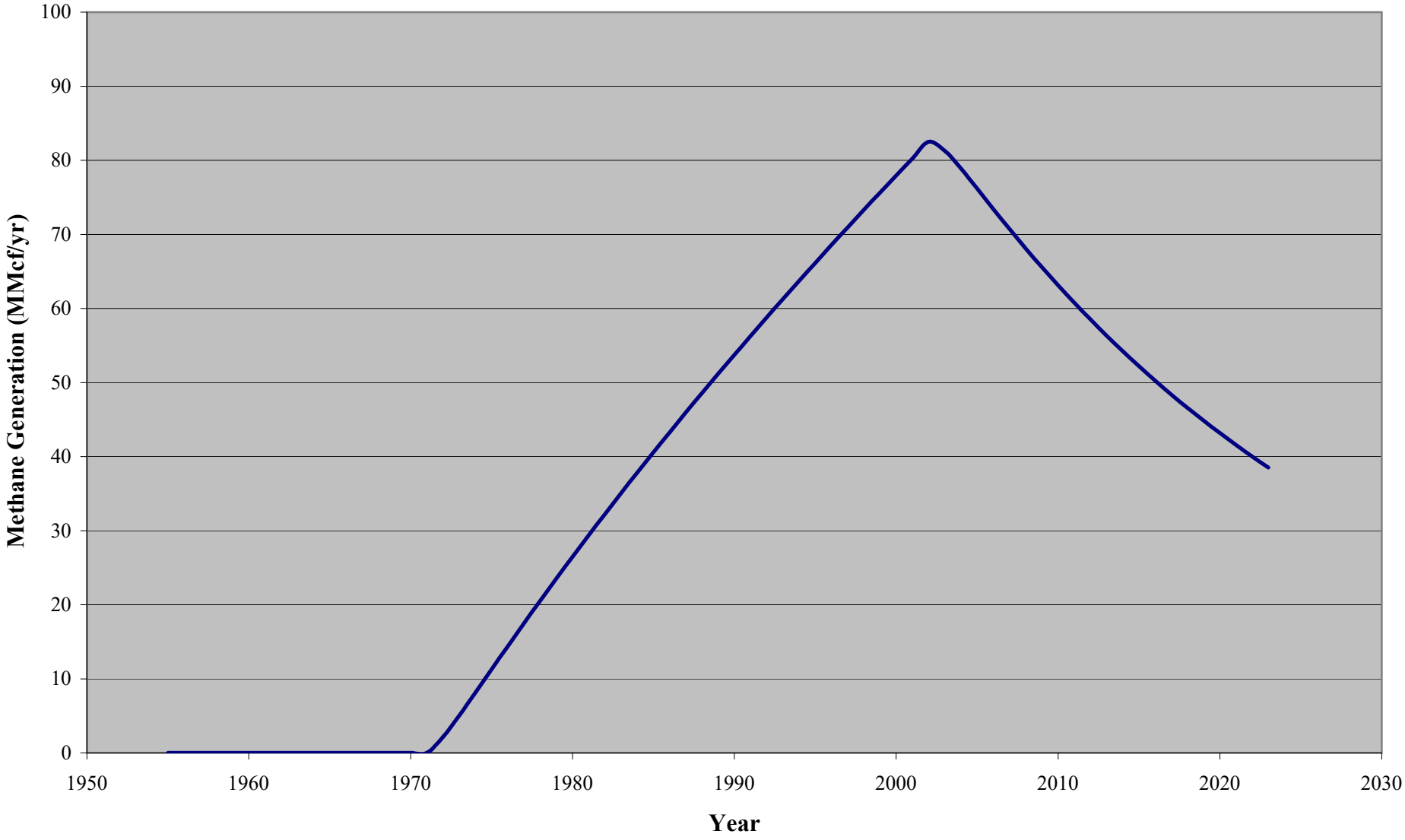
s:	1.00	
Lo:	3,200	cubic feet Methane/ton refuse
k:	0.038	/year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	0	0
1956	0	0
1957	0	0
1958	0	0
1959	0	0
1960	0	0
1961	0	0
1962	0	0
1963	0	0
1964	0	0
1965	0	0
1966	0	0
1967	0	0
1968	0	0
1969	0	0
1970	0	0
1971	28,050	0
1972	28,600	2
1973	29,150	5
1974	29,700	8
1975	30,250	11
1976	30,800	14
1977	31,350	17
1978	31,900	21
1979	32,450	24
1980	33,000	26
1981	33,550	29
1982	34,100	32
1983	34,650	35
1984	35,200	38
1985	35,750	41
1986	36,300	43
1987	36,850	46
1988	37,400	49
1989	37,950	51
1990	38,500	54
1991	39,050	56
1992	39,600	59
1993	40,150	61
1994	40,700	64
1995	41,250	66
1996	41,800	69
1997	42,350	71
1998	42,900	73
1999	43,450	76
2000	44,000	78
2001	44,550	80
2002	0	82
2003	0	81
2004	0	79
2005	0	76
2006	0	73
2007	0	71
2008	0	68
2009	0	66
2010	0	63
2011	0	61
2012	0	59
2013	0	56
2014	0	54
2015	0	52
2016	0	50
2017	0	48
2018	0	47
2019	0	45
2020	0	43
2021	0	42
2022	0	40
2023	0	39

MODIFIED FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



FIRST ORDER MULTI-PHASE MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 4: Parameters
First Order Multi-Phase

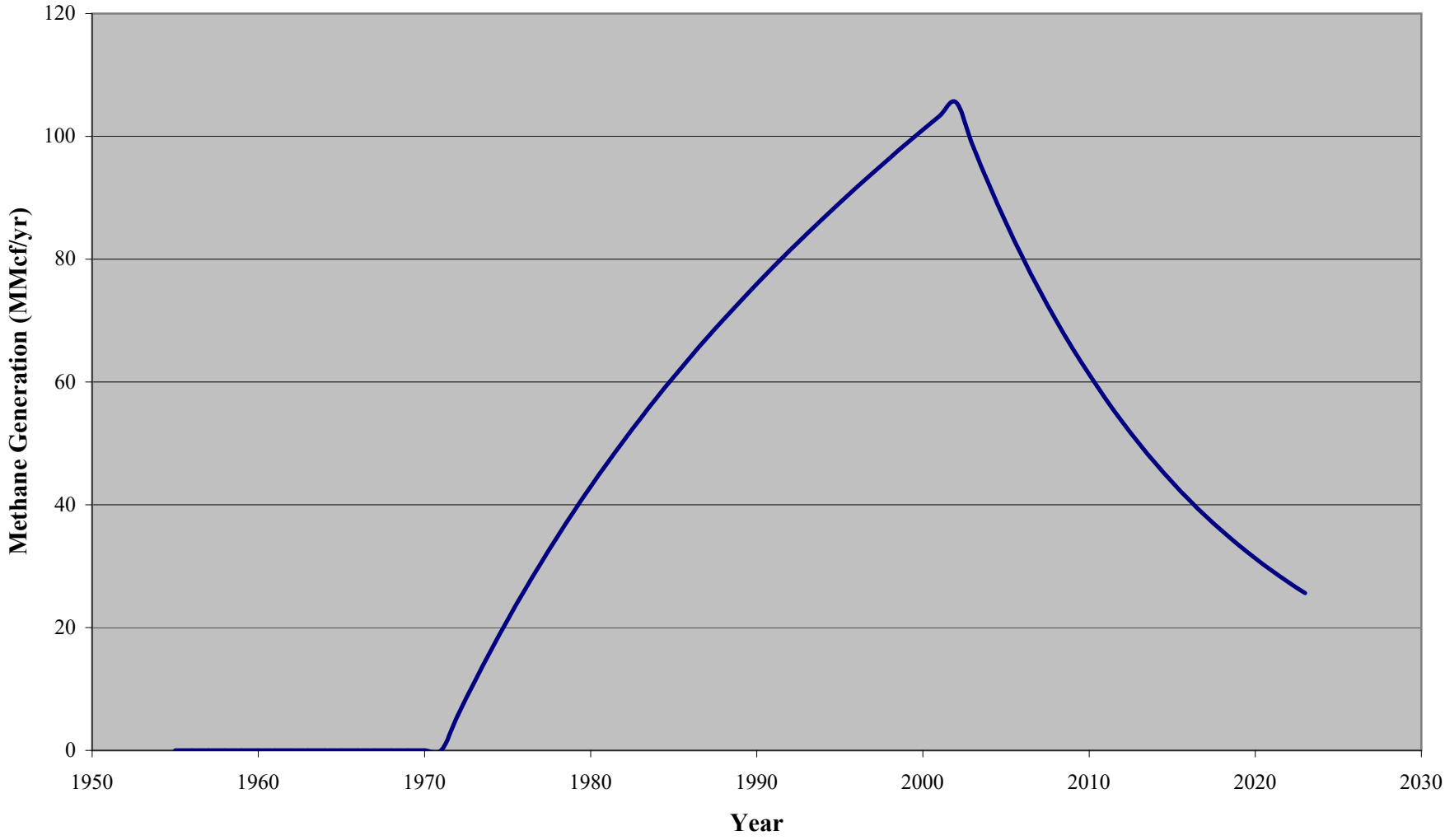
k-Constant (for rapid)	0.08	Decay Rate of Rapidly Decomposables
k-Constant (for slow)	0.06	Decay Rate of Slowly Decomposables
Fraction rapid decomposing	40%	Fraction of Rapidly Decomposing Waste
Fraction slow decomposing	60%	Fraction of Slowly Decomposing Waste
Lo-Constant	3,200	cubic feet Methane/ton refuse

Lag time between initial placement of refuse and start of generation
is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	0	0
1956	0	0
1957	0	0
1958	0	0
1959	0	0
1960	0	0
1961	0	0
1962	0	0
1963	0	0
1964	0	0
1965	0	0
1966	0	0
1967	0	0
1968	0	0
1969	0	0
1970	0	0
1971	28,050	0
1972	28,600	6
1973	29,150	11
1974	29,700	16
1975	30,250	21
1976	30,800	26
1977	31,350	30
1978	31,900	35
1979	32,450	39
1980	33,000	43
1981	33,550	47
1982	34,100	50
1983	34,650	54
1984	35,200	57
1985	35,750	61
1986	36,300	64
1987	36,850	67
1988	37,400	70
1989	37,950	73
1990	38,500	76
1991	39,050	79
1992	39,600	81
1993	40,150	84
1994	40,700	87
1995	41,250	89
1996	41,800	92
1997	42,350	94
1998	42,900	96
1999	43,450	99
2000	44,000	101
2001	44,550	103
2002	0	106
2003	0	99
2004	0	92
2005	0	86
2006	0	80
2007	0	75
2008	0	70
2009	0	66
2010	0	61
2011	0	57
2012	0	53
2013	0	50
2014	0	47
2015	0	44
2016	0	41
2017	0	38
2018	0	36
2019	0	33
2020	0	31
2021	0	29
2022	0	27
2023	0	26

FIRST ORDER MULTI-PHASE (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



APPENDIX B-4

SCENARIO 4

IPCC MODEL

Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1900		
1901		
1902		
1903		
1904		
1905		
1906		
1907		
1908		
1909		
1910		
1911		
1912		
1913		
1914		
1915		
1916		
1917		
1918		
1919		
1920		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		
1929		
1930		
1931		
1932		
1933		
1934		
1935		
1936		
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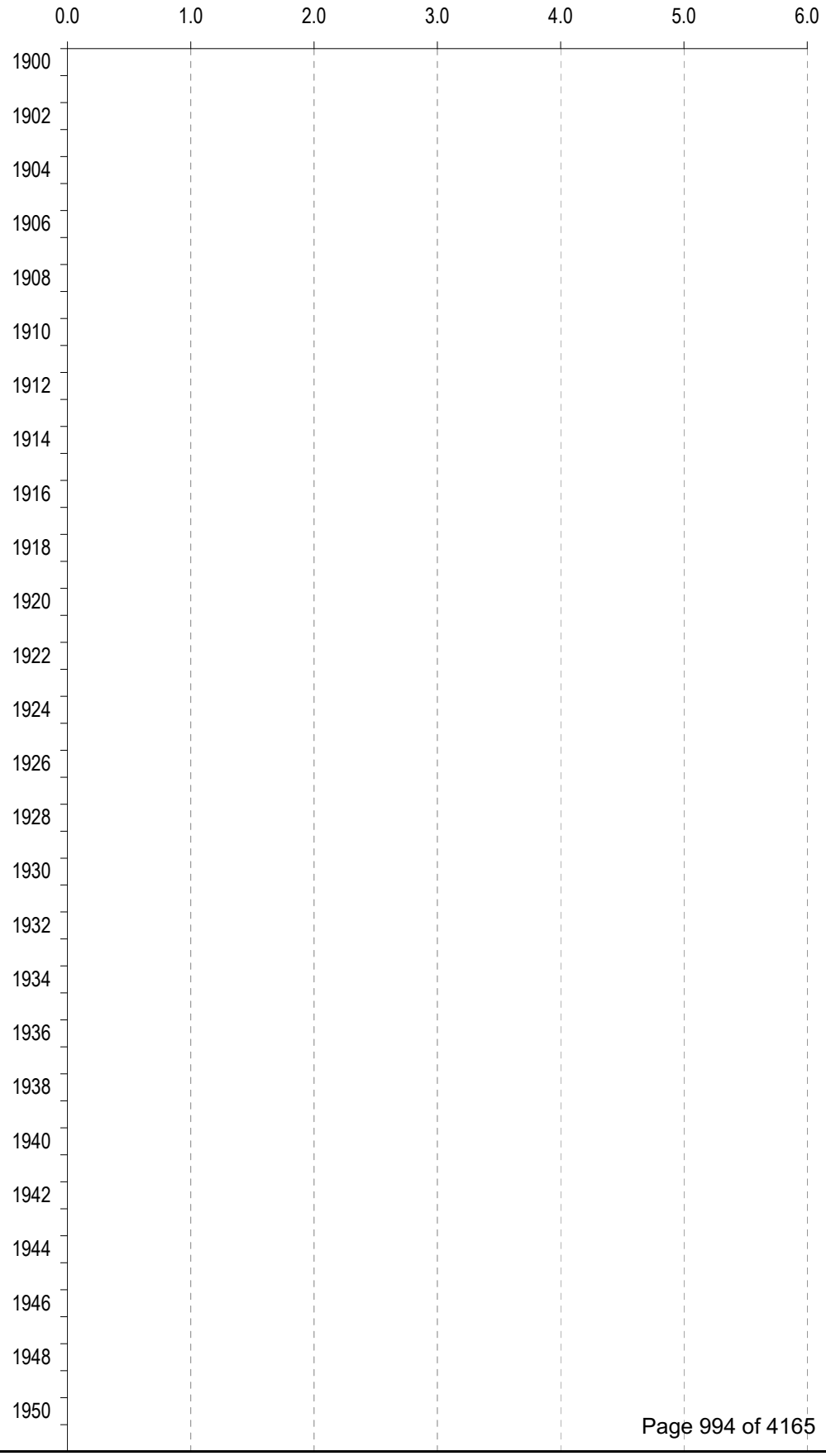
1949		
1950		
1951		

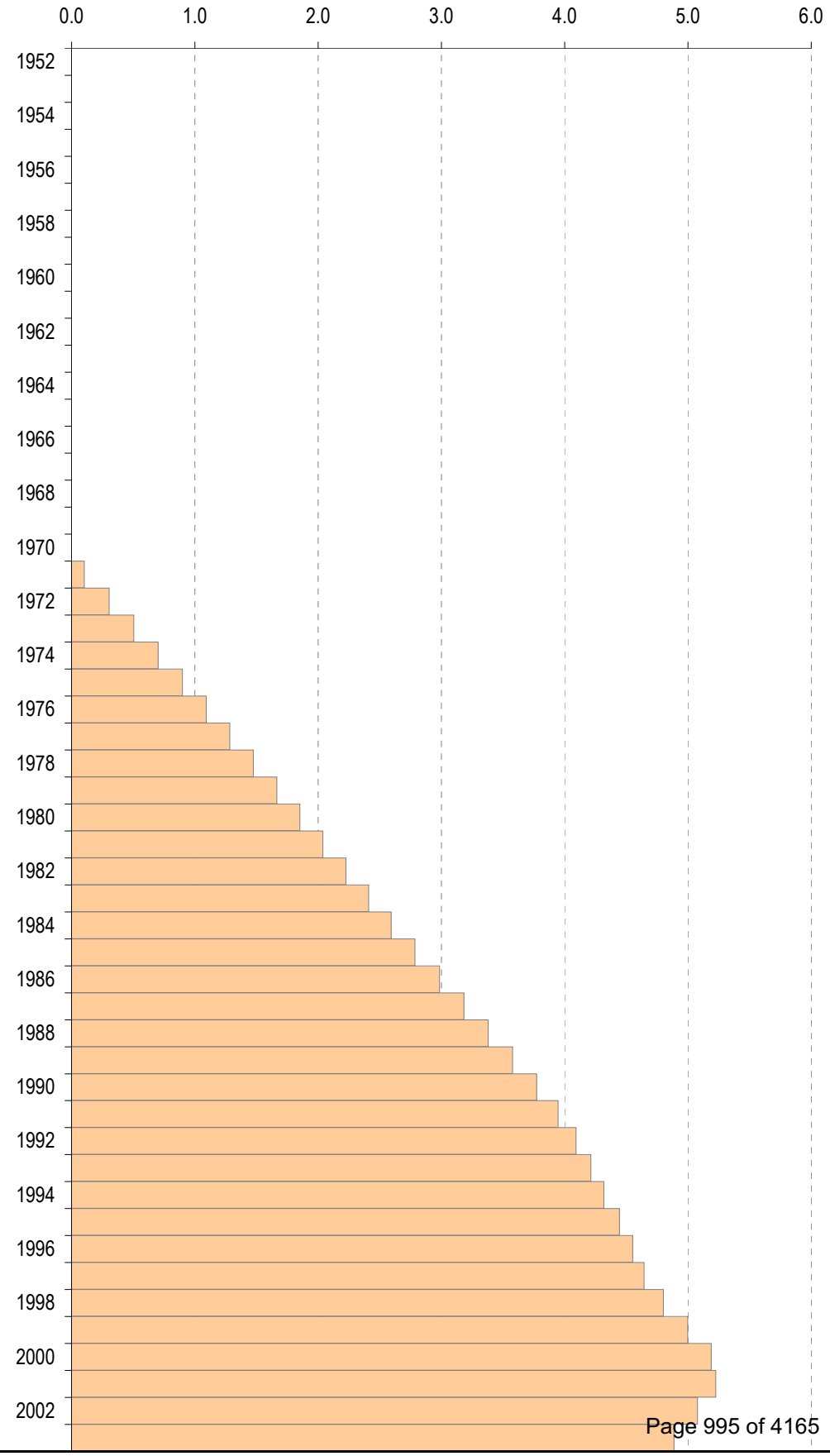


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		
1968		
1969		
1970		
1971	3	0.1
1972	10	0.3
1973	17	0.5
1974	23	0.7
1975	30	0.9
1976	36	1.1
1977	42	1.3
1978	49	1.5
1979	55	1.7
1980	61	1.9
1981	67	2.0
1982	73	2.2
1983	79	2.4
1984	85	2.6
1985	92	2.8
1986	98	3.0
1987	105	3.2
1988	111	3.4
1989	118	3.6
1990	124	3.8
1991	130	3.9
1992	135	4.1
1993	139	4.2
1994	142	4.3
1995	146	4.4
1996	150	4.6
1997	153	4.6
1998	158	4.8
1999	165	5.0
2000	171	5.2
2001	172	5.2
2002	167	5.1
2003	161	4.9

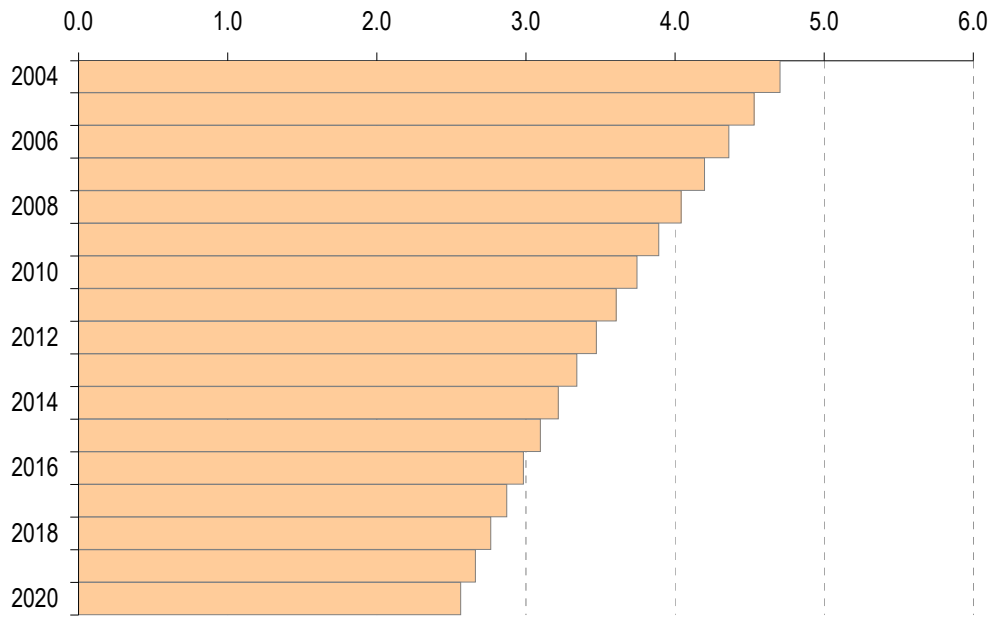


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
2004	155	4.7
2005	149	4.5
2006	144	4.4
2007	138	4.2
2008	133	4.0
2009	128	3.9
2010	123	3.7
2011	119	3.6
2012	114	3.5
2013	110	3.3
2014	106	3.2
2015	102	3.1
2016	98	3.0
2017	95	2.9
2018	91	2.8
2019	88	2.7
2020	84	2.6



SIMPLE FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 2: Parameters
Simple First Order

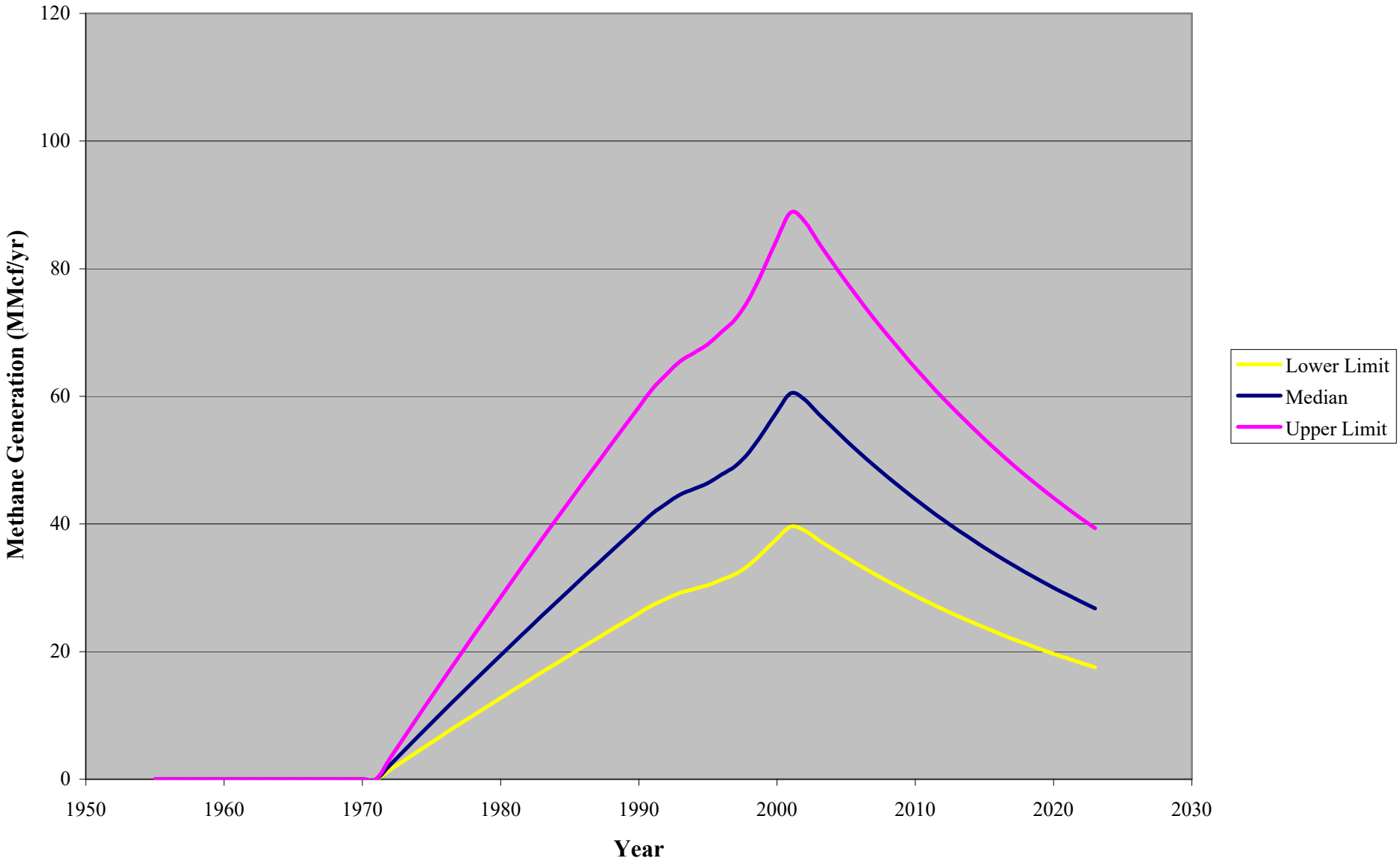
Lo: **3,200** cubic feet Methane/ton refuse
k: **0.038** /year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year) Lower Limit	Median	Upper Limit
1955	**0**	0	0	0
1956	**0**	0	0	0
1957	**0**	0	0	0
1958	**0**	0	0	0
1959	**0**	0	0	0
1960	**0**	0	0	0
1961	**0**	0	0	0
1962	**0**	0	0	0
1963	**0**	0	0	0
1964	**0**	0	0	0
1965	**0**	0	0	0
1966	**0**	0	0	0
1967	**0**	0	0	0
1968	**0**	0	0	0
1969	**0**	0	0	0
1970	**0**	0	0	0
1971	**19,017**	0	0	0
1972	**19,567**	1	2	3
1973	**20,117**	3	4	7
1974	**20,667**	4	7	10
1975	**21,217**	6	9	13
1976	**21,767**	7	11	16
1977	**22,317**	9	13	19
1978	**22,867**	10	15	22
1979	**23,417**	11	17	25
1980	**23,967**	13	19	29
1981	**24,517**	14	22	32
1982	**25,067**	15	24	35
1983	**25,617**	17	26	38
1984	**26,167**	18	28	41
1985	**26,717**	19	30	44
1986	**27,267**	21	32	47
1987	**27,817**	22	34	50
1988	**28,367**	23	36	52
1989	**28,917**	25	38	55
1990	**29,467**	26	40	58
1991	**26,540**	27	42	61
1992	**25,444**	28	43	63
1993	**21,986**	29	45	65
1994	**22,255**	30	45	67
1995	**26,330**	30	46	68
1996	**27,001**	31	48	70
1997	**34,184**	32	49	72
1998	**42,489**	34	51	75
1999	**44,995**	36	54	80
2000	**42,856**	38	58	85
2001	**10,724**	40	60	89
2002	**0**	39	59	87
2003	**0**	38	57	84
2004	**0**	36	55	81
2005	**0**	35	53	78
2006	**0**	33	51	75
2007	**0**	32	49	72
2008	**0**	31	47	70
2009	**0**	30	46	67
2010	**0**	29	44	64
2011	**0**	28	42	62
2012	**0**	27	41	60
2013	**0**	26	39	58
2014	**0**	25	38	55
2015	**0**	24	36	53
2016	**0**	23	35	51
2017	**0**	22	34	49
2018	**0**	21	32	48
2019	**0**	20	31	46
2020	**0**	20	30	44
2021	**0**	19	29	42
2022	**0**	18	28	41
2023	**0**	18	27	39

SIMPLE FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATES



MODIFIED FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 3: Parameters
Modified First Order

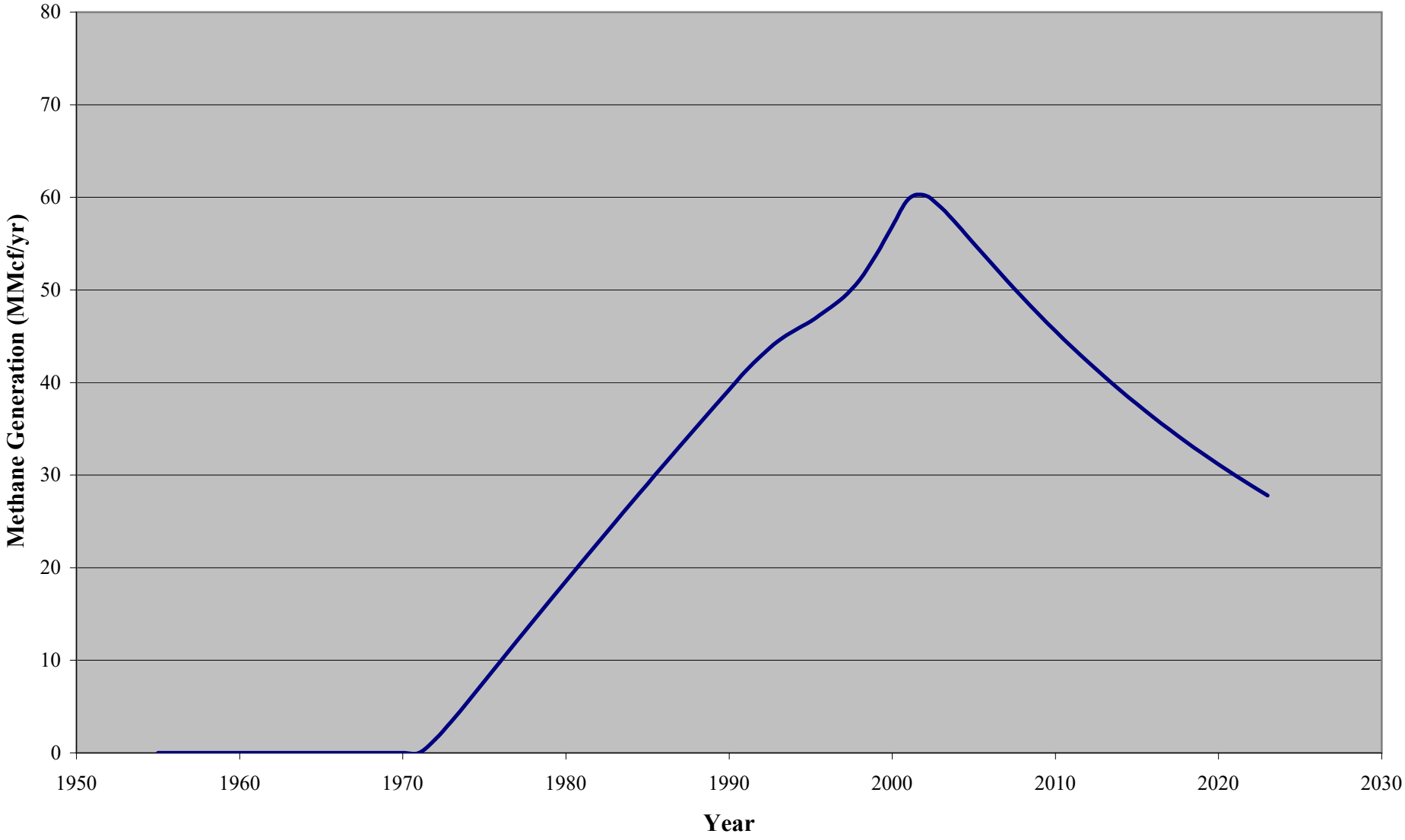
s:	1.00	
Lo:	3,200	cubic feet Methane/ton refuse
k:	0.038	/year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	0	0
1956	0	0
1957	0	0
1958	0	0
1959	0	0
1960	0	0
1961	0	0
1962	0	0
1963	0	0
1964	0	0
1965	0	0
1966	0	0
1967	0	0
1968	0	0
1969	0	0
1970	0	0
1971	19,017	0
1972	19,567	1
1973	20,117	3
1974	20,667	6
1975	21,217	8
1976	21,767	10
1977	22,317	12
1978	22,867	14
1979	23,417	16
1980	23,967	19
1981	24,517	21
1982	25,067	23
1983	25,617	25
1984	26,167	27
1985	26,717	29
1986	27,267	31
1987	27,817	33
1988	28,367	35
1989	28,917	37
1990	29,467	39
1991	26,540	41
1992	25,444	43
1993	21,986	44
1994	22,255	46
1995	26,330	47
1996	27,001	48
1997	34,184	49
1998	42,489	51
1999	44,995	54
2000	42,856	57
2001	10,724	60
2002	0	60
2003	0	59
2004	0	57
2005	0	55
2006	0	53
2007	0	51
2008	0	49
2009	0	47
2010	0	46
2011	0	44
2012	0	42
2013	0	41
2014	0	39
2015	0	38
2016	0	36
2017	0	35
2018	0	34
2019	0	32
2020	0	31
2021	0	30
2022	0	29
2023	0	28

MODIFIED FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



FIRST ORDER MULTI-PHASE MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 4: Parameters
First Order Multi-Phase

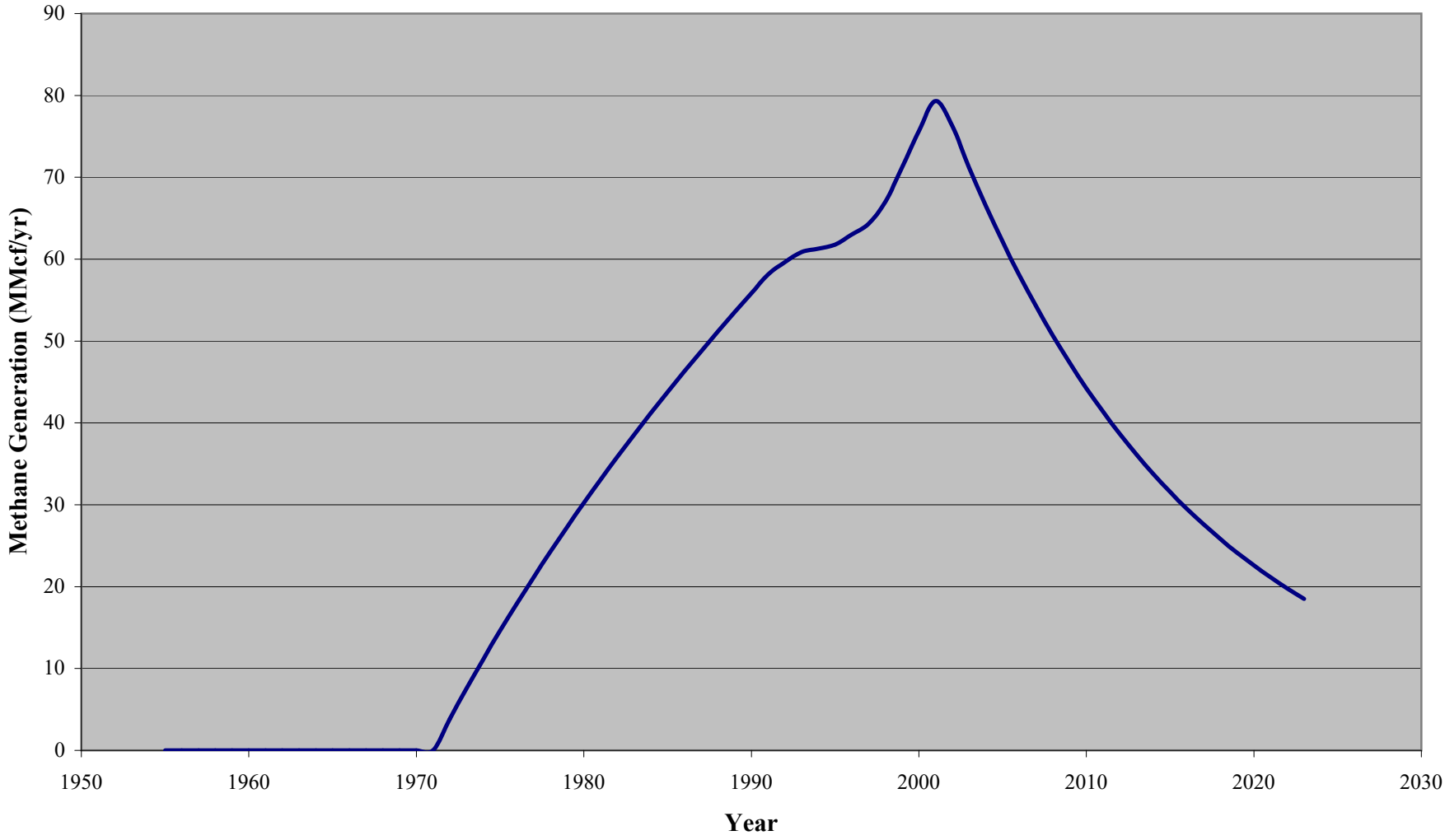
k-Constant (for rapid)	0.08	Decay Rate of Rapidly Decomposables
k-Constant (for slow)	0.06	Decay Rate of Slowly Decomposables
Fraction rapid decomposing	40%	Fraction of Rapidly Decomposing Waste
Fraction slow decomposing	60%	Fraction of Slowly Decomposing Waste
Lo-Constant	3,200	cubic feet Methane/ton refuse

Lag time between initial placement of refuse and start of generation
is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	0	0
1956	0	0
1957	0	0
1958	0	0
1959	0	0
1960	0	0
1961	0	0
1962	0	0
1963	0	0
1964	0	0
1965	0	0
1966	0	0
1967	0	0
1968	0	0
1969	0	0
1970	0	0
1971	19,017	0
1972	19,567	4
1973	20,117	8
1974	20,667	11
1975	21,217	15
1976	21,767	18
1977	22,317	21
1978	22,867	24
1979	23,417	27
1980	23,967	30
1981	24,517	33
1982	25,067	36
1983	25,617	39
1984	26,167	41
1985	26,717	44
1986	27,267	46
1987	27,817	49
1988	28,367	51
1989	28,917	54
1990	29,467	56
1991	26,540	58
1992	25,444	60
1993	21,986	61
1994	22,255	61
1995	26,330	62
1996	27,001	63
1997	34,184	64
1998	42,489	67
1999	44,995	71
2000	42,856	76
2001	10,724	79
2002	0	76
2003	0	71
2004	0	67
2005	0	62
2006	0	58
2007	0	54
2008	0	51
2009	0	47
2010	0	44
2011	0	41
2012	0	39
2013	0	36
2014	0	34
2015	0	32
2016	0	30
2017	0	28
2018	0	26
2019	0	24
2020	0	23
2021	0	21
2022	0	20
2023	0	19

FIRST ORDER MULTI-PHASE (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



APPENDIX C

LFG SAMPLES
CERTIFIED ANALYTICAL REPORT

K PRIME, Inc.

CONSULTING ANALYTICAL CHEMISTS

3621 Westwind Blvd.
Santa Rosa CA 95403
Phone: 707 527 7574
FAX: 707 527 7879

TRANSMITTAL

DATE: 9/24/2013

TO: MR. MIKE DELMANOWSKI
EBA ENGINEERING
825 SONOMA AVENUE
SANTA ROSA, CA 95404

Phone: 707-544-0784
Fax: 707-544-0866
Email: dataeba1@ebagroup.com
mdelmanowski@ebagroup.com

ACCT: 9986
PROJ: 02-907 TASK 8

FROM: Richard A. Kagel, Ph.D. RAK 9/24/2013
Laboratory Director

SUBJECT: LABORATORY RESULTS FOR YOUR PROJECT 02-907 TASK 8

Enclosed please find K Prime's laboratory reports for the following samples:

SAMPLE ID	TYPE	DATE	TIME	KPI LAB #
LFG-LW-1	AIR	9/12/2013	11:32	114282
GP-1	AIR	9/16/2013	14:55	114283
LFG-COMP	AIR	9/16/2013	16:25	114284

The above listed sample group was received on 9/17/2013 and tested as requested on the chain of custody document.

Please call me if you have any questions or need further information.
Thank you for this opportunity to be of service.

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO 15 (GC-MS-SCAN)

SAMPLE ID:	LFG-LW-1
LAB NO:	114282
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/12/2013
TIME SAMPLED:	11:32
BATCH ID:	091713A1
DATE ANALYZED:	09/18/2013

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
DICHLORODIFLUOROMETHANE	75-71-8	100	572	495	2830
DICHLOROTETRAFLUOROETHANE	76-14-2	100	103	699	718
CHLOROMETHANE	74-87-3	100	ND	207	ND
VINYL CHLORIDE	75-01-4	100	5830	256	14900
BROMOMETHANE	74-83-9	100	ND	388	ND
CHLOROETHANE	75-00-3	100	ND	264	ND
TRICHLOROFLUOROMETHANE	75-69-4	100	ND	562	ND
1,1-DICHLOROETHENE	75-35-4	100	ND	397	ND
TRICHLOROTRIFLUOROETHANE	76-13-1	100	ND	766	ND
METHYLENE CHLORIDE	75-09-2	100	147	347	512
1,1-DICHLOROETHANE	75-34-3	100	ND	405	ND
CIS-1,2-DICHLOROETHENE	156-59-2	100	2060	397	8170
CHLOROFORM	67-66-3	100	ND	488	ND
1,1,1-TRICHLOROETHANE	71-55-6	100	ND	546	ND
CARBON TETRACHLORIDE	56-23-5	100	ND	629	ND
1,2-DICHLOROETHANE	107-06-2	100	ND	405	ND
BENZENE	71-43-2	100	161	319	515
TRICHLOROETHENE	79-01-6	100	241	537	1290
1,2-DICHLOROPROPANE	78-87-5	100	ND	462	ND
TRANS-1,3-DICHLOROPROPENE	10061-02-6	100	ND	454	ND
TOLUENE	108-88-3	100	390	377	1470
CIS-1,3-DICHLOROPROPENE	10061-01-5	100	ND	454	ND
1,1,2-TRICHLOROETHANE	79-00-5	100	ND	546	ND
TETRACHLOROETHENE	127-18-4	100	819	678	5560
1,2-DIBROMOETHANE	106-93-4	100	ND	768	ND
CHLOROBENZENE	108-90-7	100	ND	460	ND
ETHYLBENZENE	100-41-4	100	ND	434	ND
XYLENE (M+P)	1330-20-7	100	409	434	1780
XYLENE (O)	95-47-6	100	144	434	626
STYRENE	100-42-5	100	ND	426	ND
1,1,2,2-TETRACHLOROETHANE	79-34-5	100	ND	687	ND
1,3,5-TRIMETHYLBENZENE	108-67-8	100	ND	492	ND
1,2,4-TRIMETHYLBENZENE	95-63-6	100	ND	492	ND
1,3-DICHLOROBENZENE	541-73-1	100	ND	601	ND
1,4-DICHLOROBENZENE	106-46-7	100	ND	601	ND
1,2-DICHLOROBENZENE	95-50-1	100	ND	601	ND
1,2,4-TRICHLOROBENZENE	120-82-1	200	ND	1480	ND
HEXACHLOROBUTADIENE	87-68-3	100	ND	1070	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: RMC
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO 15 (GC-MS-SCAN)

SAMPLE ID:	LFG-COMP
LAB NO:	114284
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/16/2013
TIME SAMPLED:	16:25
BATCH ID:	091713A1
DATE ANALYZED:	09/18/2013

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
DICHLORODIFLUOROMETHANE	75-71-8	1000	ND	4950	ND
DICHLOROTETRAFLUOROETHANE	76-14-2	1000	ND	6990	ND
CHLOROMETHANE	74-87-3	1000	ND	2070	ND
VINYL CHLORIDE	75-01-4	1000	1540	2560	3940
BROMOMETHANE	74-83-9	1000	ND	3880	ND
CHLOROETHANE	75-00-3	1000	ND	2640	ND
TRICHLOROFLUOROMETHANE	75-69-4	1000	ND	5620	ND
1,1-DICHLOROETHENE	75-35-4	1000	ND	3970	ND
TRICHLOROTRIFLUOROETHANE	76-13-1	1000	ND	7660	ND
METHYLENE CHLORIDE	75-09-2	1000	ND	3470	ND
1,1-DICHLOROETHANE	75-34-3	1000	ND	4050	ND
CIS-1,2-DICHLOROETHENE	156-59-2	1000	ND	3970	ND
CHLOROFORM	67-66-3	1000	ND	4880	ND
1,1,1-TRICHLOROETHANE	71-55-6	1000	ND	5460	ND
CARBON TETRACHLORIDE	56-23-5	1000	ND	6290	ND
1,2-DICHLOROETHANE	107-06-2	1000	ND	4050	ND
BENZENE	71-43-2	1000	ND	3190	ND
TRICHLOROETHENE	79-01-6	1000	ND	5370	ND
1,2-DICHLOROPROPANE	78-87-5	1000	ND	4620	ND
TRANS-1,3-DICHLOROPROPENE	10061-02-6	1000	ND	4540	ND
TOLUENE	108-88-3	1000	7010	3770	26400
CIS-1,3-DICHLOROPROPENE	10061-01-5	1000	ND	4540	ND
1,1,2-TRICHLOROETHANE	79-00-5	1000	ND	5460	ND
TETRACHLOROETHENE	127-18-4	1000	ND	6780	ND
1,2-DIBROMOETHANE	106-93-4	1000	ND	7680	ND
CHLOROBENZENE	108-90-7	1000	1950	4600	8960
ETHYLBENZENE	100-41-4	1000	159000	4340	692000
XYLENE (M+P)	1330-20-7	1000	123000	4340	534000
XYLENE (O)	95-47-6	1000	136000	4340	591000
STYRENE	100-42-5	1000	ND	4260	ND
1,1,2,2-TETRACHLOROETHANE	79-34-5	1000	ND	6870	ND
1,3,5-TRIMETHYLBENZENE	108-67-8	1000	6020	4920	29600
1,2,4-TRIMETHYLBENZENE	95-63-6	1000	6290	4920	30900
1,3-DICHLOROBENZENE	541-73-1	1000	ND	6010	ND
1,4-DICHLOROBENZENE	106-46-7	1000	ND	6010	ND
1,2-DICHLOROBENZENE	95-50-1	1000	ND	6010	ND
1,2,4-TRICHLOROBENZENE	120-82-1	2000	ND	14800	ND
HEXACHLOROBUTADIENE	87-68-3	1000	ND	10700	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: PMK
DATE: 9/24/13

K PRIME, INC.

LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: TVH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

UNITS: PPM-V

SAMPLE ID	LAB NO.	SAMPLE TYPE	DATE SAMPLED	BATCH ID	DATE ANALYZED	MRL	SAMPLE CONC
LFG-LW-1	114282	AIR	09/12/2013	091713A1	09/17/2013	5.00	33.7
GP-1	114283	AIR	09/16/2013	091713A1	09/17/2013	5.00	80.6
LFG-COMP	114284	AIR	09/16/2013	091713A1	09/17/2013	5.00	1120

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: [signature]
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: TVH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

UNITS: UG/M3

SAMPLE ID	LAB NO.	SAMPLE TYPE	DATE SAMPLED	BATCH ID	DATE ANALYZED	MRL	SAMPLE CONC
LFG-LW-1	114282	AIR	09/12/2013	091713A1	09/17/2013	17600	119000
GP-1	114283	AIR	09/16/2013	091713A1	09/17/2013	17600	283000
LFG-COMP	114284	AIR	09/16/2013	091713A1	09/17/2013	17600	3920000

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: _____
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: METHANE, OXYGEN, NITROGEN
REFERENCE: ASTM D 1946

SAMPLE ID:	LFG-LW-1
LAB NO:	114282
BATCH ID:	091713A3
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/12/2013
TIME SAMPLED:	11:32
DATE RECEIVED:	09/17/2013
DATE ANALYZED:	09/17/2013
UNITS:	%-V

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
METHANE	0.100	47.8
OXYGEN	1.00	ND
NITROGEN(BALANCE)	1.00	18.3

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: RMK
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: METHANE, OXYGEN, NITROGEN
REFERENCE: ASTM D 1946

SAMPLE ID:	GP-1
LAB NO:	114283
BATCH ID:	091713A3
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/16/2013
TIME SAMPLED:	14:55
DATE RECEIVED:	09/17/2013
DATE ANALYZED:	09/17/2013
UNITS:	%-V

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
METHANE	0.100	55.2
OXYGEN	1.00	2.48
NITROGEN(BALANCE)	1.00	6.66

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: RMS
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: METHANE, OXYGEN, NITROGEN
REFERENCE: ASTM D 1946

SAMPLE ID:	LFG-COMP
LAB NO:	114284
BATCH ID:	091713A3
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/16/2013
TIME SAMPLED:	16:25
DATE RECEIVED:	09/17/2013
DATE ANALYZED:	09/17/2013
UNITS:	%-V

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
METHANE	0.100	57.5
OXYGEN	1.00	ND
NITROGEN(BALANCE)	1.00	7.22

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: _____
DATE: 9/24/13

K PRIME, INC.

LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: CARBON DIOXIDE
REFERENCE: ASTM D 1946

UNITS: %-V

SAMPLE ID	LAB NO.	SAMPLE TYPE	DATE SAMPLED	BATCH ID	DATE ANALYZED	MRL	SAMPLE CONC
LFG-LW-1	114282	AIR	09/12/2013	091713A2	09/17/2013	0.100	33.2
GP-1	114283	AIR	09/16/2013	091713A2	09/17/2013	0.100	35.7
LFG-COMP	114284	AIR	09/16/2013	091713A2	09/17/2013	0.100	34.9

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: _____
DATE: 9/24/13

K PRIME, INC.
LABORATORY METHOD BLANK REPORT

METHOD BLANK ID: B091713A1
SAMPLE TYPE: AIR

BATCH ID: 091713A1
DATE ANALYZED: 09/17/2013

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO 15 (GC-MS-SCAN)

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
DICHLORODIFLUOROMETHANE	75-71-8	0.500	ND	2.47	ND
DICHLOROTETRAFLUOROETHANE	76-14-2	0.500	ND	3.50	ND
CHLOROMETHANE	74-87-3	0.500	ND	1.03	ND
VINYL CHLORIDE	75-01-4	0.500	ND	1.28	ND
BROMOMETHANE	74-83-9	0.500	ND	1.94	ND
CHLOROETHANE	75-00-3	0.500	ND	1.32	ND
TRICHLOROFLUOROMETHANE	75-69-4	0.500	ND	2.81	ND
1,1-DICHLOROETHENE	75-35-4	0.500	ND	1.98	ND
TRICHLOROTRIFLUOROETHANE	76-13-1	0.500	ND	3.83	ND
METHYLENE CHLORIDE	75-09-2	0.500	ND	1.74	ND
1,1-DICHLOROETHANE	75-34-3	0.500	ND	2.02	ND
CIS-1,2-DICHLOROETHENE	156-59-2	0.500	ND	1.98	ND
CHLOROFORM	67-66-3	0.500	ND	2.44	ND
1,1,1-TRICHLOROETHANE	71-55-6	0.500	ND	2.73	ND
CARBON TETRACHLORIDE	56-23-5	0.500	ND	3.15	ND
1,2-DICHLOROETHANE	107-06-2	0.500	ND	2.02	ND
BENZENE	71-43-2	0.500	ND	1.60	ND
TRICHLOROETHENE	79-01-6	0.500	ND	2.69	ND
1,2-DICHLOROPROPANE	78-87-5	0.500	ND	2.31	ND
TRANS-1,3-DICHLOROPROPENE	10061-02-6	0.500	ND	2.27	ND
TOLUENE	108-88-3	0.500	ND	1.88	ND
CIS-1,3-DICHLOROPROPENE	10061-01-5	0.500	ND	2.27	ND
1,1,2-TRICHLOROETHANE	79-00-5	0.500	ND	2.73	ND
TETRACHLOROETHENE	127-18-4	0.500	ND	3.39	ND
1,2-DIBROMOETHANE	106-93-4	0.500	ND	3.84	ND
CHLOROBENZENE	108-90-7	0.500	ND	2.30	ND
ETHYLBENZENE	100-41-4	0.500	ND	2.17	ND
XYLENE (M+P)	1330-20-7	0.500	ND	2.17	ND
XYLENE (O)	95-47-6	0.500	ND	2.17	ND
STYRENE	100-42-5	0.500	ND	2.13	ND
1,1,2,2-TETRACHLOROETHANE	79-34-5	0.500	ND	3.43	ND
1,3,5-TRIMETHYLBENZENE	108-67-8	0.500	ND	2.46	ND
1,2,4-TRIMETHYLBENZENE	95-63-6	0.500	ND	2.46	ND
1,3-DICHLOROBENZENE	541-73-1	0.500	ND	3.01	ND
1,4-DICHLOROBENZENE	106-46-7	0.500	ND	3.01	ND
1,2-DICHLOROBENZENE	95-50-1	0.500	ND	3.01	ND
1,2,4-TRICHLOROBENZENE	120-82-1	0.500	ND	3.71	ND
HEXACHLOROBUTADIENE	87-68-3	0.500	ND	5.33	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

K PRIME, INC.
LABORATORY QUALITY CONTROL REPORT

LAB CONTROL ID: L091713A1
LAB CONTROL DUPLICATE ID: D091713A1

SAMPLE TYPE: AIR
BATCH ID: 091713A1
DATE ANALYZED: 09/17/2013

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO 15 (GC-MS-SCAN)

COMPOUND NAME	SPIKE ADDED (PPB)	REPORTING LIMIT (PPB)	SAMPLE CONC (PPB)	SPIKE CONC (PPB)	SPIKE REC (%)	REC LIMITS (%)
1,1-DICHLOROETHENE	10.0	0.500	ND	8.64	86	60 - 140
TRICHLOROETHENE	10.0	0.500	ND	9.71	97	60 - 140
BENZENE	10.0	0.500	ND	8.75	88	60 - 140
TOLUENE	10.0	0.500	ND	9.48	95	60 - 140
TETRACHLOROETHENE	10.0	0.500	ND	10.1	101	60 - 140

COMPOUND NAME	SPIKE ADDED (PPB)	SPIKE DUP CONC (PPB)	SPIKE DUP REC (%)	RPD (%)	QC LIMITS RPD (%)	QC LIMITS REC (%)
1,1-DICHLOROETHENE	10.0	8.30	83	4.0	25	60 - 140
TRICHLOROETHENE	10.0	9.29	93	4.4	25	60 - 140
BENZENE	10.0	8.56	86	2.2	25	60 - 140
TOLUENE	10.0	9.28	93	2.1	25	60 - 140
TETRACHLOROETHENE	10.0	10.0	100	0.9	25	60 - 140

NOTES:
NA - NOT APPLICABLE OR AVAILABLE
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT

K PRIME, INC.
LABORATORY QC REPORT

METHOD BLANK ID: B091713A1
LAB CONTROL SAMPLE ID: L091713A1
LAB CONTROL DUPLICATE ID: D091713A1
BATCH ID: 091713A1

METHOD: TVH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

SAMPLE TYPE: AIR
UNITS: PPM-V

METHOD BLANK

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
TVH	2.50	ND

ACCURACY (LAB CONTROL SAMPLE)

COMPOUND NAME	EXPECTED CONC	MEASURED CONC	PERCENT RECOVERY	LIMITS (PERCENT)
TVH	167	159	95	60-140

PRECISION (LAB CONTROL DUPLICATE)

COMPOUND NAME	SAMPLE RESULT	DUPLICATE RESULT	RPD (PERCENT)	LIMITS (PERCENT)
TVH	159	152	4.5	±30

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
TVH - TOTAL VOLATILE HYDROCARBONS

K PRIME, INC.
LABORATORY QC REPORT

METHOD BLANK ID: B091713A1
LAB CONTROL SAMPLE ID: L091713A1
LAB CONTROL DUPLICATE ID: D091713A1
BATCH ID: 091713A1

METHOD: TVH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

SAMPLE TYPE: AIR
UNITS: UG/M3

METHOD BLANK

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
TVH	8790	ND

ACCURACY (LAB CONTROL SAMPLE)

COMPOUND NAME	EXPECTED CONC	MEASURED CONC	PERCENT RECOVERY	LIMITS (PERCENT)
TVH	586000	561000	96	60-140

PRECISION (LAB CONTROL DUPLICATE)

COMPOUND NAME	SAMPLE RESULT	DUPLICATE RESULT	RPD (PERCENT)	LIMITS (PERCENT)
TVH	561000	535000	4.7	±30

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
TVH - TOTAL VOLATILE HYDROCARBONS

K PRIME, INC.
LABORATORY QC REPORT

METHOD: METHANE, OXYGEN, NITROGEN (BALANCE)
REFERENCE: ASTM D 1946

METHOD BLANK ID: B091713A3
SAMPLE ID: L091713A3
DUPLICATE ID: D091713A3
BATCH #: 091713A3
SAMPLE TYPE: AIR
UNITS: %-V

DATE ANALYZED: 09/17/2013

METHOD BLANK

PARAMETER	REPORTING LIMIT	SAMPLE RESULT
METHANE	0.100	ND
OXYGEN	1.00	ND

ACCURACY (MATRIX SPIKE)

PARAMETER	SPIKE ADDED	SAMPLE RESULT	SPIKE RESULT	RECOVERY (%)	LIMITS (%)
METHANE	50.0	ND	48.4	97	90-110
OXYGEN	10.0	ND	9.00	90	90-110
NITROGEN (BALANCE)	40.0	ND	42.6	107	90-110

PRECISION (SPIKE DUPLICATE)

COMPOUND NAME	REPORTING LIMIT	SPIKE RESULT	DUPLICATE RESULT	RPD (%)	LIMITS (%)
METHANE	0.100	48.4	48.9	1.0	±10
OXYGEN	1.00	9.00	9.06	0.7	±10
NITROGEN (BALANCE)	1.00	42.6	42.0	1.3	±10

K PRIME, INC.

LABORATORY QC REPORT

METHOD: CARBON DIOXIDE
REFERENCE: ASTM D 1946

METHOD BLANK ID: B091713A2
SAMPLE ID: L091713A2
DUPLICATE ID: D091713A2
BATCH #: 091713A2
SAMPLE TYPE: AIR
UNITS: %-V

DATE ANALYZED: 09/17/2013

METHOD BLANK

PARAMETER	REPORTING LIMIT	SAMPLE RESULT
CARBON DIOXIDE	0.050	ND

ACCURACY (MATRIX SPIKE)

PARAMETER	SPIKE ADDED	SAMPLE RESULT	SPIKE RESULT	RECOVERY (%)	LIMITS (%)
CARBON DIOXIDE	1.00	ND	1.00	100	70-130

PRECISION (SPIKE DUPLICATE)

COMPOUND NAME	REPORTING LIMIT	SPIKE RESULT	DUPLICATE RESULT	RPD (%)	LIMITS (%)
CARBON DIOXIDE	0.050	1.00	1.00	0.4	±20

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
NA - NOT AVAILABLE OR APPLICABLE

K PRIME, INC.

CHAIN OF CUSTODY RECORD

CONSULTING ANALYTICAL CHEMISTS 3621 Westwind Blvd., Santa Rosa, CA 95403 PHONE: (707) 527-7574 FAX: (707) 527-7879

Client/Project ID	Address/Phone	ANALYSES	KPI Project No.
EBA ENGINEERING	825 SONOMA AVE SANTA ROSA CA		
Project Location	Client Project No.		☐ EDF Log Code:
UKIAH LANDFILL	02-907 TASK 8		
Contact	Sampler (Signature)		Global ID
M. DELMANOWSKI			

Sample Identification No.	Date	Time	Lab Sample No.	Type of Sample	No. of Containers	CH4, O2, CO2, N2 (4946)	TVH - TO-3	TO-14					Expected Turnaround Time	Remarks
LFG-LW-1	9-12-13	1132	114282	AIR	1	X	X	X					5-DAY	NO EDF
GP-1	9-16-13	1455	114283	"	1	X	X							
LFG-COMP	9-16-13	1550, 1625	114284	"	1	X	X	X						

Relinquished by: (Signature)	Received by: (Signature) RW - COOK KPI	Date 9/17/13	Time 10:58
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Disposal Method	White Copy : Accompanies Samples Yellow Copy : Sampler		
Disposed by: (Signature)	Date	Time	

APPENDIX D

LFG CONDENSATE GENERATION CALCULATIONS

CONDENSATE GENERATION CALCULATIONS
LOWEST AVERAGE MONTHLY TEMPERATURE AT MINIMUM FLOW RATE
CITY OF UKIAH LANDFILL

Design Parameters:

LFG Temp. at Initial Point (F):	120	
LFG Temp. at Final Point (F):	36	
Vapor Pressure at Initial Temp.	1.6927	(see attached table)
Vapor Pressure at Final Temp.	0.0999	(see attached table)
Average Vacuum Pressure ("w.c.)	25	
Average Vacuum Pressure (psia)	13.797	
Design Flow Rate (scfm):	53	
Conversion Factor:	0.0057	

Method 1 - Detailed Procedure (LANDTEC, 1994)

Xcond = Pw/Plfg = Vcond/Vlfg

where:

Xcond	=	Fraction of liquid gas condensate (assumed to be primarily aqueous water)
Xw	=	Water vapor fraction
Pwater	=	Partial (vapor) pressure of water at LFG temperature determined (psia)
Plfg	=	Total pressure of LFG (psia) (i.e., average pipeline pressure)
Vcond	=	Volue of LFG condensate
Vlfg	=	Volume of LFG

therefore:

Dropped Out Xcond = Initial Xw - Final Xw
Dropped Out Xcond = 0.115

Condensate (gal) per Design Flow (scf) = Dropped Out Xcond x Flow x Conversion Constant
Condensate (gal) per Design Flow (scf) = 0.035

Gallons of Condensate per day = ***50 gal/day***

Method 2 - Conservative Method (Source: LANDTEC, 1994)

Vcond = 5694 x (10^B/Ps)

where:

Vcond	=	Volume of condensate (water) produced (MMcf)
B	=	6.32 - (3081/T+385) = 0.219
T	=	Maximum (initial) gas temperature (F)
Ps	=	System pressure (psia)

Vcond = 683.326 gal/MMcf

Corrected Vcond for Design Flow = ***52 gal/day***

CONDENSATE GENERATION CALCULATIONS
MEAN TEMPERATURE (ANNUAL) AT MINIMUM FLOW RATE
CITY OF UKIAH LANDFILL

Design Parameters:

LFG Temp. at Initial Point (F):	120	
LFG Temp. at Final Point (F):	59	
Vapor Pressure at Initial Temp.	1.6927	(see attached table)
Vapor Pressure at Final Temp.	0.2561	(see attached table)
Average Vacuum Pressure ("w.c.)	25	
Average Vacuum Pressure (psia)	13.797	
Design Flow Rate (scfm):	53	
Conversion Factor:	0.0057	

Method 1 - Detailed Procedure (LANDTEC, 1994)

Xcond = Pw/Plfg = Vcond/Vlfg

where:

Xcond	=	Fraction of liquid gas condensate (assumed to be primarily aqueous water)
Xw	=	Water vapor fraction
Pwater	=	Partial (vapor) pressure of water at LFG temperature determined (psia)
Plfg	=	Total pressure of LFG (psia) (i.e., average pipeline pressure)
Vcond	=	Volue of LFG condensate
Vlfg	=	Volume of LFG

therefore:

Dropped Out Xcond = Initial Xw - Final Xw
Dropped Out Xcond = 0.104

Condensate (gal) per Design Flow (scf) = Dropped Out Xcond x Flow x Conversion Constant
Condensate (gal) per Design Flow (scf) = 0.031

Gallons of Condensate per day = ***45 gal/day***

Method 2 - Conservative Method (Source: LANDTEC, 1994)

Vcond = 5694 x (10^B/Ps)

where:

Vcond	=	Volume of condensate (water) produced (MMcf)
B	=	6.32 - (3081/T+385) = 0.219
T	=	Maximum (initial) gas temperature (F)
Ps	=	System pressure (psia)

Vcond = 683.326 gal/MMcf

Corrected Vcond for Design Flow = ***52 gal/day***

CONDENSATE GENERATION CALCULATIONS
LOWEST AVERAGE MONTHLY TEMPERATURE AT MAXIMUM FLOW RATE
CITY OF UKIAH LANDFILL

Design Parameters:

LFG Temp. at Initial Point (F):	120	
LFG Temp. at Final Point (F):	36	
Vapor Pressure at Initial Temp.	1.6927	(see attached table)
Vapor Pressure at Final Temp.	0.0999	(see attached table)
Average Vacuum Pressure ("w.c.)	25	
Average Vacuum Pressure (psia)	13.797	
Design Flow Rate (scfm):	210	
Conversion Factor:	0.0057	

Method 1 - Detailed Procedure (LANDTEC, 1994)

Xcond = Pw/Plfg = Vcond/Vlfg

where:

Xcond	=	Fraction of liquid gas condensate (assumed to be primarily aqueous water)
Xw	=	Water vapor fraction
Pwater	=	Partial (vapor) pressure of water at LFG temperature determined (psia)
Plfg	=	Total pressure of LFG (psia) (i.e., average pipeline pressure)
Vcond	=	Volue of LFG condensate
Vlfg	=	Volume of LFG

therefore:

Dropped Out Xcond = Initial Xw - Final Xw
Dropped Out Xcond = 0.115

Condensate (gal) per Design Flow (scf) = Dropped Out Xcond x Flow x Conversion Constant
Condensate (gal) per Design Flow (scf) = 0.138

Gallons of Condensate per day = ***199 gal/day***

Method 2 - Conservative Method (Source: LANDTEC, 1994)

Vcond = 5694 x (10^B/Ps)

where:

Vcond	=	Volume of condensate (water) produced (MMcf)	
B	=	6.32 - (3081/T+385) =	0.219
T	=	Maximum (initial) gas temperature (F)	
Ps	=	System pressure (psia)	

Vcond = 683.326 gal/MMcf

Corrected Vcond for Design Flow = ***207 gal/day***

CONDENSATE GENERATION CALCULATIONS
MEAN TEMPERATURE (ANNUAL) AT MAXIMUM FLOW RATE
CITY OF UKIAH LANDFILL

Design Parameters:

LFG Temp. at Initial Point (F):	120	
LFG Temp. at Final Point (F):	59	
Vapor Pressure at Initial Temp.	1.6927	(see attached table)
Vapor Pressure at Final Temp.	0.2561	(see attached table)
Average Vacuum Pressure ("w.c.)	25	
Average Vacuum Pressure (psia)	13.797	
Design Flow Rate (scfm):	210	
Conversion Factor:	0.0057	

Method 1 - Detailed Procedure (LANDTEC, 1994)

Xcond = Pw/Plfg = Vcond/Vlfg

where:

Xcond	=	Fraction of liquid gas condensate (assumed to be primarily aqueous water)
Xw	=	Water vapor fraction
Pwater	=	Partial (vapor) pressure of water at LFG temperature determined (psia)
Plfg	=	Total pressure of LFG (psia) (i.e., average pipeline pressure)
Vcond	=	Volue of LFG condensate
Vlfg	=	Volume of LFG

therefore:

Dropped Out Xcond = Initial Xw - Final Xw
Dropped Out Xcond = 0.104

Condensate (gal) per Design Flow (scf) = Dropped Out Xcond x Flow x Conversion Constant
Condensate (gal) per Design Flow (scf) = 0.125

Gallons of Condensate per day = ***179*** ***gal/day***

Method 2 - Conservative Method (Source: LANDTEC, 1994)

Vcond = 5694 x (10^B/Ps)

where:

Vcond	=	Volume of condensate (water) produced (MMcf)	
B	=	6.32 - (3081/T+385) =	0.219
T	=	Maximum (initial) gas temperature (F)	
Ps	=	System pressure (psia)	

Vcond = 683.326 gal/MMcf

Corrected Vcond for Design Flow = ***207*** ***gal/day***

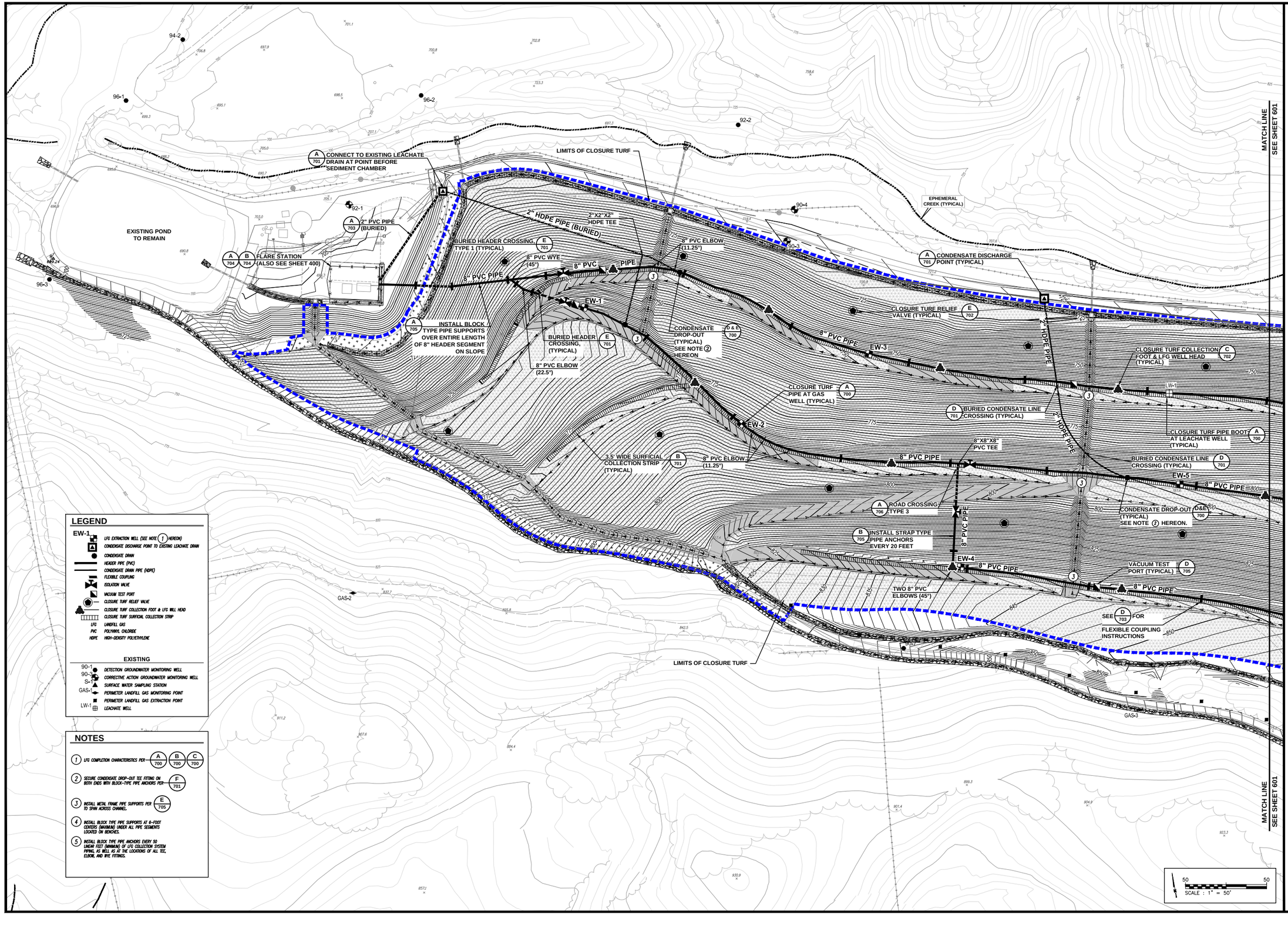
Water Vapor Pressure vs. Temperature Data

Condensate Generation Calculations

Temperature (F)	*Pressure (psia)*
32	0.0886
35	0.0999
40	0.1216
45	0.1474
50	0.1780
60	0.2561
70	0.3629
80	0.5068
90	0.6981
100	0.9492
110	1.2750
120	1.6927
130	2.2230
140	2.8892
150	3.7180
160	4.7410

APPENDIX E

CONSTRUCTION DRAWINGS



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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM LAYOUT - WEST PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Drawn By: WC
Checked By: DFB
Date: 2019-04-30

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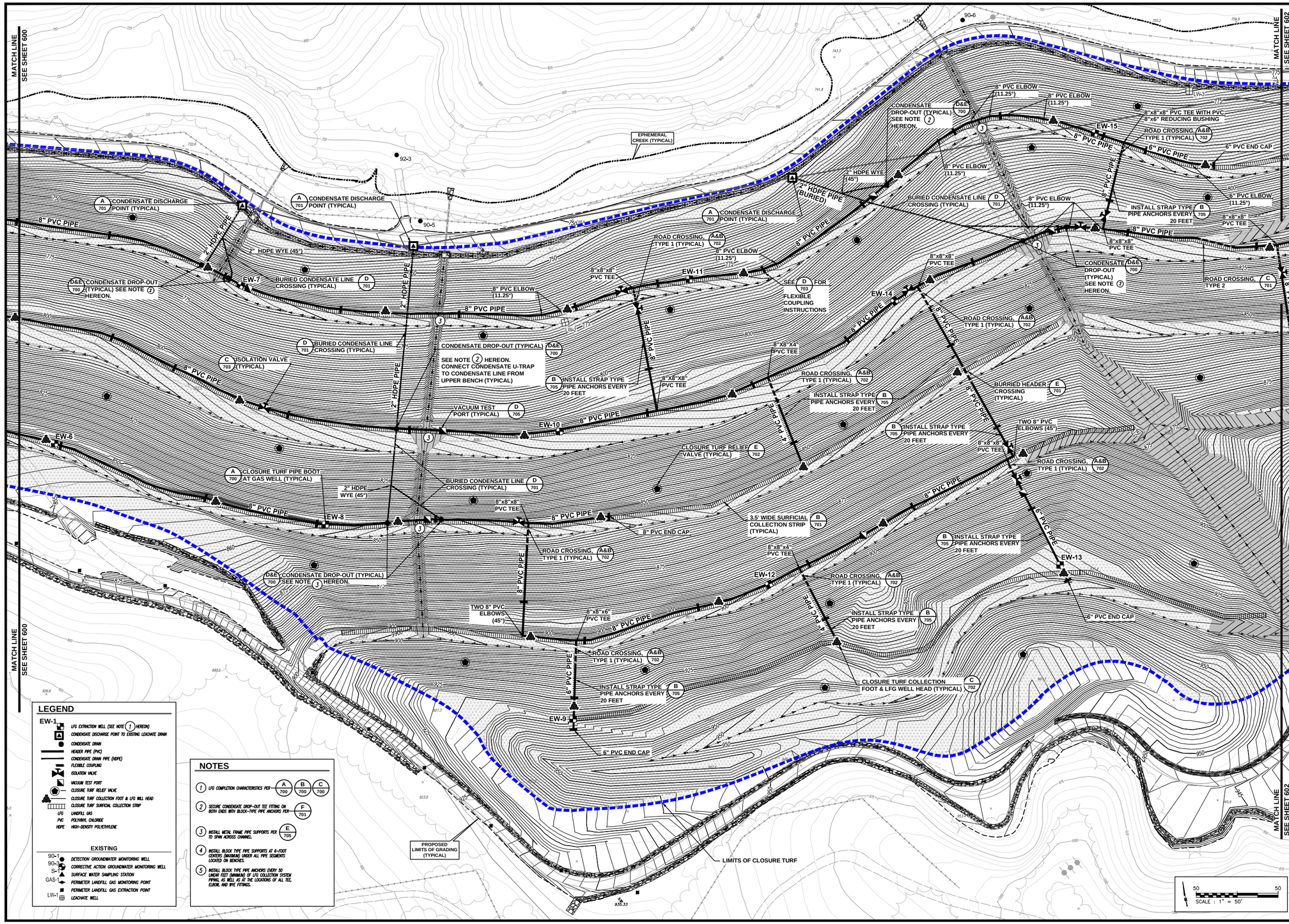

LEGEND

EW-1 — LFG EXTRACTION WELL (SEE NOTE 1 HEREON)
CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
CONDENSATE DRAIN
HEADER PIPE (PVC)
CONDENSATE DRAIN PIPE (HDPE)
FLEXIBLE COUPLING
ISOLATION VALVE
VACUUM TEST PORT
CLOSURE TURF RELIEF VALVE
CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD
CLOSURE TURF SURFICIAL COLLECTION STRIP
LFG — LANDFILL GAS
PVC — POLYVINYL CHLORIDE
HDPE — HIGH-DENSITY POLYETHYLENE

EXISTING

90-1 — DETECTION GROUNDWATER MONITORING WELL
90-3 — CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1 — SURFACE WATER SAMPLING STATION
GAS-1 — PERIMETER LANDFILL GAS MONITORING POINT
PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1 — LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER A 700, B 700, C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER F 701
3. INSTALL METAL FRAME PIPE SUPPORTS PER E 705 TO SPAN ACROSS CHANNEL.
4. INSTALL BLOCK TYPE PIPE SUPPORTS AT 6-FOOT CENTERS (MAXIMUM) UNDER ALL PIPE SEGMENTS LOCATED ON BENCHES.
5. INSTALL BLOCK TYPE PIPE ANCHORS EVERY 50 LINEAR FEET (MINIMUM) OF LFG COLLECTION SYSTEM PIPING, AS WELL AS AT THE LOCATIONS OF ALL TEE, ELBOW, AND WYE FITTINGS.

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SYSTEM LAYOUT - CENTRAL PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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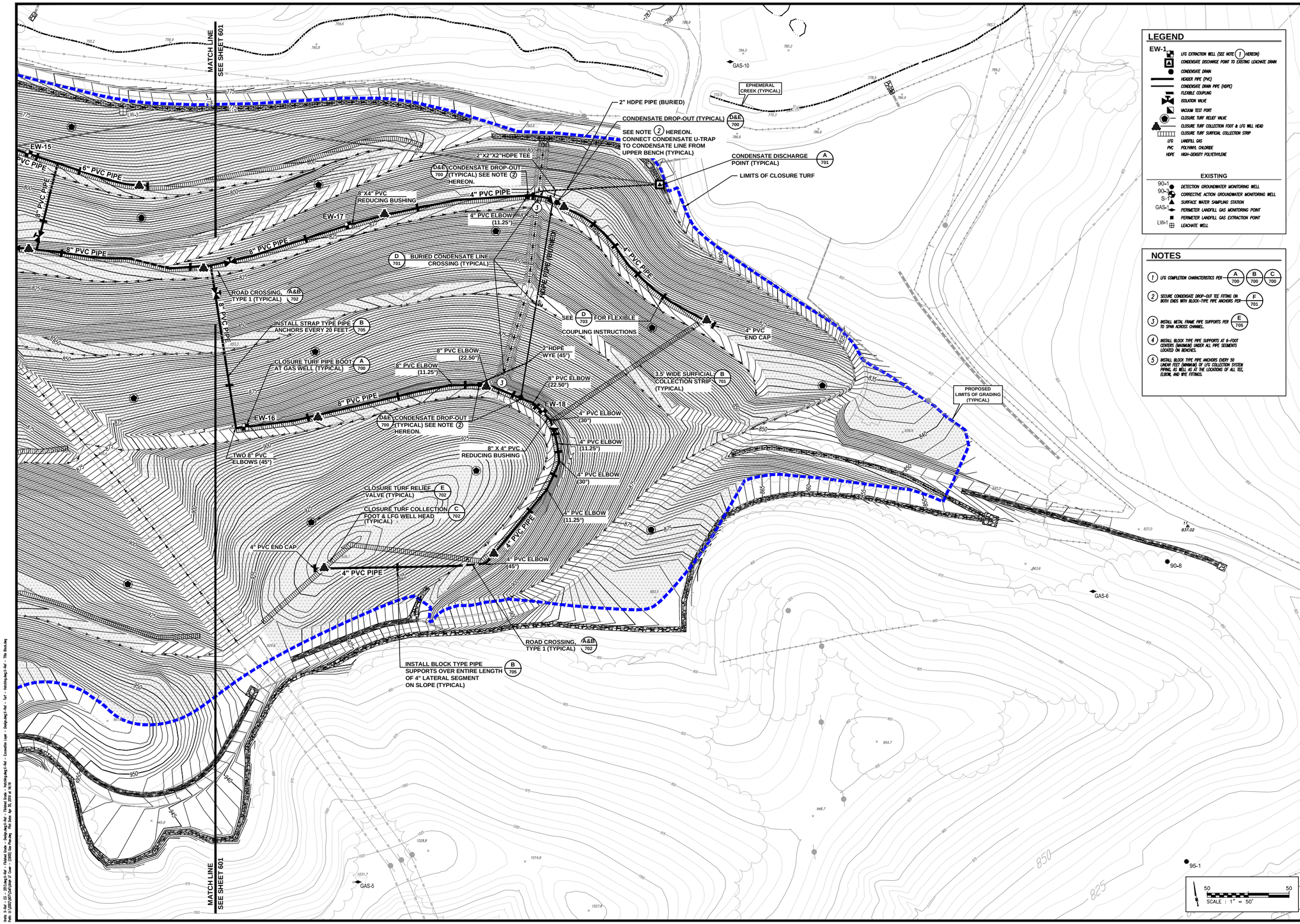

LEGEND

EW-1 LFG EXTRACTION WELL (SEE NOTE 1 HEREON)
CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
CONDENSATE DRAIN
HEADER PIPE (PVC)
CONDENSATE DRAIN PIPE (HDPE)
FLEXIBLE COUPLING
ISOLATION VALVE
VACUUM TEST PORT
CLOSURE TURF RELIEF VALVE
CLOSURE TURF COLLECTION FOOT & LFG WILL HEAD
CLOSURE TURF SURFICIAL COLLECTION STRIP
LFG LANDFILL GAS
PVC POLYVINYL CHLORIDE
HDPE HIGH-DENSITY POLYETHYLENE

EXISTING

90-1 DETECTION GROUNDWATER MONITORING WELL
90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1 SURFACE WATER SAMPLING STATION
GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1 LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER A 700 B 700 C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER F 701
3. INSTALL METAL FRAME PIPE SUPPORTS PER E 705 TO SPAN ACROSS CHANNEL.
4. INSTALL BLOCK TYPE PIPE SUPPORTS AT 6-FOOT CENTERS (MAXIMUM) UNDER ALL PIPE SEGMENTS LOCATED ON BENCHES.
5. INSTALL BLOCK TYPE PIPE ANCHORS EVERY 50 LINEAR FEET (MINIMUM) OF LFG COLLECTION SYSTEM PIPING, AS WELL AS AT THE LOCATIONS OF ALL TEE, ELBOW, AND WYE FITTINGS.

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SYSTEM LAYOUT - EASTERN PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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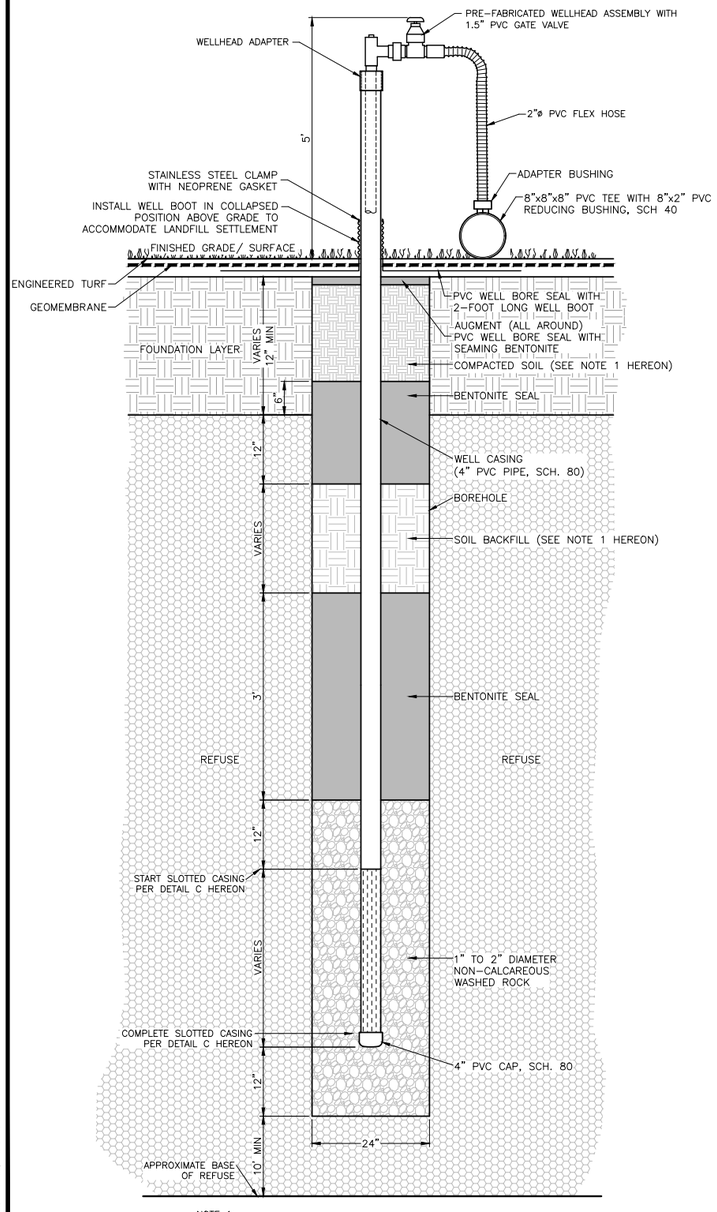
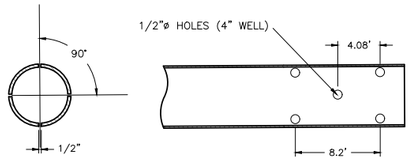


NOTE 1:

SOIL BACKFILL MATERIAL SHALL BE OBTAINED FROM THE BORROW AREA AND MEET THE MATERIAL SPECIFICATIONS FOR ENGINEERED FILL.

A LFG EXTRACTION WELL (TYPICAL)

NOT TO SCALE



B CASING PERFORATIONS FOR LFG EXTRACTION WELLS (TYPICAL)

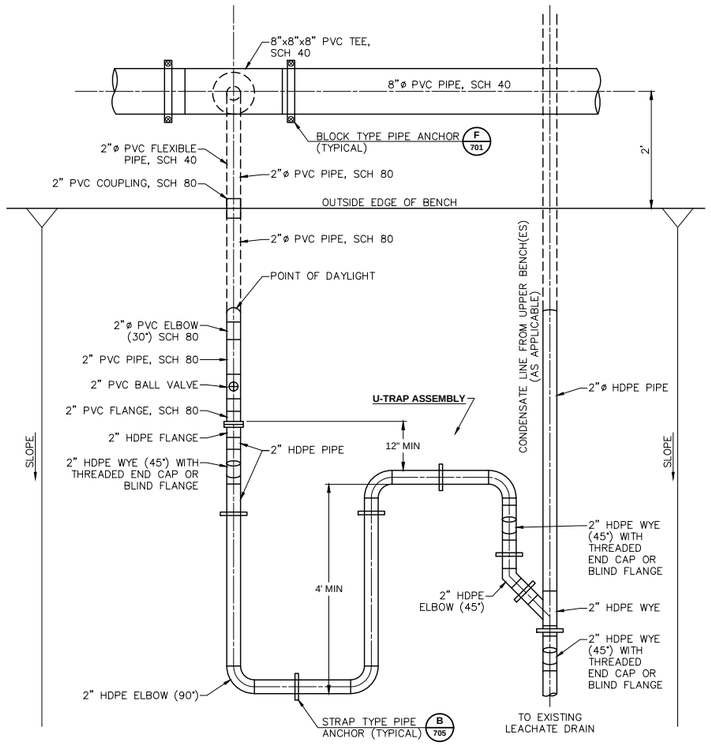
NOT TO SCALE

Extraction Well	Bottom Completion Depth (Feet BGS)	Perforated Interval (Feet BGS)	Gravel Pack Interval (Feet BGS)	Surface Seal Interval (Feet BGS)
EW-1	35	21 - 34	20 - 35	0 - 20
EW-2	45	21 - 44	20 - 45	0 - 20
EW-3	35	21 - 34	20 - 35	0 - 20
EW-4	60	21 - 59	20 - 60	0 - 20
EW-5	70	21 - 69	20 - 70	0 - 20
EW-6	70	21 - 69	20 - 70	0 - 20
EW-7	35	21 - 34	20 - 35	0 - 20
EW-8	70	21 - 69	20 - 70	0 - 20
EW-9	60	21 - 59	20 - 60	0 - 20
EW-10	50	21 - 49	20 - 50	0 - 20
EW-11	25	16 - 25	15 - 25	0 - 15
EW-12	70	21 - 69	20 - 70	0 - 20
EW-13	80	21 - 79	20 - 80	0 - 20
EW-14	45	21 - 44	20 - 45	0 - 20
EW-15	35	21 - 34	20 - 35	0 - 20
EW-16	60	21 - 59	20 - 60	0 - 20
EW-17	35	21 - 34	20 - 35	0 - 20
EW-18	60	21 - 59	20 - 60	0 - 20

BGS: Below Ground Surface (as referenced from top of final grade following placement of final cover system)

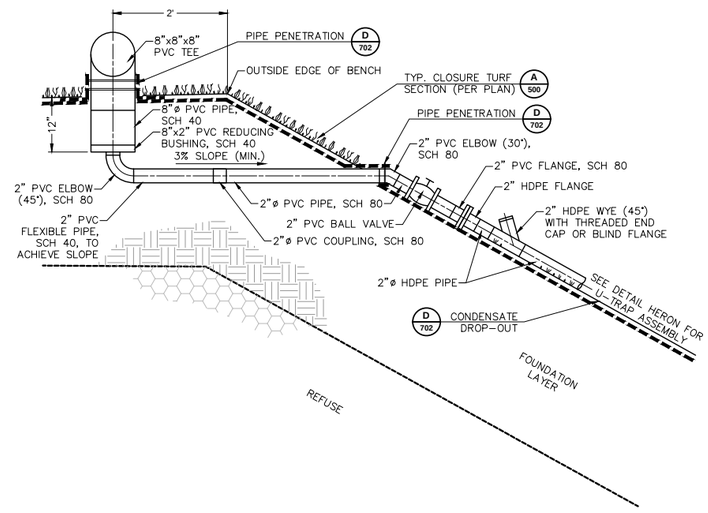
C LFG EXTRACTION WELL COMPLETION CHARACTERISTICS

NOT TO SCALE



D CONDENSATE DROP-OUT - PLAN VIEW (TYPICAL)

NOT TO SCALE



E CONDENSATE DROP-OUT - DETAIL (TYPICAL)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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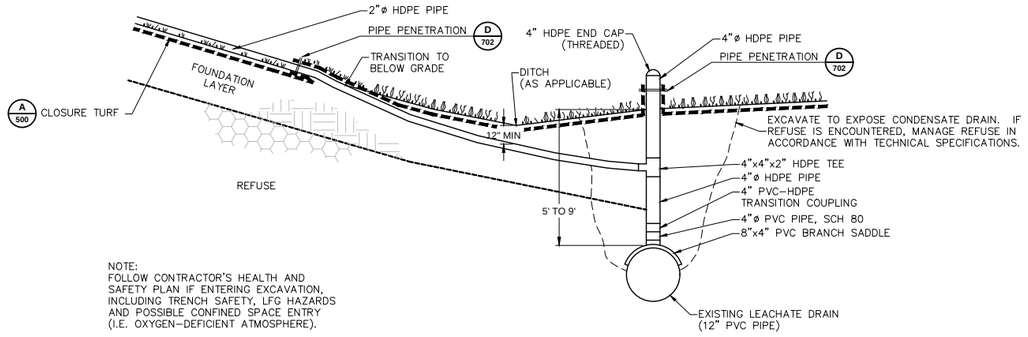
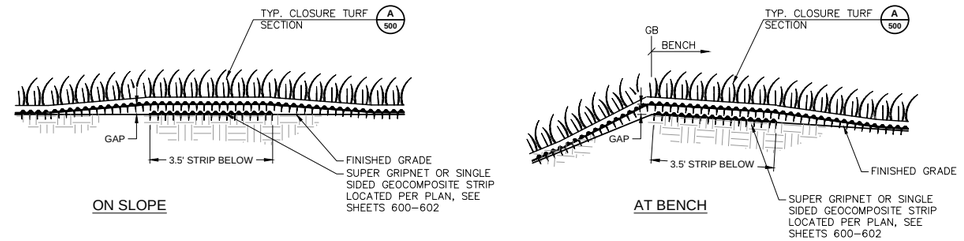


A CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN (TYPICAL)

NOT TO SCALE

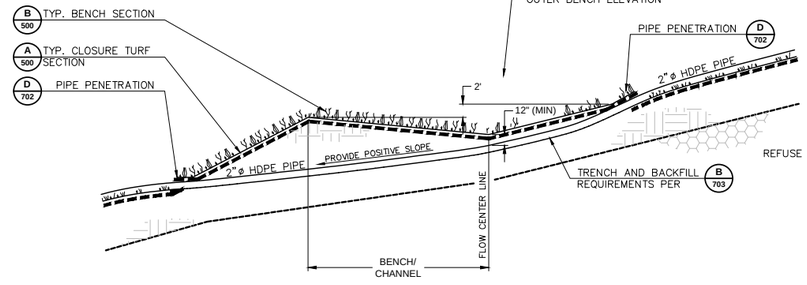


B CLOSURE TURF SURFICIAL COLLECTION STRIP

NOT TO SCALE

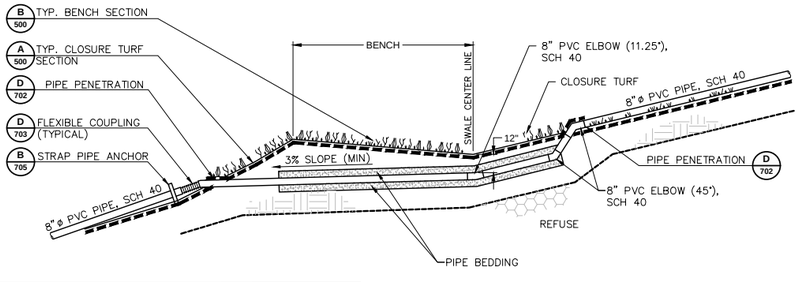
C ROAD CROSSING, TYPE 2 - DETAIL

NOT TO SCALE



D BURIED CONDENSATE LINE CROSSING (TYPICAL)

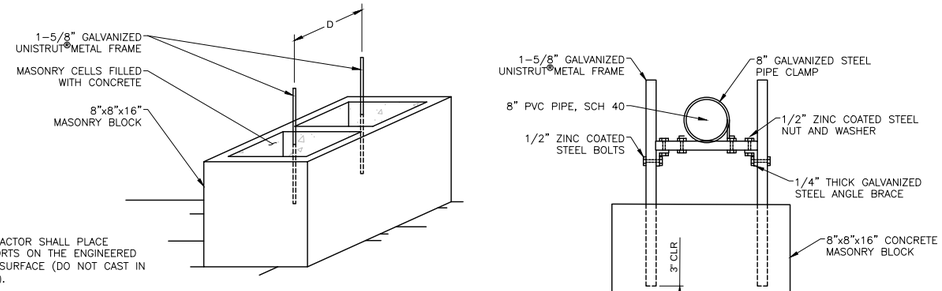
NOT TO SCALE



* CONTRACTOR SHALL ADJUST FOUNDATION GRADE PLAN FOR INSTALLATION OF LFG COLLECTION PIPING, ASSURING PROPER SECTION PER A 500. SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE SECTION.

E BURIED HEADER CROSSING (TYPICAL, TYPE 1)

NOT TO SCALE



F BLOCK TYPE PIPE ANCHOR (TYPICAL)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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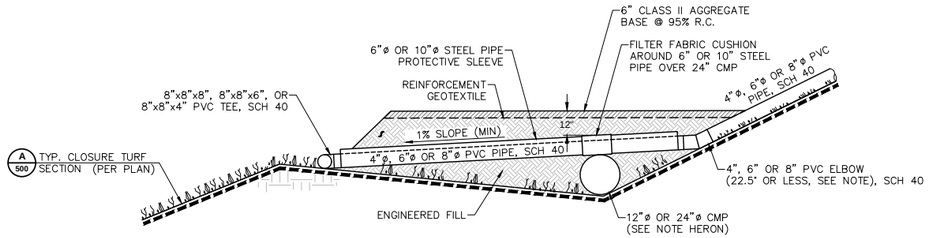
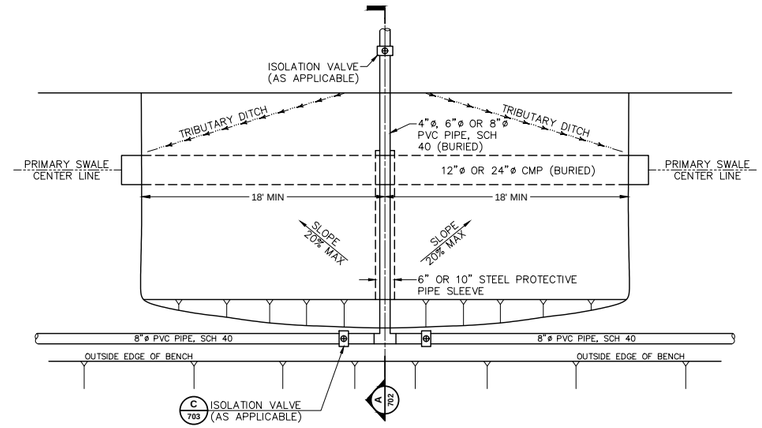


NOTE:
ADJUST AS NECESSARY TO ATTAIN MINIMUM 1 PERCENT PIPE SLOPE WHILE MINIMIZING HEIGHT OF ROAD CROSSING.

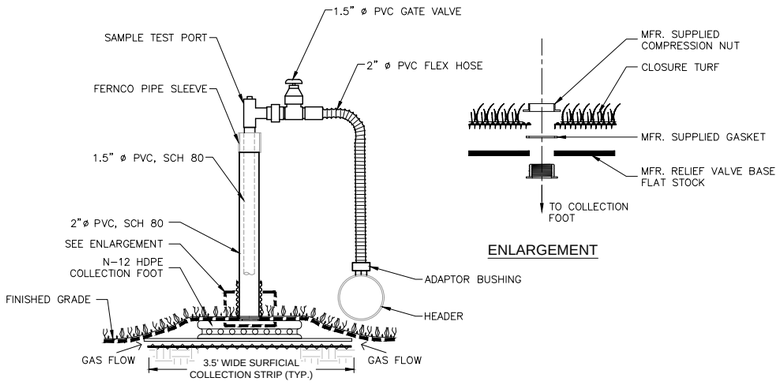
A ROAD CROSSING TYPE 1 - DETAIL (TYPICAL)

NOT TO SCALE



B ROAD CROSSING, TYPE 1 - PLAN VIEW (TYPICAL)

NOT TO SCALE

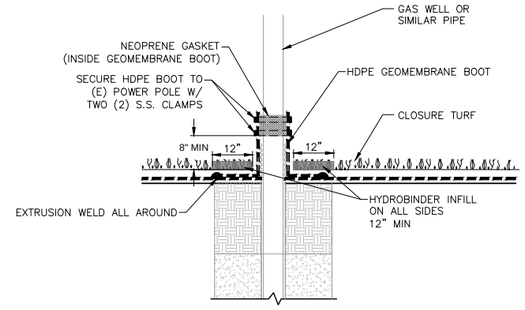


C CLOSURE TURF COLLECTION FOOT & LFG WELLHEAD

NOT TO SCALE

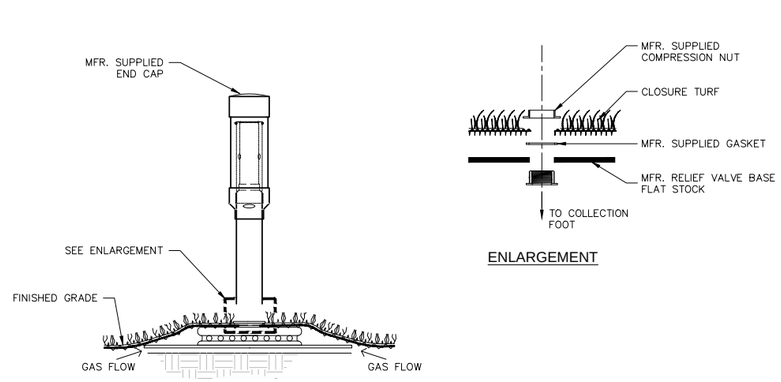
NOTES:

1. PIPE AND GEOMEMBRANE SHALL BE CLEAN TO PROVIDED AIRTIGHT CONNECTION.
2. CONTRACTOR SHALL TIGHTEN HOSE CLAMP TO ENSURE PROPER SEAL OF GEOMEMBRANE AROUND PIPE WHILE PREVENTING PIPE DAMAGE.



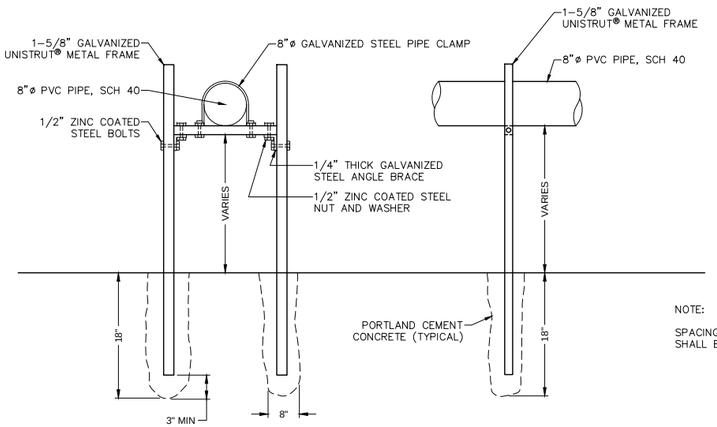
D PIPE PENETRATION (TYPICAL)

NOT TO SCALE



E CLOSURE TURF RELIEF VALVE

NOT TO SCALE



NOTE:
SPACING OF PIPE SUPPORTS SHALL BE 6 FEET ON CENTER.

F METAL FRAME PIPE SUPPORT OUTSIDE WASTE BOUNDARY (TYPICAL)

(NON-CLOSURE TURF AREAS)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By:	DFB
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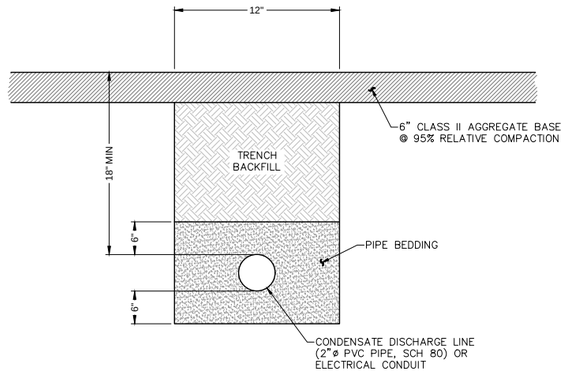
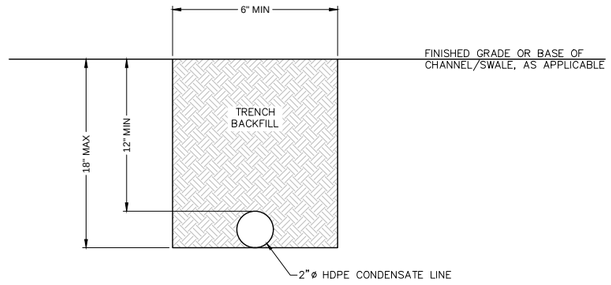


A FLARE STATION TRENCH DETAIL

NOT TO SCALE



B BURIED CONDENSATE LINE TRENCH DETAIL (TYPICAL)

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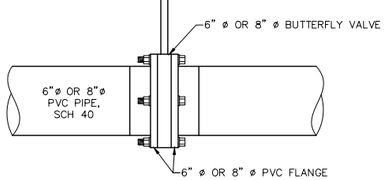
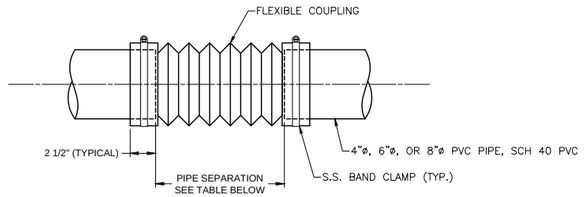


C ISOLATION VALVE ASSEMBLY (TYPICAL)

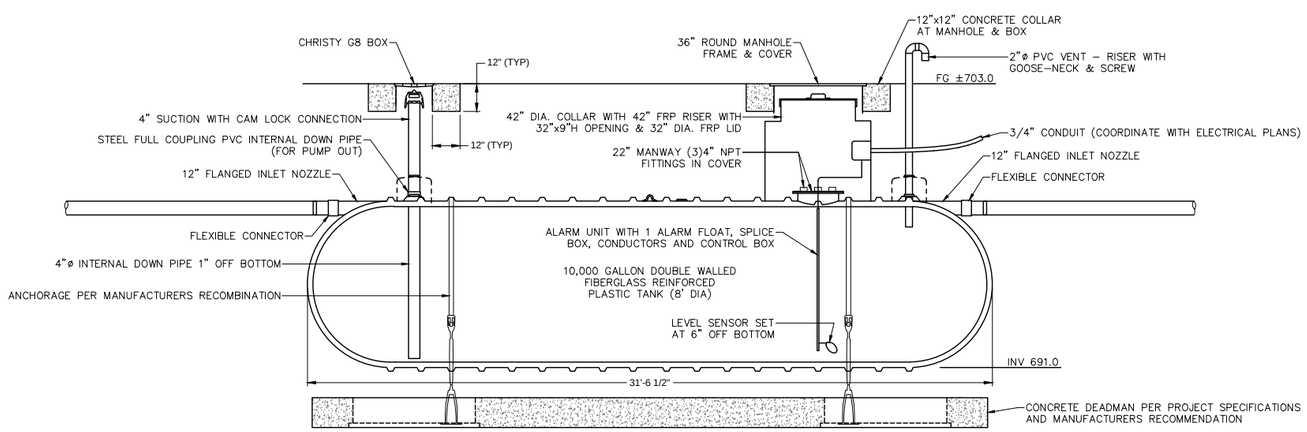
NOT TO SCALE



PIPE SEPARATION TABLE								
INSTALLATION TEMPERATURE (F°)	30	40	50	60	70	80	90	100
PIPE SEPARATION (in)	13	12	12	11	11	10	10	9

D FLEXIBLE COUPLING (TYPICAL)

NOT TO SCALE



E LEACHATE OVERFLOW STORAGE TANK-ELEVATION

NOT TO SCALE

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LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Date:	2019-04-30

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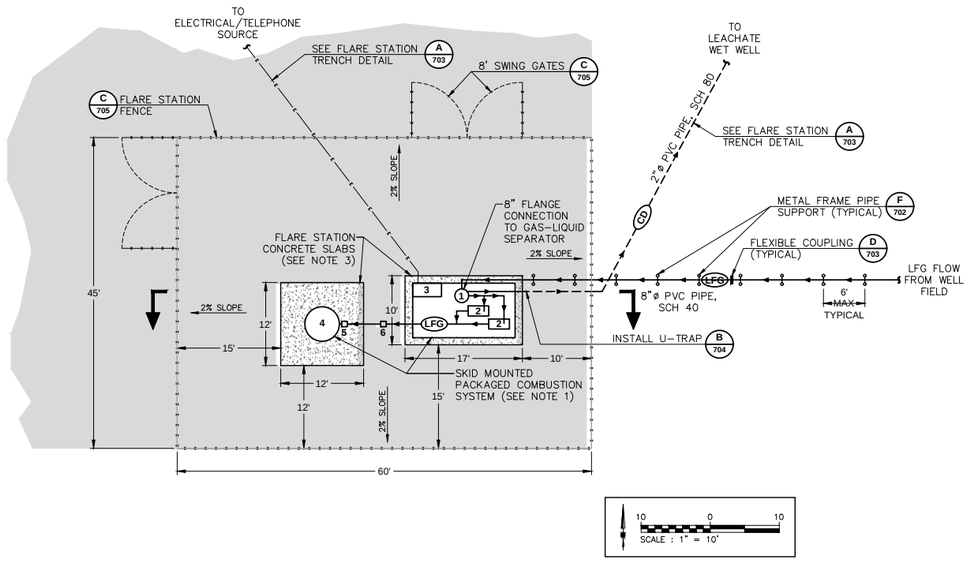
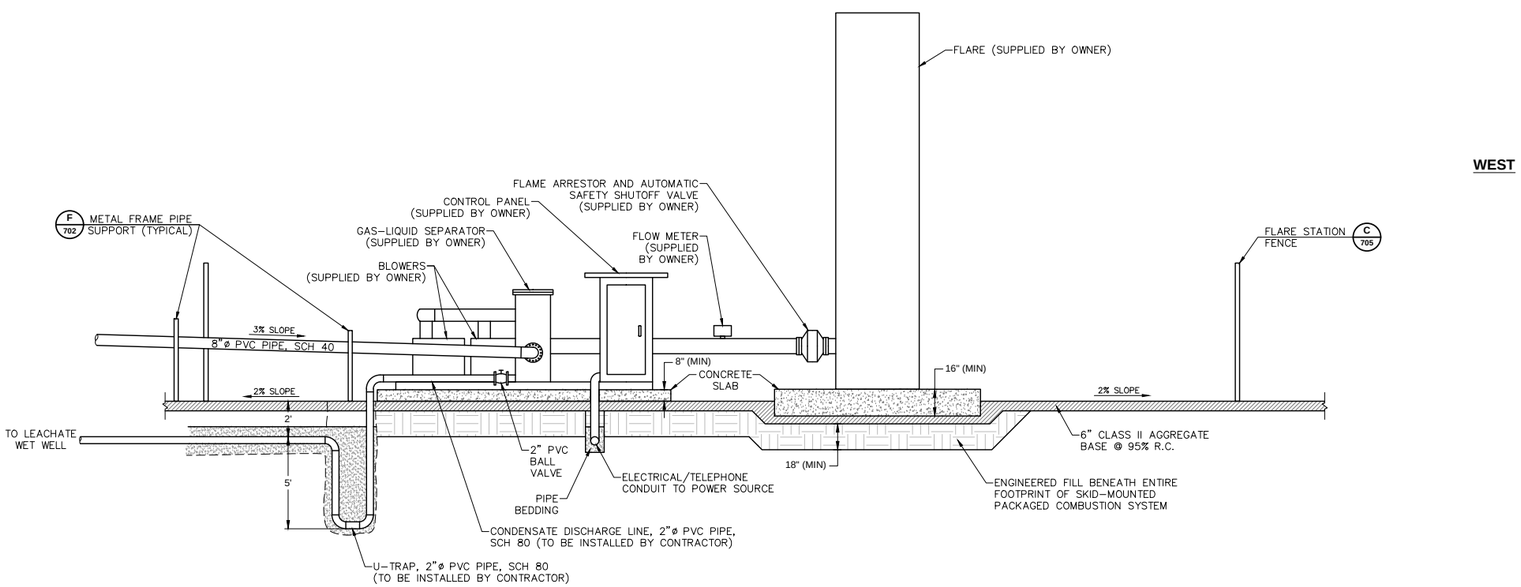


A FLARE STATION - PLAN VIEW

SCALE: 1"=10'



B FLARE STATION - SECTION VIEW

SCALE: 1"=4'

LEGEND

1 GAS-LIQUID SEPARATOR (SUPPLIED BY OWNER)
2 BLOWER (SUPPLIED BY OWNER)
3 CONTROL PANEL (SUPPLIED BY OWNER)
4 FLARE (SUPPLIED BY OWNER)
5 FLAME ARRESTOR AND AUTOMATIC SAFETY SHUTOFF VALVE (SUPPLIED BY OWNER)
6 FLOW METER (SUPPLIED BY OWNER)
CD CONDENSATE DISCHARGE LINE, 2" PVC PIPE, SCH 80
LFG LANDFILL GAS PRIMARY HEADER PIPE

ABOVE GROUND LINE/PIPE
UNDERGROUND LINE/PIPE
ELECTRICAL/TELEPHONE LINE
8' HIGH CHAIN LINK FENCE
FLEXIBLE COUPLING
PIPE SUPPORT

NOTES

1. THE ORIENTATION OF THE SKID-MOUNTED PACKAGED COMBUSTION SYSTEM COMPONENTS SHOWN HEREON ARE FOR ILLUSTRATION PURPOSES ONLY. THE ACTUAL ORIENTATION OF THESE COMPONENTS ON THE CONCRETE SLAB ARE SUBJECT TO CHANGE BASED ON MANUFACTURER'S FINAL DESIGN.
2. ALL CONDUIT AND PIPING OUTSIDE LIMITS OF FLARE STATION CONCRETE SLAB SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR.
3. THE CONCRETE SLAB FOR THE FLARE (12'x12') SHALL BE 16" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY AT TOP AND BOTTOM OF SLAB. THE OTHER SLAB (10'x17') SHALL BE 8" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY.
4. COMPLETION HEIGHTS OF PIPE SUPPORTS SHALL BE ADJUSTED ACCORDINGLY TO MAINTAIN POSITIVE SLOPE (3% MINIMUM) OF LFG COLLECTION SYSTEM PIPING TOWARDS THE GAS-LIQUID SEPARATOR.

EBA ENGINEERING
825 SONOMA AVENUE
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SANTA ROSA, CA 95404
TEL: (707) 544-0784

REGISTERED GEOLOGIST
DAMON F. BROWN
No.
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:
1
2
3
4
5
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Job No: 02-907
Drawn By: WC
Checked By: DFB
Date: 2019-04-30

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Date: 5 May - Time: 08:00:44 AM
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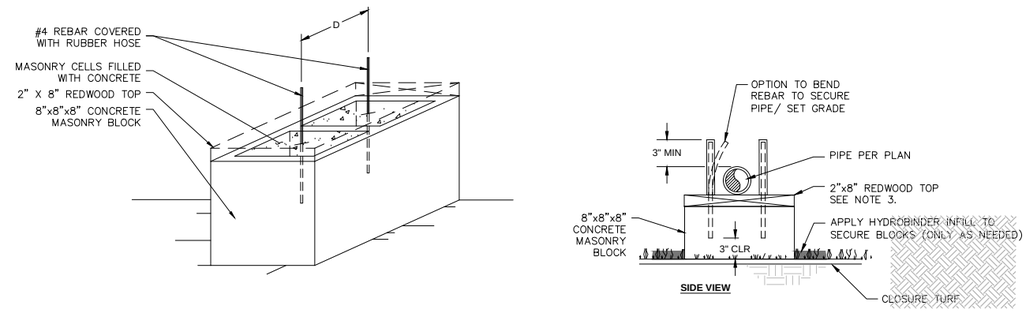
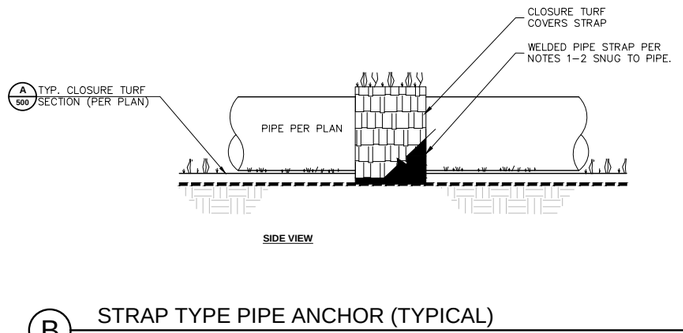


NOTES:

1. CONTRACTOR SHALL PLACE SUPPORTS ON THE ENGINEERED TURF SURFACE (DO NOT CAST IN PLACE).
2. D = 11" FOR 8" PVC
   D = 9" FOR 6" PVC
   D = 7" FOR 4" PVC
3. 6" HEIGHT CONCRETE MASONRY BLOCK OR ADDITIONAL 1X REDWOOD TOP MAY BE USED TO ADJUST SUPPORT HEIGHT.
4. PIPE SUPPORTS SHALL BE SPACED AT 6 FEET ON CENTERS FOR ALL PIPING INSTALLED ON BENCHES.

A BLOCK TYPE PIPE SUPPORT (TYPICAL)

NOT TO SCALE

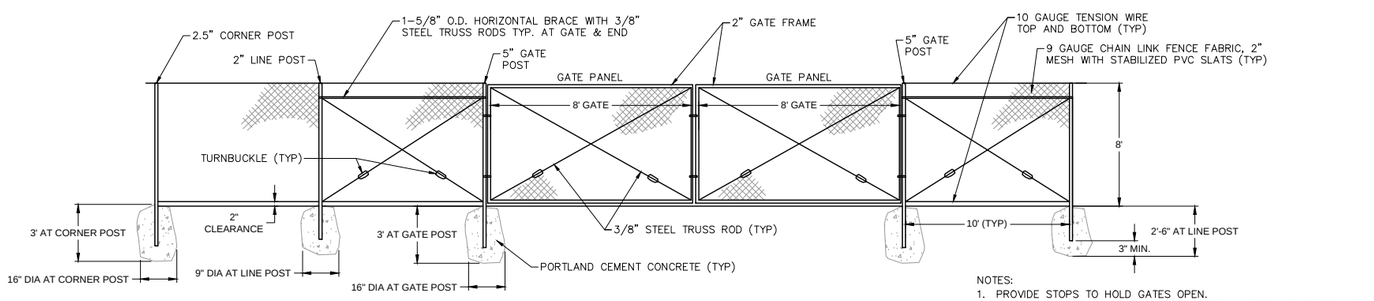


NOTES:

1. HDPE OR LLDPE (GEOMEMBRANE) MATERIAL STRIP TO CROSS PIPE PERPENDICULAR AND FORM SNUG FIT PREVENTING MOVEMENT.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO STRAP USING EXTRUSION WELD METHOD, 3"MIN. OVERLAP.
3. CONTRACTOR TO ENSURE NO PENETRATION OF THE GEOMEMBRANE. ANY DAMAGE TO THE GEOMEMBRANE SHALL BE REPARED AT CONTRACTOR'S EXPENSE.

B STRAP TYPE PIPE ANCHOR (TYPICAL)

NOT TO SCALE



NOTES:
1. PROVIDE STOPS TO HOLD GATES OPEN.
2. PROVIDE CENTER REST AND LOCKING LATCH ATTACHMENT FOR GATE.
3. LINE POST SPACING SHALL NOT EXCEED 10 FEET.

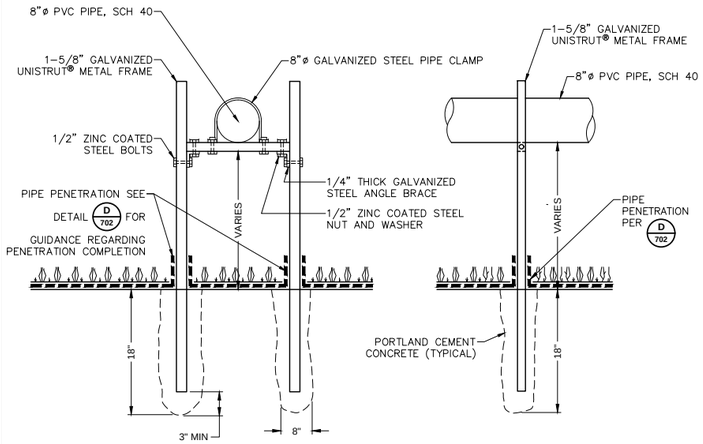
C FLARE STATION FENCE AND GATES

NOT TO SCALE



D VACUUM TEST PORT (TYPICAL)

NOT TO SCALE



NOTE:

SPACING OF PIPE SUPPORTS SHALL BE 6 FEET ON CENTER.

E METAL FRAME PIPE SUPPORT WITHIN WASTE BOUNDARY (TYPICAL)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No:	02–907
Drawn By:	WC
Checked By:	DFB
Date:	2019–04–30

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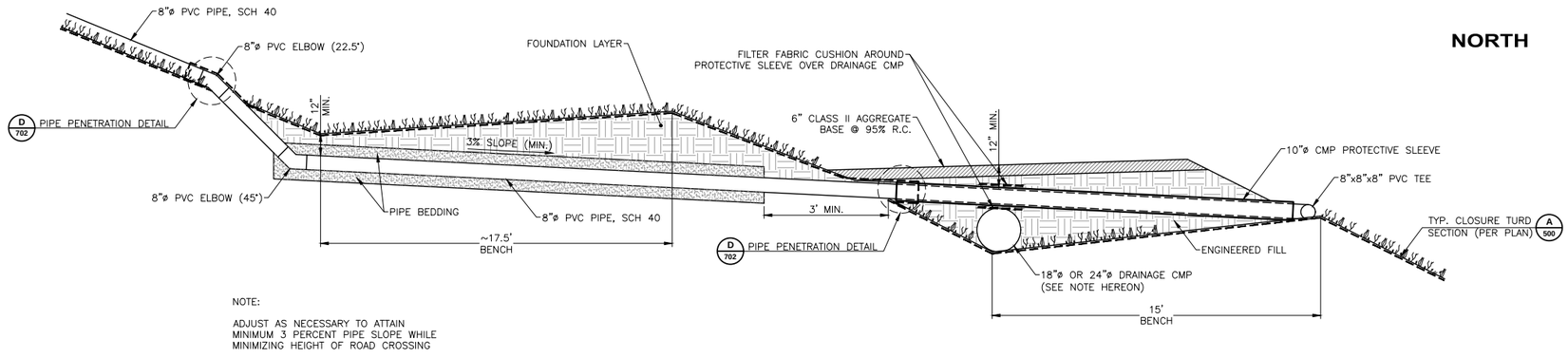
SOUTH **NORTH**



NOTE:

ADJUST AS NECESSARY TO ATTAIN MINIMUM 3 PERCENT PIPE SLOPE WHILE MINIMIZING HEIGHT OF ROAD CROSSING

A ROAD CROSSING, TYPE 3

NOT TO SCALE

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CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

Sheet Number

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APPENDIX F

COLLECTION SYSTEM PIPING HEAD LOSS CALCULATIONS

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CITY OF UKIAH LANDFILL - FRICTION LOSS CALCULATIONS

Darcy-Weisbach Equation	
Head Loss:	(27.7*(f*L*v^2*p))/(144*D*2*gc)
Friction Factor (f):	0.316/Nre(0.25)
Reynolds Number (Nre):	(D*v*p)/ue
Specific Gravity:	0.9714
Absolute Viscosity (ue):	8.14E-06 lbm/feet-sec
Density (p):	0.075 lbs/ft^3
Absolute Roughness (e):	0.000005 ft (for PVC)
LFG EXTRACTION WELL (EW) FLOW	10 scfm

PVC EQUIVALENT LENGTHS (Feet)

	2″	*4″*	*6″*	*8″*	*10″*	*12″*
90 Elbow	5.5	10.1	15.2	20.0	25.1	29.8
45 Elbow	2.8	5.4	8.1	10.6	13.4	15.9
T (Header)	4.3	8.3	12.5	16.5	20.7	24.7
T (Branch)	12.0	22.1	32.2	39.9	50.1	59.7
Dropout	---	32.2	47.4	59.9	75.2	89.5
Gate Valve	2.2	4.4	6.6	8.6	10.9	12.9
Butterfly Valve						
Wellhead (Full	10.5	12.7	---	---	---	---
Wellhead (1/2)	35.9	62.0	---	---	---	---
Wellhead (1/4)	163.3	310.3	---	---	---	---

SIMPLIFIED GENERAL DARCY CALCULATION (TOTAL)

FLOW (Q):	**210**	cfm
INTERNAL PIPE DIAMETER (d)	**7.981**	in
INTERNAL PIPE DIAMETER (D)	**0.665**	ft
AREA (A)	0.347	ft^2
VELOCITY (v):	10.080	fps
LINEAR FEET OF PIPE	**3570**	ft
REYNOLDS NUMBER (Nre)	6.177E+04	
RELATIVE ROUGHNESS (e/D)	7.518E-06	
FRICTION FACTOR (f)	0.0175	(from Moody Chart)
TOTAL FRICTION LOSS (PSI)	0.077	
TOTAL FRICTION LOSS (in w.c.)	2.136	
FRICTION LOSS/100 FT (in w.c.)	0.060	

PVC PIPE INSIDE DIAMETERS (Inches)

	Sch. 40	*Sch. 80*
2"	2.067	1.939
4"	4.026	3.826
6"	6.065	5.761
8"	7.981	7.625
10"	10.020	9.564
12"	11.938	11.376

CITY OF UKIAH LANDFILL
FRICTION HEAD LOSS CALCULATIONS

DESIGN FLOW CONDITIONS

LFG Extraction Wells:	8 SCFM
LFG Collection Foot Assembly:	1 SCFM

MANIFOLD SYSTEM	PIPE DIA. (INCHES)	AREA (FT^2)	SEGMENT FLOW (CFM)	CUM. FLOW (CFM)	VELOCITY (FPM)	REYNOLDS	FRICTION (f)	EQUIV. LENGTH (FEET)	FRICTION LOSS (PSI)	FRICTION LOSS (INCHES W.C.)
END : EW-18	4.026	0.0884	3.14	3	36	1831	0.0483	483.4	0.0002	0.0055
EW-18 : MAIN HEADER	7.981	0.3472	19.14	22	64	6553	0.0351	736.8	0.0004	0.0100
MAIN HEADER : EW-15 BRANCH	7.981	0.3472	14.28	37	105	10753	0.0310	271.4	0.0003	0.0087
EW-15 BRANCH: EW-13 BRANCH	7.981	0.3472	15.85	52	151	15415	0.0284	363.9	0.0008	0.0220
EW-13 BRANCH : EW-11 BRANCH	7.981	0.3472	26.99	79	229	23354	0.0256	483.4	0.0022	0.0604
EW-11 BRANCH : EW-4 BRANCH	7.981	0.3472	30.28	110	316	32260	0.0236	1439.6	0.0114	0.3165
EW-4 BRANCH : EW-1 BRANCH	7.981	0.3472	73.27	183	527	53811	0.0207	764.0	0.0149	0.4113
EW-1 BRANCH : T.O. UNIT	7.981	0.3472	26.99	210	605	61750	0.0200	214.9	0.0053	0.1472
SUBTOTAL:								4757.4		**0.9815**
T.O. KNOCKOUT	7.981			210						**0.4000**
WELL HEAD	1.59	0.0138	8	8	580	11811	0.0303	163.3	0.0283	**0.7825**
								TOTAL FRICTION LOSS		***2.1640***

APPENDIX G

ALTERNATIVE WALKING PATTERN DOCUMENTATION

July 18, 2013

Mr. Robert Scaglione
Mendocino County Air Quality Management District (MCAQMD)
306 East Gobi Street
Ukiah, CA 95482-5511

RE: REQUEST FOR ALTERNATIVE COMPLIANCE – WALKING PATTERN
CITY OF UKIAH LANDFILL, MENDOCINO COUNTY, CALIFORNIA
EBA JOB No. 13-1953 (TASK 2)

Dear Mr. Scaglione:

This document is being submitted on behalf of the City of Ukiah, Department of Public Works, operator of the City of Ukiah Landfill in Ukiah, California, to request an alternative compliance under Title 17, California Code of Regulations (17CCR), §95468 as it pertains to the required walking pattern stipulated in the Assembly Bill 32 (AB32) regulations for *Methane Emissions from Municipal Solid Waste Landfills*. In general, 17CCR, §95471(c)(1)(B) requires that the walking pattern be no more than a 25-foot spacing interval within each 50,000-square foot monitoring grid. Whereas the uppermost (southern) portions of the landfill surface readily allow for the implementation of this procedure, the majority of the landfill surface is comprised of steep, vegetated slopes that present logistical and safety issues. These issues are as follows:

- The height of the established grass cover on the primary slopes is typically on the order of 12 to 24 inches tall. Based on the 17CCR, §95471(c)(1)(A) requirement that the detector probe must be held within 3 inches of the landfill surface while traversing the grid, the grass would likely have to be cut two to three times over the course of the year in order to meet this criterion. Due to the steepness of the primary slopes, the grass would have to be cut by hand using a "weed wacker". It is estimated that such a provision would take approximately 200 to 300 man-hours to complete per event. This provision is considered to be overly burdensome and costly.

- The grass cover, regardless of its height or moisture content (wet or dry), can be slippery when trying to traverse by foot. In addition, the landfill surface is uneven in places due to the presence of rocks and depressions. Finally, add to this a sampler carrying a 30- to 40-pound instrument on his or her back/shoulder and holding the detector probe in one hand, while simultaneously trying to focus on both the monitoring device and the ground

surface. The combination of these constraints makes for a potential fall hazard and overall safety concern.

- The existing grass cover has been shown to harbor rattlesnakes. Thus, exposure to this potential hazard would be incurred as part of the quarterly surface emissions monitoring, as well as to personnel conducting the grass cutting as described above.

In light of these circumstances, it is recommended that surface emissions monitoring for the primary slope areas target the respective benches. Under this approach, both the inside and outside edges of each bench would be monitored in accordance with the instantaneous surface emissions monitoring procedures described in the regulations. This approach is considered to offer a means of monitoring for surface emissions within the primary slope areas as a whole while promoting a safe monitoring procedure for the individuals responsible for implementing the program in the field.

A site plan illustrating the overall grid network proposed for the site with respect to the monitoring grid required under 17CCR, §95471(c)(1) is attached as Figure 1. Please note that the grid network is not symmetrical in shape, but is instead designed to allow for easy identification and orientation in the field based on prominent site and topographic features. As shown on Figure 1, 39 grids (G1 through G39) have been established for the approximate 40-acre Landfill. This equates to an average grid size of approximately 44,700 square feet, which is compliant with the 50,000-square foot size requirement stipulated in the regulations. As presented in the previous paragraph, the monitoring of benches is proposed for the majority of the grids due to the steep, vegetated slopes. Those grids that include areas that can be monitored using the 25-foot spacing interval include G6, G7, G10, G11, G14, G18, G19, G26, G27, G38 and G39 (see Figure 1).

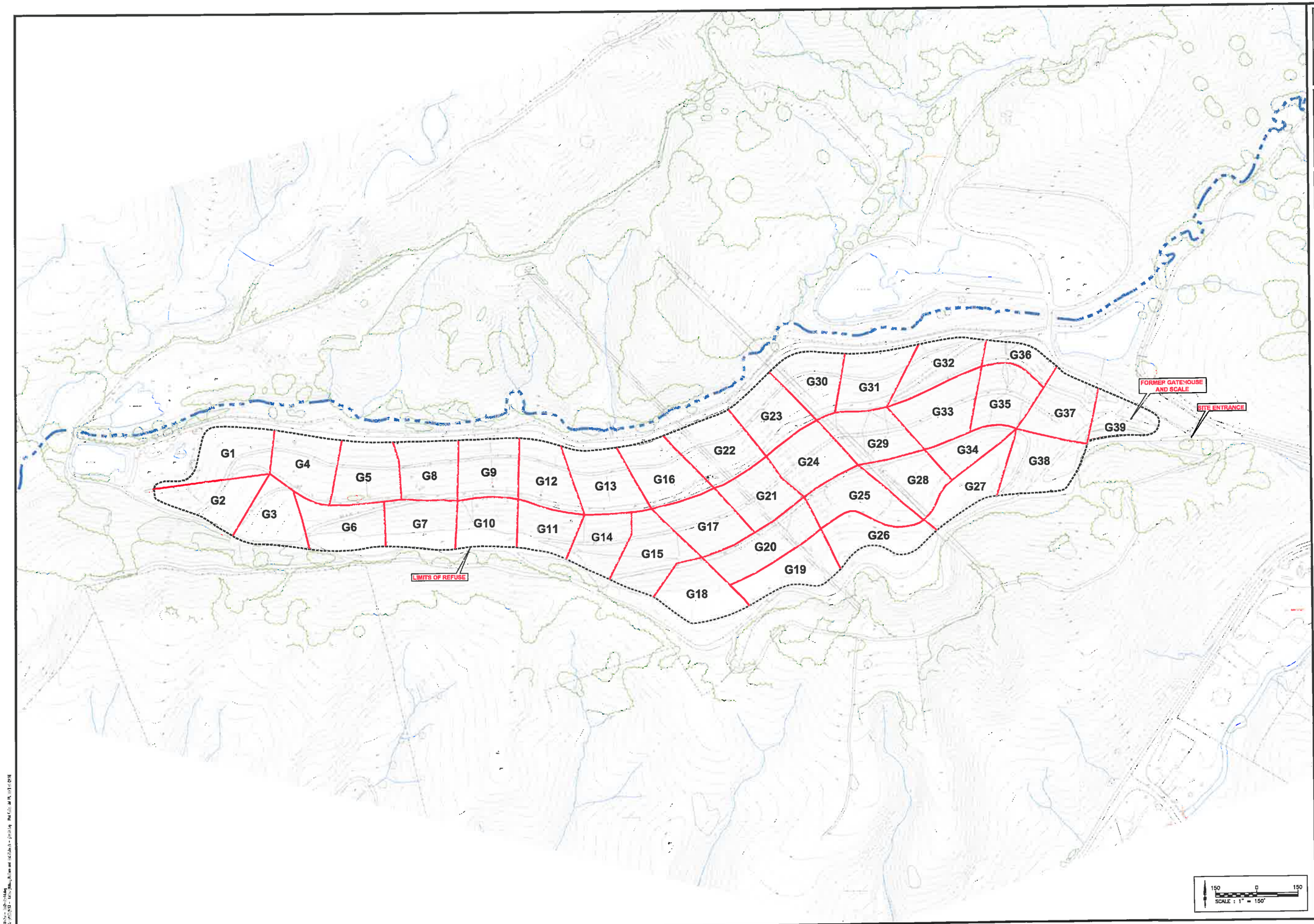
Thank you in advance for your consideration of this matter. If you should have any questions regarding the information contained herein, please do not hesitate to contact our office at (707) 544-0784.

Sincerely,
EBA ENGINEERING

Mike Delmanowski, C.E.G., C.Hg.
Senior Hydrogeologist

cc: Mr. Tim Eriksen, City of Ukiah, Department of Public Works

Attachment: Figure 1 (Proposed AB32 Monitoring Grid Network)



EBA ENGINEERING

PROPOSED AB32 MONITORING GRID NETWORK

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

Submittal / Revision:

Job No:	13-1953
Drawn By:	SGH
Checked By:	MD
Date:	2013-07-15

FIGURE
1
1 of 1

APPENDIX H

FINAL CLOSURE
TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

for the

CITY OF UKIAH
DEPARTMENT OF PUBLIC WORKS

CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

April 2019

EBA Job No. 02-907

Prepared by:

EBA ENGINEERING
825 Sonoma Avenue
Santa Rosa, CA 95404
(707) 544-0784

TECHNICAL SPECIFICATIONS
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

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DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Project description.

B. Work by Contractor

C. Work by Owner.

D. Work by Others.

1.02 PROJECT DESCRIPTION

A. The Project is titled "City of Ukiah Landfill Final Closure Construction". The City of Ukiah Landfill is located in Mendocino County, California approximately two miles east of the City of Ukiah. The Work site address is 3100 Vichy Springs Road, Ukiah, California 95482 (Sheet 1). The City of Ukiah Landfill was operated as a Class III solid waste disposal facility and is comprised of a single waste management unit that is approximately 40 acres in size. The Final Closure generally consists of the following construction features:

Site Preparation:
- Refuse excavation and relocation.
- Interim cover preparation.

ClosureTurf™ Final Cover System (in ascending order):
- 2-foot thick foundation layer.
- Gas relief/venting system.
- LLDPE geomembrane liner.
- Engineered synthetic turf with specific grade sand infill ballast.

Miscellaneous items:
- Drainage and erosion control measures.
- Access roads.
- General earthwork, including various excavations and fills.
- Leachate overflow collection and storage system, including installation of a leachate underground storage tanks (UST).
- Landfill gas (LFG) collection system, including condensate drainage components.
- Installation of skid-mounted packaged combustion system provided by others.
- Borrow area reclamation.
- Seeding and fertilizing.
- Security fencing.

1.03 WORK BY CONTRACTOR

A. Unless noted otherwise, the Contractor shall perform, or subcontract to perform, all Work shown on the Plans in accordance with the Technical Specifications.

B. The geosynthetics installation subcontractor or Installer and the Installer's foreman must have experience in placing 1,000,000 square feet of geomembrane material on at least three (3) landfill projects and at least on project installing ClosureTurf™.

C. Except as specifically noted, the Contractor shall provide the following Work:
   1. All labor and materials.
   2. All tools, construction equipment, and machinery.
   3. Any water, heat, and utilities required.
   4. All other facilities and services necessary for proper execution and completion of the Work.

D. The Contractor shall pay legally required sales, consumer, and use taxes.

E. The Contractor shall secure and pay for, as necessary for proper execution and completion of the Work, all applicable permits and licenses.

F. The Contractor shall comply with the requirements of all permits.

G. The Contractor shall give all required notices.

H. The Contractor shall comply with all codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of the work.

I. The Contractor shall within five (5) calendar days, submit written notice to the Design Engineer of observed variance of Contract Documents from legal requirements.

J. The Contractor shall give written notice to the Design Engineer of any conditions encountered at the Work site which are unforeseen, concealed, or materially different from those set forth in the Plans or Technical Specifications, or ordinarily encountered and generally recognized as inherent in the Work. Such written notice shall be given to the Design Engineer within five (5) calendar days of the discovery of any such facts.

K. If any Subcontractor or person employed by the Contractor appears to the Design Engineer to be incompetent or to act in a disorderly or improper manner, he or she shall be discharged immediately at the request of the Design Engineer, and such person shall not again be employed on the Work. This provision does not impose an obligation upon the Design Engineer to ensure proper or orderly behavior on the part of the Contractor's employees or the employees of the Contractor's subcontractors, nor shall the Engineer's failure to make such a request relieve the Contractor of the obligation to require employees and subcontractor employees to refrain from engaging in disorderly or improper conduct.

1.04 WORK BY OWNER

A. All portions of the Work specified to be performed by the "Owner" refers to the responsibilities of the City of Ukiah, Department of Public Works and are not the responsibility of the Contractor.

B. The Owner will award a contract to the Contractor for construction of the project, administer the contract, measure quantities for progress payments and final payment, and manage the contract. Performance of the Work will commence as indicated in the Bid Documents.

1.05 WORK BY OTHERS

A. All portions of the Work specified to be performed by the "Design Engineer", "CQA Officer", "CQA Monitor", "CQA Surveyor", "Soils Testing Laboratory" or "Geosynthetics Testing Laboratory" refer to the responsibilities of EBA Engineering (EBA, or subcontractors to EBA) which have contracted separately and directly with the Owner and are not the responsibility of the Contractor.

END OF SECTION

SECTION 01039
PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

A. Preconstruction meeting.

B. Progress meetings.

C. Preparatory meetings.

1.02 PRECONSTRUCTION MEETING

A. The Design Engineer will schedule the preconstruction meeting after awarding the Contract to the Contractor. The objectives of this meeting are to:
   1. Clearly define the roles, responsibility, and authority of each organization and individual involved in the project.
   2. Review details of the Construction Quality Assurance (CQA) program.
   3. Establish a foundation of cooperation to achieve quality construction.

B. The following agenda, as related to CQA, will be addressed by the Design Engineer or CQA Officer.
   1. Introduce and discuss role, authority, and responsibilities of each organization and individual involved in the project.
   2. Establish lines of communication.
   3. Review Technical Specifications and Plans.
   4. Distribute of the CQA Plan.
   5. Review of CQA activities to be performed.
   6. Discuss Contractor's construction schedule and workplan.
   7. Discuss Contractor's Construction Quality Control (CQC) procedures and responsibilities.
   8. Discuss submittal review and approval procedures.
   9. Discuss non-conformance and corrective action procedures.
   10. Discuss construction restrictions due to weather conditions.
   11. Discuss and schedule weekly progress meetings.
   12. Discuss health and safety issues.

C. Meeting minutes and items for resolution will be recorded by the Design Engineer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preconstruction meeting.
   1. Owner's Project Manager or representative.
   2. Contractor's Project Manager and on-site Superintendent.
   3. Installer's Project Manager and on-site Superintendent.
   4. Design Engineer's Project Manager and CQA Officer.

E. The Contractor's attendance at the preconstruction meeting is not a payable item. Any costs incurred by the Contractor for attendance at the preconstruction meeting should be included in the Contract Lump Sum Price for "Mobilization".

1.03 PROGRESS MEETINGS

A. In coordination with the Engineer, the CQA Officer will schedule and administer weekly progress meetings. The objectives of these meetings are to: 1) maintain lines of communication; 2) review procedures and results of the CQA program; and 3) maintain and improve the established foundation of cooperation to achieve quality construction. The following agenda will be addressed by the CQA Officer.
   1. Review minutes of previous progress meeting.
   2. Review work progress.
   3. Review and update construction schedule and obtain a schedule from the Contractor, listing the construction activities for the following two (2) weeks.
   4. Discuss CQA and CQC related field observations, testing results, problems, decisions, and conflicts.
   5. Review and update Submittal Log.
   6. Review status of pending Change Orders.

B. Meeting minutes and items for resolution will be recorded by the CQA Officer and distributed to all parties in attendance.

C. The following representatives from each organization are required to attend the weekly progress meetings.
   1. Owner's Project Manager or representative.
   2. Contractor's on-site Superintendent.
   3. Installer's on-site Superintendent (during geosynthetics installation).
   4. Design Engineer's Project Manager and CQA Officer.
   5. Representative of major subcontractors performing work during the week of the weekly progress meeting

D. The Contractor's attendance at the progress meetings is not a payable item. Any costs incurred by the Contractor for attendance at the progress meetings should be included in the Contract Lump Sum Price for "Mobilization".

1.04 PREPARATORY MEETINGS

A. In coordination with the Design Engineer, the CQA Officer will schedule and administer, as needed, informal preparatory meetings prior to construction of the following items.
   1. Refuse excavation and interim cover preparation.
   2. Foundation layer placement.
   3. Gas relief/venting system installation.
   4. LLDPE geomembrane and engineered turf installation.
   6. General earthwork, drainage and erosion control, and access road construction, as needed.
   7. Sedimentation basin improvements.
   8. Leachate overflow collection and storage system installation.
   9. LFG collection system installation.
   10. Borrow area reclamation and seeding and fertilizing.

B. The objective of the preparatory meetings is to establish a complete understanding of the upcoming unit of construction and CQA procedures and testing that will be implemented during construction. To achieve this objective, the following agenda will be addressed by the CQA Officer.
   1. Review "Products" section of the applicable Technical Specifications.
   2. Review "Execution" section of the applicable Technical Specifications.
   3. Discuss any construction and grade control staking needed to complete the Work.
   4. Discuss CQA testing, observation, and surveying to be performed.
   5. Verify that all submittals have been or will be received and approved by the CQA Officer in accordance with the schedule.
   6. Discuss Contractor's CQC responsibilities.
   7. Discuss Contractor's coordination, scheduling, and sequencing of the Work.
   8. Discuss Contractor's proposed equipment and manpower.

C. Meeting minutes and items for resolution will be recorded by the CQA Officer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preparatory meetings.
   1. Design Engineer's Project Manager or representative.
   2. Contractor's on-site Superintendent.
   3. On-site Superintendent of any Subcontractor, as applicable to the unit of construction.
   4. CQA Officer.
   5. CQA Monitor(s), as applicable to the unit of construction.

E. The Contractor's attendance at the preparatory meetings is not a payable item. Any costs incurred by the Contractor for attendance at the preparatory meetings should be distributed and included in the Contract Unit Price for the item for which the meeting is held.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01060
SURVEYING AND FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

A. Surveying and field engineering. All survey and layout for all improvements are to be provided by the Contractor.

B. Quality assurance.

C. Submittals.

D. Project record documents.

E. Examination.

F. Survey reference points.

G. Survey requirements.

H. Surveying accuracy and tolerances in setting of survey stakes.

I. Surveys for record drawings.

J. Payment.

1.02 RELATED SECTIONS

A. Information Available to Bidders: Topographic survey.

B. Section 01720 - Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 DESCRIPTION

A. Reference points: Reference points to be provided by Design Engineer pursuant to the General Conditions will include referenced monuments and elevation benchmarks in the vicinity of the Project. If displaced by Contractor, replacement of these reference points will be at the expense of Contractor.

B. Contractor will furnish all necessary detail surveys including all lines, grades, and elevation appropriate to control construction. At a minimum, construction surveys are required for top of foundation layer.

C. Use by Design Engineer: Design Engineer may at any time use line and grade points and markers established by Contractor. Contractor's surveys are a part of the Work and may be checked by Engineer at any time. Contractor is responsible for any lines, grades, or measurements which do not comply with specified or proper tolerances, or which are otherwise defective, and for any resultant defects in the Work. Contractor will be required to conduct re-surveys or check surveys to correct errors indicated by review of the field notebooks or otherwise detected.

3.02 QUALITY ASSURANCE

A. Employ a Land Surveyor or eligible Engineer registered in the State of California and acceptable to the Design Engineer to perform survey work of this Section.

B. Submit evidence of Land Surveyor's or eligible Engineer's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

C. Provide instruments and other survey equipment that are accurate, suitable for the surveys required in accordance with recognized professional standards, and in proper condition and adjustment at all times. Perform surveys under the direct supervision of a licensed Land Surveyor or eligible Engineer.

D. Record surveys in field notebooks.

3.03 SUBMITTALS FOR REVIEW

A. Submit name, address, and telephone number of Land Surveyor or eligible Engineer before starting survey work.

B. On request, submit documentation verifying accuracy of survey work.

C. Submit a certificate signed by the Land Surveyor or eligible Engineer, that the elevations and locations of the Work are in conformance with Contract Documents.

3.04 RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

B. Submit record documents under provisions of Section 01720.

3.05 EXAMINATION

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Design Engineer of any discrepancies discovered.

3.06 SURVEY REFERENCE POINTS

A. Contractor to locate and protect survey control and reference points.

B. Control datum for survey is that indicated on the Plans.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Design Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Owner.

3.07 SURVEY REQUIREMENTS

A. Provide field engineering services for all proposed improvements. Utilize recognized engineering survey practices.

B. Establish a minimum of two (2) permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on record documents.

C. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including: stakes for grading, fill, slopes, and all site improvements.

D. Periodically verify layouts by same means.

E. Contractor's layout work will include the following:
   1. Slope staking for top of erosion-resistant layer at 50-foot grid and grade breaks.
   2. All as-built surveys as specified here in.
   3. Surveys to measure completed units of Work specified here in.

F. Contractor must perform all additional slope staking, off-setting and other control staking necessary to perform the Work.

3.08 SURVEYING ACCURACY AND TOLERANCES IN SETTING OF SURVEY STAKES

A. Perform control traverse field surveys and computations to an accuracy of at least 1:10,000.

B. The tolerances applicable in setting survey stakes are as set forth below. Such tolerances cannot supersede stricter tolerances required by the Plans or Technical Specifications, and cannot otherwise relieve the Contractor of responsibility for measurements in compliance therewith.

Type of Mark	Horizontal Position	Elevation
Permanent reference points	1 in 10,000	±.01 ft
General excavation and earthwork	1 in 2,000	±.10 ft

C. Tolerances for the thickness of earthen layers shown on Plans and for elevations shown on the Plans are ±0.10 foot unless otherwise specified.

3.09 SURVEYS FOR RECORD DRAWINGS

A. Provide the Design Engineer with as-built record drawings (field surveyed) for items that were revised during construction and differ from the Plans including the following items:
   1. Topography that depicts the top of the foundation layer.
   2. Topography of ditches.
   3. Locations of catch basins.
   4. Alignment, ends, and invert elevations of pipes and culverts.
   5. Topography of storm water retention basins and borrow area.
   6. Locations of LFG collection system components, including collection system piping, LFG extraction wells, above ground condensate drain lines, condensate discharge points, flare station concrete pads, and flare station security fencing.
   7. Location of leachate UST manway.

B. The Design Engineer may perform independent checks.

C. Provide record documents on 24" x 36" size drawings, and on a computer disk in AutoCAD. Use the coordinate system shown on the drawings.

PART 4 MEASUREMENT AND PAYMENT

4.01 PAYMENT

A. Payment for providing all surveying and field engineering is included in the Contract Unit Price paid for the various items of Work for which they are required. No separate or additional payment will be made therefore.

END OF SECTION

SECTION 01200
ACRONYM LIST

PART 1 GENERAL

1.01 SUMMARY

A. Standards, Institutes and Societies

B. Materials and Units

C. Miscellaneous

1.02 STANDARDS, INSTITUTES AND SOCIETIES

A. Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AASHTO	-	American Association of State Highway and Transportation Officials
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standards Institute
ASTM	-	American Society for Testing and Materials
AWWA	-	American Water Works Association
CAC	-	California Administrative Code
CFR	-	Code of Federal Regulations
CRSI	-	Concrete Reinforcing Steel Institute
CTM	-	California Test Methods
NEMA	-	National Electrical Manufacturer's Association
NEC	-	National Electric Code
NFPA	-	National Fire Protection Association
OSHA	-	Occupational Health and Safety Administration
RWQCB	-	Regional Water Quality Control Board
SWANA	-	Solid Waste Association of North America
SWRCB	-	State Water Resources Control Board
UL	-	Underwriters Laboratories Inc.
US	-	United States

1.03 MATERIALS AND UNIT S

A. Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AC	-	acre
AWG	-	American Wire Gauge
cm	-	centimeter
ClosureTurf™		Three (3) component final cover system composed of structured LLDPE geomembrane liner drainage studs

		and spike, engineered synthetic turf, and a specific grade of sand infill ballast.
CMP	-	corrugated metal pipe
Engineered Turf		Synthetic turf component of ClosureTurf™
EPDM	-	ethylene propylene diene monomer
°F	-	degree Fahrenheit
ft	-	foot
g	-	gram
LLDPE	-	Linear Low-Density Polyethylene
HDPE	-	High-Density Polyethylene
HP	-	horse power
HydroBinder		Cementious infill used for surface drainage conveyance areas of engineered turf.
in	-	inch
”	-	inch
kN	-	kilonewtons
lb	-	pound
MARV	-	minimum average roll value
m	-	meter
mm	-	millimeter
mil	-	1/1000 of 1 inch
ml	-	milliliters
min	-	minute
No.	-	number
oz	-	ounce
%	-	percent
psf	-	pounds per square foot
psi	-	pounds per square inch
psig	-	pounds per square inch gauge
PVC	-	Polyvinyl Chloride
SDR	-	Standard Dimension Ratio
sec	-	second
TFE	-	tetrafluoroethylene
TRM	-	turf reinforcement mat
yd	-	yard

1.04 MISCELLANEOUS

A. Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AST	-	Above Ground Storage Tank
@	-	at
BMP	-	Best Management Practice
CQA	-	Construction Quality Assurance
CQC	-	Construction Quality Control
CSMP	-	Construction Storm Water Management Plan
EBA	-	EBA Engineering
=	-	equals
LFG	-	Landfill Gas

max.	-	maximum
min.	-	minimum
MQC	-	Manufacturer's Quality Control
MSDS	-	Material Data Safety Sheet
NOI	-	Notice of Intent
NPDES	-	National Pollutant Discharge Elimination System
PDF	-	Portable Document Format
POC	-	Point of Connection
QSD	-	Qualified SWPPP Developer
QSP	-	Qualified SWPPP Practitioner
REAP	-	Rain Event Action Plan
SAP	-	Storm Water Action Plan
SMARTS	-	Storm Water Multiple Application and Report Tracking System
SPC	-	Storm Water Pollution Control
Std.	-	Standard
SWPPP	-	Storm Water Pollution Prevention Plan
TEFC	-	Totally Enclosed Fan Cooled
UST	-	Underground Storage Tank
UV	-	Ultra-violet
WDID	-	Waste Discharge Identification
WPC	-	Water Pollution Control

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Submittal Control Log.

B. Submittal review and approval procedures.

1.02 SUBMITTAL CONTROL LOG

A. All submittals required by the Technical Specifications are included in individual sections. A Submittal Control Log will be maintained by the CQA Officer in coordination with the Contractor during construction. The Submittal Control Log documents: 1) submittal number; 2) referenced specification section; 3) submittal description; 4) submitter; 5) date received; 6) reviewer; 7) action taken determination; and 8) return date.

1.03 SUBMITTALS - GENERAL REQUIREMENTS

A. The Contractor shall submit to the Engineer all submittals required by the Contract Documents and as required herein, or subsequently required by modifications. All such items required to be submitted for review shall be furnished by and at the expense of the Contractor, and any work affected by them shall not proceed without such review. Submittals and their contents shall be properly prepared, identified, and transmitted as provided herein or as the Engineer may otherwise direct. Except for record documents, and instructional manuals for operation and maintenance, each submittal shall be approved before the material or equipment covered by the submittal is delivered to the site.

B. Unless otherwise specified, three (3) sets of printed submittals shall be submitted.

C. Contractor shall allow a total period of not less than two (2) calendar weeks for review and approval of submittals by the Engineer, not including the time necessary for delivery or mailing, and shall cause no delay in the Work. Extension of the Contract Time will not be granted because of the Contractor's failure to make timely and correctly prepared and presented submittals with allowance for the checking and review periods.

D. At the time of the submission, the Contractor shall give notice, in writing, in the submittal, of any deviation from the requirements of the Contract Documents. The deviations shall be clearly indicated or described. The Contractor shall state in writing, all variation in costs occasioned by the deviations, and his assumption of the cost of all related changes if the deviation is approved.

E. The Contractor shall deliver submittals by means of dated, signed, and sequence numbered transmittals on the Engineer provided forms, identifying as to initial or resubmittal status, and fully describing the submittal contents. In each transmittal, the Contractor shall state the Project Number and Name, Name and Address of Contractor, Name and Address of Sub-Contractor, Manufacturer, Distributor, and specification Section (as applicable), Articles, and

paragraphs to which the submittal pertains; accompanying data sheets, catalogs, and brochures shall be identified in the same manner. Where several types or models are contained in the literature, the Contractor shall delete non-applicable portions, or specifically indicate which portions are intended and applicable. Submittal transmittals shall fully index all items submitted.

1. Incomplete Submittals, including those not correctly transmitted, not correctly titled and identified, or not bearing the Contractor's review and approval stamp, will be returned to the Contractor without review.
2. Interrelated Submittals: Except where the preparation of a submittal is dependent upon the approval of a prior submittal, all submittals pertaining to the Work, shall be submitted simultaneously.

F. Every submittal of shop drawings, samples, materials lists, equipment data, instruction manuals, and other submittals upon which the proper execution of the Work is dependent, shall bear the Contractor's review and approval stamp certifying that the Contractor: 1) has reviewed, checked and approved the submittal and has coordinated the contents with the requirements of the Contract Documents, 2) has determined and verified all quantities, field measurements, field construction criteria, materials, equipment, catalog numbers, and similar data, or will do so, and 3) states the Work covered by the submittal is recommended by the Contractor and the Contractor's guarantee will fully apply thereto. Contractor's stamp shall be dated and signed by the Contractor in every case.

G. Submittals will be reviewed only for conformance with the design concept of the Project and with the information given in the Contract Documents. The approval of a separate item, as such, will not indicate approval of the assembly in which the item functions, nor shall approval be construed as revising, in any way, the requirements for a fully integrated and operable system, as specified. The approval of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents, or for any revision in resubmittals, unless the Contractor has given notice, in writing, of the deviation or revision at the time of submission or resubmission, and written approval has been given to the specific deviation or revision, nor shall any approval relieve the Contractor of responsibility for errors or omissions in the submittals, or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, and completion of the Work.

H. The Contractor shall make all required corrections and shall resubmit the required number of corrected submittals until approved by the Engineer. The Contractor shall direct specific attention, in writing, to revisions other than the corrections called for on previous submittals, and shall state, in writing, all variations in costs, and his assumption of the cost of related changes. Identify each resubmittal with number of the original submittal, followed by consecutive letters starting with "A" for first resubmittal, "B" for second resubmittal, etc. Note that in addition to any applicable liquidated damages, the Owner reserves the right to deduct monies from the amounts due to Contractor to cover the cost of Engineer's review time beyond the second submission.

I. The Contractor shall check submittals returned to him for correction and ascertain if the corrections result in extra cost to him above that included under the Contract Documents, and shall give written notice to the Engineer within five (5) days, if in his opinion, such extra cost results from corrections. By failing to notify the Engineer or by starting any Work covered by

a submittal, the Contractor waives all claims for extra costs resulting from required corrections.

J. No Work represented by required submittals shall be purchased, or paid for, or commenced until the applicable submittal has been approved. Work shall conform to the approved submittals and all other requirements of the Contract Documents, unless subsequently revised by an appropriate modification, in which case, the Contractor shall prepare and submit revised submittals as may be required. The Contractor shall not proceed with any related Work which may be affected by the Work covered under submittals until the applicable submittals have been approved.

K. Piecemeal submittals will be returned unreviewed. However, for mechanical equipment and the like, separate submittals for embedded items, embedded metal work and anchors, will be reviewed, as applicable.

1.04 OTHER SUBMITTALS.

A. Provide no less than two (2) copies of other submittals such as calculations, manufacturer's certified reports, operational demonstration and system validation reports specified elsewhere in the Contract Documents, one (1) of which will be retained by the Engineer and the rest of which will be returned to the Contractor marked to show the required corrections.

1.05 FORM OF APPROVAL.

A. Copies of submittals which are returned to the Contractor and which are subject to approval will be marked with notations (1), (2), (3) or (4), and may also be marked with notation (6), in which case the action so indicated shall be taken by the Contractor.
   1. No Exceptions Taken.
   2. Furnish as Corrected
   3. Revise and Resubmit.
   4. Not reviewed.
   5. Rejected.

B. Returned copies of drawings marked with either notation (1), or (2) authorize Contractor to proceed with the fabrication, or construction, or any combination thereof, covered by such returned drawings, provided, that such fabrication, or construction shall be subject to the comments, if any, shown on such returned copies.

C. Returned copies of drawings marked with notation (3), (4) or (5) shall be corrected as necessary and a revised submittal shall be submitted in the same manner as before.

D. Returned copies of drawings marked with either notation (3), (4) or (5) shall be resubmitted not later than seven (7) days after date of transmittal by Engineer.

E. The Submittal Control Log will be reviewed and updated in coordination with the Contractor at the weekly progress meetings.

END OF SECTION

SECTION 01500
MOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all services associated with the mobilization and demobilization of personnel, equipment, supplies, and incidentals to the Work site in accordance with this Section.

B. The Contractor shall supply and implement all construction facilities and temporary controls in accordance with this Section and as shown on the Plans.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Standard Plans Book.* California Department of Transportation, 2010.

1.03 SUBMITTALS

A. At least 14 calendar days prior to mobilizing to the Work site, the Contractor shall submit a Dust Control Plan for approval by the Design Engineer prior to commencement of the Work. The plan shall comply with the requirements of the Mendocino County Air Quality Management District and shall identify procedures to minimize dust related impacts with the intent of eliminating dust nuisance complaints from adjacent areas or regulatory agencies.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MOBILIZATION

A. The Contractor shall perform preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the Work site; for the establishment of all offices, buildings, and other facilities necessary for execution of the Work; and for all other work and operations which must be performed or costs incurred prior to beginning the Work in accordance with Section 11 of the Standard Specifications.

B. The Contractor shall give written notice to the Design Engineer at least 48 hours prior to transporting oversize and/or overload equipment to the Work site.

3.02 DEMOBILIZATION

A. The Contractor shall perform any work and operations, including, but not limited to, those necessary for the removal of personnel, equipment, supplies, temporary utilities (underground

and above ground), construction facilities, excess, surplus, waste materials and incidentals from the Work site prior to application for final payment.

B. The Contractor shall clean and repair damage caused by installation or use of construction facilities or temporary controls.

3.03 CONSTRUCTION FACILITIES

A. General
   1. Unless noted otherwise within these Technical Specifications or allowed through specific agreement with the Design Engineer, the Contractor shall provide and pay for all labor, materials, tools, equipment, machinery, necessary permits, water, heat, utilities, and any other facilities or services necessary to complete the Work in accordance with these Technical Specifications and as shown on the Plans.
   2. Provision of all construction facilities shall be coordinated with the Design Engineer.

B. Access Roads
   1. The Contractor may construct and maintain any haul road necessary to execute the Work or use existing haul and access roads at the Work site.
   2. The Contractor shall repair any existing roads damaged by the Contractor during construction, as directed by the Design Engineer.

C. Staging Area
   1. The Contractor shall utilize a staging area for equipment and materials storage, and personnel parking. The location of the staging area shall be determined in coordination with the Design Engineer.

D. Temporary Buildings
   1. The Contractor may provide and maintain a weather-tight temporary office trailer, for the use of the Contractor and any Subcontractors, equipped as desired by the Contractor.
   2. The Contractor shall provide a weather-tight temporary office trailer, for the use of the Owner and CQA representatives, equipped with a table, desk, and chairs. The Contractor shall locate the trailer at a location approved by the Design Engineer.
   3. The Contractor's office trailer shall be located adjacent to the CQA office trailer as determined by the Design Engineer.
   4. The Contractor shall install a security fence around their office trailer and the CQA Office, as directed by the Design Engineer. The fences shall be chain link, a minimum 6 feet in height with three strands of barbed wire and a minimum 12-foot-wide gate.

E. Temporary Utilities
   1. Electricity
      a. The Contractor shall provide and pay to connect to electrical power required for construction facilities and execution of the Work including, but not limited to, a temporary electric feeder from electrical service, adequate power outlets with branch wiring and distribution boxes located as required, flexible power cords as required, and main service disconnect and overcurrent protection at convenient location.

b. The Contractor shall provide and pay for the electrical service and all power required for the temporary office trailer for use by the Owner and CQA representatives for the duration of the project.

2. Telephone and Facsimile
   a. The Contractor shall provide, maintain, and pay for separate telephone and facsimile service for the Contractor's office trailer and the CQA Officer's trailer, as needed.
3. Water
   a. Construction Water
      1. The Contractor shall be responsible for developing a water supply for construction water and dust control and delivering and applying water as needed. Full compensation for developing a water supply and delivering and applying water shall be considered as included in the Contract Unit Price paid for the various contract items requiring water.
   b. Drinking Water
      1. Drinking water shall be provided by the Contractor from a potable source so piped or transported as to keep it safe, fresh, and served from single service containers or satisfactory types of sanitary drinking stands or fountains. Drinking water services and facilities shall be furnished in strict accordance with existing governing health regulations.
4. Sanitary Facilities
   a. The Contractor shall furnish, install, and maintain ample sanitary facilities as required for the Contractor's and Design Engineer's employees and for the employees of any Subcontractors.
   b. A sufficient number of enclosed temporary toilets shall be conveniently placed as required by the sanitary codes of state and local government.

3.04 TEMPORARY CONTROLS

A. General
   1. The Contractor shall comply with all codes, ordinances, rules, regulations, orders, or other legal requirements of public authorities, which bear on performance of the Work.
   2. The Contractor shall instruct all personnel and maintain strict control of all Work activities to protect and maintain the integrity of all existing environmental monitoring and control systems for the landfill.

B. Safety
   1. The Contractor shall submit a Health and Safety Plan with an Emergency Contact List to the Design Engineer prior to commencement of the Work and in accordance with Section 01800 (Health and Safety) of these Technical Specifications.
   2. The entire Work site is subject to shutdown, at the discretion of the Design Engineer, due to heavy rain, high winds, or other inclement weather.
   3. The Contractor's equipment and vehicles shall not travel at speeds of more than 20 miles per hour within 200 feet of any active work areas, equipment, or personnel.
   4. The Contractor shall contact PG&E with regard to the overhead power lines and associated health and safety issues prior to the commencement of work.

C. Equipment Fueling and Maintenance

1. The Contractor shall perform equipment fueling and maintenance within a contained area, to be constructed by the Contractor in a location approved by the Design Engineer to prevent any release of fuel or other contaminants. The Contractor shall immediately remediate any leaks, spills, or other release of fuel or other contaminants as directed by the Design Engineer.

D. Drainage Control

1. The Contractor shall provide ample means and devices with which to promptly remove and dispose of all water from any source entering the Work areas and maintain these at all times during execution of the Work and until the final Work has been approved by the Design Engineer.

E. Erosion and Sediment Control

1. Temporary erosion and sediment control measures shall be implemented by the Contractor for all Work areas in accordance with the SWPPP prepared as part of Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications.

F. Dust Control

1. Dust control measures shall be implemented by the Contractor for all Work areas in accordance with the Contractor's approved Dust Control Plan submitted under Section 14-9.02A of the Standard Specifications.

PART 4 MEASUREMENT AND PAYMENT

2.01 MOBILIZATION

A. Payment for mobilization, demobilization, construction facilities and temporary controls including temporary erosion control described in these Technical Specifications is considered as included in the Contract Lump Sum Price paid for "Mobilization" and includes all compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the Work specified herein and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Payment for "Mobilization" shall be as follows:

1. When the monthly partial payment estimate exceeds 5% the contract amount, not including any amount paid for Mobilization, 5% of the contract amount or 50% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

2. When the monthly partial payment estimate exceeds 10% the contract amount, not including any amount paid for Mobilization, 7.5% of the contract amount or 75% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

3. When the monthly partial payment estimate exceeds 20% the contract amount, not including any amount paid for Mobilization, 9.5% of the contract amount or 95% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

4. When the monthly partial payment estimate exceeds 50% the contract amount, not including any amount paid for Mobilization, 10% of the contract amount or 100% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

5. After the Engineer determines that the work is substantially complete, any amount bid for Mobilization exceeding 10% of the contract amount will be paid in the final payment.

END OF SECTION

SECTION 01550
STORM WATER POLLUTION PREVENTION

PART 1 GENERAL

1.01 SUMMARY

A. Preparation, implementation, and monitoring of the Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharge of pollutants from the Work site into receiving waters. This includes, but is not limited to the prevention of sedimentation from the Work site into storm drains and natural drainages and the prevention of pollution discharges derived from equipment fueling and maintenance/repairs, improper dumping, spills, or leakage from storage tanks or transfer areas.

B. Prohibit illicit discharge (non-rainwater) into the storm drain system or natural drainages.

C. Construct any and all necessary systems to eliminate contaminants from entering the storm drain system or natural drainages.

D. Clean up and control of Work site materials, spoils, and debris.

E. Removal of contaminants produced by the Project.

F. Implement erosion and sediment control measures to prevent discharge of sediment to the storm drain system and natural drainages (see Section 02960 [Temporary Erosion and Sediment Controls] of these Technical Specifications).

G. The Work shall include the provision of all labor, materials, equipment, and apparatus not specifically mentioned herein or noted on the Plans, but which are incidental and necessary to complete the Work specified.

1.02 REFERENCES

A. *California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ (NPDES No. CAS000002)*. State Water Resources Control Board, 2010.

B. *California Storm Water Best Management Practice Handbooks:*
   1. Municipal
   2. Industrial/Commercial
   3. Construction Activity

1.03 REGULATORY REQUIREMENTS

A. Contractor shall comply with the State Water Resources Control Board (SWRCB), Regional Water Quality Control Board (RWQCB), county, city, municipal, and other local agency

requirements regarding storm water discharges and management. The State does not obtain local permits.

1.04 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A. A SWPPP shall be prepared for the Project by the Contractor. SWPPP preparation includes obtaining SWPPP acceptance, amending the SWPPP, preparing a Construction Storm Water Management Plan (CSMP) and a Storm Water Action Plan (SAP), and monitoring and inspecting Water Pollution Control (WPC) practices at the Work site and shall include:

1. Storm water sampling and analysis including reporting of storm water quality per qualifying rain event. If specified for the risk level, the work includes preparation, collection, analysis, and reporting of storm water samples for turbidity, pH, and other constituents.
2. Preparation of the Storm Water Annual Report including certifications, monitoring and inspection results, and obtaining Storm Water Annual Report acceptance.
3. If specified for the project risk level, preparation of a Rain Event Action Plan (REAP) including preparing and submitting REAP forms and monitoring weather forecasts.

B. The Contractor shall amend the SWPPP, as necessary, during construction showing the best management practices (BMPs) for the prevention and control of pollutants and erosion of the Work site. The SWPPP shall be in accordance with all of the requirements of the General Construction Storm Water Permit (Permit). Contractor is responsible to implement the SWPPP and make revisions to the SWPPP as necessary until completion of the Project. Information on the Permit can be found on the internet at http://www.swrcb.ca.gov/stormwtr/construction.htm. The Contractor shall prepare the Notice of Intent (NOI) to the SWRCB and provide to the Owner for filing at the SWRCB.

1.05 RISK LEVEL

A. The Risk Level for this Project is Level D.

1.06 QUALITY ASSURANCE

A. All work performed under this Contract and all Contractors and their associates and/or employees are required to comply with all applicable storm water regulations and to implement BMPs at all times.

B. A SWPPP shall be provided by the Contractor for the proposed control of contaminants entering the storm water system and natural drainages. The SWPPP must be approved by the Design Engineer prior to commencement of work.

C. All employees and subcontractors shall be trained on the storm water pollution prevention requirements contained in these Technical Specifications.

D. A supply of spill clean-up materials such as rags or absorbents shall be kept readily accessible on-site at all times.

1.07 SUBMITTALS

A. The Contractor shall submit a site-specific SWPPP prepared by a Qualified SWPPP Developer (QSD). The Contractor shall amend the SWPPP when required, prepare a CSMP, and perform water pollution control work under the oversight of a Qualified SWPPP Practitioner (QSP), as specified in the General Permit. All reports and data that must be submitted to the SWRCB will be uploaded by the Contractor's QSP to the Storm Water Multiple Application and Report Tracking System (SMARTS) website for final submittal. Final submittal and certification will be performed by the Owner.

B. Within 14 calendar days of Authorization to Proceed, the Contractor shall submit three (3) printed copies of the SWPPP and Site Map and one (1) electronic copy in a Portable Document Format (PDF) to the Design Engineer for review. The Contractor shall allow five (5) working days for the Design Engineer's review. If revisions are required, the Design Engineer will provide comments, and the Contractor shall revise and resubmit the SWPPP and Site Map in printed and electronic form within five (5) working days of receipt of the Design Engineer's comments. Within three (3) working days of receipt of the Design Engineer's approved SWPPP, the Contractor shall submit three (3) paper copies of the approved SWPPP to the Design Engineer and prepare the NOI and upload all pertinent documentation to SMARTS for final submittal and certification by the Design. The SWRCB will review the NOI and the issue a Waste Discharge Identification (WDID) number for the Project.

C. The Contractor shall not perform work that may cause water pollution until the state has issued a WDID number for the Project. The Design Engineer's review and approval of the SWPPP shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State and local laws, regulations, and requirements.

D. The Contractor shall keep a copy of the approved SWPPP at the Work site. The SWPPP shall be made available when requested by a representative of the RWQCB, SWRCB, United States Environmental Protection Agency, or the local storm water management agency. Requests from the public shall be directed to the Owner.

E. The Contractor shall submit a Construction Management Plan that includes proposed provisions to prevent pollution and debris from reaching the water channel and shall include wet weather protection, erosion measures, methods, and location for cleaning tools and equipment dust control, litter prevention, debris collection and removal, location of portable toilets, storm water management controls, and hazardous material (including fuel) management at the Work site.

F. The Contractor shall submit Storm Water Training Records including training dates and subjects for employees and subcontractors including:
   1. Within five (5) working days of SWPPP acceptance for existing employees.
   2. Within five (5) working days following training of all new employees (Contractor and subcontractors).
   3. At least five (5) working days prior to subcontractors starting work for subcontractor's employees.

G. The SWPPP including the CSMP and SAP, SWPPP amendments, training records, REAPs, sampling and analysis results, exceedance reports, visual monitoring reports, inspection reports, BMP status reports, annual reports, and reporting on Storm Water Pollution Control (SPC) practices, shall be prepared and submitted to the Design Engineer under the direction of a QSD.

1.08 PERMIT

A. Within three (3) working days of receipt of the Design Engineer's approved SWPPP, the Contractor shall submit three (3) paper copies of the approved SWPPP to the Owner and prepare the NOI and upload all pertinent documentation to SMARTS for final submittal and certification by the Owner. The SWRCB will review the NOI and the issue a WDID number for the Project.

B. The Owner shall pay required fees and pay annual renewal fees until completion of the Project.

1.09 LIABILITIES AND PENALTIES

A. Review of the SWPPP, amended and finalized by the Contractor from an initiated plan, shall not relieve the Contractor from liabilities arising from non-compliance of storm water pollution regulations.

B. Contractor will be held responsible for paying penalties for violations of permit conditions. In the event of any fines against the City, due to non-compliance by the Contractor, the City shall recover all costs of the fines from the Contractor.

1.10 IMPLEMENTATION

A. The Contractor shall not perform work that may cause water pollution until the SWRCB has issued a WDID number for the Project. The City's review and approval of the SWPPP shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State, and local laws, regulations, and requirements.

B. Contractor shall comply with the requirements of the Permit and the SWPPP. Contractor shall update the SWPPP and have the SWPPP map available at the Work site at all times.

C. Contractor shall implement BMPs for control of all pollutants including sediment, fuel and other petroleum and non-petroleum hydrocarbon products, concrete waste, fertilizers, soil amendments and other construction related pollutants.

D. Contractor shall implement an effective combination of erosion and sediment controls by stabilizing all disturbed soil, paying particular attention to exposed slopes. Back up erosion prevention measures with sediment control measures. Ensure all control measures are adequate, in place, and in operable condition.

E. Contractor shall conduct site inspections before, during extended storm events, and after each storm event to identify areas that may contribute to erosion and sediment problems or any other pollutant discharges. If additional control measures are needed, implement them

immediately. Document all inspection findings and actions taken in detailed, site specific inspection reports. These reports must be maintained on site for review.

F. Contractor shall maintain and repair all erosion prevention and sediment control measures throughout the season and until completion of the project. Replacement supplies shall be kept on the Work site.

G. Contractor shall train all site personnel in erosion prevention and sediment control techniques, and the responsibilities under the Permit.

H. Contractor shall conduct weekly training meetings and training for personnel collecting water samples.

I. Contractor shall immediately report to the RWQCB office any instances of sediment or other pollutant discharges from the Work site.

J. Contractor shall obtain services and pay for any sampling, testing, and analysis of storm water as required for compliance with the General Permit and the SWPPP.

K. Contractor shall make the SWPPP available to the RWQCB staff and correct any requirements imposed as a result of their inspections.

1.11 CERTIFICATION AND REPORTS

A. Prior to July 1 of each year during the construction period, submit two (2) copies of the Annual Report that the construction activities are in compliance with the General Permit and the SWPPP to the Design Engineer for review.

B. At Completion of the Project, submit records of all inspections, compliance certifications and noncompliance reports to the SWRCB.

C. Upon Completion of the Project, the Contractor shall file a Notice of Termination with the SWRCB.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 HAZARDOUS MATERIAL/WASTE MANAGEMENT/MATERIALS MANAGEMENT

A. Designated areas of the Work site shall be proposed by the Contractor for approval by the Design Engineer suitable for material delivery, storage, and waste collection as far from catch basins, drainage inlets, and natural drainages as possible.

B. All hazardous materials such as fuels and solvents and all hazardous waste such as waste oil and antifreeze shall be labeled and stored in accordance with State and Federal regulations.

C. All hazardous materials and all hazardous waste shall be stored in accordance with secondary containment regulations, and it is recommended that these materials and waste be covered as needed to avoid potential management of collected rainwater as a hazardous waste.

D. Regular hazardous waste collection shall be arranged for to comply with time limits on the storage of hazardous waste.

E. Granular materials shall be stored a minimum 10 feet from the closest catch basin and drainage inlet associated with the storm drain system. The Contractor shall not allow these granular materials to enter the storm drain system or natural drainages.

F. Warning signs shall be posted in areas containing or treated with chemicals.

G. An accurate up-to-date inventory, including Material Safety Data Sheets (MSDSs) of hazardous waste stored on site shall be kept and available to assist emergency response personnel in the event of a hazardous materials incident.

H. Maintenance and fueling of vehicles and equipment shall be performed in a designated, bermed area, or over a drip pan that will not allow run-off of spills. Vehicles and equipment shall be regularly checked and have leaks repaired promptly. Secondary containment shall be used to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.

3.02 DUST CONTROL

A. The Contractor's Dust Control Plan required under Section 01500 (Mobilization) of these Technical Specifications shall comply with the requirements of the Mendocino County Air Quality Management District, including the acquisition of a Large Area Grading Permit.

B. A minimum of two (2) water trucks with operators shall be in operation at all times during excavation to provide dust control at all excavation, haul road, stockpile and staging areas. If necessary, additional water trucks or other equipment with operators shall be provided and used by the Contractor to maintain these areas in a misted condition at all times during excavation.

C. Access and haul roads shall be watered on a continuous basis to control dust.

D. The Contractor will be restricted from areas where dust cannot be controlled and excessive equipment speeds, which cause dust, may be regulated by the Owner.

E. The Design Engineer will require all excavation activities to cease if the Contractor's dust control efforts do not follow the approved SWPPP, or fail to meet any of the requirements of this Part, until such time that the Contractor can demonstrate a return to compliance.

F. Other methods of dust control and suppression may be used, however; Design Engineer approval must be obtained prior to such use.

3.03 CONCRETE WASTE MANAGEMENT

A. Concrete trucks shall not be washed out into storm drains or natural drainages.

B. Concrete trucks and equipment shall be washed out off-site or in a designated area on-site where the water will flow onto dirt or into a temporary pit or bermed area. The water shall percolate into the soil and the hardened concrete placed in a waste container for disposal. If a suitable soil or bermed area is not available on-site, the wash water shall be collected and removed off-site and disposed of properly.

3.04 EROSION AND SEDIMENT CONTROL

A. Stabilize all denuded areas and install and maintain all temporary erosion and sediment control continuously between October 15th and April 15th of each year, until permanent erosion controls have been installed (see Section 02960 [Temporary Erosion and Sediment Controls] of these Technical Specifications).

B. Divert on-site runoff around exposed areas and divert off-site runoff around the Work site (e.g., swales and dikes).

C. Incorporate provisions for preventing erosion and trapping sediment on-site, such as sediment basins or traps, earthen dikes or berms, silt fences, check dams, storm drain inlet protection, soil blankets or mats, covers for soil stock piles, and/or other measures.

3.05 CONSTRUCTION SITE BMPs

A. Store, handle, and dispose of construction materials and waste properly, so as to prevent their contact with storm water.

B. Control and prevent the discharge of all potential pollutants, including concrete, petroleum products, chemicals, washwater or sediments, and non-storm water discharges to storm drains and natural drainages.

C. Use sediment controls or filtration to remove sediment when dewatering site and obtain all necessary permits.

D. Avoid cleaning, fueling, or maintaining vehicles on-site, except in a designated area where washwater is contained and treated.

E. Delineate with field markers clearing limits, easement, setbacks, sensitive or critical areas, buffer zones, trees, and drainage courses.

F. Protect adjacent properties and undisturbed areas from construction impacts using vegetative buffer strips, sediment barriers or filters, dikes, mulching, or other measures as appropriate.

G. Perform clearing and earth moving activities only during dry weather.

H. Limit and time applications of fertilizers to prevent polluted runoff.

I. Limit construction access routes and stabilize designated access points.

J. Avoid tracking dirt or other materials off-site; clean off-site paved areas using dry sweeping methods.

K. The Contractor shall train and provide instruction to all employees and subcontractors regarding the construction BMPs.

3.06 SITE CLEANUP

A. The cleaning of equipment or materials shall not be performed on-site using soaps, solvents, degreasers, steam cleaning, or equivalent methods.

B. All cleanup must be performed in a designated area that will not allow the cleaning rinse to flow off-site or into on-site storm drains or natural drainages.

3.07 PERFORMANCE REQUIREMENTS

A. The SWPPP is a minimum requirement. Revisions and modifications to the SWPPP are acceptable only if they maintain levels of protection equal to or greater than originally specified.

B. Read and be thoroughly familiar with all of the requirements of the SWPPP.

C. Inspect and monitor all work and storage areas for compliance with the SWPPP prior to any anticipated rain.

D. Complete any and all corrective measures as may be directed by regulatory agencies.

E. Costs: Contractor to pay all costs associated with the implementation of the requirements of the SWPPP in order to maintain compliance with the Permit. This includes installation of all Housekeeping BMPs, General Site and Material Management BMPs, inspection requirements, maintenance requirements, and all other requirements specified in the SWPPP.

PART 4 MEASUREMENT AND PAYMENT

4.01 STORM WATER POLLUTION PREVENTION

A. Measurement and payment for storm water pollution prevention shall be considered as included in the Contract Lump Sum Price paid for "Temporary Erosion and Sediment Controls" addressed in Section 02960 (Temporary Erosion and Sediment Controls) of these Technical Specifications.

END OF SECTION

SECTION 01720
RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUBMITTALS

A. Quality Control Submittals: Written procedures for maintaining and markup of record documents.

B. Contract Closeout Submittal: Submit record documents in accordance with the requirements of this section. Submit prior to application for final payment.

1.02 QUALITY ASSURANCE

A. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.

B. Accuracy of Records:

1. Coordinate changes within record documents, making legible and accurate entries on each page of Technical Specifications and each sheet of Plans and other documents where such entry is required to show change.
2. Purpose of Project record documents is to provide factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.

C. Make entries within 24 hours after receipt of information that a change in Work has occurred.

D. Prior to submitting each request for progress payment, request Design Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in delay of Progress Payment made by the Owner.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Maintain record documents completely protected form deterioration, loss, and damage until completion of Work.

B. In event of loss of recorded data, use means necessary to again secure data to Design Engineer's acceptance.

1. Such means shall include, if necessary in Design Engineer's opinion, removal and reconstruction of covering materials, at no cost to Owner.

PART 2 PRODUCTS

2.01 RECORD DOCUMENTS

A. Promptly following commencement of Contract Times, secure from Owner at no cost to Contractor, one complete set of Contract Documents. Plans will be full size.

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

A. General:
1. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
2. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

B. Preservation
1. Maintain record documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make record documents and samples available at all times for observation by Design Engineer.

C. Making Entries on Plans
1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
    a. Color Coding:
        i. Green when showing information deleted from Plans.
        ii. Red when showing information added to Plans.
        iii. Blue and circled in blue to show notes.
2. Date entries
3. Call attention to entry by "cloud" drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including but not limited to:
    a. Horizontal and vertical locations of existing and new underground facilities and appurtenances, and other underground structures, equipment or Work. Reference to at least two measurements of permanent surface improvements.
    b. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
    c. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
    d. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and Design Engineer's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.

5. Dimensions on Schematic Layouts: Show on record documents, by dimension, the centerline of each run of items such as described in the previous subparagraph above.
   a. Clearly identify the item by accurate note such as "cast iron drain," galv. water," and the like.
   b. Show, by symbol or note, vertical location of item ("under slab", "exposed", and the like).
   c. Make identification sufficiently descriptive that it may be related reliably to the Technical Specifications.

D. Make entries in other pertinent record documents as accepted by Design Engineer.

E. If record documents are not accepted by Design Engineer, secure a new copy of that record document from Design Engineer at Design Engineer's usual charge for reproduction and handling, and carefully transfer change data to new copy to acceptance of Design Engineer.

END OF SECTION

SECTION 01800
HEALTH AND SAFETY

PART 1 GENERAL

1.01 SUMMARY

A. Site safety.

B. LFG hazards.

C. Other landfill related hazards.

1.02 SITE SAFETY

A. All safety requirements are applicable to the Work to be performed under the Contract and any subsequent addenda, modifications, alterations, and extensions thereto.

B. The Contractor shall be solely and completely responsible for conditions of the Work site, including the safety of all persons and property during performance of the Work and provision of safety measures on weekends and holidays. This requirement will apply continuously and shall not be limited to normal working hours.

C. The Contractor shall comply with all federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Agency, and Division of Industrial Safety, State of California, and other such safety measures as may be required by the above mentioned regulatory agencies.

D. Contractor shall be solely and completely responsible for the safety of all construction personnel performing the Work, including all Subcontractors. Contractor shall be ultimately responsible for any and all necessary safety precautions and safety programs.

E. Contractor shall also be held responsible for their own compliance with the provisions of this Section, as well as the compliance of all Subcontractors with the provisions of this Section. Contractor shall be held responsible for any and all violations of the provisions of this Section, as well as violations of any federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Agency, and Division of Industrial Safety, State of California, and other such safety statutes and requirements which apply to the Work.

F. No act, service, drawing review or construction review by the Owner, Design Engineer, CQA Officer or their Consultants is intended to include review of the adequacy of the Contractor's safety measures in, on, or near the Work site.

G. If a conflict should occur between the safety requirements of the Standard Specifications, these Technical Specifications, the approved Health and Safety Plan, Referenced Standards, or other federal, state, and local safety codes, ordinances, and regulations, the more stringent requirement shall prevail.

H. The Contractor shall contact PG&E with regard to the overhead power lines and associated health and safety issues prior to the commencement of work.

1.03 LFG HAZARDS

A. The Contractor is advised that decomposing refuse produces LFG, which is approximately 50 percent methane and 50 percent carbon dioxide by volume. LFG may be present in the Work area. LFG is colorless, can be odorless, may contain benzene, vinyl chloride, hydrogen sulfide, and other toxic constituents, is combustible, and contains little or no oxygen. LFG can migrate through soil near the surface so the Contractor is therefore advised of the need for precautions against fire, explosion, and asphyxiation when working in or near excavations which are in or near refuse fill areas.

B. The Contractor shall be responsible for informing his or her employees and Subcontractors and their employees of the potential danger of LFG on and near landfills.

C. Smoking shall be prohibited at all times and at all locations within the limits of the Work shown on the Plans.

D. The Contractor shall be familiar with "A Compilation of Landfill Gas Field Practices and Procedures" as prepared by the Solid Waste Association of North America (SWANA).

E. LFG has the potential to create hazardous conditions if not controlled or recognized. Some of the hazards of LFG include:
   1. Fires which may start spontaneously from exposed and/or decomposing refuse.
   2. Fires and explosions which may occur from the presence of methane gas.
   3. Oxygen deficiency in underground trenches, excavations, vaults, conduits and structures.
   4. The potential presence of hydrogen sulfide, a highly toxic and flammable gas.
   5. The potential presence of benzene, vinyl chloride, and other toxic gases which are known to the State of California to cause cancer, birth defects, and reproductive harm.
   6. Water vapor in LFG often becomes over saturated and condenses as a liquid in contained pipes and vessels. This condensate may contain the toxic constituents found in LFG.

1.04 OTHER LANDFILL-RELATED HAZARDS

A. The Contractor is advised that solid waste fills and the decomposing refuse therein may present other unique health and safety considerations. Such considerations include, but are not limited to:
   1. Unstable ground and surface cave-ins due to decomposition and differential settlement of refuse when working over, in, or near refuse fill areas.
   2. Possible caving of trenches and excavations when working over, in, or near refuse fill areas.
   3. Potentially hazardous materials in or near refuse fill areas.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 HEALTH AND SAFETY PLAN

A. Prior to start of construction, the Contractor shall submit a written Health and Safety Plan, to the Design Engineer indicating all proposed safety measures. Said plan shall be prepared in accordance with the requirements of Part 29 of the Code of Federal Regulations (29 CFR) 1910.120.

B. The Health and Safety Plan shall comply with all federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Administration (OSHA), and Division of Industrial Safety, State of California. The Contractor shall comply with Section 5-1.02A of the Standard Specifications for safety plan requirements for trenches and excavations. Contractor's attention is further directed to Section 6705 of the Labor Code concerning trench excavation safety plans.

3.02 SITE SAFETY MONITOR

A. The Contractor shall provide a person who will be designated as the Site Safety Monitor.

B. The Site Safety Monitor shall be thoroughly trained in rescue procedures, and use of safety equipment and gas detectors as required by the Health and Safety Plan.

C. At a minimum the Site Safety Monitor shall have taken a certified 40-hour OSHA safety course and 8-hour supplementary health and safety supervisor course which meets the requirements of 29 CFR 1910.120. Certificates of participation shall be submitted to the Design Engineer prior to start of construction.

D. The Site Safety Monitor shall have the delegated authority to order any person or worker to follow safety rules related to LFG or other site safety hazards. Failure to observe these rules shall be sufficient cause for removal of the person or worker from the Work site.

E. Supplemental to the Contractor's regular safety program, the Site Safety Monitor shall develop and institute procedures to inform all workers and the public visiting the Work site of the potential for the presence of methane and other landfill gases emanating from the natural decomposition of refuse buried at or near the Work site, and the importance of safety precautions to provide for the safety of workers and the public.

3.03 TRENCH AND EXCAVATION SAFETY

A. Contractor shall comply with all requirements of the trench and excavation safety, including provisions of Section 5-1.02A of the Standard Specifications and all occupational safety and health requirements of the Labor Code. In particular, the Contractor shall:

1. Submit to the Design Engineer at least 14 calendar days in advance of excavation, a detailed plan showing the design of sheeting, shoring, bracing, slopes, or other provisions to be made for worker protection from the hazard of caving ground during excavation. Sheeting and shoring plans shall be designed

and stamped by a Registered Civil or Structural Engineer with experience in shoring design. The Contractor shall be solely responsible for ensuring the safety of any excavation. Shoring and submittal of any plans for sheeting, shoring, bracing, slopes, or other provisions to be made for worker protection shall not relieve the Contractor from this responsibility.

2. If required, obtain a permit from the division of Industrial Safety for the construction of excavations that are 5 feet in depth or deeper and into which a person or persons is (are) required to descend.

B. Contractor shall provide all necessary materials to sheet, shore, brace, or otherwise provide for worker protection in temporary excavations as well as may be required to prevent adjacent surface settlement or damage to public and private property and to ensure safe working conditions at the Work site.

C. Contractor shall remove all sheeting, shoring, bracing or similar structures in accordance with the above requirements and in such a manner as to prevent any damage to the Work.

D. The Contractor shall repair all damages resulting from improper sheeting, shoring, bracing or similar measures, or damages resulting from failure to provide such measures at no expense to the City.

PART 4 MEASUREMENT AND PAYMENT

4.01 HEALTH AND SAFETY

A. Payment for providing all health and safety measures, including preparation of required Health and Safety Plan, is included in the Contract Unit Price paid for the various items of Work for which they are required. No separate or additional payment will be made therefore.

END OF SECTION

DIVISION 2

SITE WORK

SECTION 02200
REMOVAL, REPLACEMENT, AND ADJUSTMENT OF EXISTING FACILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Existing facilities that interfere with the Work shall be removed, reset, relocated, adjusted, or otherwise modified as specified herein, as shown on the Plans, or as directed by the Engineer. The Contractor shall perform all removal, replacement, abandonment, and adjustment of existing facilities in accordance with this Section and at the locations and details shown on the Plans including the following:

1. Adjust three (3) existing groundwater monitoring wells to grade;
2. Adjust two (2) existing leachate wells to grade;
3. Remove existing CMP and HDPE downdrains and drain outlets to creek;
4. Remove and/or abandon existing leachate piping;
5. Adjust of five (5) existing leachate manholes to grade;
6. Remove and replace existing vault boxes;
7. Install G5 traffic vault with checker plate top over existing valve;
8. Adjust existing gas vault to grade;
9. Adjust existing air release valve and vault to grade;
10. Adjust four (4) existing landfill gas perimeter monitoring wells/vaults to grade;
11. Remove existing fencing at site entrance; and
12. Demolish existing scale house structure.

B. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to implement the respective removal, replacement, and adjustment activities outlined above and within this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Standard Plans Book.* California Department of Transportation, 2010.

1.03 SUBMITTALS

A. At least 14 calendar days prior to beginning any replacement work in accordance with the requirements of this Section, the Contractor shall provide three (3) copies to the Design Engineer manufacturer's product data sheets for any new materials used in the replacement or adjustment of existing facilities.

1.04 PROJECT CONDITIONS

A. Except for materials indicated to be stockpiled or to remain the City's property, cleared materials are the Contractor's property. Remove cleared materials from the project site and dispose of in lawful manner.

B. Salvaged Materials: Carefully remove items indicated to be salvaged and store where indicated on Plans or where designated by the City. Avoid damaging materials designated for

salvage.

C. Unidentified Materials:
   1. If unidentified materials are discovered, including hazardous materials that may require additional removal other than is required by the Contract Documents, immediately report the discovery to the City.
   2. I necessary, the City will arrange for any testing or analysis of the discovered materials and shall provide instruction regarding the removal and disposal of unidentified materials.

PART 2 PRODUCTS

2.01 SOIL MATERIAL

A. Backfill excavations resulting from removal operations with onsite or import materials conforming to the specification for compacted engineered fill as described in Section 02224 (Engineered Fill).

2.02 VAULT BOXES

A. New or replacement vault boxes shall be pre-cast boxes with solid concrete or steel lids at the sizes and dimensions as indicated on the Plans. Extension risers shall be used as necessary to raise vault box to grade. Vault boxes shall be Christy boxes or equivalent with traffic rated cover where indicated.

PART 3 EXECUTION

3.01 GENERAL

A. Items demolished or removed that are not to be salvaged or reused in the Work shall become the property of the Contractor and shall be legally disposed of or recycled.

B. Verify that utilities have been disconnected and capped before starting demolition operations.

3.02 DOWNDRAIN AND DRAIN OUTLET REMOVAL

A. Unless indicated on the Plans to remain, all existing aboveground and below ground CMP and HDPE downdrains and drain pipe including any hardware shall be removed within the limits of Work.

B. Backfill trench excavations resulting from removal operations with onsite or import materials conforming to the specification for compacted engineered fill as described in Section 02224 (Engineered Fill). Compact to 90% relative compaction.

3.03 LEACHATE PIPING REMOVAL/ABANDONMENT

A. Cut existing leachate pipe at points shown on the Plans. The pipe cuts shall be square, perpendicular to the center of the pipe. Cap or plug with concrete the ends of the piping where indicated.

B. Unless piping is shown on the Plans to be abandoned in place, excavate and remove piping for disposal per section 1.04A.

C. Backfill excavations resulting from removal operations with onsite or import materials conforming to the specification for compacted engineered fill as described in Section 02224 (Engineered Fill). Compact to 90% relative compaction.

3.04 LEACHATE MANHOLE ADJUSTMENT

A. Frames and covers of existing leachate manholes shall be adjusted to grade with new materials similar in character to those in the original structure in accordance with the provisions of these specifications.

C. After the existing cover and frame has been removed, the top of the structure to be raised shall be trimmed to provide a suitable foundation for the new material.

D. When reconstruction or adjustment of a concrete structure requires partial removal of concrete, sufficient concrete shall be removed to permit new reinforcing steel to be spliced to existing reinforcing steel. Existing reinforcement that is to be incorporated in new work shall be protected from damage and shall be thoroughly cleaned of adhering material before being embedded in new concrete.

E. Concrete removal shall be performed without damage to the portion that is to remain in place. Damage to the existing concrete, which is to remain in place, shall be repaired to a condition equal to that existing prior to the beginning of removal operations. The cost of repairing existing concrete damaged by the Contractor's operations shall be at the Contractor's expense.

F. At the option of the Contractor, raising devices may be used in place of adjusting manholes to grade with new materials similar in character to those in the original structure.

G. The shape and size of the raising devices shall match the existing frame and shall produce an installation which is equal to or better than the existing installation in stability, support and non-rocking characteristics. Each section of the raising device shall be fastened securely to the existing frame.

3.05 DEMOLITION

A. Demolish indicated existing buildings as shown on the Plans. Use methods required to complete the Work within limitations of governing regulations.

B. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental protection regulations. Do not use water when it may damage construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Proceed with demolition of structural framing members systematically, from higher to lower level.

D. Remove below-grade construction, including footings and foundation walls completely.

E. Remove existing utilities within limits of structure completely. Fill depressions and voids

with onsite or import fill compacted to a relative compaction of 90%.

F. Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory onsite or import fill compacted to a relative compaction of 90%.

PART 4 MEASUREMENT AND PAYMENT

4.01 ADJUST GROUNDWATER MONITORING WELLS TO GRADE

A. Adjustment of groundwater monitoring wells to grade shall be measured by each well that is adjusted. Payment shall be included in the Contract Unit Price per each well adjusted for "Adjust Groundwater Monitoring Wells to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 ADJUST LEACHATE WELLS TO GRADE

A. Adjustment of leachate wells to grade shall be measured by each well that is adjusted. Payment shall be included in the Contract Unit Price per each well adjusted for "Adjust Leachate Wells to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 REMOVE EXISTING CMP AND HDPE DOWNDRAINS AND DRAIN OUTLETS

A. Measurement and payment for removal of existing above ground and underground CEP and HDPE downdrains and drain outlets shall be included in the Contract Lump Sum Price for "Remove Existing CMP and HDPE Downdrains and Drain Outlets" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the removal as shown on the Plans, as specified herein, and as directed by the Design Engineer, including pipe removal, excavations, disposal, and trench backfill and compaction. No additional compensation will be allowed therefore

4.04 REMOVE EXISTING LEACHATE PIPING

A. Measurement and payment for removal and abandonment of existing leachate piping shall be included in the Contract Lump Sum Price for "Remove Existing Leachate Pipe" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the removal as shown on the Plans, as specified herein, and as directed by the Design Engineer, including cutting and capping pipe, excavation, pipe removal, and trench backfill and compaction. No additional compensation will be allowed therefore.

4.05 ADJUST LEACHATE MANHOLES

A. Adjustment of leachate manholes to grade shall be measured by each manhole that is adjusted. Payment shall be included in the Contract Unit Price per each manhole adjusted for "Adjust Leachate Manhole to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to

complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.06 INSTALL G5 TRAFFIC VAULT WITH CHECKER PLATE COVER

A. Installation of G5 traffic vault with checker plate cover shall be measured by each vault that is installed. Payment shall be included in the Contract Unit Price per each vault removed and replaced for "Install G5 Traffic Vault with Check Plate Cover" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the replacement as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.07 ADJUST EXISTING GAS VAULT TO GRADE

A. Adjustment of gas vault to grade shall be measured by each vault that is adjusted. Payment shall be included in the Contract Unit Price per each manhole adjusted for "Adjust Existing Gas Vault to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.08 INSTALL B2436 GAS EXTRACTION VAULT WITH CHECKER PLATE TOP

A. Installation of B2436 gas extraction vault with checker plate cover shall be measured by each vault that is installed. Payment shall be included in the Contract Unit Price per each vault removed and replaced for "Install B2436 Gas Extraction Vault with Check Plate Cover" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the replacement as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.09 ADJUST EXISTING AIR RELEASE VALVE AND VAULT TO BOX GRADE

A. Adjustment of existing air release valve and vault box to grade shall be measured by each valve adjustment that is performed. Payment shall be included in the Contract Unit Price per each vault removed and replaced for "Adjust Existing Air Release Valve and Vault Box to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the replacement as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.10 ADJUST LFG PERIMETER MONITORING WELLS

A. Adjustment of LFG perimeter monitoring wells to grade shall be measured by each well that is adjusted. Payment shall be included in the Contract Unit Price per each well adjusted for "Adjust LFG Monitoring Wells to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.11 REMOVE EXISTING FENCING

A. Measurement and payment for removal of existing fencing shall be included in the Contract Lump Sum Price for "Remove Existing Fencing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the removal as shown on the Plans, as specified herein, and as directed by the Design Engineer, including cutting and capping pipe, excavation, pipe removal, and trench backfill and compaction. No additional compensation will be allowed therefore.

4.12 STRUCTURE DEMOLITION

A. Measure and payment for the demolition of the existing scale house structure shall be included in the Contract Lump Sum Price for "Structure Demolition" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the demolition as shown on the Plans, as specified herein, and as directed by the Design Engineer, including demolition of structure and foundation, removal of utilities, disposal of materials, and backfill and compaction of voids and depressions. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02207
AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all aggregate materials, including aggregate base for the construction of access roads, road crossings, and placement within and around the flare station, sand ballast and hydrobinder infill for the engineered turf, pipe bedding for trenches, rock riprap for lined swales and outfalls, gravel pack material for LFG extraction wells, concrete aggregate, coarse rock for the construction entrance, and tank bedding and backfill for the leachate UST, in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to install the respective aggregate materials.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. *California Test Methods*. California Department of Transportation, Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM C 33	Standard Specification for Concrete Aggregates.
B.	ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates.
C.	ASTM D 2434	Standard Test Method for Permeability of Granular Soils (Constant Head).
D.	CTM 229	Method of Test for Durability Index.
E.	CTM 301	Method for Determining the Resistance "R" Value of Treated and Untreated Bases, Subbases, and Basement Soils by the Stabilometer.

1.04 SUBMITTALS

A. At least 14 calendar days prior to beginning any aggregate material installation, the Contractor shall provide three (3) copies of the name and location of the proposed borrow source, and laboratory test results on the aggregate materials from the proposed borrow source to the Design Engineer which show that the aggregate materials have the properties specified in Part 2 of this Section. The Design Engineer will provide the

Contractor with an approval or rejection of the borrow source and aggregate materials within two (2) working days of receipt of the borrow source information and laboratory test results.

1.05 QUALITY ASSURANCE

A. Testing of the aggregate materials shall be conducted in accordance with the CQA Plan.

B. If the Design Engineer's review of Contractor's submittals indicates that an aggregate material(s) does not meet specified requirements, the Contractor shall provide an alternative material(s) and submit corresponding test results to the Design Engineer for approval.

PART 2 PRODUCTS

2.01 GENERAL

A. Each aggregate product shall come from the same source throughout the Work.

2.02 AGGREGATE BASE

A. The aggregate base material shall be clean, hard, sound, durable, uniform in quality, free of any surface coatings, and free of any detrimental quantity of soft, friable, thin, elongated, or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substance. The aggregate base material may contain Portland cement concrete and asphalt concrete meeting the grading specifications.

B. Aggregate base shall conform to requirements of Section 26 of the Standard Specifications and these Technical Specifications. Aggregate base shall meet the requirements for Class 2, ¾-inch maximum per the Standard Specifications.

2.03 SAND BALLAST INFILL

A. Sand Ballast Infill will meet Particle Size Parameters of ASTM C-33 for fine aggregates as shown in Table 1 below:

Table 1: Sand Ballast Infill ASTM C-33-03 Particle Size Distribution

ASTM C-33-03	
Sieve	Percent Passing
9.5 mm (3/8 in.)	100
4.75 mm (No. 4)	95 to100
2.36 mm (No. 8)	80 to 100

(Continued)

ASTM C-33-03	
Sieve	Percent Passing
1.18 mm (No. 16)	50 to 85
600 µm (No. 30)	25 to 60
300 µm (No. 50)	5 to 30
150 µm (No. 100)	0 to 10

2.04 HYDROBINDER INFILL

A. HydroBinder™ is a cementious product used as the infill component for surface drainage conveyance areas.

B. HydroBinder™ infill Shall be HydroBinder™ Cementitious Infill. The HydroBinder™ infill material may be delivered in either pallet form of 80 lb. bags or 3,000 lb. bulk super sacks.

C. Cement, except as otherwise specified herein, will be a brand of Portland Cement, meeting ASTM C 150 and will be Type I or Type II. Only one brand of cement will be used throughout the duration of this Contract.

D. The cementitious infill mix design will conform to the requirements of ASTM C 387 for high strength mortars.

E. The cementious infill will have a minimum 28 day compressive strength of 5,000 psi.

2.05 PIPE BEDDING

A. Pipe bedding material shall conform to Section 19-3.02E(2) of the Standard Specifications.

2.06 LOOSE ROCK RIPRAP

A. Stone and/or recycled concrete for loose rock riprap shall conform to Section 72-5.02 of the Standard Specifications and the following size requirements:

Screen Size	% (By Weight) Retained Above
4" x 4"	95-100
6" x 6"	75-100
9" x 9"	25-100

2.07 GROUTED ROCK RIPRAP

A. Stone and/or recycled concrete for grouted rock riprap shall be "Light" class rock per Section 72-2.02 of the Standard Specifications.

2.08 GRAVEL PACK

A. Gravel pack material for the LFG extraction wells shall be 1- to 2-inch diameter non-calcareous washed rock.

2.09 CONCRETE AGGREGATE

A. Coarse and fine aggregate for concrete shall conform to ASTM C 33 as determined by the Supplier. All aggregate shall be thoroughly washed. Maximum aggregate size shall be 3/4 inches in diameter.

2.10 COARSE ROCK FOR CONSTRUCTION ENTRANCE

A. Coarse rock for construction entrance shall be 2- to 3-inch crushed stone.

2.11 TANK BEDDING AND BACKFILL

A. Tank bedding shall consist of filter sand.

B. Tank backfill shall be clean naturally rounded aggregate with a mix of particle sizes not less than 1/8-inch or more than ¾-inch (pea gravel) in accordance with the tank manufacturer's specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall provide all construction, grading control, and other staking necessary to construct the aggregate materials to the lines, grades, and thickness shown on the Plans.

3.02 STOCKPILING

A. Materials shall be stockpiled at the Work site at a location(s) designated by the Design Engineer.

B. Stockpiles shall be of sufficient quantity to meet Project schedule and requirements.

C. Surface water shall be directed away from stockpile site(s) so as to prevent erosion or deterioration of materials.

3.03 STOCKPILE CLEANUP

A. Surplus aggregate material stockpiles shall be removed or left in a clean and neat

condition. Stockpile area surface(s) shall be graded to prevent free standing surface water.

3.04 PLACEMENT

A. Aggregate base shall be placed in accordance with the requirements for aggregate base placement in Section 02310 (Access Roads) and Section 15300 (Flare Station) of these Technical Specifications.

B. Pipe bedding shall be placed in accordance with the requirements for backfilling in Section 02225 (Trenching and Backfilling) of these Technical Specifications.

C. Sand ballast infill and HydroBinder infill shall be placed in accordance with the requirements for infill placement, respectively in Section 02773 (Engineered Turf) of these Technical Specifications.

D. Rock riprap shall be placed in accordance with the requirements for placement in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

E. Gravel pack material shall be placed in accordance with the requirements for backfilling in Section 15100 (Landfill Gas [LFG] Extraction Wells) of these Technical Specifications.

F. Coarse rock shall be placed at the construction entrances in accordance with the requirements of Section 02960 (Temporary Erosion and Sediment Controls) of these Technical Specifications.

G. Concrete sand shall be placed in accordance with the requirements of Section 02774 (Geosynthetic Clay Liner [GCL]) of these Technical Specifications.

H. Tank bedding and backfill shall be placed in accordance with the requirements of Section 15500 (Leachate Overflow and Collection System) of these Technical Specifications.

PART 4 MEASUREMENT AND PAYMENT

4.01 AGGREGATE BASE

A. Measurement and payment for aggregate base shall be included in the Contract Unit Prices for “Access Roads” addressed in Section 02310 (Access Roads) and “Flare Station” addressed in Section 15300 (Flare Station) of these Technical Specifications.

4.02 SAND BALLAST INFILL

A. Measurement and payment for sand ballast infill shall be included in the Contract Unit Prices for “Engineered Turf ” addressed in Section 02773 (Engineered Turf) of these Technical Specifications

4.03 HYDROBINDER INFILL

A. Measurement and payment for HydroBinder infill shall be included in the Contract Unit Prices for "Engineered Turf" addressed in Section 02773 (Engineered Turf) of these Technical Specifications

4.04 PIPE BEDDING

A. Measurement and payment for pipe bedding shall be included in the Contract Unit Price paid for the various items of Work for which pipe bedding is required.

4.05 LOOSE AND GROUTED ROCK RIPRAP

A. Measurement and payment for loose and grouted rock riprap shall be included in the Contract Unit Price paid for the various items of Work for which loose and grouted riprap is required.

4.06 GRAVEL PACK

A. Measurement and payment for gravel pack shall be included in the Contract Unit Price for "LFG Extraction Wells" addressed in Section 15100 (Landfill Gas [LFG] Extraction Wells) of these Technical Specifications.

4.07 CONCRETE AGGREGATE

A. Measurement and payment for concrete aggregate shall be included in the Contract Unit Price paid for the various items of Work for which concrete aggregate is required.

4.08 COARSE ROCK FOR CONSTRUCTION ENTRANCE

A. Measurement and payment for coarse rock for the construction entrance shall be considered as included in the Contract Lump Sum Price paid for "Mobilization" addressed in Section 01500 (Mobilization) of these Technical Specifications.

4.09 TANK BEDDING AND BACKFILL

A. Measurement and payment for tank bedding and backfill for the leachate UST installation shall be considered as included in the Contract Unit Price paid for "Leachate UST" addressed in Section 15500 (Leachate Overflow and Collection System) of these Technical Specifications.

END OF SECTION

SECTION 02222
EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall perform all excavation work including clearing, grubbing, stripping, excavation, and grading of the on-site borrow area and construction of the final cover system's foundation layer, drainage and erosion control structures, LFG collection system and condensate drain/discharge components, and leachate UST in accordance with this Section and at the locations and to the dimensions shown on the Plans.

B. The Contractor shall excavate refuse in selected areas and relocate the refuse to the designated refuse relocation area shown on the Plans. Incidental refuse excavation and disposal shall also be performed as part of the installation of drainage, LFG collection system, and condensate drain/discharge components.

C. Excavation to be performed by the Contractor shall also include construction of any necessary haul roads, stockpiling of all excavated materials, hauling and disposal of any excavated refuse, and provisions for temporary dust, erosion, and drainage control measures.

D. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to implement the respective excavation activities outlined above and within this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

1.03 SUBMITTALS

A. Temporary erosion and sediment control measures associated with excavation activities shall be addressed in the Work site's SWPPP prepared as part of Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications.

B. The Contractor shall provide the Design Engineer with certified weight tags issued by the permitted transfer station or solid waste disposal facility for all loads of refuse transported off-site for disposal.

1.04 QUALITY ASSURANCE

A. Observation
   1. The CQA Monitor will periodically observe performance of the excavations to verify conformance with the execution requirements in Part 3 of this Section.

2. If any portion(s) of the excavations are determined by the CQA Monitor to not meet the requirements of this Section, the Contractor, at his expense, shall rework or replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

B. Surveying

1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the excavations to the lines, grades, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Project for use by the Contractor's Land Surveyor or eligible Engineer.
2. All grades and dimensions of completed areas of the excavations shall be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA field surveying that any portion(s) of the excavations does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Unless provided otherwise within this Section, all excavation activities shall conform to the applicable requirements of Section 16 and 19 of the Standard Specifications.

B. The Contractor shall instruct all personnel and maintain strict control over all excavation activities to protect and maintain the integrity of all existing environmental monitoring and control systems and any other facilities for the existing landfill. The cost of repairing any damage to these existing features will be determined by the Owner and be borne by the Contractor. The total repair cost to be borne by the Contractor will include those for exploration to determine extent of damage, mobilization of work crews, materials, material delivery, CQA testing and observation, and additional design.

3.02 CLEARING AND GRUBBING

A. The existing interim cover soil on the landfill surface and natural ground surface within the limits of the on-site borrow area as depicted on the Plans shall be cleared of all vegetative growth, such as brush, grass, weeds, or other deleterious material.

B. Clearing and grubbing shall be performed prior to beginning excavation in any area.

C. Cleared and stripped topsoil shall be stockpiled separately from excavated material or disposed of in accordance with this Section.

3.03 REFUSE EXCAVATION AND RELOCATION

A. Refuse shall be excavated at the designated locations beneath the existing power lines to the lines, grades and dimensions shown on the Plans.

B. After clearing and grubbing, residual existing interim cover soil overlying the designated refuse excavation areas shall be segregated and subsequently reused as foundation layer material. This material shall be free of refuse and shall be placed and compacted in accordance with Section 02240 (Foundation Layer) of these Technical Specifications.

B. Excavated refuse shall be relocated to the designated refuse relocation area shown on the Plans.

C. Relocated refuse placed within the designated refuse relocation area shall be spread in uniform lifts not to exceed 2 feet in thickness and each lift compacted with a minimum of four (4) passes using a dozer.

D. Relocated refuse lifts shall be covered with a minimum of 6 inches of soil at the end of each working day to minimize vector hazards and odor nuisance.

E. Within five (5) working days of completing the refuse excavation work beneath the existing power lines, the refuse relocation area shall be completely covered with a minimum of 12 inches of prepared and compacted foundation layer material in accordance with Section 02240 (Foundation Layer) of these Technical Specifications.

3.04 INCIDENTAL REFUSE EXCAVATION AND DISPOSAL

A. Refuse shall be excavated as necessary to accommodate the installation of drainage, LFG collection system, and condensate drain/discharge components at the locations and to the details shown on the Plans.

B. Excavated refuse may be temporarily stockpiled on and covered with visqueen at a designated location on-site, or discharged directly into a roll-off bin or dump truck. If temporarily stockpiled, the refuse must be removed by the end of each working day and transferred into a roll-off bin or dump truck for subsequent transport and disposal by the Contractor to a permitted transfer station or solid waste disposal facility. Refuse remaining on-site overnight in a roll-off bin or dump truck shall be covered at the end of each working day. Excavated refuse shall not remain on-site for more than a 48-hour period.

C. The Contractor shall not mix excess, surplus, or waste materials from other general construction activities with the refuse derived from the excavation work described in this Section. Those materials shall be managed and paid for separately under the Contract Lump Sum Price for "Mobilization" as outlined in Section 01500 (Mobilization) of these Technical Specifications.

3.05 SOIL EXCAVATION

A. The horizontal control points and one (1) benchmark shall be provided by the Design Engineer in the vicinity of the Work site. It shall be the responsibility of the Contractor to maintain control points and property line markers and to provide and maintain construction

staking, grading control, or other staking necessary to perform the excavation and construct the stockpile.

B. Control points and property line markers that are removed, damaged, or destroyed by the Contractor shall be reestablished by the Contractor at the Contractor's expense.

C. Boulders encountered by the Contractor during excavation shall be removed, separated by size as directed by the Design Engineer, and stockpiled separately from excavated material or disposed of in accordance with this Section.

D. Excavation for drainage and erosion control structures shall conform to Section 19-1.03E of the Standard Specifications.

3.06 GRADING

A. The excavation shall be constructed in conformance with the lines, grades, and dimensions shown on the Plans; all distances and measurements, except elevations and structural dimensions, shall be made on a horizontal plane unless otherwise stated in this Section.

B. When completed, the grading plane for the drainage channels at any point shall not vary more than 0.10 foot above or below the grade shown on the Plans on slopes less than 10 percent nor vary more than 0.20 foot above or below the grade shown on the Plans on slopes greater than 10 percent.

C. Unsuitable materials, as determined by the Design Engineer, encountered at the subgrade elevation shall be removed and stockpiled separately from excavated material or disposed of in accordance with this Section. If, after removal of the unsuitable materials, a surface in accordance with Part 3 of this Section does not result, overexcavation correction procedures in this Section shall be followed.

D. If any portion of the excavation area is excavated by the Contractor below the design (prepared subgrade) elevations shown on the Plans, the Contractor shall perform overexcavation correction procedures, resulting in a surface which meets the requirements of Part 3 of this Section, as directed by the Design Engineer. Overexcavation correction procedures may consist of excavating, grading, and surface preparation of the entire overexcavated slope, or some portion thereof, to a lower subgrade elevation determined by the Design Engineer; backfilling with engineered fill and compacting to provide a firm and unyielding subgrade in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications; or as otherwise directed by the Design Engineer. The cost of overexcavation correction procedures, redesign, additional surveying, and other incidental fees resulting from the overexcavation shall be paid by the Contractor, unless the overexcavation is performed at the direction of the Design Engineer to remove unsuitable materials at the subgrade elevation.

3.07 HAUL ROAD CONSTRUCTION

A. The Contractor shall construct and maintain any haul roads necessary to perform excavation.

B. The location of all haul roads proposed for construction and use by the Contractor must be approved by the Design Engineer.

3.08 DUST CONTROL

A. Dust control shall comply with the Contractor's approved Dust Control Plan.

B. A minimum of two (2) water trucks with operators shall be in operation at all times during excavation to provide dust control at all excavation, haul road, stockpile and staging areas. If necessary, additional water trucks or other equipment with operators shall be provided and used by the Contractor to maintain these areas in a misted condition at all times during excavation.

C. The Design Engineer will require all excavation activities to cease if the Contractor's dust control efforts do not follow the approved Dust Control Plan, or fail to meet any of the requirements of this Part, until such time that the Contractor can demonstrate a return to compliance.

3.09 EROSION AND SEDIMENT CONTROL

A. Erosion and sediment control measures shall be implemented by the Contractor in accordance with the approved SWPPP, and as directed by the Design Engineer for all excavation work areas including haul roads and stockpile areas, adjacent areas which have been disturbed, or other affected areas.

B. The Contractor shall maintain erosion and sediment control measures until the final graded surface of the excavation is approved by the Design Engineer. If erosion creates a final subgrade surface which is not in accordance with any requirements of this Section, overexcavation correction procedures in this Section shall be performed by the Contractor, at the expense of the Contractor, including payment of all incidental fees.

3.10 DRAINAGE CONTROL

A. The Contractor shall provide ample means and devices with which to promptly remove and dispose of all water from any source entering the excavation or stockpile area(s) and maintain these at all times during excavation and until the final graded surface of the excavation and stockpile are approved by the Design Engineer. The Contractor shall perform excavation in the borrow source area in a manner that allows for the discharge and retention of storm water that does no conflict with the Contractor's excavation activities in the borrow area.

3.11 ARCHAEOLOGICAL AND PALEONTOLOGICAL RESOURCES

A. The Design Engineer shall serve as the Archaeological and Paleontological Monitor. The Contractor shall notify the Design Engineer in the event that he suspects that an archaeological or paleontological discovery is found during excavation for the Design Engineer's investigation. Should a paleontological or archaeological discovery be made during excavation, the Contractor shall cease work in that area until the discovery is evaluated or recovered. The Contractor may resume work elsewhere on the Work site that does not disturb the discovery until the evaluation or recovery is completed. Should the discovery result in an unavoidable delay to the Contractor, the Contractor shall immediately notify the Design Engineer of the delay in writing. Additional working days will be allowed for such a delay. The Contractor shall not charge the Owner for the delay under Sections 8-1.09 or 8-1.10 of the Standard Specifications until such delay exceeds a total of 20 hours for the Project, after which the Contractor may be entitled to compensation under said sections.

PART 4 MEASUREMENT AND PAYMENT

4.01 CLEARING AND GRUBBING

A. Clearing and grubbing shall be measured by the acre cleared and grubbed. Payment shall be included in the Contract Unit Price per acre for "Clearing and Grubbing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the clearing and grubbing as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 REFUSE EXCAVATION AND RELOCATION

A. Refuse excavation and relocation shall be measured by the in-place cubic yards to be removed and includes all excavation, loading, transport, placement, compaction, and cover soil. Payment shall be included in the Contract Unit Price per cubic yard for "Refuse Excavation and Relocation" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the refuse excavation and relocation as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 INCIDENTAL REFUSE EXCAVATION AND DISPOSAL

A. Measurement and payment for incidental refuse excavation shall be included in the Contract Unit Price paid for the various items of Work for which incidental refuse excavation is required.

B. Disposal of refuse shall be measured by the tonnage of refuse disposed of off-site at a permitted transfer station or solid waste disposal facility. Payment shall be included in the Contract Unit Price per ton for "Refuse Disposal" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to dispose of refuse as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 SOIL EXCAVATION

A. Measurement and payment for soil excavation associated with construction of the foundation layer, drainage and erosion control structures, LFG collection system and condensate drain/discharge components, and the leachate overflow collection and storage system shall be included in the Contract Unit Price paid for these various items of Work for which soil excavation is required.

END OF SECTION

SECTION 02224
ENGINEERED FILL

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall install all engineered fill including all fill needed for backfilling of the former leachate pond, fill required for conforms outside ClosureTurf™ footprint area, as well as incidental engineered fill placement for access road subgrades, buried header crossings, road crossings, and backfilling anchor trenches and pipe/conduit trenches in the flare station area, in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, equipment, transportation and incidentals as necessary to prepare the subgrade, excavate, haul, place, moisture condition, compact, and grade the material to install the engineered fill.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of engineered fill shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If field and/or laboratory testing by CQA Monitor indicate that any area(s) of engineered fill does not meet compacted moisture content and dry density requirements, the Contractor shall rework the material in that area(s) at his expense until the engineered fill is in conformance with the requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to pay for testing of the recompacted engineered fill material.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from disking or aerating the subject materials to achieve acceptable conditions.

B. Surveying

1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the engineered fill to the lines, grades, contour lines, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Project for use by the Contractor's Land Surveyor or eligible Engineer.
2. All grades and dimensions of completed areas of the engineered fill may be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA verification surveying that any portion(s) of the engineered fill does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 PRODUCTS

2.01 SOURCE

A. On-site material meeting the requirements of this Section and as follows shall be used for engineered fill. The Contractor may need to segregate suitable on-site material for use as engineered fill.

B. Material excavated from within the on-site borrow area and leachate UST excavation meeting the requirements of this Section shall be used for engineered fill.

C. It is expected that sufficient suitable material for engineered fill will be available from the on-site sources described in these Technical Specifications. The Contractor may need to segregate or select material from these sources for use as engineered fill, however the Contractor will not be required to mechanically screen or import material for engineered fill.

2.02 PROPERTIES

A. Engineered fill material shall be soil or soil/rock mixture that is free of organic matter, debris, and/or deleterious or other unsuitable materials.

B. Engineered fill material shall not contain rocks or clods over 6 inches in greatest dimension, and not more than 15 percent by dry weight shall be larger than 2 inches in greatest dimension or as approved by the Design Engineer.

PART 3 EXECUTION

3.01 PLACEMENT

A. Prior to placement of engineered fill on native ground, scarify the exposed soils in-place to a depth of approximately 6 inches, moisture condition to within 1 to 3 percentage points of optimum moisture content, and compact as engineered fill to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

B. General engineered fill shall be placed in 6-inch lifts with a maximum uncompacted thickness of 8 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition in each layer. Engineered fill material shall then be brought to a uniform moisture content within 1 to 3 percentage points of the optimum moisture content, mixed as required to establish uniform moisture, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557.

PART 4 MEASUREMENT AND PAYMENT

4.01 ENGINEERED FILL

A. Engineered fill for backfilling the former leachate pond and the construction of access roads and other improvements outside the ClosureTurf™ footprint area, shall be included in the Contract Unit Price for "Fill (Foundation Layer and Engineered Fill)" addressed in Section 02240 (Foundation Layer) of these Technical Specifications and includes all excavation, transport, placement, moisture conditioning and compaction. The quantity for "Fill (Foundation Layer and Engineered Fill" shall be a final pay quantity as described in Section 9-1.015 of the Standard Specifications and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install engineered fill as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 INCIDENTAL ENGINEERED FILL

A. Measurement and payment for incidental engineered fill shall be included in the Contract Unit Price paid for the various items of Work for which incidental engineered fill is required.

END OF SECTION

SECTION 02225
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall perform all trenching and/or backfilling operations necessary to install corrugated metal pipe (CMP) and high-density polyethylene (HDPE) drainage components, down drains and overflow pipes, sedimentation basin outlet, buried pipes and conduits, anchoring of the ClosureTurf™ (if necessary), and condensate drain lines in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation and incidentals as necessary to implement the trenching and backfilling operations.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of trenching and backfilling shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If field testing by the CQA Monitor indicates that the moisture content or density of any lift, or portion thereof, of trench and former leachate pond backfill fails to meet the specified requirement, the subject layer or portion thereof shall be re-worked, at the Contractor's expense, until the required moisture and density have been attained. No additional backfill shall be placed until the in-place fill has been inspected and accepted by the Design Engineer.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from discing or aerating the subject materials to achieve acceptable conditions.

PART 2 PRODUCTS

2.01 PIPE BEDDING

A. Pipe bedding shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.02 CONDENSATE DRAIN LINE TRENCH BACKFILL

A. Backfill material for the condensate drain line trenches as shown on the Plans shall consist of material excavated from the trench unless specified otherwise by the Design Engineer.

2.03 OTHER TRENCH BACKFILL

A. Backfill material for all other trenches (i.e., utilities, road crossings, ClosureTurf™ anchor trenches, condensate drop-outs/discharge points, etc.) shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 TRENCH PREPARATION

A. Required points of connection, lines, levels, contours, and datum locations shall be identified by the Contractor. Locations for points of connection that are shown on the Plans are approximate. The Contractor shall locate utilities to best serve the intended use and to avoid mechanical and structural interference.

3.02 TRENCH EXCAVATING

A. Trenches shall be excavated to the lines and grades as shown on the Plans. Water or materials that interfere with the work shall be removed.

B. Soft areas of trench subgrade not capable of compaction in place shall be cut out.

C. The trench bottom shall be firm, continuous, relatively smooth and free of rocks and/or unsuitable material prior to the installation of pipe bedding or trench backfill material.

3.03 SHORING, SHEETING, AND BRACING OF TRENCH

A. The trench shall be braced and supported with sheets when necessary to prevent caving during excavation in unstable material, or to protect adjacent structures, property, and workers.

B. The Contractor shall secure a trench permit from the California Division of Industrial Safety prior to the excavation of any trench over 5 feet in depth.

C. Shoring and sheeting shall be removed as the backfill is completed in a manner that will not damage the pipe or permit voids in the backfill.

D. All sheeting, shoring, and bracing of trenches shall conform to the safety requirements of the federal, state, or local public agency having jurisdiction. The most stringent of these requirements shall apply.

3.04 PIPE/CONDUIT TRENCH BACKFILLING

A. Trenches shall be backfilled to the lines and grades as shown on the Plans.

B. Placement methods shall be employed that do not disturb or damage buried drainage pipes and conduits in the trench.

C. Pipe bedding material shall be placed at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth and compacted to 90 percent of maximum dry density as determined by ASTM D 1557.

D. Pipe bedding shall be placed around the sides and to the top of the pipe/conduit, tamped in place, and compacted to 90 percent of maximum dry density as determined by ASTM D 1557.

E. Optimum moisture content of pipe bedding material shall be maintained to attain required compaction density.

F. Portion of trench above pipe bedding shall be backfilled with engineered fill in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

G. Jetting of trenches shall not be permitted, unless allowed by the Design Engineer.

H. For buried pipe that does not require pipe bedding or engineered fill (condensate drain pipe), the trench backfill shall be placed in a manner that will not damage the pipe. The trench backfill shall be compacted to a firm consistency consistent with surrounding erosion-resistant layer material.

3.05 ANCHOR TRENCH BACKFILLING (IF NECESSARY)

A. A placement method shall be employed that does not damage the ClosureTurf™ in the trench.

B. The portion of the trench above the ClosureTurf™ shall be backfilled with engineered fill in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

C. Jetting of trenches shall not be permitted, unless allowed by the Design Engineer.

D. Trenches shall be backfilled to the lines and grades as shown on the Plans.

PART 4 MEASUREMENT AND PAYMENT

4.01 TRENCHING

A. Measurement and payment for trenching per this Section shall be considered as included in the Contract Unit Price paid for the various items of Work for which it is required.

4.02 SHORING, SHEETING, AND BRACING

A. Measurement and payment for any shoring, sheeting and trench bracing per this Section shall be considered as included in the Contract Unit Price paid for the various items of Work for which they are required.

4.03 TRENCH BACKFILLING

A. Measurement and payment for backfilling of trenches per this Section shall be considered as included in the Contract Unit Price paid for the various items of Work for which it is required.

END OF SECTION

SECTION 02240
FOUNDATION LAYER

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall prepare all existing interim cover soil to be incorporated into the foundation layer and place all new foundation layer material as necessary in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare, haul, place and grade soil material to install the foundation layer.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the foundation layer, including verification of thickness, shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If field and/or laboratory testing by CQA Monitor indicates that any area(s) of the foundation layer does not meet compacted moisture content and dry density requirements, the Contractor shall rework the material in that area(s) at his expense until the foundation layer is in conformance with the requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to pay for testing of the recompacted foundation layer material.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from discing or aerating the subject materials to achieve acceptable conditions.

B. Surveying
   1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the foundation layer to the lines, grades, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Work site for use by the Contractor's Land

Surveyor or eligible Engineer.

2. All grades and dimensions of completed areas of the foundation layer may be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA verification surveying that any portion(s) of the foundation layer does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

C. Foundation Layer Thickness

1. If field testing by CQA Monitor indicates that any area(s) of the foundation layer does not meet the minimum thickness requirements, the Contractor shall place additional foundation layer material at his expense until the deficient area(s) is in conformance with the requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to pay for testing of the new foundation layer placement area(s).

PART 2 PRODUCTS

2.01 SOURCE

A. On-site material meeting the requirements of this Section and as follows shall be used for the foundation layer.

B. Existing interim cover soils removed from the designated refuse excavation areas meeting the requirements of this Section shall be used for the foundation layer.

C. Material excavated from within the on-site borrow area meeting the requirements of this Section shall be used for the foundation layer.

D. It is expected that sufficient suitable material for the foundation layer will be available from the above on-site sources. The Contractor may need to segregate or select material from the borrow area for use as foundation layer material, however the Contractor will not be required to mechanically screen or import material for the foundation layer.

2.02 PROPERTIES

A. Foundation layer material shall be soil or soil/rock mixture that is free of organic matter, debris, and/or deleterious or other unsuitable materials.

B. Foundation layer material shall not contain rocks or clods over 6 inches in greatest dimension, and not more than 15 percent by dry weight shall be larger than 2 inches in greatest dimension or as approved by the Design Engineer.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. All vegetative growth on existing interim cover soil surfaces shall be removed in accordance

with the "Clearing and Grubbing" procedures presented in Section 02222 (Excavation) of these Technical Specifications.

B. The existing interim cover soils shall be fine graded to eliminate rough or low areas.

C. The existing interim cover soils shall be scarified within the limits shown on the Plans to a depth of approximately 12 inches, moisture conditioned to within 1 to 3 percentage points of optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

3.02 PLACEMENT OF NEW FOUNDATION LAYER MATERIAL

A. In areas requiring additional foundation layer material as shown on the Plans, new foundation layer material shall be placed in 6-inch lifts with a maximum uncompacted thickness of 8 to 12 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition in each layer. Foundation layer material shall then be brought to a uniform moisture content within 1 to 3 percentage points of the optimum moisture content, mixed as required to establish uniform moisture, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557.

3.03 SURFACE GRADING

A. When completed, the surface of the foundation layer shall conform to the grades shown on the Plans after placement and compaction and at no point on the completed grading plane shall the grade vary above the designated grades by more than 0.10 feet.

B. When completed, the surface of all foundation layer slopes greater than 10 percent shall conform to the grades shown on the Plans. At no point on the completed grading plane shall the grade vary below the designated grades measured perpendicular to the slope, nor by more than 0.20 feet above the designated grades as measured perpendicular to the slope.

PART 4 MEASUREMENT AND PAYMENT

4.01 SUBGRADE PREPARATION

A. Subgrade preparation shall be measured by the square foot and includes all fine grading, scarification, moisture conditioning and recompaction. Payment shall be included in the Contract Unit Price per square foot completed for "Subgrade Preparation" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to prepare the subgrade as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 NEW FOUNDATION LAYER MATERIAL

A. New foundation layer material comprised of interim cover soil removed from the designated refuse excavation areas shall be measured by the in-place cubic yard installed and includes all excavation, transport, placement, moisture conditioning and compaction. The quantity for "Fill (Refuse Excavation Interim Cover Soils)" shall be a final pay quantity as described in Section 9-1.015 of the Standard Specifications and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install new foundation layer material derived from the designated refuse excavation areas as shown on the

Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. New foundation layer material from all other sources shall be measured by the in-place cubic yard installed and includes all excavation, transport, placement, moisture conditioning and compaction. The quantity for "Fill (Foundation Layer and Engineered Fill)" shall be a final pay quantity as described in Section 9-1.015 of the Standard Specifications and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install new foundation layer material as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02310
ACCESS ROADS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall construct all access roads, including grading and subgrade preparation, in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare and construct the access roads.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the access roads shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If any portion(s) of the access road construction is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall rework or remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from discing or aerating the subject materials to achieve acceptable conditions.

PART 2 PRODUCTS

2.01 REINFORCEMENT GEOTEXTILE

A. Reinforcement geotextile for the access road construction shall conform to the requirements of Section 02771 (Reinforcement Geotextile) of these Technical Specifications.

2.02 AGGREGATE BASE

A. Aggregate base for the access road construction shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.03 ENGINEERED FILL

A. Engineered fill for the access road construction shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall provide all construction, grading control, and other staking necessary to construct the access roads to the lines, grades, and dimensions shown on the Plans.

3.02 SUBGRADE

A. Where access roads are not constructed on engineered fill, the subgrade for the access roads shall be scarified a minimum of 6 inches, uniformly moisture conditioned to within 1 to 3 percentage point of optimum moisture content and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557.

B. Where access roads are constructed on engineered fill, the engineered fill shall be placed and compacted in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

C. Where access roads are constructed on the installed engineered turf, the following precautions and requirements shall be implemented:
   1. Vehicle and equipment access on the installed engineered turf during the access road construction shall conform with applicable provisions outlined in Section 02772 (Geomembrane) of these Technical Specifications. This requirement no longer applies once a minimum of 12 inches of material has been placed atop the engineered turf.
   2. The initial lift of engineered fill placed atop the installed engineered turf shall be well graded and shall not contain rock or clods over 1 inch in greatest dimension.
   3. Damage to the underlying engineered turf resulting from the access road construction operations shall be repaired at the Contractor's expense and in accordance with applicable repair procedures outlined in Section 02772 (Geomembrane) of these Technical Specifications.

3.03 REINFORCEMENT GEOTEXTILE

A. Prior to placing geotextile on the subgrade for access roads, the stability of the subgrade shall be checked in the presence of the CQA Officer by proof rolling with a roller or loaded water truck. Areas which are not suitable shall be allowed to air dry until stable or shall be over-excavated and backfilled with aggregate base, at the Contractor's expense.

B. Reinforcement geotextile shall be installed over the access road subgrade and seamed as specified in Section 02771 (Reinforcement Geotextile) of these Technical Specifications, as shown on the Plans, and in accordance with the manufacturer's instructions.

C. Reinforcement geotextile panels shall be installed (unrolled) in the direction of traffic (longitudinally).

D. Reinforcement geotextile panels shall be overlapped a minimum of 2 feet on sides and ends.

E. Trucks and other construction equipment shall not drive on reinforcement geotextile prior to covering with the full thickness of aggregate base.

3.04 AGGREGATE BASE

A. Prior to placing aggregate base on subgrade for access roads, the stability of the subgrade shall be checked in the presence of the CQA Officer by proof rolling with a roller or loaded water truck. Areas which are not suitable shall be allowed to air dry until stable or shall be over-excavated and backfilled with aggregate base, at the Contractor's expense.

B. Trucks shall back-dump aggregate base onto the reinforcement geotextile, driving on previously dumped aggregate base to progress.

C. The aggregate base shall be spread in uniform loose lifts not exceeding 8 inches in thickness.

D. The aggregate base shall be moisture conditioned to within 1 to 3 percentages points of optimum moisture content, and compacted to a minimum of 95 percent of maximum dry density per ASTM D 1557.

E. Access roads shall be "proof rolled" in the presence of the Design Engineer or their representative with a heavy wheel-load vehicle, such as a loaded water truck, to identify weak areas. Weak areas shall be reworked to the Design Engineer's satisfaction without additional compensation.

PART 4 MEASUREMENT AND PAYMENT

4.01 ACCESS ROADS

A. Access roads constructed over engineered turf shall be measured by the square foot in place as determined by the actual length constructed by the actual width constructed and includes all engineered fill (supply and installation), subgrade preparation, reinforcement geotextile and aggregate base. Payment shall be included in the Contract Unit Price per square foot installed for "Access Roads over Engineered Turf" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the access roads as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. All other access roads shall be measured by the square foot in place as determined by the actual length constructed by the actual width constructed and includes all grading, subgrade preparation, reinforcement geotextile and aggregate base. Payment shall be included in the Contract Unit Price per square foot installed for "Access Roads" addressed in this Section and

shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the access roads as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02722
DRAINAGE AND EROSION CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install (including necessary excavations) all drain inlets, drain pipes, sedimentation basin outlet structures, side slope drainage channels (grading only), earthen and lined swales, rock riprap swales, rock riprap outfalls and inlets, and erosion control materials in accordance with this Section and at the locations and to the dimensions and grades shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare and construct the various drainage and erosion control features.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plan*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 [2,700 kN-m/m3]).

1.04 SUBMITTALS

A. At least 14 calendar days prior to beginning any drainage or erosion control construction in accordance with the requirements of this Section, the Contractor shall provide three (3) copies to the Design Engineer of the name and location of material sources, laboratory test results and/or material data sheets conforming with relevant details shown on the Plans.

B. The Contractor shall provide the name and location of source, laboratory test results, and product data sheets (mix design) for the concrete to be used showing that the material meets or exceeds the product requirements. If more than one (1) concrete mix is to be used, mix designs for each area shall be submitted and clearly marked as to the area of Work that the mix is intended for.

C. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall submit the following to the Design Engineer for approval:
   1. Samples, manufacturer's product data sheets, and manufacture's installation guidelines for the following materials to verify that the materials meet or exceed the corresponding product requirements:
      a. CMP, HDPE, fittings, anchor assembly stakes and hardware.
      b. Turf reinforcement mat (TRM) and anchorage stakes.

c. Erosion control netting and anchorage staples.

1.05 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the drainage and erosion control structures shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
3. If any portion(s) of the drainage and erosion control structures is determined by the CQA Monitor to not meet the requirements of this Section, based on either testing or observations, the Contractor shall, at his expense, rework or remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

B. Surveying
1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the drainage components to the lines, grades, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Work site for use by the Contractor's Land Surveyor or eligible Engineer.
2. All lines, grades and dimensions of installed drainage components may be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA verification surveying that any portion(s) of the drainage components does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 PRODUCTS

2.01 DRAIN INLETS

A. Drain inlets shall be as shown on the Plans. Drain inlets shall be manufactured of cast in place concrete or prefabricated reinforced concrete or approved steel equivalent to the dimensions set forth in the Plans.

B. Concrete for the drain inlets shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.02 PIPE AND FITTINGS

A. The CMP for the drain pipe shall be of 16 gauge continuous helical lock corrugated steel pipe conforming to the requirements of Section 66 "Corrugated Metal Pipe" of the Standard Specifications. All CMP and standard assembly fittings required for complete assembly shall be galvanized conforming to the requirements of Section 66-1.02 E(1) of the Standard Specifications for zinc coated steel.

B. HDPE pipe shall be Type S corrugated polyethylene pipe with smooth interior and shall conform to the requirements in AASHTO Designation M294. The pipe shall be manufactured from high-density polyethylene virgin compounds.

C. Pipe (including all couplings and fabricated fittings) shall be supplied from the source approved by the Design Engineer based on the submittal requirements in Part 1.04 of this Section.

D. Anchor assembly stakes and hardware for above ground CMP shall conform to Section 75-1.02 of the Standard Specifications. All hardware shall be galvanized after fabrication. All pipe stakes shall be either galvanized after fabrication, or be fabricated from pre-galvanized pipe. If pre-galvanized pipe is used, weld areas shall be cleaned and painted with zinc-rich primer.

2.03 PIPE BEDDING

A. Pipe bedding shall conform to the requirements of Section 02207 (Aggregate Base) of these Technical Specifications.

2.04 BACKFILL

A. Backfill above the pipe bedding shall consist of material excavated from the trench/excavation unless specified otherwise by the Design Engineer.

2.05 EROSION MATTING

A. Erosion matting as shown on the Plans for erosion mat lined swales shall be lined with TRM and shall be made of thermally-welded PVC monofilaments in a two-dimensional web as manufactured by Greenstreak and distributed as "PEC-MAT," or approved equivalent.

B. Anchorage for the TRM shall be wooden survey stakes, 1 inch by 4 inches in dimension, and approximately 10 to 12 inches in length.

2.06 FILTER GEOTEXTILE

A. Filter geotextile shall conform to the requirements of Section 02771 (Geotextile) of these Technical Specifications.

2.07 ROCK RIPRAP

A. Loose and grouted rock riprap for the swales and outfalls shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.08 CONCRETE

A. Concrete for the drain inlets, sedimentation basin outlet structure foundations, and grouted riprap outfalls shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.09 EROSION CONTROL

A. Straw for erosion control shall be certified weed free.

B. Erosion control netting shall be lightweight polypropylene having an approximate 0.50-inch x 0.50-inch mesh.

C. U-staples to anchor the netting shall be 0.50-inch by 10-inch U-staples as recommended by the netting manufacturer or as approved by the Design Engineer.

2.09 WOOD POSTS AND RAILING

A. The wood used for the posts and railing at the drainage inlets shall be construction common or better grade redwood. The wood shall be painted with two coats of premium quality exterior grade flat white latex paint approved by the Engineer. Nails used to fasten the rails to the posts shall be galvanized box gauge.

2.10 STEEL GRATE

A. The steel grate on the drainage inlet shall be made of #6 reinforcing bars at a 12 inch spacing. The bars shall be shop welded to form the grate per Plans. The ends of the bars in the upper mat shall be bent downward ¾ inch so that they will rest flat on the bottom of the notch at the top of the drainage inlet. The steel in the reinforcing bars may be Grade 40 or 60.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall provide all construction, grading control, and other staking necessary to construct drainage and erosion control structures to the lines and grades shown on the Plans.

3.02 STOCKPILING

A. The Contractor shall stockpile drainage and erosion control materials in an area(s) approved by the Design Engineer.

3.03 EXCAVATION

A. Excavation for drainage and erosion control structures shall be in conformance with the requirements specified in Section 02222 (Excavation) of these Technical Specifications.

3.04 DRAIN INLETS AND DRAIN PIPE

A. Trenching for drain inlets and buried drain pipe shall be in conformance with the requirements specified in Section 02225 (Trenching and Backfilling) of these Technical Specifications.

B. Placement of drain inlets/buried drain pipe and associated bedding and backfill material shall be in conformance with Section 66-1 of the Standard Specifications and Section 02225 (Trenching and Backfilling) of these Technical Specifications.

C. Above ground drain pipe shall be placed and anchored in conformance with Section 66 of the Standard Specifications and as shown on the Plans.

3.05 SEDIMENTATION BASIN OUTLET STRUCTURES

A. Vertical slots shall be cut in the sedimentation basin drainage risers to the dimensions, orientation and frequency as shown on the Plans.

B. Trenching for the drainage riser foundations shall be in conformance with the requirements specified in Section 02225 (Trenching and Backfilling) of these Technical Specifications.

C. Minor concrete for the drainage riser foundations shall be installed as shown on the Plans and placed in conformance with Section 03300 (Concrete) of these Technical Specifications.

D. Placement of backfill material shall be in conformance with Section 66-1 of the Standard Specifications and Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.06 EARTHEN SWALES

A. Earthen swales shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

3.07 EROSION MAT LINED SWALES

A. The TRM shall be installed as shown on the Plans and per manufacturer's recommendations.

B. Trenches for terminal and check slots (anchorage) shall be excavated into the erosion-resistant layer as shown on the Plans. Backfill of trenches shall be compacted to 90 percent of maximum dry density as determined by ASTM D 1557.

C. TRM placed at the top of swale (finish surface) shall be at or below the final grade so surface drainage can flow freely into the swale.

D. TRM shall first be installed in the upstream terminal end slow and rolled downstream with care taken to assure that the TRM conforms to the flow surface of the channel and is not in tension.

E. All splices shall be shingled downstream.

F. Anchorage stakes shall be installed as shown on the Plans and per manufacturer's recommendations.

3.08 LOOSE ROCK RIPRAP LINED SWALES

A. The earthen portion of the swale shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

B. Filter geotextile shall be installed to the dimensions as shown on the Plans and in accordance with Section 02771 (Geotextile) of these Technical Specifications.

C. Rock riprap shall be placed on the earthen and ClosureTurf™ swales (where applicable) to the dimensions as shown on the Plans. Rock riprap shall be placed to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

D. Rock riprap shall not be placed by dumping.

E. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire length of the swale. The placed rock riprap shall be free of pockets of small stones or clusters of larger stones.

3.09 GROUTED ROCK RIPRAP OUTFALLS

A. The footprint of the outfall shall be excavated to the dimensions as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

B. Rock riprap shall be placed within the excavated footprint to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Rock riprap shall not be placed by dumping.

D. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution over the entire footprint of the outfall. The placed rock riprap shall be free of pockets of small stones or clusters of larger stones.

E. Placement of concrete for the grouted rock riprap shall be in conformance with Section 03300 (Concrete) of these Technical Specifications.

3.10 LOOSE ROCK RIPRAP INLETS AND OUTLETS

A. The earthen portion of the inlets and outlets shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

B. Filter geotextile shall be installed to the dimensions as shown on the Plans and in accordance with Section 02771 (Geotextile) of these Technical Specifications.

C. Rock riprap shall be placed on the installed filter geotextile to the dimensions as shown on the Plans. Rock riprap shall be placed to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

D. Rock riprap shall not be placed by dumping.

E. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire

area of protection. The placed rock riprap shall be free of pockets of small stones or clusters of larger stones.

3.11 EROSION CONTROL

A. Following the application of seed and fertilizer, straw shall be blown onto landfill and borrow area surface slopes that are steeper than 10 percent. Blown straw shall be applied to achieve a minimum thickness of 1.5 inches in place.

B. Following application of the straw, cover the straw with erosion control netting. Space netting anchors at a frequency of 1 foot on center along the edges, and one (1) every 35 square feet for interior areas. Space the butt joints 1 foot apart.

PART 4 MEASUREMENT AND PAYMENT

4.01 DRAIN INLETS AND DRAIN PIPE

A. Drain inlets shall be measured by each drain inlet installed and include all trenching, CMP, backfill, concrete, metal cover, and bars at the opening. Payment shall be included in the Contract Unit Price per each unit installed for "Concrete Drain Inlets (4'x4')" and "30" CMP Drain Inlets" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the respective drain inlets as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Above ground drain pipe shall be measured by the linear foot in place and include all pipe, couplings, and anchor assemblies. Payment shall be included in the Contract Unit Price per linear foot installed for the various sizes and types of "CMP Drain Pipe (Above Ground)" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the above ground drain pipe as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

C. Buried drain pipe shall be measured by the linear foot in place and include all trenching, pipe bedding, pipe and couplings, backfill, and compaction. Payment shall be included in the Contract Unit Price per linear foot installed for the various sizes and types of "CMP Drain Pipe (Buried)" and "HDPE Drain Pipe (Buried)" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the respective buried drain pipe as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 SEDIMENTATION BASIN OUTLET STRUCTURES

A. Sedimentation basin outlet structures shall be measured on each outlet structure at each sedimentation basin for the complete installation of the outlet structure including all trenching, excavation, backfill, CMP, HDPE pipe, HDPE riser, pipe bedding, concrete, concrete riprap outfall, and other incidentals shown on the Plans. Payment shall be included in the Contract Unit Price for "Sedimentation Basin Outlet Structures" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the sedimentation basin outlet

labor, equipment, tools, and incidentals required to install the sedimentation basin outlet structures as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore. All payment items under this section shall be excluded from other payment in other sections.

4.03 SIDE SLOPE DRAINAGE CHANNEL GRADING

A. Side slope drainage channel grading shall be measured by the linear foot in place and include all excavation and grading. Installation of the ClosureTurf™ portion is covered separately under payment for the geomembrane and engineered turf pay items. Payment shall be included in the Contract Unit Price per linear foot constructed for "Side Slope Drainage Channel Grading" addressed in this Section and shall include full compensation for providing all labor, equipment, tools, and incidentals required to construct the side slope drainage channels as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 SWALES

A. Earthen swales (Type I) shall be measured by the linear foot in place and include all excavation and grading. Payment shall be included in the Contract Unit Price per linear foot installed for "Type I Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type I swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Earthen swales with TRM (Types II and IV) shall be measured by the linear foot in place and include all excavation, grading and TRM materials. Payment shall be included in the Contract Unit Prices per linear foot installed for "Type II Swales" and "Type IV Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type II and Type IV swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

C. Earthen swales with loose rock riprap (Type III) shall be measured by the linear foot in place and include all excavation, grading, filter geotextile and riprap. Payment shall be included in the Contract Unit Price per linear foot installed for "Type III Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type III swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

D. Loose rock riprap swales over ClosureTurf™ (Type V) shall be measured by the linear foot in place and include all excavation, grading and riprap. Installation of the ClosureTurf™ portion is covered separately under payment for the geomembrane and engineered turf pay items. Payment shall be included in the Contract Unit Price per linear foot installed for "Type V Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type V swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 GROUTED ROCK RIPRAP OUTFALLS

A. Grouted rock riprap outfalls shall be measured by each grouted rock riprap outfall installed and include all excavation, rock riprap and concrete. Payment shall be included in the Contract Unit Price per each unit installed for "Grouted Rock Riprap Outfalls" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the grouted rock riprap outfalls as shown on the Plans, as specified herein, and as directed by the Design Engineer. The Contractor shall make provisions for additional material needed to account for excessive voids between rocks, as no additional compensation will be allowed therefore.

4.06 LOOSE ROCK RIPRAP INLETS AND OUTLETS

A. Rock riprap inlets and outlets shall be measured by each rock riprap inlet and outlet installed and include all excavation, filter geotextile and rock riprap. Payment shall be included in the Contract Unit Price per each unit installed for "Loose Rock Riprap Inlets and Outlets" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the rock riprap protection as shown on the Plans, as specified herein, and as directed by the Design Engineer. The Contractor shall make provisions for additional material needed to account for excessive voids between rocks, as no additional compensation will be allowed therefore.

4.07 EROSION CONTROL

A. Erosion control straw/netting shall be measured by the square foot in place and includes all straw, netting and anchorage. Payment shall be included in the Contract Unit Price per square foot installed for "Erosion Control" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the erosion control materials as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02771
GEOTEXTILE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all filter and reinforcement geotextiles in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials (including sewing thread), equipment, transportation, and incidentals as necessary to install the filter and reinforcement geotextiles, including that needed for testing and joining materials in field (sewing, heat bonding, etc.).

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM D 4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
B.	ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
C.	ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
D.	ASTM D 4632	Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
E.	ASTM D 4751	Standard Test Method for Determining the Apparent Opening Size of a Geotextile.
F.	ASTM D 5261	Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
G.	ASTM D 6241	Standard Test Method for Static Puncture Strength Resistance of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of filter and reinforcement geotextile rolls to the Work site, the Contractor shall submit three (3) copies of the following to the Design Engineer for approval:

1. Samples, product data sheets, and complete description of filter and reinforcement geotextiles that meet or exceed the product requirements of this Section.
2. Manufacturer's Quality Control (MQC) testing reports for filter and reinforcement geotextiles to be delivered to the Work site. At a minimum, results of those tests specified in Part 2 of this Section must be included in the MQC testing reports.
3. Manufacturer's recommended procedures for transporting, unloading, storage, handling, installation, repair, and seaming (sewing, heat bonding, and lapping) of filter and reinforcement geotextiles.
4. Samples, product data sheets, and complete description of sewing thread recommended by the Manufacturer to sew the filter and reinforcement geotextile.

1.05 TRANSPORT AND STORAGE

A. The filter and reinforcement geotextile rolls shall be transported to the Work site by the Contractor with opaque protective coverings in a closed trailer.

B. At least seven (7) calendar days prior to any Work site delivery, the Contractor shall notify the Design Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Design Engineer prior to site delivery.

C. Unloading and storage (stacking) of the filter and reinforcement geotextile rolls at the Work site shall be the responsibility of the Contractor; who shall observe and certify, in writing, that the unloading and storage of filter and reinforcement geotextile rolls was performed in accordance with the submitted Manufacturer's recommended procedures.

D. The Contractor shall transport filter and reinforcement geotextile rolls from the storage area in a manner that does not damage the reinforcement geotextiles, and in accordance with the Manufacturer's recommended procedures.

1.06 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the filter and reinforcement geotextile shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
3. If any portion(s) of the filter and reinforcement geotextile installation is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 FILTER GEOTEXTILE

A. The geotextile filter shall be manufactured of non-woven, continuous or staple filament, needle-punched, polypropylene or polyester, ultra-violet (UV)-stabilized yarn orientated into a stable network that maintains its structure during handling, placement, and long-term service.

B. The geotextile filter shall be chemical resistant and cannot be heat burnished or contain recycled materials.

C. The geotextile filter shall have the following minimum average roll values:

1.	Mass per Unit Weight (ASTM D 5261)	3.8 oz./square yard
2.	Grab Tensile Strength (ASTM D 4632)	110 lbs.
3.	Trapezoidal Tear Strength (ASTM D 4533)	50 lbs.
4.	Puncture (ASTM D 6241)	310 lbs.
5.	Permittivity (ASTM D 4491)	1.7 sec^{-1}
6.	Apparent Opening Size (ASTM D 4751)	<No. 70 U.S. Std. Sieve
7.	UV Resistance (ASTM D 4355)	Retain 70% strength @ 500 hrs.

D. A geotextile product which can be used and meets these specifications is TenCate Mirifi 140N.

2.02 REINFORCEMENT GEOTEXTILE

A. Reinforcement geotextile shall be constructed of polypropylene materials and shall be resistant to damage under normal construction activities, and to biological and chemical degradation.

B. Reinforcement geotextile shall be a woven geotextile manufactured for the purposes of separation, confinement, and roadway subgrade reinforcement.

C. Physical properties of the reinforcement geotextile shall be tested at a minimum testing frequency of once per every 100,000 square feet of reinforcement geotextile manufactured and the physical properties shall be as follows:

Test Method	Property	Required Value/MARV
ASTM D 4632	Grab Tensile	
	-Machine Direction	315 lb.
	-Cross Direction	315 lb.
ASTM D 4632	Grab Elongation	
	-Machine Direction	12%
	-Cross Direction	12%
ASTM D 4833	Puncture	120 lb.
ASTM D 4533	Trapezoid Tear Strength	
	-Machine Direction	113 lb.
	-Cross Direction	113 lb.

D. Geotextile products which can be used and meet these specifications are TC Mirafi 600X, Synthetic Industries Geotex 315ST, or equivalent.

2.02 SEWING THREAD

A. The thread used for sewing of filter and reinforcement geotextiles shall be polymeric and have strength properties equal to or greater than the filter and reinforcement geotextiles.

B. The thread used for sewing of filter and reinforcement geotextiles shall be chemical resistant.

C. The thread used for sewing the filter and reinforcement geotextiles shall be equivalent to that recommended by the filter and reinforcement geotextile Manufacturer(s) submitted in accordance with Part 1.04A of this Section.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. The Contractor shall verify that the material and surface upon which the filter and reinforcement geotextiles are to be placed are complete and in accordance with the Technical Specifications for that material or surface prior to filter and reinforcement geotextile installation.

3.02 INSTALLATION

A. Filter and reinforcement geotextiles shall be installed in accordance with Manufacturer's instructions.

B. Filter and reinforcement geotextiles shall be installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

C. Filter and reinforcement geotextile panels shall be overlapped with sufficient material to create a prayer fold for sewing operations.

D. Filter and reinforcement geotextiles shall be ballasted during installation and until they are covered with the overlying material.

E. Temporary anchorage for the filter and reinforcement geotextiles during placement shall be the responsibility of the Contractor.

F. Terminal ends of reinforcement geotextile, where the type and purpose of the reinforcement geotextile changes as shown on the Plans, shall be overlapped a minimum of 4 feet.

G. Portions of the filter and reinforcement geotextiles wasted by the Installer, and rendered unusable, as determined by the CQA Monitor, shall be transported by the Contractor off-site to a permitted transfer station or solid waste disposal facility for disposal at the Contractor's expense.

3.03 SEAMING

A. All seams for filter and reinforcement geotextiles shall be made by sewing; alternate seaming methods may be allowed if it is demonstrated by the Contractor that the method will create a seam that is acceptable for the intended purpose and will not reduce the properties of the filter and reinforcement geotextiles below those specified in Part 2 of this Section or cause damage to any underlying geosynthetic materials.

B. Soil materials which could adversely affect sewing operations shall be cleaned from the filter and reinforcement geotextiles prior to sewing.

C. A prayer fold shall be created within the overlap prior to sewing.

D. The prayer fold shall be sewn with a 401 two-thread chain stitch.

PART 4 MEASUREMENT AND PAYMENT

4.01 FILTER GEOTEXTILE

A. Measurement and payment for filter geotextile shall be included in the Contract Unit Prices for "Type III Swales", "Type V Swales" and "Rock Riprap Inlet Protection" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

4.02 REINFORCEMENT GEOTEXTILE

A. Measurement and payment for reinforcement geotextile shall be included in the Contract Unit Price for "Access Roads" addressed in Section 02310 (Access Roads) of these Technical Specifications.

END OF SECTION

SECTION 02772
GEOMEMBRANE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and transport to the site all geomembrane as shown on the Plans and a sufficient amount of extrudate rod to complete the extrusion welding necessary for testing and repairing the geomembrane.

B. The Contractor shall furnish all labor, tools, supervision, transportation, and equipment necessary for the installation of the geomembrane, including that needed for testing and welding materials in the field.

1.02 REFERENCES

A. ASTM D 638 Standard Test Method for Tensile Properties of Plastics.

B. ASTM D 746 Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

C. ASTM D 792 Standard Test Method for Specific Gravity and Density of Plastics by Displacement.

D. ASTM D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting.

E. ASTM D 1204 Standard Test Method for Linear Dimensional Changes to Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures.

F. ASTM D 1505 Test Method for Density of Plastics by the Density-Gradient Technique.

G. ASTM D 3895 Standard Test Method for Copper Induced Oxidative Induction Time of Polyolefins by Thermal Analysis.

H. ASTM D 4218 Test Method for Carbon Black Content.

I. ASTM D 4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

J. ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.

K. ASTM D 5397 Standard Test Method for Notched Constant Tensile Load Test of Geomembrane.

L. ASTM D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.

M. ASTM D 5617 Standard Test Method for Multi-Axial Tension Test for Geosynthetics.

N. ASTM D 5994 Sheet Thickness for Textured Geomembrane.

O. ASTM D 6392 Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.

P. ASTM D 7466 Standard Test Method for Measuring Asperity Height of Textured Geomembranes.

Q. FTMS 101C Puncture Resistance.

1.03 QUALIFICATIONS (Not Used - See Section 01010-1.03B)

1.04 SUBMITTALS

A. At least 14 days prior to delivery of geomembrane rolls to the site, the Contractor shall submit the following, in triplicate, to the Engineer for approval:
1. A Certificate of Compliance stating that all resin used for the product to be supplied is from a single source in the United States or Canada, of the same general type, and meets the requirements of Part 2.01 of this Section.
2. Manufacturer's Quality Control (MQC) test results for the geomembrane base resin.
3. Samples, product data sheets, and a complete description of the geomembrane to be supplied that meets or exceeds the product requirements of Part 2.02 of this Section.
4. A 2-foot by 2-foot (minimum size) sample from the same geomembrane specimen tested in accordance with Part 2.02G of this Section and possessing a degree of texturization representative of the material that will be shipped to the site.
5. MQC test results for the geomembrane rolls to be delivered to the site. At a minimum, the results of the tests specified in Part 2.02 of this Section must be included in the MQC testing reports.
6. Manufacturer's recommended procedures for transporting, unloading, storage, handling, installation, repair, seaming (extrusion and fusion welding), and seam testing of geomembrane.
7. A Certificate of Compliance stating that the extrudate rod material meets the product requirements of Part 2.03 of this Section.

B. At least 14 days prior to beginning installation of geomembrane, the Contractor shall submit the following, in triplicate, to the Engineer for approval:
1. Installer's Geomembrane Installation Quality Control Plan, which includes testing procedures and frequencies.
2. Shop Drawings showing the proposed geomembrane panel layout and details of field fabrications including skirt and sleeve pipe boots.
3. Installer's Qualifications including the following:
   a. Resume of Installer's foreman.
   b. Resume of Installer's master welder.
   c. Resumes of Installer's welding and quality control personnel.

C. Upon completion of the geomembrane installation, the Contractor shall submit the following, in triplicate, to the Engineer.
1. Installer's warranty in compliance with Part 1.07B of this Section.

2. As-built geomembrane panel layout drawings showing all panels, testing, sampling, and repair locations.

1.05 TRANSPORT AND STORAGE

A. At least seven days prior to any site delivery, the Contractor shall notify the Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Engineer prior to site delivery.

B. Unloading and storage (stacking) of the geomembrane rolls at the site is the responsibility of the Contractor; however, unloading and storage of geomembrane rolls shall be performed in accordance with the submitted Manufacturer's recommended procedures.

C. The Contractor shall transport geomembrane rolls from the storage area in a manner that does not damage the geomembrane, and in accordance with the Manufacturer's recommended procedures.

D. The storage area for the geomembrane rolls will be located by the Contractor and must be approved by the Engineer.

1.06 QUALITY ASSURANCE TESTING

A. The CQA Monitor will take at least one sample for every 100,000 square feet of geomembrane delivered to the site and perform the following quality CQA conformance testing to verify that the product meets the requirements of Part 2.02 of this Section.
1. Tensile Properties (ASTM D 6693 / ASTM D 638).
2. Density (ASTM D 1505).
3. Carbon Black Content (ASTM D 4218).
4. Carbon Black Dispersion (ASTM D 5596).
5. Sheet Thickness (ASTM D 5994)

B. The CQA Monitor will take at least one sample per lot of geomembrane delivered to the site for CQA conformance testing to verify compliance with the interface shear strength requirements of Part 2.02F of this Section.

C. Geomembrane shipped to the site that does not contain a degree of texturization comparable to the approved texture sample submitted in accordance with Part 1.04A of this Section will be rejected by the Engineer.

D. Sampling for CQA conformance testing may be performed by the CQA Monitor at the manufacturing plant prior to shipping.

E. The CQA Monitor will collect samples and send them to the Geosynthetics Testing Laboratory for seam testing in accordance with Part 3.05E of this Section. Within 48 hours of sampling, the Engineer will accept or reject the seams based on the results of laboratory testing.

F. The Contractor shall assist with seam sampling by cutting samples and repairing sample locations at the direction of the CQA Monitor.

1.07 WARRANTIES

A. The Contractor shall provide a five-year prorata warranty for the geomembrane against deterioration due to exposure to the elements, either exposed or buried.

B. The Contractor shall provide a two-year non-prorata warranty for the geomembrane against installation defects.

PART 2 PRODUCTS

2.01 RESIN

A. The resin used for manufacturing the geomembrane shall be new virgin material, first quality, compounded Linear Low-density Polyethylene (LLDPE), and manufactured specifically for producing geomembrane.

B. Preferred, but not required to have a 4- to 6-inch wide smooth edge to promote welding.

C. No mixing of different resin types shall occur during geomembrane manufacturing.

D. No second run or recycled materials shall be used during geomembrane manufacturing.

E. The resin used for manufacturing the geomembrane shall have a Specific Gravity (ASTM D 792) of minimum 0.940 g/cm^3 after addition of carbon black and other additives.

F. The resin used for manufacturing the geomembrane shall not contain more than 1 percent (by weight) additives other than carbon black.

G. The resin used for manufacturing the geomembrane shall not contain more than 3.5 percent (by weight) total additives.

2.02 GEOMEMBRANE

A. All geomembrane shall be manufactured by the same Manufacturer in the United States or Canada.

B. Geomembrane shall have a structured studded drainage surface on the top side and a spiked friction surface on the bottom side using a method which fully integrates the texture asperities with the sheet, such as Super Gripnet®, or equivalent; no spray-on texturing shall be allowed.

C. Additives for UV protection, thermal stability, or processing agents must not “bloom” to the surface of the geomembrane over time or inhibit welding.

D. Finished geomembrane rolls shall be free from blemishes, holes, pin holes, bubbles, blisters, excessive gels, undispersed resins, undispersed carbon black, contamination by foreign materials, nicks, and cuts.

E. Geomembrane shall meet the following minimum average roll values for the following properties.

TEST	MINIMUM AVERAGE ROLL VALUE[1]	MQC[3] TEST FREQUENCY
Sheet Thickness (ASTM D 5994)	50-mil ±10 % [2]	10 per roll
Density (ASTM D 792, Method B)	0.993 g/cm^3	1 per rail car
Tensile Strength @ Break (ASTM D 6693)	105 ppi	1 per 100,000 ft^2
Elongation @ Break (ASTM D 638)	300 %	1 per 100,000 ft^2
Tear Resistance (ASTM D 1004)	30 lb	1 per 100,000 ft^2
Puncture Resistance (ASTM D 4833)	55 lb	1 per 100,000 ft^2
Carbon Black Content (ASTM D 4218)	2.0 to 3.0 %	1 per 100,000 ft^2
Carbon Black Dispersion (ASTM D 5596)	All Category 1 or 2	1 per 100,000 ft^2
Oxidation Induction Time (ASTM D 3895)	140 minutes minimum @ 200°C	1 per 100,000 ft^2
Low Temperature Brittleness (ASTM D 746)	< -40°F	Certification
Dimensional Stability (ASTM D 1204)	2 % maximum change	Certification
Drainage Stud Height (ASTM D 7466)	130-mil	1 per 100,000 ft2
Friction Spike Height (ASTM D 7466)	175-mil	1 per 100,000 ft2

[1] The average of all measurements on any roll shall not be less than the MARV value.
[2] The minimum allowable thickness for any measurement shall not be less than 10% of the nominal specified thickness. The average of all measurements on any roll shall not be less than 48 mils.
[3] Manufacturing Quality Control.

F. The geomembrane shall have the following minimum seam strength and test failure criteria when welded in accordance with the submitted Manufacturer's recommended procedures:
   1. For peel test specimens:
      a. The failure mode shall be a film tear bond (FTB).
      b. There shall be no more than 10 percent peel penetration into the weld.
      c. The quantitative value for the peel strength shall be a minimum of 75 ppi.
   2. For shear test specimens:
      a. The failure mode shall be film tear bond (FTB).
      b. The specimen shall achieve a 2-inch elongation with the grips initially set one inch back from the edge of the weld.
      c. The quantitative value for bonded seam strength shall be a minimum of 120 ppi.

2.03 EXTRUDATE ROD

A. All extrudate rod shall be made from same resin as the geomembrane.

B. All additives shall be thoroughly dispersed throughout the rod.

C. Extrudate rod shall be free of contamination by moisture or foreign materials.

2.04 FIELD FABRICATIONS

A. All geomembrane used for field fabrications shall be obtained from the approved geomembrane rolls to be used for the panel installation which meet the material property requirements of Part 2.02 of this Section.

B. The Installer shall fabricate and weld all skirt and sleeve pipe boots in the locations shown on the Plans, and as shown on the approved Shop Drawings.

2.05 GEOMEMBRANE SURFICIAL STRIPS

A. Geomembrane surficial strip material shall be Super Gripnet or single-sided geocomposite (200 mil).

2.06 CLOSURE TURF™ COLLECTION FOOT ASSEMBLIES

A. The ClosureTurf™ LFG collection foot is a component of the ClosureTurf™ to provide the interface between the surficial collection strips, the geomembrane, and the LFG collection well head. The collection foot components are to be provided by the manufacturer of the ClosureTurf™ product.

B. PVC assembly components (i.e., pipe, fittings, valves, sample test port, etc.) shall conform to the requirements of Section 15200 (LFG Collection System Components) of these Technical Specifications.

C. Wellhead adapter shall be 2-inch by 1.5-inch flexible coupling with stainless steel band clamps as manufactured by Fernco, or approved equivalent.

2.07 CLOSURE TURF™ PRESSURE RELIEF VALVES

A. The ClosureTurf™ pressure relief valves are a component of the ClosureTurf™ to provide necessary release of pressure in the event the LFG collection system malfunctions. These pressure relief valves are to be provided by the manufacturer of the ClosureTurf™ product.

2.08 FIELD TESTING EQUIPMENT

A. A field tensiometer shall be used by the Installer for seam strength testing and be calibrated and accurate to within 2 pounds.

B. A one-inch (width) by six-inch (length) cutting die shall be used for cutting seam strength test specimens from bulk seam samples.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. The Installer shall verify that the subgrade surface upon which the geomembrane is to be placed is smooth, uniform, firm and unyielding, and free from rocks or other debris. No protrusions, ruts, or ridges greater in depth or height than 1.0 inch shall be allowed prior to geomembrane installation.

B. The Contractor and Installer shall complete and sign the Subgrade Acceptance Form provided by the CQA Monitor, verifying that the surface which the GCL will be installed upon is acceptable. The CQA Monitor and the Design Engineer will also verify that the surface which the GCL will be installed upon is acceptable. Once the Contractor has signed the Subgrade Acceptance Form, it is the Contractor's responsibility to maintain the surface in the condition required by Part 3.01A of this Section.

C. The Contractor is responsible for temporary anchorage during installation and until permanent ballast is fully installed.

D. Prior to and at the middle of each geomembrane welding work shift and whenever adjustments are made to the welding machines, the Installer shall prepare and test trial welds for each welding machine that are being used or will be used during that work shift. Trial welds shall be prepared for both fusion and extrusion welding machines. Trial weld samples for fusion welding machines shall be a minimum of 6-feet in length; trial weld samples for extrusion welding machines will be a minimum of 3-feet in length with the trial weld centered on and running the length of the sample. Trial welds shall be tested as follows.

1. Trial welds shall be allowed to cool to ambient conditions, prior to testing. After cooling, excessive material shall be cut from the beginning and the end of the trial weld sample (approximately 4-inches from each end). Using the cutting die, four 1-inch specimens shall be cut at an even spacing along the length of the trial weld.
2. Using the field tenisometer, two non-adjacent specimens shall be tested for peel adhesion (peel) and two for bonded seam strength (shear). Both sides of fusion welds shall be tested for peel. The rate of separation for both the peel and the shear tests shall be 2 inches per minute. The CQA Monitor will be present for, and observe, all trial weld tests.
3. All peel test specimens shall meet all of the following criteria:
    a. The failure mode shall be a film tear bond (FTB).
    b. There shall be no more than 10 percent peel penetration into the weld.
    c. The quantitative value for the peel strength shall be a minimum of 75 ppi.
4. All shear test specimens shall meet all of the following criteria:
    a. The failure mode shall be film tear bond (FTB).
    b. The specimen shall achieve a 2-inch elongation with the grips initially set one inch back from the edge of the weld.
    c. The quantitative value for bonded seam strength shall be a minimum of 120 ppi.
5. If any of the four test specimens do not meet the peel or shear criteria, the entire trial weld will be rejected and that machine shall not be used for installation of the geomembrane until passing a retest. Retesting shall consist of repeating the entire trial weld sampling and testing procedure on a new weld performed with the failing machine. If the retested trial weld fails, that welding machine shall not be used for installation of the geomembrane until proper adjustments or repairs and a passing trial weld test results. If the welding machine continually fails field testing, the machine shall be tagged and completely removed from work area.

3.02 INSTALLATION

A. Geomembrane panels shall be deployed parallel to the slope by unrolling down the entire length of the slope. Corrections or adjustments shall be made to panels which become askew to the parallel line of the slope. End-to-end panel butt seams shall occur on benches.

B. The textured geomembrane shall be placed in direct and uniform contact with underlying protective cover subgrade soil, with the spikes down and the stud side up. The geomembrane surface shall not be dragged over the underlying subgrade; a plastic slip sheet or other means shall be used to position the geomembrane without dragging it over the subgrade.

C. Adjacent geomembrane panel edges shall be overlapped a minimum of 4-inches for fusion welding. The alignment of the overlap shall be kept consistent by marking overlap indicator points.

D. Geomembrane damaged during handling, transport, or deployment shall be removed or repaired as directed by the Engineer.

E. Geomembrane installation and seaming methods shall not damage underlying subgrade or soil materials; any damage to underlying soil materials shall be repaired at the expense of the Contractor.

F. The Installer shall only deploy the quantity of geomembrane which can be completely welded and anchored by the end of the work shift or day.

G. The Contractor shall prepare an adequate number of sandbags to ballast the geomembrane during deployment. Geomembrane rolls may also be used for ballast provided that no damage to the deployed geomembrane occurs. Only plastic ties shall be used to close sandbags; no metal or wire ties shall be used. Sandbags shall be removed prior to deploying overlying materials and after completion of permanent closure turf ballast installation. Sandbags shall be disposed of as directed by the Engineer. Sandbag fill shall not be disposed of within the limits of work unless the fill consists of material which meets the Specification for the material it is disposed upon. Adequate sandbags and timely covering are required to prevent wind shifting of geomembrane. If shifting of geomembrane occurs, inspection of underlying subgrade will be required to ensure the subgrade has not been compromised. Repairs or replacement will be required if displacement or damage has occurred .

H. The Installer shall deploy and seam the geomembrane in a manner which minimizes wrinkles; however, the Installer shall be responsible for, and coordinate with the Manufacturer in, providing the proper amount of slack in the installed geomembrane to compensate for contraction due to local temperature extremes prior to covering. Stress-bridging and "fishmouths" shall not be allowed.

I. Immediately after geomembrane panels running through ditch flow lines or at toes of slopes are welded, sandbags shall be placed end-to-end along the entire length of the flow or toe line to prevent geomembrane stress-bridging at those locations.

J. The geomembrane surficial strips, ClosureTurf™ collection foot assemblies, and ClosureTurf™ pressure relief valves shall be installed per the Plans and in accordance with manufacturer's recommendations.

K. Portions of the geomembrane wasted by the Installer, and rendered unusable, as determined by the CQA Monitor, shall be transported and disposed of by the Contractor.

L. No equipment will be allowed on slopes exceeding 15% on the partially constructed turf cap system until after the completed installation of the sand infill ballast. On slopes less than

15%, ATV type vehicles will be allowed prior to infill placement if the tire /track pressure is less than 5 psi.

M. Following full specified sand infill ballast thickness installation, shall be limited to light duty vehicles with drivability tire/track pressures of less than 35 psi.

3.03 FUSION WELDING

A. Fusion welding shall only take place when the ambient temperature is between 40°F and 110°F. The Installer shall measure ambient temperature 6-inches above the deployed geomembrane. Special weather seaming plans shall be submitted by the Installer and approved by Engineer to perform fusion welds outside this ambient temperature range.

B. All geomembrane seams shall be fusion welded by the double-track method leaving an air gap for leak testing. Extrusion welding shall only be used for repairs, patches, and fabrications.

C. Fusion welding machines shall complete trial weld procedures and pass field testing as specified in Part 3.01 of this Section prior to welding the geomembrane seams.

D. A power source capable of producing sufficient and constant voltage under the combined line load of other welders and equipment shall be used.

E. The surface of the geomembrane to be welded shall be thoroughly cleaned.

F. Geomembrane panels shall be welded at the same speed, temperature, roller pressure, and gauge settings used to prepare the trial weld; the Installer shall adjust the above settings as temperature conditions indicate and record welding machine number, operator, machine settings, time, and date for each seam welded.

3.04 EXTRUSION WELDING

A. Extrusion welding guns shall complete trial weld procedures and pass field testing as specified in Part 3.01 of this Section prior to welding patches or fabrications.

B. Geomembrane patches to be extrusion welded shall overlap the underlying geomembrane panel a minimum of 4 inches.

C. The Installer shall cut square repair patches with rounded corners large enough to extend a minimum of 4 inches beyond the repair area in all directions.

D. The geomembrane patch shall be tack-welded to the underlying geomembrane panel to prevent movement during grinding and extrusion welding operations.

E. A disc grinder shall be used to remove surface debris and oxidation from the outer edge of overlapped geomembrane patches and the underlying geomembrane. Grinding parallel to seam shall not be allowed.

F. The nozzle of the extrusion gun shall be purged to remove solidified extrudate before each use.

G. The extrusion weld shall completely cover the entire width of the grind area and extend 4 inches up any intersecting fusion weld.

H. A cap strip patch shall be extrusion welded at all fusion welded seam intersections of three or more geomembrane panels.

3.05 QUALITY CONTROL

A. General
   1. The Installer shall perform all quality control procedures and testing in accordance with the approved Geomembrane Installation Quality Control Plan.
   2. The Installer shall maintain an accurate geomembrane panel layout drawing during installation. The drawing shall include: 1) roll and panel numbers; 2) seam numbers; 3) geomembrane limits; 4) anchor trench locations; and 5) seam test sample dates and locations.

B. Deployment
   1. The Installer shall coordinate with the CQA Monitor in assigning geomembrane panel and corresponding seam numbers.
   2. The Installer shall maintain, and submit to the CQA Monitor, daily deployment logs and panel layout drawings as the deployment progresses and record panel and seam numbers, panel dimensions, and deployment quantities.

C. Fusion Welding
   1. The Installer shall maintain, and submit to the CQA Monitor, daily welding logs on which are recorded welding machine number, operator, machine settings, time, and date for each seam welded.
   2. The entire length of each fusion welded seam shall be air-pressure tested by the Installer. The Installer shall provide an air pump capable of generating and maintaining 40 psi of pressure and equipped with a regulator and pressure gauge. The Installer shall provide pressure feed needles with pressure gauges accurate to 1 psi and perform the following air pressure test procedure:
      a. Seal both ends of the fusion welded seam with vise-grip plate clamps or an extrusion weld. Heat may be applied to the seam ends to aid in sealing the seam in conjunction with the clamps. Due to the potential hazard of igniting landfill gas, propane torches or any other flame producing device shall not be used.
      b. At one end of the seam, insert air pressure needle into the fusion weld channel.
      c. Pressurize the channel to 40 psi and maintain pressure for 5 minutes.
      d. Release air from the opposite end of the seam to verify that the entire length of the fusion weld channel was pressurized. If channel pressure is not maintained with a maximum allowable pressure loss of 2 psi over the 5-minute test period or does not stabilize at all; the Installer shall locate the defective area, isolate it, and repeat air pressure test procedures in each direction from the defective area.
      e. The Installer shall maintain air pressure test logs on which are recorded seam numbers, beginning and ending air pressures, beginning and ending test times, lengths of tested seam, defective areas found, and confirmation of repair.

D. Extrusion Welding

1. The Installer shall maintain, and submit to the CQA Monitor, daily welding logs on which are recorded welding machine number, operator, machine settings, time, and date.
2. The Installer shall vacuum test each extrusion welded along its entire length. The Installer shall provide a vacuum pump capable of generating and maintaining a pressure of 30 inches of mercury, and equipped with a regulator and vacuum gauge. The Installer shall also provide a vacuum box with a gasket-type seal and a clean view window, and vacuum gauge accurate to 1 psi and perform the following vacuum test procedure:
    a. Saturate the extrusion weld with a soap and water solution.
    b. Place view box over the saturated weld, create an air tight seal, and apply vacuum in the box.
    c. Maintain the vacuum for 10 seconds and examine weld for forming bubbles which indicate leaks. Mark detected leaks for follow up extrusion weld repair. Retest detected leaks after repair to verify that the leaks were successfully repaired.
    d. The Installer shall maintain vacuum test logs on which are recorded repair numbers, vacuum test dates, and vacuum test results.

E. Seam Test Sampling Procedures

1. The CQA Monitor will determine seam test sample locations at minimum intervals of 500 lineal feet of welded seam. The CQA Monitor may decrease or increase this frequency based on previous seam test results. The Installer shall cut the seam test sample where indicated by the CQA Monitor.
2. The Installer shall repair sample holes with an extrusion welded patch in accordance with Part 3.04 of this Section and perform a vacuum test in accordance with Part 3.05D of this Section.
3. Seam test samples shall be 12-inches wide by 36-inches long with the weld centered along the length of the sample. Sample sizes may be modified at the request of the CQA Monitor. The Installer shall cut one 1-inch specimen from each end of the sample and field test the specimens for peel adhesion in accordance with Part 3.01 of this Section. If these specimens pass the field peel test, the CQA Monitor will divide the remaining sample and submit one specimen to the Geosynthetics Testing Laboratory for further testing and retain one for archive. If either of the specimens fail the field peel test, the Installer shall perform Failed Seam Analysis Procedures in accordance with Part 3.07 of this Section.
4. The Installer may take and test any sample at its option; however, all sampling and testing shall be done under the observation of the CQA Monitor and all tests and repairs shall be in accordance with the procedural requirements of this Part.

3.06 LABORATORY TESTING

A. The Geosynthetics Testing Laboratory will perform the following test procedure at the direction of the Engineer:

1. Test five specimens from each sample submitted for peel adhesion and five specimens from each sample for bonded seam strength (ASTM D 6392).
2. All specimens must meet the criteria specified in Part 3.01C of this Section for each type of test.
3. Both sides of fusion welded seams shall be tested for peel adhesion.

B. The Engineer's acceptance of the welded geomembrane seams will be based on the results of laboratory seam analysis.

C. The Engineer will notify the Installer of acceptance or rejection of the seam within 24 hours of submission of the samples to the Geosynthetics Testing Laboratory.

3.07 FAILED SEAM ANALYSIS PROCEDURES

A. The Installer shall perform the following procedures in the event of a seam failure determined by field or laboratory testing:

1. The Installer shall mark the failed seam at a distance of 10 feet in each direction from the failed test sample location. The Installer shall cut a 12-inch by 12-inch sample from each location, then cut one 1-inch wide specimen from each end of the sample, and field test the specimens for peel adhesion in accordance with Part 3.01 of this Section. If all specimens pass the field peel test, the Installer shall cut, and submit to the CQA Monitor, a 12-inch wide by 18-inch long sample from each location for laboratory seam testing. If any of the specimens fail the field peel test at either location, the Installer shall continue sampling the failed seam at 10-foot intervals until specimens successfully pass the field peel tests and a sample can be submitted for laboratory testing. If specimens continually fail field peel tests at the 10-foot intervals, the entire seam or portion of the welded seam shall be repaired by the Installer as directed by the Engineer.
2. The Installer shall repair the failed length of seam determined by field peel testing with an 18-inch wide extrusion welded cap strip in accordance with Part 3.04 of this Section. The installer shall vacuum test the cap strip in accordance with Part 3.05D of this Section.
3. If the retest sample fails laboratory testing in accordance with Part 3.06 of this Section, the Installer shall repeat the interval sampling and testing procedure.

B. At the discretion of the CQA Monitor, seam test samples will be taken from extrusion welded cap strips exceeding 100 feet in length.

PART 4 MEASUREMENT AND PAYMENT

4.01 GEOMEMBRANE

A. Geomembrane material shall be measured on a horizontal plane in plan view by the square foot of the in-place material installed. The quantity for "Geomembrane" shall be a final pay quantity as described in Section 9-1.02C, "Final Pay Quantities," of the Standard Specifications and as shown on the Plans. The price paid per square foot for geomembrane shall include full compensation for providing all labor, equipment, tools, and incidentals (including ClosureTurf™ pressure relief valves) required for installation of the geomembrane as shown on the Plans, as specified herein, and as directed by the Engineer and no additional compensation will be allowed therefor. The Contractor shall make provisions for additional material needed to account for overlaps, anchorage, and waste, as no additional compensation will be allowed therefor.

4.02 GEOMEMBRANE SURFICIAL STRIPS

A. Geomobrane material for the surficial strips shall be measured by the lineal foot for the 3.5 foot wide strips. The price per lineal foot for geomembrane surficial strips shall be included in the Contract Unit Price per lineal foot installed for "Geomembrane Surficial Strips" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the geomembrane surficial strips as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefor.

4.03 CLOSURE TURF™ COLLECTION FOOT ASSEMBLIES

A. ClosureTurf™ collection foot assemblies, including connection to the LFG collection system piping, shall be measured by each collection foot assembly installed. Payment shall be included in the Contract Unit Price per each unit installed for "ClosureTurf™ Collection Foot Assembly" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install and connect the collection foot assemblies to the LFG collection system piping as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefor.

END OF SECTION

SECTION 02773
ENGINEERED TURF

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all engineered turf in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to install the engineered turf, sand ballast infill, HydroBinder® Infill, and water release vents, including that needed for testing and connecting materials in field.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

ASTM D 2256	Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method.
ASTM D 4595	Test Method for Tensile Product (MD/XD).
ASTM D 4632	Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
ASTM D 4716	Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile.
ASTM D 5035	Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).
ASTM D 5261	Test Methods for Mass Per Unit Area (weight) of Woven Fabrics.
ASTM D 5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.
ASTM D 6241	Standard Test Method for Static Puncture Strength Resistance of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
ASTM D 6913	Standard Test Methods for Particle-Size Distribution.

ASTM D 7277	Standard Test Method for Performance Testing of Articulating Concrete Block Systems in Open Channel Flow
ASTM D 96459	Standard Test Method for Determining Rainfall Induced Erosion
ASTM G 147	Standard Test Method for Determining the UV Stability of Engineered Fiber, Natural and Artificial Weathering Tests.
ASTM G 1545(M)	Standard Test Method for Determining UV Stability (exposed), Modified Cycle, UVA340.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of engineered turf rolls to the Work site, the Contractor shall submit three (3) copies of the following to the Design Engineer for approval:
   1. Samples, product data sheets, and complete description of engineered turf that meets or exceed the product requirements of this Section.
   2. MQC testing reports for engineered turf to be delivered to the Work site. At a minimum, results of those tests specified in Part 2 of this Section must be included in the MQC testing reports.
   3. For the geonet base resin:
      a. A Certificate of Compliance stating that all resin used for the product to be supplied is from a single source in the United States or Canada, of the same general type, and meets the requirements of Part 2 of this Section.
      b. MQC test results.
   4. Manufacturer's recommended procedures for transporting, unloading, storage, handling, installation, repair, and seaming (sewing, heat bonding, lapping, and plastic ties) of the geonet composite.
   5. Samples, product data sheets, and complete description of plastic fasteners (ties) recommended by the Manufacturer to join the geonet and sewing thread recommended by the Manufacturer to sew the geotextile.
   6. Panel layout showing machine direction of rolls.

1.05 TRANSPORT AND STORAGE

A. The engineered turf rolls shall be shipped by the Supplier with protective coverings in a closed trailer or a covered open trailer.

B. At least seven (7) calendar days prior to any Work site delivery, the Contractor shall notify the Design Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Design Engineer prior to Work site delivery.

C. Unloading and storage (stacking) of the engineered turf rolls at the Work site shall be the responsibility of the Contractor; however, unloading and storage of engineered turf rolls shall be performed in accordance with the submitted Manufacturer's recommended procedures. engineered turf rolls shall be stacked no more than three (3) high.

D. The Contractor shall transport engineered turf rolls from the storage area in a manner that does not damage the geonet composite, and in accordance with the Manufacturer's recommended procedures.

1.06 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the engineered turf shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
3. If any portion(s) of the engineered turf installation is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 ENGINEERED TURF

A. The engineered turf is a synthetic structured material consisting of one or more geotextiles tufted with polyethylene yarns that resemble grass blades such as DuraTurf manufactured by Shaw, or equivalent. Engineered turf shall be manufactured of UV-stabilized yarn oriented into a stable network that maintains its structure during handling, placement and long-term service.

B. The engineered turf shall be chemical resistant and cannot be heat burnished or contain recycled materials.

C. The engineered turf shall have the following minimum average roll values:

ENGINEERED TURF COMPONENT

Product Data	Test Method	Values
CBR Puncture	ASTM D6241	800 lb, (MARV)
Tensile Product (MD/XD)	ASTM D4595	1,000 lb/ft min (MARV)
Rainfall Induced Erosion	ASTM D96459	< 0.45% Infill Loss 6 in/hr
Aerodynamic Evaluation	GTRI Wind Tunnel	120 mph with maximum uplift of 0.12 lb/sf
Engineered Turf Fiber UV Stability	ASTM G147	> 60% retained tensile strength at 100 years (projected)
Backing System UV Stability (Exposed)	ASTM G1545 Modified Cycle 1.UVA340	110 lbs/ft retained tensile strength at 6500 hours (projected)
Steady State Hydraulic Overtopping (ClosureTurf® with HydroBinder™)	ASTM D7277/D7276	5 ft overtopping resulting in 29 ft/s velocity and 8.8 psf shear stress for Manning N Value of 0.02
Full Scale Wave Overtopping Test Cumulative Volume (ClosureTurf® with HydroBinder™)	Colorado State University Wave Simulator	165,000 ft^3/ft
Full Scale Wave Overtopping Test Wave Overtopping Discharge(ClosureTurf® with HydroBinder™)	Colorado State University Wave Simulator	4.0 ft^3/s/ft
Transmissivity w/ underlying structured geomembrane Normal stress 50 psf and 0.33 gradient (m2/sec)	ASTM D4716	2.5E -03m^2/sec., min.
Internal Friction of combined components	ASTM D5321	35°, min.
Sand Infill Gradation and Ballast	ASTM D6913	ASTM C-33 Fine Aggregates
Yarn Weight (Total Product Weight)	ASTM D5261	19 oz. / sq. yd. (25 oz. / sq. yd. +-1 oz.)
Tensile Strength of Yarn	ASTM D2256	15 lbs. min.

2.02 SEWING THREAD

A. The thread used for sewing of engineered turf shall be polymeric and have strength properties equal to or greater than the engineered turf.

B. The thread used for sewing of engineered turf shall be chemical resistant.

C. The thread used for sewing the engineered turf shall be equivalent to that recommended by the engineered turf Manufacturer submitted in accordance with Part 1.04A of this Section.

2.03 SAND BALLAST INFILL

A. Sand Ballast Infill will meet Particle Size Parameters of ASTM C 33-03 for fine aggregates as shown in the following Table 1:

Table 1: Sand Ballast Infill

Sieve	Percent Passing
9.5 mm (3/8")	100
4.75 mm (No. 4)	95 to 100
2.36 mm (No. 8)	80 to 100
1.18 mm (No. 16)	50 to 85
600 µm (No. 30)	25 to 60
300 µm (No. 50)	5 to 30
150 µm (No. 100)	0 to 10

2.04 HYDROBINDER™ INFILL

A. HydroBinder™ is a cementious product used as the infill component for surface drainage conveyance areas.

B. HydroBinder™ infill Shall be HydroBinder™ Cementitious Infill. The HydroBinder™ infill material may be delivered in either pallet form of 80 lb. bags or 3000 lb. bulk super sacks.

C. Cement, except as otherwise specified herein, will be a brand of Portland Cement, meeting ASTM C 150 and will be Type I or Type II. Only one brand of cement will be used throughout the duration of this Contract.

D. The cementitious infill mix design will conform to the requirements of ASTM C 387 for high strength mortars.

E. The cementious infill will have a minimum 28 day compressive strength of 5000 psi.

2.05 WATER RELEASE VENTS

A. Water release vent material shall be double-sided geocomposite (200 mil).

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. The Installer shall verify that the material and surface upon which the engineered turf is to be placed is complete and in accordance with these Technical Specifications for that material prior to beginning geonet installation.

B. The Contractor is responsible for temporary anchorage during installation and until permanent anchorage is constructed and completed.

3.02 INSTALLATION

A. Engineered turf shall be installed in accordance with the Manufacturer's instructions.

B. Engineered turf shall be installed with the machine (lengthwise) direction of the roll oriented down the slope in accordance with the Panel Layout.

C. Engineered turf panels shall be deployed from the top of the slope in a way that the engineered turf is laid substantially smooth and filaments are pointing upslope after deployment is complete.

D. The first engineered turf panel deployed shall have the turf filaments facing upward. Subsequent panels shall be deployed turf side down, and on top of the previously installed panel. After seaming each panel, the panel shall be flipped onto the geomembrane component with care to avoid pulling of tufts in the drainage studs.

E. End-to-end panel overlaps shall only occur on benches, unless the length of a slope between benches exceeds the total length of a full engineered turf roll.

F. Engineered turf shall be installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

G. A single stitch prayer type seam shall be constructed using a Nulong sewing machine or equivalent. Sewing thread shall be 207 Polyester or equivalent. Sewing will occur between the 1st and 2nd row of Engineered Turf stitches.

H. Engineered turf shall be ballasted during installation and until the engineered turf is covered with the sand ballast infill material.

I. The water release vents shall be installed per the Plans and in accordance with manufacturer's recommendations.

J. On slopes exceeding 15%, no equipment will be allowed on the partially constructed turf cap system until after the completed installation of the sand ballast infill. On slopes less than 15%, ATV type vehicles will be allowed prior to infill placement if the tire /track pressure is less than 5 psi.

K. Following full specified sand ballast infill thickness installation, shall be limited to light duty vehicles with drivability tire/track pressures of less than 35 psi.

L. Engineered turf damaged during installation shall be removed and/or repaired with a sewn or fastened patch at the direction of the Design Engineer.

M. Portions of the engineered turf wasted by the Installer, and rendered unusable, as determined by the Design Engineer, shall be transported by the Contractor and disposed of off-site at a permitted transfer station or solid waste disposal facility.

3.03 SAND BALLAST INFILL PLACEMENT

A. Sand ballast infill shall be placed between the tufts of the engineered turf and:
   1. Shall be per plan either 5/8-inch thick or 2-1/8-inch thick, with a thickness tolerance of ±1/8 inch. Measuring the sand ballast infill thickness will be performed utilizing a digital caliper, or approved alternate measuring device approved by the CQA Officer.
   2. Shall consist wholly of sand meeting ASTM C-33-03 for fine aggregates. See Section 2.03 - SAND BALLAST INFILL - Table 1 for sand infill ballast grain size parameters.
   3. Engineered turf areas that are to receive sand ballast infill must be accepted by the CQA Officer before placement of sand ballast infill takes place.

B. Sand ballast infill shall be worked into the Engineered Turf between the synthetic yarn blades.

C. Conveyor systems and/or Express Blowers shall be used to spread and place the sand ballast infill.

D. The Contractor shall explain with detail in the Preparatory Meeting the method of sand infill deployment to be used.

E. Previously installed components shall not be displaced or damaged as a result of the sand ballast infill component installation.

F. A standard washer will be utilized as a plate for the point of entry into the sand ballast infill for consistent depth control.

3.04 INFILL – HYDROBINDER® PLACEMENT

A. See also Section 2.04 - HydroBinder® INFILL.

B. The HydroBinder® infill layer may be placed using any appropriate equipment capable of completing the work. Manual hand spreading is acceptable when equipment isn't practical.

C. The Contractor shall explain in detail during the Preparatory Meeting the method of HydroBinder® infill deployment.

D. Installation of HydroBinder® infill will only be performed by a Manufacture's approved installer using techniques and equipment approved by the Manufacture.

E. The HydroBinder® shall be installed into the turf while it is in a dry state. The HydroBinder® will be worked into the tufts so the tufts are in an upright position.

F. The HydroBinder® infill shall be placed dry to a thickness of 7/8 inch with a tolerance of +/- 1/8 inch.

G. The hydration process must occur on the same day as the HydroBinder® infill placement. The required HydroBinder® infill thickness will be achieved prior to the hydration process.

H. The cemented infill shall be hydrated thoroughly, however care must be taken to avoid displacement of the non-hydrated infill. The objective is to soak the area to start the hydration process but not to inundate with water beyond saturation.

I. Once hydration is completed as described, backfill and compaction of the vertical anchor trenches (if applicable) shall take place.

K. The HydroBinder® shall be at minimum performance levels within 24 hours. HydroBinder® that does not meet minimum performance levels within 24 hours will be removed and replaced.

3.05 REPAIR

A. All damaged areas or holes shall be repaired with a patch by the Installer as directed by the Design Engineer.

B. Repairs to engineered turf are completed by using a heat-bonded seam. All tie-in seams along flatter slopes less than 15% with length greater than 25 feet will use an approved leistering machine so consistent pressure is achieved throughout the seam. A hand held heat gun with a pressure wheel shall be used for repair of smaller areas. The patch shall extend 2 feet beyond the edge of the damaged area or hole.

C. Contractor may also demonstrate techniques and practices for approval. Field demonstration and approval by the CQA Officer and the Manufacturer is required before incorporating any alternative repair technique.

PART 4 MEASUREMENT AND PAYMENT

4.01 ENGINEERED TURF WITH 5/8" SAND BALLAST INFILL

A. Engineered Turf with 5/8" Sand Ballast Infill shall be measured by the square foot of engineered turf in place covering the entire limits of waste, installed to the toes of all slopes on the landfill or five feet beyond the limits of waste, whichever is greater, as shown on the Plans. The quantity measured for engineered turf shall be as measured on a horizontal plane in plan view and shall include an allowance for overlaps, anchorage and waste. Payment shall be included in the Contract Unit Price per square foot installed for "Engineered Turf with 5/8" Sand Ballast Infill" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered turf and sand ballast infill, including that needed for testing and connecting materials in field as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 ENGINEERED TURF WITH 2" SAND BALLAST INFILL

A. Engineered Turf with 2" Sand Ballast Infill shall be measured by the square foot of engineered turf in place covering the entire limits of waste, installed to the toes of all slopes on the landfill or five feet beyond the limits of waste, whichever is greater, as shown on the Plans. The quantity measured for engineered turf shall be as measured on a horizontal plane in plan view and shall include an allowance for overlaps, anchorage and waste. Payment shall be included in the Contract Unit Price per square foot installed for "Engineered Turf with 2" Sand Ballast Infill" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered turf and sand ballast infill, including that needed for testing and connecting materials in field as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 ENGINEERED TURF WITH HYDROBINDER INFILL

B. Engineered Turf with HydroBinder® Infill shall be measured by the square foot of engineered turf in place covering the entire limits of waste, installed to the toes of all slopes on the landfill or five feet beyond the limits of waste, whichever is greater, as shown on the Plans. The quantity measured for engineered turf shall be as measured on a horizontal plane in plan view and shall include an allowance for overlaps, anchorage and waste. Payment shall be included in the Contract Unit Price per square foot installed for "Engineered Turf with HydroBinder® Infill" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered turf and HydroBinder® infill, including that needed for testing and connecting materials in field as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 ENGINEERED TURF/GEOMEMBRANE ANCHOR TRENCH

A. Engineered turf/geomembrane anchor trench shall be measured by the lineal foot of anchor trench installed, as shown on the Plans. The quantity measured for the anchor trench shall be measured on the horizontal plan and shall include trenching, placement of material in trench, and backfilling. Payment shall be included in the Contract Unit Price per lineal foot installed for "Engineered Turf/Geomembrane Anchor Trench" and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered tur/geomembrane anchor trench, as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 WATER RELEASE VENTS

A. Water release vents shall be measured by each water release vent installed. Payment shall be included in the Contract Unit Price per each unit installed for "Water Release Vent" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the isolation valves as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefor.

END OF SECTION

SECTION 02900
SEEDING AND FERTILIZING

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall seed and fertilize the on-site borrow area surfaces, earthen drainage swales, and all construction-related disturbed surfaces in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to seed and fertilize the various areas identified herein.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

1.03 SUBMITTALS

A. Prior to seeding, the Contractor shall submit to the CQA Monitor, in triplicate, the name and location of material sources, laboratory test results, and/or material data sheets conforming to the relevant details shown on the Plans as outlined herein.

B. After seeding, the Contractor shall submit to the CQA Monitor the certified tags from the seed bags.

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the seeding, fertilizing and mulching shall be conducted in accordance with the CQA Plan.
   2. If any portion(s) of the seeding and fertilizing is determined by the CQA Monitor to not meet the requirements of this Section, the Contractor, at his expense, shall rework that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 SEED

A. Seeding shall conform to the provisions of Section 20-2.10 (Seed) and Section 20-3.04 (Seeding and Fertilizing) of the Standard Specifications.

B. The seed shall consist of the following mix of species and corresponding application rates:
   1. Trilfolium Incarnaium (Crimson Clover): 25 lbs/AC
   2. Hordeum Vulgare (Common Barley): 50 lbs/AC

3. Festuca Rubra (Creeping Red Fescue): 50 lbs/AC
4. Lolium Perenne (Perennial Ryegrass): 25 lbs/AC

2.02 FERTILIZER

A. Fertilizer shall consist of the following components and percentages:

Ammonia Phosphate Sulfate	16 percent
Phosphoric Acid	20 percent
Water Soluble Potash	0 percent

PART 3 EXECUTION

3.01 GENERAL

A. The method and equipment used to spread the seed and fertilizer shall be subject to the approval of the Design Engineer.

B. Seed and fertilizer shall be applied after the after the access roads and drainage structures have been placed to grade.

C. Seed and fertilizer shall not be applied to the access roads, rock riprap swales, and sedimentation basins.

3.02 APPLICATION

A. The application of seed and fertilizer shall be performed by hydroseeding methods using the following steps:
1. *Step 1:* Seed and fiber shall be hydroseeded onto the designated surfaces at a rate of 150 lbs/AC and 500 lbs/AC, respectively.
2. *Step 2:* Hydromulch with tackifier and fertilizer shall then be applied at rates of 500 lbs/AC (fiber), 150 lbs/AC (tackifier [M-binder, organic bean base glue]), and 200 lbs/AC (fertilizer).

B. All products shall be spread uniformly over all areas subject to revegetation.

PART 4 MEASUREMENT AND PAYMENT

4.01 SEEDING AND FERTILIZING

A. Seeding and fertilizing shall be measured by the acre installed and includes all seed, fertilizer, tackifier and fiber. No adjustments in compensation will be made in the Contract Unit Price paid for "Seeding and Fertilizing" as a result of an increase or decrease in the quantity of revegetation products used, regardless of the reason for the increase or decrease, even if the increase or decrease exceeds 25 percent of the Design Engineer's Estimate. The provisions in Section 4-1.03B (Increased or Decreased Quantities) of the Standard Specifications shall not apply.

B. Payment shall be included in the Contract Unit Price per acre installed for "Seeding and Fertilizing" addressed in this Section and shall include full compensation for providing all

materials, labor, equipment, tools, and incidentals required for seeding and fertilizing as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02960
TEMPORARY EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall implement all erosion control provisions consisting of, but not limited to, the construction of permanent and temporary facilities and taking measures as are necessary to prevent, control and abate water, mud, and erosion damage to public and private property as a result of the construction of this Project. Erosion control shall apply year round to all areas where earthen material is exposed on the Work site and shall not be limited to those areas outlined in these Technical Specifications or as shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to implement the erosion control provisions.

1.02 REFERENCES

A. *Caltrans Standard Specifications (Section 20).* California Department of Transportation, May 2006.

B. *California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ (NPDES No. CAS000002)*. State Water Resources Control Board, 2010.

1.03 SUBMITTALS

A. The Contractor shall prepare and implement a SWPPP for construction activities in accordance with Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications.

PART 2 PRODUCTS

2.01 STRAW BALES

A. Straw for bales shall be noxious weed free and shall be derived from wheat, rice or barley.

2.02 STRAW WATTLES

A. Straw wattles shall be fiber rolls composed of bio-degradable fibers stuffed in a photo-degradable open weave netting.

2.03 ROCK FOR CONSTRUCTION ENTRANCE

A. Rock for the construction entrance shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.04 SILT FENCING

A. Silt Fencing: Filter fabric shall be a pervious sheet of synthetic polymer composed of at least 85% by weight ethylene, propylene, amide, ester, or vinylidene yarn, woven or non-woven. It shall contain stabilizers and/or inhibitors to resist deterioration by heat, water, and ultra-violet light. The fabric shall conform to the following:
   1. The Equivalent Opening Size (U.S. Standard Sieve) shall be within the range 70-100.
   2. The tensile strength (per ASTM D4632) shall be at least 120 pounds.

B. Silt Fencing Posts: Posts for silt fences shall be either 4-inch diameter wood or 1.33 pounds per linear foot steel with a minimum length of 3 feet. Steel posts shall have projections for fastening wire to them.

PART 3 EXECUTION

3.01 SCHEDULE

A. Construction or implementation of erosion control measures shall be performed year round. Between October 15 and May 15 of each year, such temporary erosion control features as are necessary to prevent damage during the forthcoming winter season shall be constructed and remain functional.

B. The Contractor shall comply with the pollution control measures referenced in these Technical Specifications as part of the overall program to control erosion and de-silt runoff.

C. All temporary erosion control facilities shall be maintained during temporary suspension of Work periods.

3.02 PROTECTION

A. All areas of exposed earth created by the Contractor beyond what is shown on the Plans and referred to in these Technical Specifications and areas cleared and grubbed prior to excavation or embankment operations which are subject to wind erosion and runoff shall also be subject to these Technical Specifications, except that the Contractor shall be fully responsible for all costs and liabilities associated with water pollution and temporary erosion control work in these areas.

3.03 TEMPORARY EROSION CONTROL FACILITIES

A. The Contractor shall conduct his operations in such a manner that storm water runoff will be contained within the Work site or channeled into the storm drain system which serves the runoff area. Storm water runoff from one area shall not be allowed to divert to another runoff area.

B. Temporary down drains, drainage structures, and other devices shall be provided to channel storm water runoff water into the respective permanent storm drain systems during construction. Permanent drainage structures, not fully completed, shall be modified as required to accept de-silted runoff.

C. Fill areas, while being brought to grade, and during periods of completion prior to final construction, shall be protected by various measures to eliminate erosion and the siltation of downstream facilities and adjacent areas. These measures may include, but shall not be limited to:

1. Temporary down drains, either in the form of pipes or paved ditches with protected outfall areas;
2. Graded berms around areas to eliminate erosion of embankment slopes by surface runoff;
3. Embankment slopes, not included as part of the construction contract and constructed by the Contractor for temporary access roads, shall be compacted by track walking the face of the slope in a direction perpendicular to the slope contours. Several passes may be required to adequately compact the slope face.

D. Contour graded areas shall be protected against erosion and the resulting siltation of downstream facilities and adjacent areas during grading operations. Various measures may include, but shall not be limited to:

1. Use of graded contour berms to control sheet flow.
2. Supplemental grading of large areas around temporary or unfinished inlet structures, such as inside ramp loops.

E. Culvert pipe used in conjunction with temporary erosion control measures which was new when delivered to the Work site and, in the opinion of the Design Engineer, is not damaged and whose dimensions and other properties conform to the requirements for new material may be used in the new Work.

PART 4 MEASUREMENT AND PAYMENT

4.01 TEMPORARY EROSION AND SEDIMENT CONTROL

A. Measurement and payment for temporary erosion and sediment control provisions including preparation and implementation of a SWPPP shall be considered as included in the Contract Lump Sum Price paid for "Temporary Erosion and Sediment Controls" as addressed in this Section and Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications and includes all compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the Work specified herein and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 03300
CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall supply, transport to the Work site, and install all concrete for construction of drain inlets and the pads at the flare station, post footings for the metal frame pipe supports and security fencing, foundation for the sedimentation basin outlet structures, and grouted rock riprap outfalls in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare and construct the various concrete structures.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. *Manual of Standard Practice*, Concrete Reinforcing Steel Institute (CRSI), 2009.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM A 615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
B.	ASTM C 31	Standard Specification for Making and Curing Concrete Test Specimens in the Field.
C.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
D.	ASTM C 143	Standard Test Method for Slump of Portland Cement Concrete.
E.	ASTM D 1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall provide three (3) copies of the following information to the Design Engineer for approval:
   1. Name and location of the source for the concrete and reinforcing bars.
   2. Laboratory test results for the concrete and reinforcing bars.

3. Manufacturer's product data sheets for the concrete and reinforcing bars to verify that the materials meet or exceed the corresponding product requirements.

1.05 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the concrete components shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
3. If any portion(s) of the concrete is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 CONCRETE

A. Concrete shall be supplied from the same approved source during construction of each structure.

B. Concrete for the drain inlets and flare station concrete pads shall be Type II Portland cement concrete meeting all material requirements of Sections 90-1 and 90-2 of the Standard Specifications and shall exhibit a maximum 4-inch slump when tested in accordance with ASTM C 143 and have a designated 28-day compressive strength of 2,500 psi (drain inlets) and 3,000 psi (flare station concrete pads) when tested in accordance with ASTM C 31 and ASTM C 39.

C. Concrete for post footings and sedimentation basin outlet structure foundations shall be minor concrete conforming to the requirements of Section 90-10 of the Standard Specifications.

D. Concrete for the grouted rock riprap outfalls shall be minor concrete conforming to the requirements of Sections 72-5.02 and 90-10 of the Standard Specifications.

2.02 REINFORCEMENT

A. Reinforcing bars shall be billet-steel bars for concrete reinforcement conforming to ASTM A 615, Grade 40, #4 bars.

2.03 FORMS

A. Forms used in concrete installations shall be APA “Plyform” or equivalent as designed by then Contractor and exhibiting sufficient strength to hold the concrete.

2.04 EPOXY

A. Epoxy used for securing dowels or anchors in concrete shall be Simpson "SET – Epoxy" or Covert "CIA-Gel 7000 Epoxy".

2.05 AGGREGATE BASE

A. Aggregate base for the flare station concrete pads shall conform to the requirements of Section 02207 (Aggregate Base) of these Technical Specifications.

2.06 ENGINEERED FILL

A. Engineered fill for the flare station concrete pads shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The locations, dimensions, and final elevations of the concrete slabs shall be as shown on the Plans or as staked by the Design Engineer.

B. The footprint areas for the flare station concrete pads as shown on the Plans shall be cleared and grubbed in accordance with the requirements of Section 02222 (Excavation) of these Technical Specifications.

C. Following clearing and grubbing, the flare station concrete pad areas shall be overexcavated to a depth of 18 inches and recompacted as engineered fill in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications. Overexcavation is not required if compaction data beneath the concrete slab footprints are available from the former leachate pond backfilling operations that demonstrate that the upper 18 inches meet the engineered fill compaction requirements.

D. Aggregate base for the flare station concrete pads shall be spread in a uniform loose lift not exceeding 8 inches in thickness, moisture conditioned to within 1 to 3 percentage points of the optimum moisture content, and compacted to a minimum of 95 percent of maximum dry density per ASTM D 1557.

3.02 REINFORCEMENT

A. All reinforcement shall be installed in conformance with CRSI's "Manual of Standard Practice".

B. All reinforcement shall be free from rust, oil, dirt, or any other coating.

C. Continuous reinforcing bars shall be lapped at splices at a minimum of 32 diameters.

D. Unless otherwise noted, reinforcement shall have a minimum concrete cover of 3 inches.

E. Reinforcement shall not be damaged and shall be securely supported and anchored to avoid movement during placement of concrete.

3.03 FORMWORK

A. Design and erection of concrete formwork shall be the responsibility of the Contractor. Strength of concrete formwork shall be sufficient to hold the concrete with minimal or no leakage. Shoring and bracing shall be provided to ensure stability of formwork. Three-quarter-inch chamfer strips shall be used at exposed corners.

3.04 CONCRETE SLAB PLACEMENT

A. Subgrade and forms shall be moistened prior to placing concrete.

B. Care shall be taken to not damage or displace the reinforcing steel components.

C. Concrete shall be placed in a continuous operation and thoroughly vibrated to ensure consolidation around reinforcement.

D. The final surface of the concrete slabs shall have a non-slip broom finish.

E. The Contractor shall repair or patch all significant cracks, spalls and irregularities in formed or finished surfaces or other defects, as required to attain the workmanship standards herein.

3.05 MINOR CONCRETE PLACEMENT

A. Minor concrete for post footings and sedimentation basin outlet structure foundations shall be installed as shown on the Plans and in conformance with Sections 51 and 90-10 of the Standard Specifications, as applicable.

B. Minor concrete for the grouted rock riprap shall be placed in conformance with Section 72-5.04 of the Standard Specifications.

3.06 EPOXY SECURED DOWELS OR ANCHORS

A. The diameter and depth of the drill hole shall be as indicated. If not included, the hole shall be drilled 1/8-inch larger and ten (10) times deeper than the diameter of the dowel or anchor.

B. The hole shall be thoroughly cleaned by blowing it out with compressed air and by using a wire brush.

C. Placement of epoxy in the hole shall be performed using a dispensing tool provided by, or recommended by the manufacturer. The hole shall be completely filled with epoxy.

D. The dowel or anchor shall be placed in the hole and the epoxy allowed sufficient time to completely cure before disturbing the dowel or anchor.

PART 4 MEASUREMENT AND PAYMENT

4.01 CONCRETE SLABS

A. The concrete slabs for the flare station shall be measured by the cubic yard of concrete installed and includes all subgrade and pad preparation work, aggregate base, reinforcement steel, formwork, and epoxy secured dowels and anchors. Payment shall be included in the Contract Unit Price per cubic foot installed for "Flare Station Concrete Slabs" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the flare station concrete slabs as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 DRAIN INLETS

A. Measurement and payment for concrete associated with the drain inlets shall be included in the Contract Unit Price for "Drain Inlets" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

4.03 CONCRETE POST FOOTINGS

A. Measurement and payment for concrete post footings associated with the metal frame pipe supports and security fencing for the flare station shall be included in the Contract Unit Prices for "Metal Frame Pipe Supports" addressed in Section 15200 (LFG Collection System Components) and "Security Fencing" addressed in Section 15300 (Flare Station), respectively, of these Technical Specifications.

4.04 SEDIMENTATION BASIN OUTLET STRUCTURES

A. Measurement and payment for concrete associated with the sedimentation basin outlet structure foundations shall be included in the Contract Unit Price for "Sedimentation Basin Outlet Structures" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

4.05 GROUTED ROCK RIPRAP OUTFALLS

A. Measurement and payment for concrete associated with the grouted rock riprap outfalls shall be included in the Contract Unit Price for "Grouted Rock Riprap Outfalls" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

END OF SECTION

SECTION 15100
LANDFILL GAS (LFG) EXTRACTION WELLS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall install all LFG extraction wells as shown on the Plans and in accordance with these Technical Specifications. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to install the LFG extraction wells.

1.02 REFERENCES

A. *Caltrans Standard Specifications*. California Department of Transportation, 2010.

1.03 SUBMITTALS

A. At least 14 calendar days prior to commencement of drilling operations, the Contractor shall submit the following to the Design Engineer for approval:
   1. Drilling subcontractor information, including name of subcontractor, proof of State of California drilling contractor license (Class C-57), type and make of drill rig, names and experience of drill rig operator and helpers, and proposed operating procedures.
   2. The name and location of source, laboratory test results, and/or product data sheets for the following materials to verify that the materials meet or exceed the requirements in Section 7-1.2:
      a. PVC well casing and fittings.
      b. Gravel pack material.
      c. Bentonite.
      d. PVC well bore seal.
      e. Prefabricated Well Head Assemblies.
   3. Manufacturer's recommended installation procedures and operation instructions for prefabricated well head assemblies.
   4. Copies of approved drilling permits (if required) issued by the local governing agency.

B. At the completion of each working day, the Contractor shall prepare a work order summarizing the total footage drilled and amount of materials used for well construction, and submit it to the Design Engineer for approval.

C. The Contractor shall submit to the Design Engineer performance test results for the prefabricated well head assemblies within 14 calendar days of completion of the testing.

1.04 QUALITY ASSURANCE

A. Testing and Observation

1. Testing and/or observation of the casing, annular materials, PVC well bore seal and prefabricated well head assembly installations shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
3. If any portion(s) of the LFG extraction well installations is determined by the Design Engineer to not meet the requirements of this Section based on observations, the Contractor, at his expense, shall mitigate that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 LFG EXTRACTION WELLS

A. PVC WELL CASING AND FITTINGS: PVC well casing and fittings for the LFG extraction wells shall conform to the requirements of Section 15200 (LFG Collection System Components) of these Technical Specifications.

B. GRAVEL PACK: Gravel pack material shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

C. BENTONITE SEAL: Bentonite seal material shall be 100 percent premium grade bentonite clay.

D. PVC WELL BORE SEAL: PVC well bore seals shall consist of a prefabricated pipe boot and a 10-foot by 10-foot skirt manufactured from 30 mil PVC and designed specifically for the intended purpose. The boot portion shall have a minimum length of 4 feet and shall be sized to accommodate a 4-inch diameter well casing.

E. SOIL BACKFILL: Soil backfill material shall be engineered fill material in accordance with Section 02224 (Engineering Fill) of these Technical Specifications.

2.02 PREFABRICATED WELL HEAD ASSEMBLIES

A. Prefabricated well head assemblies for LFG extraction wells shall be Series 3100 PVC well heads manufactured by Real Environmental Products [(209) 296-7900], or approved equivalent. The overall assembly shall include: Series 3100 PVC well head equipped with a 1.5-inch diameter PVC gate valve and dedicated thermometer; orifice assembly with four (4) interchangeable orifice plates with bore diameters of ½ inch, ¾inch, 1 inch and 1-1/2 inch; elastomeric adaptor for connection between the well casing and well head; and a 2-inch diameter PVC flexible hose for connection between the well head and the LFG collection system piping.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor's attention is directed to the details contained in the Plans for information regarding individual well construction characteristics.

B. The locations of LFG extraction wells will be staked by the Design Engineer prior to the commencement of drilling operations.

C. All required drilling permit(s), fees, and inspections shall be arranged, and paid for, by the Contractor.

3.02 DRILLING

A. Drilling and installation of LFG extraction wells shall be by a drilling contractor licensed (Class C-57) in the State of California.

B. Individual LFG extraction wells shall be drilled and installed in a single day so as to minimize the potential for LFG emissions from the borehole. Installation shall include placement of casing, gravel pack, and surface seal (including lower and upper hydrated bentonite seals). The top of the casing shall be capped until installation of the prefabricated well head assembly. In the event of equipment breakdown or other unforeseen circumstance prohibits complete installation of the LFG extraction well within the same working day, provisions shall be made to cover and seal the exposed borehole at the surface to prevent LFG emissions.

C. The boreholes for the LFG extraction wells shall be drilled using a bucket auger drill rig capable of drilling 24-inch diameter boreholes. The Design Engineer will prepare boring logs and associated records.

D. The borehole depths listed in the Plans are estimated and may be adjusted in the field by the Design Engineer.

E. Spoils generated as part of drilling operations may be temporarily stockpiled in proximity of the borehole, or discharged directly into a roll-off bin or dump truck. If temporarily stockpiled, the spoils must be removed by the end of each working day and transferred into a roll-off bin or dump truck for subsequent transport and disposal by the Contractor in accordance with Section 02222 (Excavation) of these Technical Specifications. Spoils remaining on-site overnight in a roll-off bin or dump truck shall be covered at the end of each working day. Spoils shall not remain on-site for more than a 48-hour period.

F. As soon as drilling is completed, a safety screen shall be placed over the top of the borehole. This screen shall stay in place until backfilling is within 4 feet of the surface. The safety screen size should be large enough to accommodate all backfill materials and activities yet not large enough for any human to accidentally fall through.

G. The borehole shall be straight and the well casing shall be installed in the center of the borehole. The Contractor shall take all tension off of the pipe by mechanical means and center the well casing in the middle of the borehole before starting to backfill.

H. PVC well casing joints shall be solvent cemented and secured with 3/8-inch long Type 316 stainless steel lag screws.

I. The completion height of the well casing above ground surface shall be such that the final height of the installed prefabricated well head assembly is 5 feet above final grade.

J. Obstructions and saturated conditions may be encountered during drilling; the Contractor is expected to make reasonable effort to drill through obstructions and saturated conditions and may only abandon the borehole if written approval is obtained from the Design Engineer.

3.03 BACKFILLING

A. Backfilling operations shall commence immediately after well drilling is completed and the well casing has been installed in the borehole. Backfill materials shall be installed as shown on the Plans and as directed by the Design Engineer.
   1. If water is encountered during drilling, the Design Engineer may elect to have the borehole remain open overnight to allow the water level to stabilize. Under this scenario, the Contractor shall make provisions to cover and secure the borehole as a safety precaution and to prevent LFG emissions.

B. The gravel pack shall be poured or scooped through the safety screen at a rate that will not endanger the integrity of the well casing.

C. The upper and lower bentonite seals shall be formed by evenly distributing the bentonite material around the annulus of the well casing and then adding fresh water in a manner that will allow for a thorough saturation of the bentonite. The proportion of water added versus bentonite material shall be in accordance with the bentonite manufacturer's recommendations. This process shall be continued until the minimum bentonite seal thickness as specified on the Plans has been achieved.

D. Soil backfill shall be placed from the top of the lower bentonite seal to the bottom of the upper bentonite seal in a manner that will promote self compaction and avoid bridging of the soil backfill material.

E. The PVC well bore seal shall be installed in accordance with the manufacturer's recommendations around the well casing and placed at the location shown on the Plans. At a minimum, the following provisions shall be implemented during PVC well bore seal installation:
   1. The boot portion of the well bore seal shall be secured around the well casing with stainless steel straps to provide an air-tight connection. Following placement of erosion-resistant layer material, the boot shall be installed in a collapsed position above the final grade to accommodate potential settlement.
   2. Following installation, the PVC well bore seal shall be covered with the overlying GCL material or soil (temporary) if the PVC well bore seal is going to be exposed for more than three (3) working days.

F. For each completed LFG extraction well, the Design Engineer will make a record of borehole and well completion details to include the following information:
   1. Boring log summarizing materials and conditions encountered.

2. Well construction log outlining completion depths and intervals for well casing and construction materials.
3. Map showing the well location by grid coordinates and ground surface elevation.
4. Numbering system to correlate each well with its corresponding well log.

3.04 INSTALLATION OF PREFABRICATED WELL HEAD ASSEMBLIES

A. The prefabricated well head assemblies shall be handled and installed in accordance with the manufacturer's recommendations and as shown on the Plans.

B. Provisions shall be made to ensure that the well head is installed such that the interior extension tube assembly is concentric within the well casing.

C. The completion height of the well head assembly shall be 5 feet above final grade as shown on the Plans.

D. The PVC flexible hose connection between the well head and LFG collection system piping shall be installed with sufficient slack (6 to 8 inches) to accommodate expansion and contraction. "IPS Weld-On 795" plastic pipe cement, or approved equivalent, shall be used for flexible hose connections to the well head and LFG collection system piping.

3.05 ABANDONMENT OF LFG EXTRACTION WELL BOREHOLE (IF REQUIRED)

A. Boreholes approved by the Design Engineer for abandonment shall be backfilled with refuse and/or soil to the final grade and compacted. If refuse is used, the refuse should be mechanically compacted within the borehole using the bucket auger to eliminate potential voids.

B. Upon completion of borehole abandonment activities, the area around the borehole shall be restored to meet the surrounding grades as shown on the Plans.

3.06 PERFORMANCE TESTING

A. During testing of the entire LFG collection system as described in Section 15300 (Flare Station) of these Technical Specifications, the Contractor shall test the prefabricated well head assemblies to verify proper operation. The scope of testing shall include the following:
1. Testing of static and differential pressure ports with valve completely open and completely closed.
2. Operation of temperature gauge.
3. Operation of gas sample port.
4. General inspection of well head assembly, PVC flexible hose, and fittings for leaks.

B. Testing of the static and differential pressure ports and gas sample port shall be conducted using a LANDTEC GEM-2000 Analyzer or equivalent. The Contractor shall measure and record the following information for subsequent submittal to the Design Engineer:
1. Static and differential pressure (valve open and closed).
2. Temperature (valve open and closed).

3. Gas composition: methane, carbon dioxide, oxygen and balance (valve open and closed).

PART 4 MEASUREMENT AND PAYMENT

4.01 LFG EXTRACTION WELLS

A. LFG extraction wells shall be measured by the vertical linear foot installed and includes all drilling, backfilling, and materials. Payment shall be included in the Contract Unit Price per vertical linear foot installed for "LFG Extraction Wells" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the LFG extraction wells as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 PREFABRICATED WELL HEAD ASSEMBLIES

A. Prefabricated well head assemblies shall be measured by each assembly installed and include supply of four (4) interchangeable orifice plates for each assembly. Payment shall be included in the Contract Unit Price per each unit installed for "Prefabricated Well Head Assemblies" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the prefabricated well head assemblies as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 ADDITIONAL BOREHOLE SET-UP

A. Additional borehole set-up (resetting on boreholes allowed to sit overnight for water level stabilization) shall be measured by each set-up required. Payment shall be included in the Contract Unit Price per each occurrence for "Additional Borehole Set-up" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to implement an additional borehole set-up as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 BOREHOLE ABANDONMENT

A. Borehole abandonment shall be measured by the vertical liner foot of borehole abandoned and includes all drilling, backfilling, and materials. Payment shall be included in the Contract Unit Price per vertical linear foot of borehole drilled/backfilled for "Borehole Abandonment" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to implement each borehole abandonment as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 REFUSE DISPOSAL

A. Measurement and payment for disposal of refuse generated by the LFG extraction well drilling operation shall be included in the Contract Unit Price for "Refuse Disposal" addressed in Section 02222 (Excavation) of these Technical Specifications.

4.06 PERFORMANCE TESTING

A. Measurement and payment for performance testing of the prefabricated well head assemblies described in this Section shall be included in the Contract Unit Price paid for "Prefabricated Well Head Assemblies". No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15200
LFG COLLECTION SYSTEM COMPONENTS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all required LFG collection system components, including PVC and HDPE pipe, fittings, and valves, flexible couplings, pipe supports and anchors, condensate drop-outs, and condensate discharge points, as shown on the Plans and in accordance with these Technical Specifications. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals, including excavation and backfilling services, necessary to install the respective LFC collection system components outlined above.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, May 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. American National Standards Institute (ANSI).

E. Plastic Pipe Institute.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM A 193	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
B.	ASTM A 194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
C.	ASTM A 325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength.
D.	ASTM D 1784	Standard Specification for Rigid PVC Compounds and Chlorinated PVC Compounds.
E.	ASTM D 1785	Standard Specification for PVC Plastic Pipe, Schedules 40, 80, and 120.
F.	ASTM D 2464	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 80.

G. ASTM D 2466 Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 40.

H. ASTM D 2467 Standard Specification for Socket-Type PVC Plastic Pipe Fittings, Schedule 80.

I. ASTM D 2513 Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.

J. ASTM D 2564 Standard Specification for Solvent Cements for PVC Plastic Piping Systems.

K. ASTM D 2855 Standard Specification for Making Solvent-Cemented Joints with PVC Pipe and Fittings.

L. ASTM D 3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

M. ASTM D 3350 Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall provide three (3) copies of the following to the Design Engineer for approval:
   1. Manufacturer's product data sheets for the following materials to verify that the materials meet or exceed the corresponding product requirements:
      a. PVC pipe, fittings, and valves (including gasket, seal, bearing and gear materials).
      b. HDPE pipe and fittings.
      c. Vacuum test port fittings.
      d. PVC-HPDE transition coupling.
      e. Flexible couplings and band clamps.
      f. Block type pipe supports and anchors (including concrete masonry blocks, pipe clamps and miscellaneous fittings).
      g. Metal frame pipe supports (including metal frames, pipe clamps and miscellaneous fittings).
      h. Primer and paint.
   2. Manufacturer's recommended procedures for handling (transporting, unloading, storage, etc.), installation, and welding of PVC and HDPE pipe, fittings, and valves, as applicable.

B. At least 14 calendar days prior to conducting performance testing, the Contractor shall submit proposed procedures for the following to the Design Engineer for approval:
   1. Vacuum pressure test of HDPE condensate drain pipe.
   2. Gravity flow discharge test of condensate discharge points.

C. Within 14 calendar days of completion of performance testing for the respective components, the Contractor shall submit to the Design Engineer test results for the following system components:
   1. PVC LFG collection system pipe.
   2. HDPE condensate drain pipe.
   3. Condensate discharge points.

1.05 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the LFG collection system component installations shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
   3. If any portion(s) of the LFG collection system component installations is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 PVC PIPE AND FITTINGS

A. PVC pipe shall meet the requirements of ASTM D 1784 and ASTM D 1785 for Schedule 40 and Schedule 80 PVC pipe. The pipe shall be manufactured from a PVC compound which meets the requirements of Cell Classification 12454-B PVC as outlined in ASTM D 1784.

B. PVC fittings shall meet the requirements of ASTM D 2464, ASTM D 2466, and ASTM D 2467 for Schedule 40 and Schedule 80 PVC pipe fittings. Fittings unavailable in Schedule 40 may be replaced with Schedule 80. The fittings shall be manufactured from a PVC compound which meets the requirements of Cell Classification 12454-B PVC as outlined in ASTM D 1784.
   1. Fittings shall be industrial, heavy duty, hub style.
   2. Socket fittings shall be pressure rated as for the corresponding pipe size prescribed by ASTM D 1785. Threaded fittings shall be pressure rated at 50 percent of the rating for socket fittings.
   3. *Flanges:* Flanges shall meet the following specifications:
      a. Flanges shall be one-piece solid design or two-part van stone type which use the tapered, serrated face and full-face gasket technique for joining and are comparable with ANSI B16.5 Class 150 metal flanges.
      b. Flanges shall be non-shock and pressure rated at 150 psi for water service at 73ºF, and have a minimum burst requirement of 3.3 times the rate pressure.
      c. Bolts shall be Type 316 stainless steel ASTM A 193, Grade B8M hex head and nuts shall be ASTM A 194, Grade 8m hex head.
      d. Gaskets shall be full-face neoprene.

4. *Branch Saddles:* Branch saddles shall either be socket style affixed using PVC cement or clamp-on style secured using stainless steel screws.

2.02 PVC BUTTERFLY VALVES (ISOLATION VALVES)

A. Butterfly valves used for isolating LFG collection system piping segments shall be wafer-type design with a body and disc manufactured from a PVC compound which meets the requirements of Cell Class 12454-B PVC as outlined in ASTM D 1784 and shall be compatible with associated PVC pipe fittings. The PVC butterfly valves shall also meet the following material and performance specifications:

1. Shaft shall be cadmium-plated steel alloy or 300 series stainless steel, positively attached to the disc, and totally sealed from exposure to the process gas or environment. The shaft shall also have a directional indicator on top to indicate disc position with handle removed.
2. Valve body shall be of the wafer design for ease of installation and maintenance and shall be compatible with ANSI B16.5 Class 150 metal flanges.
3. Seat material shall be Viton.
4. Bearings shall be corrosion resistant TFE or polypropylene 20 percent glass filled.
5. Secondary seal material shall be Viton and correspond to the seat material for maximum chemical resistance.
6. Handles and worm gear operators shall be corrosion resistant.
7. Valves shall be non-shock, rated at 150 psi for water service at 73°F, and have a minimum burst requirement of 3.3 times the rate pressure.

2.03 PVC BALL VALVES

A. PVC ball-type valves shall be designed with the major components manufactured from a PVC compound which meets the requirements of Cell Class 12454-B PVC as outlined in ASTM D 1784 and shall be compatible with associated PVC pipe fittings. The PVC ball valves shall also meet the following material and performance specifications:

1. Ball seats shall be virgin TFE and the stem/body seals and seat energizers shall be Viton.
2. PVC socket type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2467.
3. Threaded type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2464 and ANSI B1.20.1 for tapered pipe threads.
4. The valve assembly shall be of construction such that a two-piece body is screwed together to contain seats which are maintained under compressive load against the ball.
5. Valves shall be non-shock, rated at 150 psi for water service at 73ºF, and have a minimum burst requirement of 3.3 times the rated working pressure.

2.04 PVC GATE VALVES

A. PVC gate-type valves shall be designed with the major components manufactured from a PVC compound which meets the requirements of Cell Class 12454-B PVC as outlined in ASTM D 1784 and shall be compatible with associated PVC pipe

fittings. The PVC gate valves shall also meet the following material and performance specifications:

1. Seals shall be Viton.
2. PVC socket type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2467.
3. Threaded type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2464 and ANSI B1.20.1 for tapered pipe threads.
4. Valve wedge shall be constructed of polypropylene and have strain-equalizing threads.
5. Valves shall be non-shock, rated at 150 psi for water service at 73ºF, and have a minimum burst requirement of 3.3 times the rated working pressure.

2.05 PVC CEMENT

A. PVC cements shall meet the requirements of ASTM D 2564 for solvent cemented PVC joints.

2.06 VACUUM/SAMPLE TEST PORTS

A. Vacuum/sample test ports for the LFG collection system piping and ClosureTurf™ collection foot assemblies shall be 1/8-inch flow, ¼-inch threaded polypropylene quick disconnect couplings.

2.07 HDPE PIPE AND FITTINGS

A. HDPE pipe and fittings for the condensate drain piping shall be SDR 9 and rated PE 3408 by the Plastics Pipe Institute. The HDPE pipe shall have a cell classification per ASTM D 3350 of 345444C

B. HDPE pipe and fittings shall meet the following criteria:
   1. The nominal inside diameter of the HDPE pipe shall be true to the pipe size shown on the Plans in accordance with ASTM D 2513.
   2. HDPE fittings for use in laying pipe shall have standard dimensions that conform to ASTM D 3261.
   3. Where possible, HDPE pipe and fittings should be produced by the same manufacturer from identical materials meeting the requirements of this specification. Special or custom fittings may be exempted from this requirement.

2.08 PVC-HDPE TRANSITION COUPLING

A. The PVC-HDPE transition coupling used in the condensate discharge point assemblies to the existing leachate drain shall be Series 735 transition couplings manufactured by Poly-Cam, Inc. [(763) 786-6682], or approved equivalent.

2.09 FLEXIBLE COUPLINGS

A. Flexible couplings shall be 4, 6, or 8 inches in diameter by 18 inches long (Model # LFG44) as manufactured by Snook, Inc. [(2310 799-3333], or approved equivalent.

B. Band clamps used to secure the flexible couplings shall be stainless steel.

2.10 BLOCK TYPE PIPE SUPPORTS AND ANCHORS

A. Blocks for pipe supports and anchors shall be 8” x 8” x 16” masonry blocks.

B. The masonry blocks for the pipe supports shall be equipped with a 2” x 8” redwood cap and #4 rebar stakes covered with rubber hose.

C. Metal frames for the pipe anchors shall be 1-5/8-inch hot-dipped galvanized carbon steel as manufactured by UNISTRUT® (Part No. P1000HS[HG]), or approved equivalent.

D. Pipe clamps shall be galvanized carbon steel and as shown on the Plans.

E. Miscellaneous fittings (i.e., angle braces, bolts, nuts and washers) shall be zinc-coated carbon steel and conform to ASTM A 325.

2.11 METAL FRAME PIPE SUPPORTS

A. Metal frames for pipe supports shall be 1-5/8-inch hot-dipped galvanized carbon steel as manufactured by UNISTRUT® (Part No. P1000HS[HG]), or approved equivalent.

B. Pipe clamps shall be galvanized carbon steel and as shown on the Plans.

C. Miscellaneous fittings (i.e., angle braces, bolts, nuts and washers) shall be zinc-coated carbon steel and conform to ASTM A 325.

2.12 CORRUGATED METAL PIPE (CMP)

A. CMP for pipe supports/drainage for the Type 1 and 3 roadcrossings shall be of 16 gauge CMP continuous helical lock steel conforming to the requirements of Section 66-3 of the Standard Specifications. All CMP shall be galvanization compatible and conform to the requirements of Section 66-3.02 of the Standard Specifications for zinc coated steel.

2.13 STEEL PIPE PROTECTIVE SLEEVES

A. Steel pipe protective sleeves used for the Type 1 and 3 road crossings shall conform to ASTM A53.

2.14 REINFORCED CONCRETE PIPE (RCP) PROTECTIVE SLEEVE

A. The RCP protective sleeve used for the Type 2 road crossing shall conform to ASTM C76, Class III with mesh reinforcement; minimum wall thickness not less than 1.75 inches; steel areas not less than 0.06 square inches per linear foot of pipe barrel; bell and spigot end joints.

2.15 CONCRETE

A. Concrete for block type pipe supports/anchors and metal frame pipe supports shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.16 PIPE BEDDING

A. Pipe bedding for buried header crossings shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.17 ENGINEERED FILL

A. Engineered fill for buried header crossings and road crossings shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The alignment and locations of the LFG collection system components will be staked by the Design Engineer prior to installation.

B. PVC and HDPE pipe, fittings, and valves shall be installed by skilled laborers experienced in installation of such materials.

C. All exposed PVC pipe and fittings shall be painted.

3.02 LFG COLLECTION SYSTEM PIPING

A. LFG collection system piping, including flexible couplings, isolation valves and condensate drop-out points, shall be installed as shown on the Plans.

B. All PVC pipe, fittings and valves shall be handled carefully in loading and unloading, and in such a manner as to avoid shock during placement. PVC pipe, fittings and valves shall not be dropped or dumped.

C. Prior to painting and installation, all PVC pipe, fittings and valves shall be inspected for cuts, scratches, or other damages. Pipe, fittings and valves with imperfections shall not be used.

D. Prior to installation, all PVC pipe and fittings to be left exposed shall be steam cleaned and allowed to dry, then painted with an undercoat coat of high-quality, water-based exterior latex primer, followed by a topcoat of high-quality, ultra-violet resistant, water-based exterior latex paint. The pipe shall be painted to within 6 inches of each end of the pipe section length. Light sanding may be necessary to achieve an acceptable bond. The paint shall be medium gray or white in color, or as specified by the City. Within 24 hours of cleaning, the first coat shall be applied followed by the second coat no more than 48 hours after the first coat has dried. The pipe joints shall be painted in this manner after installation.

E. PVC pipe, fittings and valves shall be joined with socket and solvent cement welding in accordance with ASTM D 2855. Joining of PVC pipe, fittings and valves shall be in accordance with these specifications and the pipe manufacturer's recommendations.

F. All PVC pipe cuts shall be square and perpendicular to the centerline of the pipe. In addition, PVC pipe ends shall be beveled prior to applying primer and solvent cement so that the primer or cement are not wiped off during insertion into the fitting socket.

G. All burrs, chips, etc. generated as a result of cutting operations shall be removed from the pipe interior and exterior. In addition, the inside of the piping shall be kept clean of dirt and debris. Piping left overnight shall be capped.

H. A coating of CPS primer as recommended by the PVC pipe supplier shall be applied to the entire interior surface of the fitting socket, and to an equivalent area on the exterior of the pipe prior to applying solvent cement.

I. The solvent cement shall comply with the requirements of ASTM D 2564 and shall be applied in strict accordance with manufacturer's specifications.

J. PVC pipe, fittings and valves shall not be primed or solvent welded when it is raining or when ambient temperature is below 40°F or above 100°F.

K. After solvent welding, the PVC pipe, fittings and valves shall remain undisturbed until cement has thoroughly set. As a guideline for joint setting time, use 1 hour for ambient temperatures 60°F to 100°F, or 2 hours when ambient temperature is 40°F to 60°F.

L. Flexible couplings shall be installed at the locations shown on the Plans. The flexible couplings shall be installed per the pipe separation criteria specified in the Plans based on the ambient temperature at the time of installation. The stainless steel band clamps shall be secured around the ends of the flexible coupling in such a manner as to provide an air-tight joint.

M. Vacuum/sample test ports shall be installed at the locations and orientations shown on the Plans. The ports shall be installed by drilling and tapping an appropriate sized hole in the LFG collection pipe to allow insertion of the threaded quick disconnect coupling. The ports shall be installed currently with the LFG collection pipe installation and near the end of pipe sections (but not within coupled joints) to facilitate the removal of PVC shavings introduced into the pipe by the drilling/tapping process.

N. Block type pipe supports shall be installed under all pipe segments located on benches. The block type pipe supports shall be spaced at 6 feet on-center (maximum) along the full length of the pipe segments.

O. Block type pipe anchors shall be installed every 50 linear feet (minimum) of LFG collection system piping, as well as at the locations of all tee, elbow and wye fittings (both ends, but not on the fittings themselves). Pipe clamps shall be secured around the LFG header system pipe to ensure that the pipe does not move. Securing of the pipe clamps shall be done in such a manner as to not damage the pipe. No portion of the fittings and flexible couplings shall rest on the block type pipe anchors.

P. Strap type pipe anchors shall be installed at various locations as shown on the Plans to prevent movement associated with thermal expansion. Strap type pipe anchors shall be installed per the Plans and in accordance with the manfucturer’s recommendations.

Q. Metal frame pipe supports shall be installed at channel crossings and near the flare station at the locations shown on the Plans. The pipe supports shall be spaced at 6 feet on-center (maximum) along the full length of the designated spans. Concrete for the pipe supports shall be batched and placed in accordance with the requirements of Section 03300 (Concrete) of these Technical Specifications. The height of cross-bar pipe supports shall be adjusted as appropriate to ensure positive slope of LFG collection system piping.

3.03 BURIED HEADER CROSSINGS

A. Trenching across bench sections shall be to the depth and dimensions shown on the Plans. *Do not excavate deeper than necessary to avoid or minimize the volume of refuse that may be encountered*.

B. Pipe bedding material and LFG collection system piping shall be placed to the dimensions shown on the Plans. LFG collection system piping shall be sloped as shown on the Plans to maintain proper condensate drainage capabilities. The pipe bedding shall be placed in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications

C. The remainder of trench shall be backfilled with engineered fill in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

3.04 ROAD CROSSINGS

A. CMP used for pipe support/drainage and the steel pipe/RCP protective sleeves shall be installed in the orientations shown on the Plans. The CMP shall be aligned with the center line of the drainage swale.

B. A small section of reinforcement geotextile used in the access road construction shall be wrapped around the steel pipe protective sleeve where it will be in direct contact with the underlying pipe support/drainage CMP in order to provide a cushion between the two pipes.

C. LFG collection system piping shall be inserted through the steel pipe/RCP protective sleeves in a manner that will not damage or compromise the LFG collection system piping.

D. Engineered fill shall be placed around and over the CMPs and protective sleeves as shown on the Plans and in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

E. The final surface of the road crossing shall be completed in accordance with the requirements of Section 02310 (Access Roads) of these Technical Specifications and as shown on the Plans.

3.05 CONDENSATE DRAIN PIPE AND FITTINGS

A. The HDPE pipe and fitting manufacturer shall package products for shipment in a manner suitable for safe transport and shall be subsequently handled in accordance with the manufacturer's recommendations.

B. Prior to installation, all HDPE pipe and fittings shall be inspected for cuts, scratches, or other damages. Pipe and fittings with imperfections shall not be used.

C. Trench excavation and backfill for buried HDPE pipe and fittings shall be as shown on the Plans.

D. HDPE pipe connection ends and fittings shall be joined by butt fusion procedures in accordance with the HDPE pipe and fitting manufacturer's recommended procedures.

E. The Contractor shall not bend the HDPE pipe to a degree greater than the minimum radius recommended by the manufacturer.

F. The HDPE pipe shall not be subjected to strains that will overstress or buckle piping or impose excessive stress on joints.

G. Open ends of fused HDPE pipe shall be covered or capped at the end of each working day to prevent entry by animals or debris.

H. For segments completed above ground, provide sufficient slack to allow for thermal expansion and contraction so as to not promote excessive stress on the piping following installation.

I. For segments completed below ground, the Contractor shall allow for thermal expansion or contraction of the HDPE pipe within the trench and coordinate pipe backfill operations to avoid buildup of thermal stresses. Whenever possible, segment tie-ins shall be completed within the trench to prevent overstressed conditions.

J. Following placement of HDPE pipe, sufficient time shall be allowed (per manufacturer's recommendations) for the pipe to adjust to trench temperature prior to testing, segment tie-ins, or backfilling activities.

3.06 CONDENSATE DROP-OUTS

A. Condensate drop-outs, including u-trap assemblies, shall be installed at the locations and to the dimensions shown on the Plans. *Do not excavate deeper than necessary to avoid or minimize the volume of refuse that may be encountered.*

B. The transition from PVC to HDPE shall be at the flange connection as shown on the Plans.

C. PVC and HDPE pipe, fittings and valves shall be installed in accordance with Part 3.02 (LFG Collection System Piping) and Part 3.05 (Condensate Drain Pipe and Fittings) of this Section.

D. Strap type pipe anchors shall be installed at various points on the u-trap piping as shown on the Plans to prevent movement associated with thermal expansion. Strap type pipe anchors shall be installed per the Plans and in accordance with the manfucturer's recommendations.

E. Following construction of u-trap assemblies and prior to start of LFG collection system operations, the u-trap assemblies shall be filled with clean water.

3.07 CONDENSATE DISCHARGE POINTS

A. Condensate discharge points shall be installed at the locations and to the dimensions shown on the Plans.

B. Soil and/or refuse shall be excavated to expose the existing condensate drain. If refuse is encountered, the refuse shall be removed and disposed of in accordance with Section 02222 (Excavation) of these Technical Specifications.

C. When entering excavations to install branch saddles, miscellaneous piping and/or backfill materials, the Contractor's Health and Safety Plan shall be followed accordingly, including trench safety, LFG hazards and possible confined space entry (i.e., oxygen-deficient atmosphere).

D. PVC and HDPE pipe and fittings shall be installed in accordance with Part 3.02 (LFG Collection System Piping) and Part 3.05 (Condensate Drain Pipe and Fittings) of this Section.

E. For condensate discharge points located within the limits of the final cover system, the respective final cover system components shall be placed and installed in accordance with Sections 02240 (Foundation Layer), 02772 (Geomembrane), and 02773 (Engineered Turf) of these Technical Specifications. Portions below the final cover system shall be backfilled in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications.

F. For condensate discharge points located outside the limits of the final cover system, the excavation shall be backfilled in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.08 PERFORMANCE TESTING

A. *PVC LFG Collection System Pipe:* After all PVC pipe and fittings have been joined, including flexible couplings, all connections shall be visually inspected to verify that the connections are securely intact. Tension on the stainless steel straps for the flexible couplings shall also be checked to ensure that the ends of the flexible couplings are adequately secured to the LFG collection system piping and that the tension within the flexible couplings is appropriate based on the given ambient temperature.

B. *HDPE Condensate Drain Pipe:* Before the HDPE condensate drain pipe is connected to the PVC piping system and existing leachate drain, each HDPE condensate drain pipe segment shall be tested and withstand a minimum of 5 psig vacuum for a period of not less than 10 minutes without any drop in pressure. Vacuum shall be measured by a

mercury manometer, slope gauge, or an equivalent device calibrated to read increments of not greater than 0.1 psi. The source of the vacuum shall be isolated before the test is made. Testing shall be performed prior to backfilling segments of the HDPE condensate drain pipe that are to be buried. It shall be the Contractor's responsibility to ensure that proper safety precautions are observed during the testing.

C. *Condensate Discharge Points:* After the HDPE condensate drain pipe is connected to the leachate drain but prior to connecting it to PVC piping system, the functionality of each HDPE condensate drain pipe segment shall be tested to verify each segment's ability to transmit water to the existing leachate drain. Testing shall include introducing water at the uppermost point (i.e., highest elevation) of each segment and verifying the influx of water into the existing leachate drain utilizing the closest downgradient manhole as the point of observation.

PART 4 MEASUREMENT AND PAYMENT

4.01 LFG COLLECTION SYSTEM PIPING

A. PVC pipe and fittings for the LFG collection system piping shall be measured by the linear foot of each for each size of pipe installed and includes all fittings. Payment shall be included in the Contract Unit Price per linear foot installed for "PVC Pipe and Fittings" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the PVC pipe and fittings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Isolation valves shall be measured by each isolation valve installed. Payment shall be included in the Contract Unit Price per each unit installed for "Isolation Valves" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the isolation valves as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

C. Flexible couplings shall be measured by each flexible coupling installed. Payment shall be included in the Contract Unit Price per each unit installed for "Flexible Couplings" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the flexible couplings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

D. Vacuum test ports shall be measured by each vacuum test port installed. Payment shall be included in the Contract Unit Price per each unit installed for "Vacuum Test Ports" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the vacuum test ports as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore

E. Block type pipe supports shall be measured by each block type pipe support installed. Payment shall be included in the Contract Unit Price per each unit installed for "Block Type Pipe Supports" addressed in this Section and shall include full compensation for

providing all materials, labor, equipment, tools, and incidentals required to install the block type pipe supports as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

F. Block type pipe anchors shall be measured by each block type pipe anchor installed. Payment shall be included in the Contract Unit Price per each unit installed for "Block Type Pipe Anchors" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the block type pipe anchors as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

G. Strap type pipe anchors shall be measured by each strap type pipe anchor installed. Payment shall be included in the Contract Unit Price per each unit installed for "Strap Type Pipe Anchors" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the strap type pipe anchors as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

H. Metal frame pipe supports installed within the waste boundary shall be measured by each metal frame pipe support installed and includes all fittings and concrete post footings. Payment shall be included in the Contract Unit Price per each unit installed for "Metal Frame Pipe Supports – Within Waste Boundary" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the metal frame pipe supports within the waste boundary as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

I. Metal frame pipe supports installed outside the waste boundary shall be measured by each metal frame pipe support installed and includes all fittings and concrete post footings. Payment shall be included in the Contract Unit Price per each unit installed for "Metal Frame Pipe Supports – Outside Waste Boundary" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the metal frame pipe supports outside the waste boundary as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

J. The buried header crossing shall be measured by each buried header crossing installed and includes all trenching and backfill materials. *PVC pipe and fittings for the LFG collection system piping are not included in this payment as they are addressed separately.* Payment shall be included in the Contract Unit Price per each unit installed for "Buried Header Crossing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the buried header crossing as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

K. Road crossings shall be measured by each road crossing (Type 1, 2, or 3) installed and includes all trenching, steel pipe/RCP protection sleeves, pipe support/drainage CMPs, and backfill materials. *PVC pipe and fittings for the LFG collection system piping and reinforcement geotextile/aggregate base associated with the access road construction are*

not included in this payment as they are addressed separately. Payment shall be included in the Contract Unit Prices per each unit installed for "Type 1 Road Crossings", "Type 2 Road Crossing" and "Type 3 Road Crossing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the road crossings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 CONDENSATE DRAIN PIPING

A. HDPE pipe and fittings for the condensate drain piping shall be measured by the linear foot installed and includes all fittings. *HDPE pipe and fittings for the condensate drop-outs and condensate discharge points are not included in this payment as they are addressed separately* Payment shall be included in the Contract Unit Price per linear foot installed for "Condensate Drain Piping" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the condensate drain piping as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 CONDENSATE DROP-OUTS

A. Condensate drop-outs, including u-trap assemblies, shall be measured by each condensate drop-out installed. Payment shall be included in the Contract Unit Price per each unit installed for "Condensate Drop-outs" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the condensate drop-outs as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 CONDENSATE DISCHARAGE POINTS

A. Condensate discharge points shall be measured by each condensate discharge point installed. Payment shall be included in the Contract Unit Price per each unit installed for "Condensate Discharge Points" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the condensate discharge points as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 PERFORMANCE TESTING

A. Measurement and payment for performance testing of the various LFG collection system components described in this Section shall be included in the Contract Unit Price paid for the various items of Work for which they are required. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15300
FLARE STATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall assemble all required flare station components and associated appurtenances and implement improvements as shown on the Plans and in accordance with these Technical Specifications, including: installation of a skid-mounted packaged combustion system; installation of condensate drainage line between the skid-mounted packaged combustion system and leachate wet well; completion of all electrical, telephone, and mechanical connections; installation of security fencing; and placement of aggregate base within and around the flare station area as shown on the Plans.

B. The Contractor shall furnish all labor, supervision, tools, materials, equipment, and incidentals necessary to assemble all required flare station components and associated appurtenances, including all required piping, fittings, and connections.

C. The Contractor shall not begin flare station assembly activities requiring hookup to the LFG collection system until performance testing of that system is completed in accordance with Section 15100 (Landfill Gas [LFG] Extraction Wells) and Section 15200 (LFG Collection System Components) of these Technical Specifications.

D. The Owner will be responsible for purchasing and arranging delivery of the skid-mounted packaged combustion system. The actual plans and specifications for these units are not currently available. Based on this circumstance, the design plans, specifications, and installation instructions for the aforementioned system will be supplied to the Contractor a minimum of six (6) weeks prior to commencement of the scheduled LFG collection system installation activities. The Contractor shall be responsible for reviewing the design plans, specifications, and installation instructions in a timely manner and furnishing all necessary materials required to complete the Work in accordance with the approved Construction Schedule.

E. The Contractor shall be responsible for mechanical and electrical assembly and connections of the skid-mounted packaged combustion system. As noted above, actual plans and specifications for these units are not currently available. Based on these circumstances, an assumed scope of work has been developed based on the Design Engineer's experience on similar projects. Whereas the assumed scope of work presented herein is considered representative of what the assembly will entail, the actual work scope is subject to minor revisions based on requirements specified by the selected flare manufacturer.

F. Assembly of the skid-mounted packaged combustion system will require use of a 5 ton crane. The crane will also be required for unloading the skid-mounted packaged combustion system upon its delivery to the Work site. The Contractor shall be responsible for furnishing and operating the crane to implement these tasks. The Design

Engineer or Owner will coordinate the delivery schedule of the skid-mounted packaged combustion system with the Contractor.

G. A representative of the manufacturer of the skid-mounted packaged combustion system will be present during start-up and troubleshooting of the system. Written approval of the system installation and operation by the manufacturer will be required prior to Owner's acceptance of the flare station components. The Owner will pay for the manufacturer's inspection services under the provisions and requirements of this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. American Institute of Steel Construction (AISC).

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 SUBMITTALS

A. At least 14 calendar days prior to commencement of flare station assembly, the Contractor shall submit to the Design Engineer copies of any building permits (if required) issued by the local governing agency.

B. Within 14 calendar days of completion of flare station assembly, the Contractor shall submit to the Design Engineer copies of any building inspection reports (if required) issued by the local governing agency.

C. At least 14 calendar days prior to conducting performance testing, the Contractor shall submit proposed procedures for the following to the Design Engineer for approval:
   1. Skid-mounted packaged combustion system operation.
   2. Hydrostatic pressure test of PVC condensate discharge pipe.

D. Within 14 calendar days of completion of performance testing for the respective components, the Contractor shall submit to the Design Engineer test results for the following system components:
   1. Skid-mounted packaged combustion system.
   2. PVC condensate discharge pipe.

1.05 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the flare station components shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
   3. If any portion(s) of the flare station components is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall fix that portion(s) to meet the requirements of this Section as directed by the Design Engineer.
   4. Abraded and otherwise damaged portions of shop-applied paint shall be cleaned and repainted per the flare manufacturer's recommendations. Welded seams and other un-coated surfaces, heads and nuts of field-installed bolts, and surface where paint was damaged during installation shall be given a coat of specified primer, followed by top coat paint once the primer has completely dried.

PART 2 PRODUCTS

2.01 SKID-MOUNTED PACKAGED COMBUSTION SYSTEM

A. The skid-mounted packaged combustion system will be furnished by the Owner. In general, the system will be comprised of the following primary equipment components:
   1. *Primary Skid Assembly* (AISC designed) housed on a galvanized structural steel skid. This skid will be installed on the eastern flare station concrete pad as shown on the Plans. Primary equipment components mounted to the skid include:
      a. Gas-liquid separator.
      b. Two (2) centrifugal blowers equipped with TEFC electric motors and variable frequency drive.
      c. 4-inch to 8-inch diameter LFG process piping (stainless steel or HDPE) equipped within an automatic block valve.
      d. Control station assembly that includes a self-supporting steel rack with a weather-proof control panel, main power supply disconnect, power transformer, and pilot gas control system.
   2. *Totally-Enclosed Vertical Ground Flare* constructed of A-36 carbon steel. The flare will be installed on the western flare station concrete pad as shown on the Plans. The flare stack diameter will be 4 feet (estimated) with an overall height of approximately 30 feet (estimated). Primary equipment components mounted to the skid include:
      a. One (1) or two (2) combustion air dampers.
      b. Self-checking ultra-violet flame scanner.
      c. Purge air blower.
      d. Thermocouples.
   3. *Miscellaneous Appurtenances* including a flow meter, inlet flame arrestor, continuous chart recorder, and an automatic telephone dialer system.
   4. All piping, conduit and manual valves are pre-piped/pre-wired to the greatest extent possible and are mounted within the skid boundaries.

2.02 ELECTRICAL CONDUIT, WIRE AND FITTINGS

A. Electrical conduit, wire, and fittings for the flare station shall conform to the requirements of Section 15400 (Flare Station Electrical and Telephone Feed) of these Technical Specifications.

2.03 PVC PIPE, FITTINGS AND BALL VALVE

A. PVC pipe, fittings and ball valve for the condensate drainage line between the skid-mounted packaged combustion system and leachate wet well shall conform to the requirements of Section 15200 (LFG Collection System Components) of these Technical Specifications.

2.04 PIPE BEDDING

A. Pipe bedding for the buried portion of the condensate drainage line shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.05 TRENCH BACKFILL

A. Backfill for the buried portion of the condensate drainage line shall conform to the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

2.06 CHAIN LINK FENCE

A. Chain link fence materials for the security fence shall conform to the requirements of Section 80-4.01 of the Standard Specifications and as shown on the Plans.

2.07 CONCRETE

A. Concrete for the security fence post footings shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.08 AGGREGATE BASE

A. Aggregate base placed on the completed ground surface within and around the flare station shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

PART 3 EXECUTION

3.01 FLARE STATION ASSEMBLY

A. All required building permits, fees, and inspections shall be arranged and paid for by the Contractor.

B. Assembly of the flare components shall be performed by skilled laborers experienced in installation of similar equipment.

C. The skid-mounted packaged combustion system shall be installed in strict accordance with the manufacturer's specifications. Design drawings and installation instructions will be provided to the Contractor upon selection of the flare manufacturer. In general, installation of the skid-mounted packaged combustion system will include the following tasks:

1. *Mechanical Assembly*
   a. Mount/anchor the primary skid assembly and totally-enclosed vertical ground flare to the concrete slabs.
   b. Connect inlet flame arrestor to the totally-enclosed vertical ground flare.
   c. Connect LFG process piping from the primary skid assembly to the flame arrestor.
   d. Mount thermocouples (three or four) onto the totally-enclosed vertical ground flare (elevated).
   e. Connect the LFG collection system header pipe from the wellfield to the primary skid assembly.
2. *Electrical Assembly*
   a. Connect main power supply, telephone line, and conduit to the control station assembly.
   b. Connect thermocouple wire and conduit between the thermocouples (elevated) and the control station assembly.

D. Abraded and otherwise damaged

3.02 CONDENSATE DRAINAGE LINE

A. Trenching and pipe bedding placement shall conform to the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

B. Handling and installation of the PVC pipe, fittings and ball valve shall conform to the requirements of Section 15300 (LFG Collection System Components) of these Technical Specifications.

C. The condensate drainage line shall be installed at a minimum slope of 1 percent in the direction of the leachate wet well.

D. The wall of the leachate wet well shall be penetrated at the appropriate depth by coring or other means to allow for insertion of the condensate drainage line. The annular space between the condensate drainage line and the wall of the leachate wet well shall be sealed using non-shrink grout.

E. Following placement of pipe bedding material, the remainder of the trench shall be backfilled in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.03 SECURITY FENCE

A. The chain link fence and gates shall be installed as shown on the Plans and in accordance with the requirements of Section 80-4.02 of the Standard Specifications.

B. All line, corner, and gate post assemblies shall be constructed with concrete post footings in accordance with the requirements of Section 03300 (Concrete) of these Technical Specifications.

C. Soil between fence posts shall be leveled to create a 2-inch clearance under the fence fabric.

3.04 FLARE STATION AGGREGATE BASE

A. Aggregate base within and around the flare station shall be placed to the dimensions shown on the Plans.

B. The aggregate base shall be spread in uniform loose lifts not exceeding 8 inches in thickness.

C. The aggregate base shall be moisture conditioned to within 1 to 3 percentage points of optimum moisture content, and compacted to a minimum of 95 percent of maximum dry density per ASTM D 1557. The final compacted thickness shall be a minimum of 6 inches.

3.05 PERFORMANCE TESTING

A. *Skid-Mounted Packaged Combustion System:* The skid-mounted packaged combustion system shall be tested to verify proper operation in accordance with the manufacturer's recommendations. Performance testing shall be supervised by the flare manufacturer's on-site inspector and shall encompass all aspects of system operations, including but not limited to the verification of proper operation of the following components:

1. Gas-liquid separator.
2. Blowers.
3. Automatic ignition and pilot gas control system.
4. Automatic temperature controls, including thermocouples and actuated louver assembly.
5. Automatic block valve operation.
6. Flow meter and continuous chart recorder.
7. Control panel gauges and indicator lighter.
8. Safety shut-down and alarm systems, including automatic telephone dialer system.

Written approval from the flare manufacturer's representative for the system installation and operation will be required prior to the Owner's acceptance of the flare station components. The written approval shall certify that the equipment was properly installed and connected, is in accurate alignment, and is free of undue stress imposed by piping or mounting bolts. The performance testing and acquisition of the manufacturer's approval shall be done within a 3-day work period.

During performance testing of the flare station, the entire LFG collection system well field shall be visually inspected to identify any problems or breaks in the system that may have resulted from system operations.

B. *Condensate Drainage Line:* The PVC condensate drainage line between the flare station and existing leachate wet well shall be hydrostatically pressure tested in accordance with the pipe manufacturer's recommended procedures. It shall be the Contractor's responsibility to ensure that proper safety precautions are observed during the testing.

PART 4 MEASUREMENT AND PAYMENT

4.01 FLARE STATION ASSEMBLY

A. Measurement and payment for flare station assembly shall be included in the Contract Lump Sum Price for "Flare Station Assembly" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, general electrical work, and incidentals required to assemble the flare station as shown on the Plans, as specified herein and within the flare manufacturer's specifications, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 CONDENSATE DRAINAGE LINE

A. Measurement and payment for the condensate drain line shall be included in the Contract Lump Sum Price above for "Flare Station Assembly" of this Section. No additional compensation will be allowed therefore.

4.03 SECURITY FENCE

A. Security fencing for the flare station shall be measured by the linear foot installed and includes all posts, chain link fence fabric, gates, slats and fittings. Payment shall be included in the Contract Unit Price per linear foot installed for "Security Fencing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the security fence as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 FLARE STATION AGGREGATE BASE

A. Aggregate base placed within and around the flare station shall be measured by the square foot installed. Payment shall be included in the Contract Unit Price per square foot installed for "Flare Station Aggregate Base" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the aggregate base as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 PERFORMANCE TESTING

A. Measurement and payment for performance testing of the skid-mounted packaged combustion system and condensate discharge pipe described in this Section shall be

included in the Contract Lump Sum Price paid for "Flare Station Assembly". No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15400
FLARE STATION ELECTRICAL AND TELEPHONE FEED

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install the electrical and telephone feed for the flare station as shown on the Plans and in accordance with these Technical Specifications, which includes extending electrical and telephone services from the existing service point locations to the flare station control panel. The Contractor shall furnish all labor, tools, supervision, equipment, and materials necessary to provide the flare station electrical and telephone feed.

B. The Owner will be responsible for upgrading the power supply at the existing electrical service point shown on the Plans to accommodate the following power requirements for the flare station: 480 volts, 3 phase, 60 hertz, 100 amps, and 35 HP. In addition, the Owner will be responsible for extending telephone service to the service point shown on the Plans.

1.02 APPLICABLE STANDARDS AND SPECIFICATIONS

A. California Administrative Code (CAC) - Title 24.

B. County Ordinances.

C. National Electrical Code (NEC).

D. National Electrical Manufacturer's Association (NEMA).

E. National Fire Protection Association (NFPA).

F. Underwriters Laboratory Inc. (UL).

1.03 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall submit the following to the Design Engineer for approval:
   1. Name and location of source, product data sheets, and manufacturer's installation instructions for the following materials to verify that the materials meet or exceed the product requirements specified herein:
      a. Wire.
      b. Conduit and fittings.
      c. Meter socket.
      d. Pull boxes.
      e. Panel.
      f. Junction and outlet boxes.

B. At least 14 calendar days prior to commencement of a specific task, the Contractor shall submit to the Design Engineer copies of electrical permits (if required) issued by the local governing agency.

C. Within 14 calendar days of completion of all electrical work, the Contractor shall submit to the Design Engineer copies of electrical inspection reports (if required) issued by the local governing agency.

1.04 QUALITY ASSURANCE

A. Testing and Observation
1. The Contractor shall notify the Design Engineer of progress of all Work in order that the Design Engineer may make the appropriate site inspections.
2. The Contractor shall cooperate with the Design Engineer during testing and observation.
3. If any portion(s) of the electrical components is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall repair or replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

1.05 HAZARDOUS CLASSIFICATION

A. All underground electrical installed shall be classified as Class 1, Division 2. Above ground electrical work from the ground surface to within 18 inches above the ground surface shall be classified as Class 1, Division 2.

PART 2 PRODUCTS

2.01 GENEAL

A. All electrical materials shall be new, meet UL requirements, and bear appropriate UL labels.

2.02 WIRE

A. Wire shall be NEC standard copper wire and shall bear UL and manufacturer's labels. Wire shall provide proper connection and operation of all equipment. Requirements for connection of the respective electrical components are as follows:
1. *Main Power Supply:* Copper AWG No. 2, THW (four [4] wires total).
2. *Automatic Telephone Dialer System:* Standard telephone line (one [1] wire total).

2.03 CONDUIT AND FITTINGS

A. All exposed conduit and fittings shall be rigid PVC type, Schedule 80. All buried conduit and fittings shall be rigid PVC type, Schedule 40. Conduit size requirements for the respective electrical components are as follows:
1. *Main Power Supply:* 1-1/4 inch conduit.
2. *Automatic Telephone Dialer System:* ½ inch conduit.

2.04 METER SOCKET

A. Meter socket for main power supply shall be NEMA 3R, raintight-outdoor, UL listed, with drip shield top that requires no gasketing. Size of meter socket shall accommodate power service requirements.

2.05 JUNCTION AND OUTLET BOXES

A. Junction and outlet boxes shall be NEMA 4 galvanized metal type, cast iron, or malleable iron with proper cover and/or mounting lugs as required.

2.06 WARNING TAPE

A. Direct burial warning tape reading "CAUTION, ELECTRICAL LINE BURIED BELOW", 4 mil polyethylene with foil laminate shall be installed in all underground electrical installations. Panduit, Motivator 3M, or approved equivalent.

2.07 PIPE BEDDING

A. Pipe bedding for conduit shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.08 ENGINEERED FILL

A. Engineered fill for backfill above the pipe bedding shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. All required electrical permits, fees, and inspections shall be arranged and paid for by the Contractor.

B. The Contractor shall furnish, install, and maintain all temporary power and lighting systems needed for construction. After construction is completed, the Contractor shall remove all temporary power equipment and devices.

C. All electrical work shall be conducted by skilled electricians and laborers experienced in this type of work. All equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 and the NEC.

D. The Contractor shall verify that the wire and conduit sizes specified herein for the main power supply and automatic telephone dialer system are appropriate for the intended use.

E. The Contractor shall install all electrical components in accordance with the NEC, NFPA and local codes and regulations for installation in a Class 1, Division 1 or Class 1, Division 2 classified locations as defined in Part 1.05 of this Section and shown on the Plans. Nothing on the Plans or in these Technical Specifications is to be construed to permit work not conforming to these governing codes and standards.

F. Installation of electrical and telephone feed shall be performed in accordance with the local electrical and telephone company rules and regulations.

G. The electrical and telephone feed from the existing service points to the flare station control panel shall be completed below grade as shown on the Plans.

H. The Contractor shall verify service and panel locations and all other service requirements prior to starting Work. Except for Work specifically excluded from the Contract, the Contractor shall provide all Work required by the serving utility companies to render utility services to the Project.

3.02 PREPARATION

A. The Contractor shall handle electrical materials carefully during loading and unloading. All means necessary shall be used to protect electrical materials before, during and after installation and to protect the installed work of other trades. In the event of damage, provisions shall be made to immediately make repairs and replacement necessary to the approval of the Design Engineer.

B. The Contractor shall inspect materials for damage and imperfections prior to installation. Damaged materials or materials with imperfections shall not be used.

3.03 TRENCHING AND BACKFILLING

A. Trenching and placement of pipe bedding and backfill material shall conform to the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.04 INSTALLATION

A. All equipment, motors, conduit and outlets, as applicable, shall be permanently and effectively grounded in accordance with NEC, CAC - Title 24 and local codes.

B. Conduits shall be sloped towards pull boxes. Conduits shall run in straight lines except where a change in direction is necessary. Couplings shall be staggered for maximum duct line strength.

C. Buried conduit and fittings shall not be dropped or dumped into trenches and the ends of conduit shall be kept closed with approved conduit seals during construction. Immediately prior to pulling wire or cable, a swab shall be drawn through all conduits to force out water and foreign materials.

D. Junction boxes shall be installed in an accessible location as required for splicing, connections and pulling of wire.

E. All above ground conduit shall be properly secured on pipe supports or concrete slabs.

F. The meter socket installed at the existing service pole shall comply with the height and fastening specifications outlined in the local electric company rules and regulations.

3.05 CLEAN-UP

A. All exposed portions of electrical installation shall be thoroughly cleaned, including the removal of all traces of soil, labels, grease, oil, and other foreign matter. Only cleaners recommended by the manufacturer shall be used.

PART 4 MEASUREMENT AND PAYMENT

4.01 ELECTRICAL AND TELEPHONE FEED

A. The electrical and telephone feed shall be measured by the linear foot installed, including trench excavation and backfill. Payment shall be included in the Contract Unit Price per linear foot installed for "Electrical and Telephone Feed" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the electrical and telephone feed as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 GENERAL ELECTRICAL WORK

A. Measurement and payment for general electrical work associated with assembly of the flare station shall be included in the Contract Lump Sum Price for "Flare Station Assembly" addressed in Section 15300 (Flare Station) of these Technical Specifications. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15500
LEACHATE OVERFLOW COLLECTION AND STORAGE SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all leachate overflow collection and storage system components, including a 10,000 gallon double wall fiberglass reinforced leachate UST, tank accessories, field testing, collection system piping and accessories, and lining of the existing sediment chamber and leachate wet well in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to install the leachate overflow collection and storage system.

B. The existing sediment chamber is a concrete manhole structure, approximately nine feet deep (base to top of manhole); four feet in diameter with a 30" high riser cone (48" to 24" in diameter). The existing wet well is approximately 18 feet deep and five feet in diameter and contains two submersible pumps.

C. The Contractor accepts full responsibility for proper handling and installation of the leachate UST and shall insure that good workmanship, practices, and construction procedures are followed during the handling and installation of the leachate UST, regardless of the inclusion or omission of any applicable suggestion in this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans.* California Department of Transportation, May 2010.

C. *American Society for Testing Materials.* Current Edition.

D. *Occupational Safety and Health Agency (OSHA) Construction Standards.* Current Edition.

E. American National Standards Institute (ANSI).

F. American Water Works Association (AWWA).

1.03 APPLICATBLE STANDARDS AND SPECIFICATIONS

A. ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

B. ASTM D 143 Standard Test Method for Slump of Portland Cement Concrete.

C. ASTM D 3034 Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

D. ASTM D 4414 Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages.

E. ASTM F 477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

F. UL Standard for Safety 1316.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall provide three (3) copies of the following information to the Design Engineer for approval:
   1. Manufacturer's product data sheets for the following materials to verify that the materials meet or exceed the corresponding product requirements:
      a. Leachate UST, fittings, and accessories.
      b. Collection piping and fittings.
      c. Concrete junction boxes and accessories.
   2. Manufacturer's recommended procedures for handling (transporting, unloading, storage, etc.) and installation of each of the products identified in Subsection 1.04(A)(1) of this Part.

B. Field Test Reports: Tank tightness test at delivery and after installation.

C. At least 14 calendar days prior to commencement of lining the leachate sediment chamber and wet well, the Contractor shall submit the following to the Design Engineer for approval:
   1. Procedures for removal and re-installation of the existing pumps within the leachate wet well.
   2. Name, location and experience of Subcontractor responsible for installation of lining product. Subcontractor shall have sufficient prior experience in the installation of the lining product.
   3. Manufacturer's recommended application procedures for lining product.
   4. Product data and chemical resistance data.

1.05 TRANSPORT AND STORAGE

A. Unloading and storage of the leachate UST and collection piping at the Work site shall be the responsibility of the Contractor and shall be performed in accordance with the manufacturer's recommended procedures.

1.06 QUALITY ASSURANCE

A. Governing Standards, as applicable:
   1. Manufacturer of the leachate overflow storage tank shall be in the business of manufacturing tanks with materials conforming to the requirements of ANSI/AWWA D120-02 Thermosetting Fiberglass-Reinforced Plastic Tanks.

2. Tank manufacturer shall be in the business of manufacturing tanks to UL 1316 standards.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

A. Pipe for gravity drain lines shall be PVC per AWWA C-900, with integral wall, bell and spigot joints. Pipe and fitting shall meet wall and strength minimum of SDR 26, and the requirements of ASTM D 3034. Joints shall be equipped with rubber rings. The bell shall consist of an integral wall section with a solid cross section rubber ring factory assembled, securely locked in place to prevent displacement. Rubber rings shall meet the requirements of ASTM F 477. All fittings and accessories shall be manufactured and furnished by the pipe supplier and have bell and/or space configurations identical to that of the pipe.

2.02 PIPE ACCESSORIES

A. All fittings and accessories shall be manufactured and furnished by pipe supplier of same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.03 PIPE BEDDING

A. Pipe bedding shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.04 CONCRETE JUNCTION BOXES

A. Concrete junction boxes for the leachate collection piping shall be as shown on the Plans. Concrete boxes shall be manufactured of cast in place concrete or prefabricated reinforced concrete or approved steel equivalent to the dimensions set forth in the Plans.

B. Concrete for the junction boxes shall be a 6 sack Portland cement Type II mix and must meet the requirements of a maximum slump of 4 inches and a minimum 28-day compressive strength of 2,500 psi when tested in accordance with ASTM C 143 and ASTM C 39, respectively.

2.05 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Lining material for the existing sediment chamber and wet well shall be a solids epoxy resin-based coating formulated for use in chemically aggressive sewer systems. It is the intent that this material shall provide waterproofing, sealing, structural reinforcement, and corrosion protection of the existing sediment chamber and wet well.

B. The coating material shall be resistant to attack from the following: volatile organic compounds; bleaches; sulfuric, acetic, hydrochloric, phosphoric, nitric, chromic, oleic, and stearic acids; sodium and calcium hydroxides; ammonium, sodium, calcium, magnesium, and ferric chlorides; ferric sulfate, hydrogen sulfides, petroleum oil and greases, vegetable and

animal oils, fats, greases, soaps and detergents. The coating shall be impermeable to sewage gases and liquid and shall be non-conducive to bacterial or fungus growth.

2.06 LEACHATE UST

A. Design Criteria
   1. *Internal Load:* Tank shall withstand a 5 psig air pressure test with 5:1 safety factor. Contractor shall individually test tank for leakage prior to installation. Maximum test pressure is 5-psi.
   2. *Vacuum Test:* To verify structural integrity, tank shall be vacuum tested by the manufacturer at the factory to 11.5 inches of mercury.
   3. *Surface Load:* Tank shall withstand surface H-20 axle loads when properly installed according to current manufacturer's installation instructions.
   4. *External Hydrostatic Pressure:* Tank shall be capable of being buried in ground with 7 feet of overburden over the top of the tank, the hole fully flooded, and a safety factor of 5:1 against general buckling.
   5. Tank shall support accessory equipment such as drop tubes when installed according to tank manufacturer's recommendations and limitations.

B. Tank shall be double wall, horizontal glass fiber reinforced tank manufactured with 100 percent resin and glass-fiber reinforcement. No sand fibers. Capacity shall be as indicated on Plans.

C. Product Storage:
   1. Tank shall be capable of storing chemicals or leachate with specific gravity up to 1.1.
   2. Tank shall be vented to atmospheric pressure.
   3. Tanks shall be capable of storing products identified in the manufacturer's current standard limited warranty.

D. Interstitial Space: Double wall tank shall have a space between the walls to allow for the free flow and containment of leaked material from the primary tank. The space also allows the insertion of a monitoring device through a monitoring fitting.

2.07 TANK ACCESSORIES

A. Manway: Flanged 22-inch (minimum) inside diameter manway with UL listed gasket, bolt and cover.

B. NPT Fittings: NPT fittings shall be sized and located as indicated on Plans. Fittings shall be UL listed. All fittings are to be 4 inches in diameter and supplied with plugs. NPT fittings shall withstand a minimum of 150 foot-pounds of torque and 1,000 foot-pounds of bending, both with a 2:1 safety factor. The monitor fitting shall consist of a 4-inch NPT fitting on the tank.

C. Striker plates shall be installed under each service fitting and manway opening.

D. Float Switch and Alarm Panel: One (1) mechanical float switch shall be provided and set at bottom of tank to detect presence of any liquid. The float switch shall be approved for use with intrinsically safe, Class I, Division 1 applications and shall be connected to an alarm

panel located at pump station structure, warning lights only. The alarm shall also be connected to an existing auto-dialer.

E. A 2-inch diameter PVC vent pipe shall be installed from tank to the surface with a goose-neck and screen.

F. Anchor Straps: Anchor straps shall be of glass fiber reinforced type and located per manufacturer's recommendations. Each strap shall be capable of withstanding the maximum buoyance force of the tank assuming the tank empty and submerged in groundwater. Number and location of straps shall be per manufacturer's recommendations.

G. Concrete Deadman: Two concrete deadman, 12" x 12" x the tank length, shall be installed at the bottom of the tank excavation as shown on the Plans.

2.08 TANK BEDDING

A. Tank bedding shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.09 BACKFILL MATERIAL

A. Backfill material above the pipe bedding and tank bedding shall conform to the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

PART 3 EXECUTION

3.01 BRACING AND SHORING

A. As required by the Trench Construction Safety Orders of the California Construction Safety Orders of the Division of Occupational Safety and Health, bracing and shoring shall be installed in trenches or excavations of 5 feet or greater depth to insure the safety of workers and to protect and facilitate the Work.

B. Bracing and shoring shall comply with Section 5-1.02A and 7-1.01E of the Standard Specifications.

3.02 GENERAL PIPE INSTALLATION

A. Contractor shall verify location of point of connection (POC) at the existing leachate collection piping as shown the Plans by potholing to determine the location and depth (elevation).

B. For the gravity drain pipe, the trench subgrade shall provide uniform support at a uniform slope along full length of pipe.

C. Contractor shall furnish all necessary fittings, fixtures, hardware, plates, fasteners, etc. to provide complete installation.

D. Location of pipes, fixtures, fittings, and drains that are shown on the Plans are approximate. The Contractor shall locate fittings and drains to best serve the intended use and to avoid mechanical and structural interferences. Location of valves, drains, and fittings must be approved by the Design Engineer prior to installation.

E. All installations shall be secure and watertight.

3.03 PIPE INSTALLATION

A. Excavation of pipe trenches shall be in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

B. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

C. Pipe, fittings, and accessories shall be installed in accordance with manufacturer's instructions. Sealed joints shall be watertight.

D. Pipe shall be placed to the lines and grades as shown on the Plans.

E. The pipe shall be laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe.

F. The horizontal alignment of the pipe shall be laid such that any point shall not vary more than 0.10 feet from the design alignment established and shown on the Plans.

G. Pipe bedding material shall be placed at sides and over top of pipe in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

H. Trench backfill above the pipe bedding shall be in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans. Pipe shall not be displaced or damaged when compacting.

3.04 CONCRETE JUNCTION BOXES

A. Excavation for concrete junction boxes shall be in accordance with Section 02222 (Excavation) of these Technical Specifications and as shown on the Plans.

B. Concrete junction boxes shall be installed in accordance with manufacturer's instructions. Placement of the concrete junction boxes into the excavation shall be performed in a manner that will not induce damage or compromise future stability.

C. Backfill for concrete structures shall conform to the provisions in Section 19-3 of the Standard Specifications.

3.05 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Sequencing of this task shall be after installation of the condensate discharge line from the flare station to the leachate wet well in order to ensure that the new penetration is properly sealed by the lining application.

B. The Contractor's Health and Safety Plan shall be followed accordingly, including LFG hazards and possible confined space entry (i.e., oxygen-deficient atmosphere), for all phases of Work.

C. Prior to start of Work, provisions shall be made to divert leachate from the existing leachate drain from discharging into the leachate sediment chamber. The leachate may be diverted to the new leachate UST (if already installed) or collected in a temporary holding tank of sufficient size.

D. Once discharge into the leachate sediment chamber has been diverted, all leachate shall be pumped from the leachate sediment chamber and wet well. The pumped leachate may be discharged to the existing leachate AST, new leachate UST (if already installed), or temporary holding tank.

E. If sediment is present at the base of the leachate sediment chamber and/or wet well, provisions shall be made to remove all sediment. Removed sediment may be disposed of with refuse excavated from other site activities, or transported separately and disposed of at a permitted transfer station or solid waste disposal facility.

F. Existing pumps and any other equipment/features that may inhibit application product shall be removed and stored in a dry and secure location.

G. The interior walls and base shall be cleaned to remove all dirt, dust, corrosion products, loose concrete, debris, grease, oils, growths, and foreign matter and residues. Residual generated by the cleaning operations shall be removed and managed in the same manner as described previously for leachate and sediment.

H. Sufficient time shall be provided to allow the surfaces of the interior walls and base to dry. Drying time may be expedited by mechanical means. Coatings shall be applied only to a sound clean surface profile consistent with the manufacturer's published recommendation.

I. Cracks, joints, eroded and damaged areas shall be sealed with a compatible grout/mortar as recommended by the coating manufacturer prior to application of the coating material.

J. Coating material shall be applied in a manner and thickness consistent with the manufacturer's published recommendation. Coatings shall be applied in a manner consistent with all applicable environmental and health and safety regulations. At a minimum, during application, the applicators shall use protective clothing, eye protection, chemical resistant gloves, and air respirators. Coating shall be applied to provide full and sufficient coverage of all interior walls and base and shall be free of blisters, pinholes, holidays, or discontinuities. Application shall be performed in strict accordance with recommended manufacturer's procedures.

K. Pumps and any other equipment/features that were removed shall be re-installed and normal operation of the leachate sediment chamber/wet well restored per pre-existing conditions.

3.06 TANK HANDLING

A. Contractor Acceptance Inspection: The Contractor is responsible for damage in shipment according to the checklist included in the tank shipment. Any discrepancies should be reported to the Design Engineer.

B. The tank shall not be dropped, rolled or impacted. The tank shall be set on smooth ground, free of rocks and foreign objects, and chock tanks to prevent movement.

3.07 TANK INSTALLATION

A. The tank excavation shall be large enough to provide:
   1. 2 feet of clearance between the tank sides and ends and the excavation walls in stable soil.
   2. 12 inches of bedding under the tank.

B. Excavation for the tank shall be in accordance with Section 02222 (Excavation) of these Technical Specifications and as shown on the Plans. Contractor shall slope or shore sides of tank hole excavation as required to comply with the requirements of "OSHA Construction Standards".

C. The tank and all related piping and accessories shall be installed as per manufacturer's printed instructions.

D. Tank backfill shall be as follows:
   1. Tank bedding material shall be evenly placed over bottom of the excavation to attain a minimum thickness of 12 inches.
   2. A 12-inch lift of tank backfill shall initially be placed evenly around the tank. Care shall be taken to push backfill material completely beneath tank bottom and under end caps to provide necessary tank support, without voids.
   3. A second 12-inch lift of tank backfill shall be placed evenly around the tank using the same procedures described above.
   4. After completion of the second lift, tank backfill can be brought to the top of the tank without additional handwork.
   5. The tank shall never be left on the bed without tank backfill to the top of tank if there is any chance of more than 12 inches of water in the hole.
   6. Once tank backfill material has been placed completely over the tank to the depth shown on the Plans, backfill the remainder of the tank excavation in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.08 PERFORMANCE TESTING

A. UST Air Test:
   1. Prior to setting the tank, the Contractor shall perform an aerostatic leakage test in the presence of the Design Engineer.

2. Pressurizing the relatively small annular space between two (2) tank shells can occur very quickly. A pressure of over 5 psi may cause damage to the tank structure which may not be immediately apparent. For all such tests, an air gauge with maximum ½ psi increments shall be used.
3. The Contractor shall provide a valve and manifold arrangement with two (2) air gauges to perform tests.
4. Testing shall be in accordance with the tank manufacturer's instructions.
5. While tank is under pressure, the entire tank, including fittings, should be wetted with a soapy solution to inspect for minor leaks which otherwise might not be evident.

B. Leachate Sediment Chamber/Wet Well:
1. Visual inspection to verify a leak-free, uniform appearance.
2. The applied wet film thickness shall be verified per ASTM D 4414, Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages.
3. The leachate sediment chamber and wet well shall be operated after the lining application and re-assembly of the pumps and other equipment/features to verify that the system is operating in accordance with pre-existing conditions.

C. If tests indicate Work does not meet specified requirements, all Work shall be removed, replaced and retested at no cost to the City.

PART 4 MEASUREMENT AND PAYMENT

4.01 LEACHATE COLLECTION PIPING

A. Leachate collection system piping shall be measured by the linear foot of collection piping installed and includes all piping, fittings, trenching, and backfilling. Payment shall be included in the Contract Unit Price per linear foot installed for the various sizes and types of "Leachate Collection Piping" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the leachate collection piping as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 CONCRETE JUNCTION BOXES

A. Concrete junction boxes for the leachate collection piping shall be measured by each box installed and include all trenching, backfill, concrete, and cover. Payment shall be included in the Contract Unit Price per each unit installed for "Concrete Junction Boxes" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the concrete junction boxes as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Measurement and payment for lining of the leachate sediment chamber/wet well shall be included in the Contract Lump Sum Price for "Leachate Sediment Chamber/Wet Well Lining" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to line the leachate sediment chamber/wet well as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 LEACHATE UST

A. Measurement and payment for the leachate UST shall be included in the Contract Lump Sum Price for "Leachate UST" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, general electrical work, and incidentals required to install the leachate UST and accessories as shown on the Plans, as specified herein and within the tank manufacturer's specifications, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

APPENDIX I

FINAL CLOSURE
CONSTRUCTION QUALITY ASSURANCE PLAN

CONSTRUCTION
QUALITY ASSURANCE PLAN

for the

CITY OF UKIAH
DEPARTMENT OF PUBLIC WORKS

CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

April 2019

EBA Job No. 02-907

Prepared by:

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CONSTRUCTION QUALITY ASSURANCE PLAN
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

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DIVISION 1

GENERAL INFORMATION

CQA SECTION 01000
INTRODUCTION

PART 1 GENERAL

1.01 PROJECT DESCRIPTION

A. The City of Ukiah Landfill is located in Mendocino County, California approximately two miles east of the City of Ukiah. The Work site address is 3100 Vichy Springs Road, Ukiah, California 95482 (Sheet 1). The City of Ukiah Landfill was operated as a Class III solid waste disposal facility and is comprised of a single waste management unit that is approximately 40 acres in size.

B. This Construction Quality Assurance (CQA) Plan applies to the final closure of the City of Ukiah Landfill. The final closure project encompasses approximately 65 acres in area and consists of the following construction features:

Site Preparation:
- Refuse excavation and relocation.
- Interim cover preparation.

Final Cover System (in ascending order):
- 2-foot thick foundation layer.
- Gas relief/venting system.
- LLDPE geomembrane.
- Engineered synthetic turf with specific grade sand infill ballast.

Miscellaneous items:
- Drainage and erosion control measures.
- Access roads.
- General earthwork, including various excavations and fills.
- Leachate overflow collection and storage system, including installation of a leachate underground storage tanks (UST).
- Landfill gas (LFG) collection system, including condensate drainage components.
- Installation of skid-mounted packaged combustion system provided by others.
- Borrow area reclamation.
- Seeding and fertilizing.
- Security fencing.

C. A detailed scope of construction for each unit of construction is presented in Section 01010 of this CQA Plan.

1.02 PURPOSE

A. The purpose of this CQA Plan is to provide a detailed guidance document for correct and thorough CQA verification procedures implemented during construction. This CQA Plan is also intended to identify, prevent, and correct problems and deficiencies that may occur during construction. This CQA Plan details general and specific requirements of the CQA program that will be implemented during construction to verify and document that

construction is in compliance with the contract documents and the design intent. Requirements of the CQA program include the following:

1. Product quality assurance verification testing to verify that all materials are in compliance with the Technical Specifications.
2. Construction monitoring and documentation to verify that each unit of construction is in compliance with the Technical Specifications and that construction was executed correctly using industry-standard construction methods and the proper materials.
3. Review and approval of product submittals to verify that construction materials are in compliance with the Technical Specifications.
4. Testing to verify that installed or constructed components are in compliance with the Technical Specifications.
5. CQA documentation consisting of Daily Summary Reports, CQA field logs, testing forms, installation logs, document control binders, material control logs, testing reports, photographic documentation, technical revisions, design modifications, record as-built drawings, and corrective action determination and verification reports.
6. Preparation of the CQA Certification Report that documents the CQA program implemented during construction and that construction was completed in compliance with the contract documents and the design intent. The CQA Certification Report will be submitted to the California Regional Water Quality Control Board, North Coast Region (RWQCB).

B. Although the CQA Plan provides a foundation for the CQA program, this plan may be modified and revised as appropriate prior to and during construction. All modifications and revisions to the CQA program will be documented in the CQA Certification Report.

1.03 PROJECT ORGANIZATION

A. The City of Ukiah, Department of Public Works (City) is the owner and operator of the City of Ukiah Landfill and has ultimate responsibility for the Project, including overall project management and project funding. For purposes of this CQA Plan, the City will be referred to as "Owner". The Owner has contracted with the following organizations to complete construction in accordance with the project documents listed in Part 1.02 of Section 01090 (References) of this CQA Plan.

1. EBA Engineering (EBA) - Design Engineer and CQA Certifying Engineer.
2. To Be Determined – Construction Contractor and Subcontractors.

B. EBA is the Design and CQA Certifying Engineer for the Project. As the Design Engineer, EBA is responsible for the design and site engineering related to the design. Site engineering includes: 1) review and approval of product and construction submittals required by the contract documents; 2) technical issues related to construction; 3) interpretation of the Technical Specifications and the Construction Drawings (herein after referred to as "Plans"); and 4) design modifications and technical revisions. For purposes of this CQA Plan, EBA will be referred to as "Design Engineer" when functioning as the Design Engineer.

As the CQA Certifying Engineer, EBA is responsible for certifying to the Owner and RWQCB that construction is in compliance with the contract documents and the design intent. Specific responsibilities of the CQA Certifying Engineer include: 1) providing a professional engineer or certified engineering geologist registered in the state of California; 2) implementing and managing the CQA program outlined in Part 1.02 of this Section; 3) review of all CQA documentation; and 4) preparation of the CQA Certification Report. EBA will provide an on-site CQA Team to implement and manage the CQA program consisting of a CQA Officer, CQA Monitors, a CQA Surveyor, and Geosynthetics and Soils CQA Testing

Laboratories. For purposes of this CQA Plan, EBA will be referred to as "CQA Officer" when functioning as the CQA Certifying Engineer.

C. The Construction Contractor is responsible for overall performance of the earthwork, including construction of drainage and erosion control measures, in accordance with the contract documents and as shown on the construction drawings. For purposes of this CQA Plan, the Construction Contractor will be referred to as "Contractor".

D. The Project Organization for CQA is shown on Table 01000-1, CQA Organization Chart

1.04 CQA PLAN FORMAT

A. This CQA Plan closely parallels the format of the Technical Specifications in the contract documents. The intent of this parallel format is to avoid discrepancies between the two documents, therefore preventing misinterpretations and misunderstandings between the Owner, Contractor, Design Engineer and CQA Certifying Engineer. This format also organizes all necessary quality assurance verification procedures for each unit of construction into a single section.

B. Division 1 of this plan presents general information about the construction project and the CQA program.

C. Division 2 of this plan provides detailed and specific CQA procedures to be implemented by the CQA Officer for each unit of construction. Division 2 is written instruction and direction for members of the CQA Team.

END OF CQA SECTION 01000
INTRODUCTION

CQA ORGANIZATION CHART
City of Ukiah Landfill
FINAL CLOSURE CONSTRUCTION PROJECT

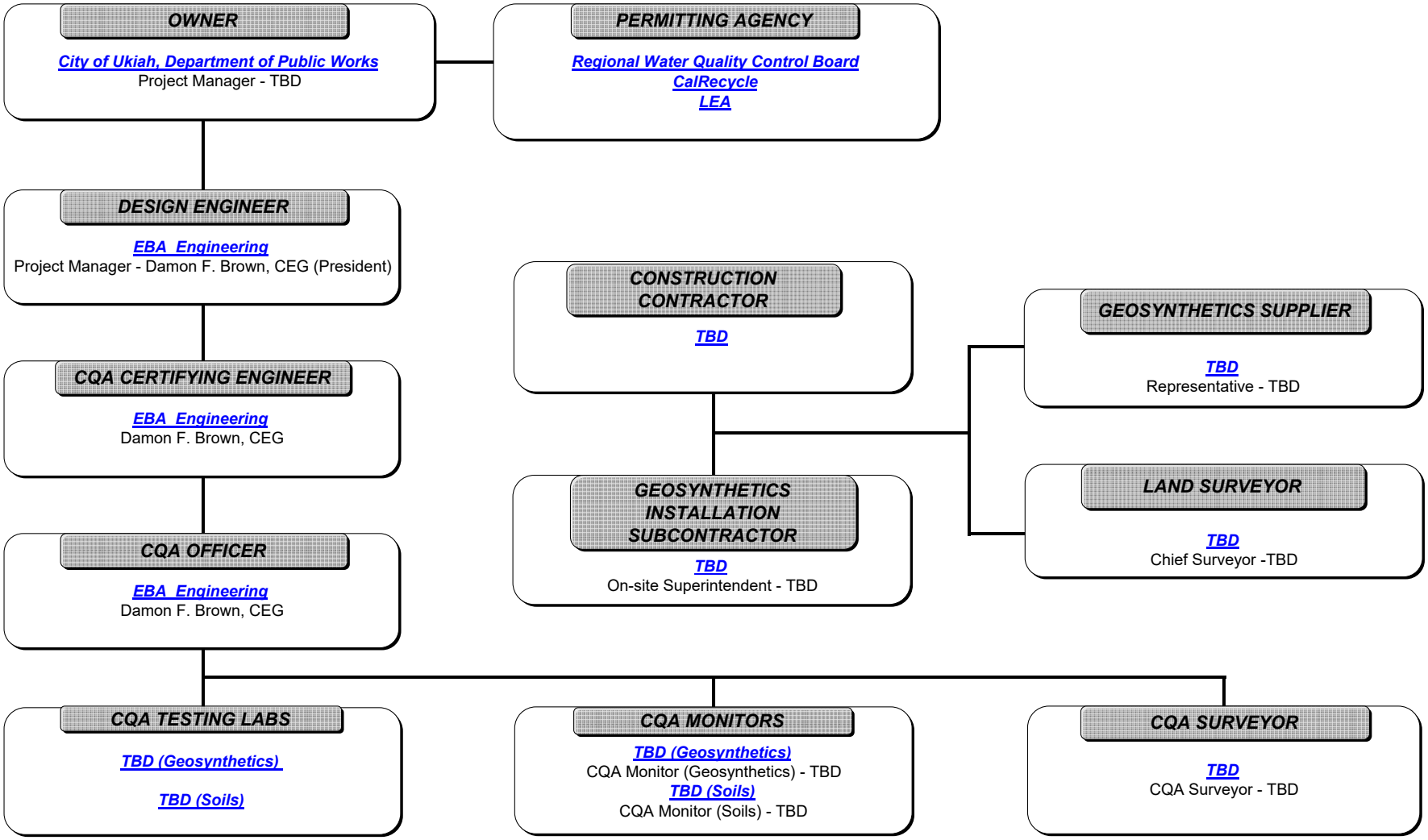

TABLE 01000-1

L:\project\1231\Final Closure Plan\CQA Plan with Geonet\Table 01000-1 orgchart

CQA SECTION 01010
SCOPE OF CONSTRUCTION

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Work to be performed by the Design Engineer

B. Work to be performed by the Owner.

C. Contractor's scope of work.

1.02 WORK TO BE PERFORMED BY THE DESIGN ENGINEER

A. The Design Engineer will provide three (3) reference control points with benchmark elevations in the vicinity of the Work site. All other necessary control or reference points needed to perform construction will be established by the Contractor.

1.03 WORK TO BE PERFORMED BY THE OWNER

A. The Owner will provide the following construction materials and services:
   1. Material for engineered fill.
   2. Material for the foundation layer.
   3. Skid-mounted packaged combustion system, including totally-enclosed vertical ground flare.
   4. Extension of adequate power and telephone service to the location of the skid-mounted packaged combustion system.

1.04 CONTRACTOR'S SCOPE OF WORK

A. The Contractor's scope of work includes the following.
   1. Mobilization of construction equipment and personnel.
   2. Excavation of on-site borrow material for construction of final cover system soil components, as well as sedimentation basin improvements.
   3. Construction of final cover system, including interim cover preparation and placement/installation of foundation layer, geomembrane, engineered turf, hydrobinder, and sand ballast.
   4. Seeding and fertilizing of disturbed areas and on-site borrow area.
   5. Excavation and construction of, and supply of materials for, drainage and erosion control measures.
   6. Construction of, and supply of materials for, access roads.
   7. Construction of, and supply of materials for, leachate overflow collection and storage system, including installation of new leachate UST and lining of existing leachate sediment chamber and wet well.
   8. Construction of, and supply materials for, LFG collection and control system, including installation of LFG extraction wells, LFG collection system piping and condensate drainage components.

9. Installation of Owner-supplied skid-mounted packaged combustion system, including totally-enclosed vertical ground flare.
10. Construction of, and supply of materials for, security fencing.

END OF CQA SECTION 01010
SCOPE OF CONSTRUCTION

CQA SECTION 01039
PROJECT MEETINGS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Communication and coordination between the Design Engineer, Contractor, and CQA Team are most important to achieve the common goals of quality construction and successful completion of the project.

B. A series of project meetings will be held for the purpose of establishing a successful environment of communications, coordination, and overall teamwork; the meetings will be administered by the CQA Officer to: 1) clearly define responsibility and authority of each organization involved in the project; 2) resolve communication problems, misunderstandings, and misinterpretations; 3) find solutions to unanticipated developments; and 4) identify, prevent, and correct problems and deficiencies that may occur during the construction process.

C. Project meetings include the following.
1. Preconstruction meeting.
2. Progress meetings.
3. Preparatory meetings.

1.02 PRECONSTRUCTION MEETING

A. A preconstruction meeting will be held to discuss topics relating to the commencement of the project.

B. The objectives of this meeting are to: 1) clearly define the roles, responsibility, and authority of each organization and individual involved in the project; 2) review specific requirements of the CQA program; and 3) establish a foundation of cooperation to achieve quality construction. The following agenda, as related to CQA, will be addressed by the Design Engineer:
1. Introduce and discuss roles, authority, and responsibilities of each organization and individual involved in the project.
2. Establish lines of communication.
3. Review Technical Specifications and Plans.
4. Distribution of the CQA Plan.
5. Review of CQA activities to be performed.
6. Discuss Contractor's construction schedule and workplan.
7. Discuss Contractor's Construction Quality Control (CQC) procedures and responsibilities.
8. Discuss submittal review and approval procedures.
9. Discuss non-conformance and corrective action procedures.
10. Discuss construction restrictions due to weather conditions.
11. Discuss and schedule weekly progress meetings.
12. Discuss health and safety issues.
13. Discuss preparatory meetings.

C. A Meeting/Discussion Summary Report (see Part 1.08 of Section 01400 of this CQA Plan) will be completed by the CQA Officer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preconstruction meeting:
   1. City's Project Manager or representative.
   2. Contractor's Project Manager and on-site Superintendent.
   3. Installer's Project Manager and on-site Superintendent.
   4. Design Engineer's Project Manager and CQA Officer.

1.03 PROGRESS MEETINGS

A. The CQA Officer will schedule and administer weekly progress meetings. The objectives of these meetings are to: 1) maintain lines of communication; 2) review work progress and CQA activities performed previously; 3) discuss upcoming construction and related CQA activities; and 4) maintain and improve the established foundation of cooperation to achieve quality construction. The following agenda will be addressed by the CQA Officer.
   1. Review minutes of previous progress meeting.
   2. Review work progress.
   3. Review and update construction schedule and obtain a 2-week look-ahead schedule from the Contractor.
   4. Discuss CQA and CQC related field observations, testing results, problems, decisions, and conflicts.
   5. Review and update Submittal Log.

B. A Meeting/Discussion Summary Report (see Section 01400 of this CQA Plan) will be completed by the CQA Officer and distributed to all parties in attendance.

C. The following representatives from each organization are required to attend the weekly progress meetings.
   1. City's Project Manager or representative.
   2. Contractor's on-site Superintendent.
   3. Installers on-site Superintendent (during geosynthetics installation).
   4. Design Engineer's Project Manager and CQA Officer.

1.04 PREPARATORY MEETINGS

A. The CQA Officer will schedule and administer informal preparatory meetings prior to beginning construction/implementation of the following items.
   1. Refuse excavation and interim cover preparation.
   2. Foundation layer placement.
   3. Geomembrane placement.
   4. Engineered turf installation.
   5. Sand ballast placement.
   6. General earthwork, drainage and erosion control, and access road construction, as needed.
   7. Sedimentation basin improvements.
   8. Leachate overflow collection and storage system installation.
   9. LFG collection system installation.
   10. Borrow area reclamation.
   11. Seeding and fertilizing.

B. The objective of these preparatory meetings is to establish a complete understanding of the upcoming unit of construction and CQA activities that will be implemented during construction. To achieve this objective, the following agenda will be addressed by the CQA Officer.

1. Review "Products" part of the applicable section of the Technical Specifications.
2. Review "Execution" part of the applicable section of the Technical Specifications.
3. Discuss any construction and grade control staking needed to perform and complete the Work.
4. Discuss CQA testing, observation, and surveying to be performed.
5. Verify that all submittals have been, or will be, received by the CQA Officer and approved by the Design Engineer in accordance with the schedule.
6. Discuss Contractor's CQC responsibilities.
7. Discuss Contractor's coordination, scheduling, and sequencing of the work.
8. Discuss Contractor's proposed equipment and manpower.

C. A Meeting/Discussion Summary Report (see Section 01400 of this CQA Plan) will be completed by the CQA Officer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preparatory meetings.

1. Design Engineer's Project Manager or representative.
2. Contractor's on-site Superintendent.
3. On-site Superintendent of any Subcontractor, as applicable to the unit of construction.
4. CQA Officer.
5. CQA Monitor(s), as applicable to the unit of construction.

END OF CQA SECTION 01039
PROJECT MEETINGS

CQA SECTION 01050
GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Conformance testing.

B. Construction monitoring.

C. Construction testing.

D. Project meetings.

E. Submittal review and approval.

F. Documentation.

1.02 CONFORMANCE TESTING

A. Prior to using a product or material in construction, sampling and testing will be performed to verify that construction products and materials to be used are in conformance with the Technical Specifications.

B. Conformance testing requirements, methods, and sampling frequencies are given for each unit of construction in Division 2 of this CQA Plan.

C. All product and material conformance test samples will be recorded on the appropriate Master Testing Control Log, assigned a sample number, and processed by the CQA Officer for either on-site or off-site testing. The Master Testing Control Logs document: 1) sample numbers; 2) product or material types; 3) required testing; 4) sampling locations and dates; 5) testing personnel or organization; 6) testing completion dates; and 7) a brief summary of the testing results. The Master Testing Control Log for soils are presented in Appendix C.

D. At the request of the Design Engineer, conformance test samples will be archived at the Work site or an alternate location determined by the Owner for a period of one year. Archived samples will be stored in sealed plastic containers tagged with: 1) the sample number; 2) product or material type; 3) the project name and number; 4) sample date and location; and 5) the date for discarding the sample.

E. The following products or materials require conformance testing.
1. Miscellaneous aggregate materials.
2. Engineered fill.
3. Foundation soil layer.
4. Geomembrane.
5. Engineered turf.
6. Concrete.

1.03 CONSTRUCTION MONITORING

A. Each unit of construction will be monitored to verify compliance with the Technical Specifications and that construction was executed correctly using industry-standard construction methods and the proper materials.

B. Monitoring guidelines and procedures are specified for each construction unit in Division 2 of this CQA Plan and include the following:
   1. Field tests.
   2. Observations.
   3. Field surveys.
   4. Physical measurements.

1.04 CONSTRUCTION TESTING

A. Construction testing will be performed during installation and construction to verify compliance with the Technical Specifications.

B. Construction testing may be performed by the Contractor, Design Engineer, or CQA personnel as required for each construction unit in Division 2 of this CQA Plan and includes the following:
   1. Engineered fill.
   2. Foundation layer.
   3. Aggregate base for access roads.
   4. Geomembrane.
   5. Engineered turf.
   6. Sand ballast.

1.05 PROJECT MEETINGS

A. In accordance with Section 01039 of this CQA Plan.

1.06 SUBMITTAL REVIEW AND APPROVAL

A. In accordance with Section 01300 of this CQA Plan.

1.07 DOCUMENTATION

A. In accordance with Section 01400 of this CQA Plan.

END OF CQA SECTION 01050
GENERAL REQUIREMENTS

CQA SECTION 01090
REFERENCES

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Project Reference Documents.

B. Industry Standards and Technical Reference Documents.

C. Soils Testing Standards and Methods.

D. Geosynthetics Testing Standards and Methods.

E. Landfill Gas Collection System Testing Standards and Methods.

F. Concrete Testing Standards and Methods.

G. Acronyms.

H. Contact Addresses and Telephone Numbers.

1.02 PROJECT REFERENCE DOCUMENTS

A. The following project reference documents provide support and background information for use in conjunction with this CQA Plan.

1. *Joint Technical Document for City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, January 2008.
2. *Response to RWQCB Comments Dated February 21, 2008, Joint Technical Document, City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, April 21, 2008.
3. *January 2008 Joint Technical Document Addendum, Response to Regulatory Comments, Final Closure and Postclosure Maintenance Plans, City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, June 20, 2013.
4. *Design Plan for Landfill Gas Collection and Control System, City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, October 2013.

1.03 INDUSTRY STANDARDS AND TECHNICAL REFERENCE DOCUMENTS

A. The following industry standards and technical reference documents were used in the preparation of this CQA Plan.

1. *ASTM Standards and Other Specifications and Test Methods on the Quality Assurance of Landfill Liner Systems.* American Society for Testing and Materials, Current Edition.
2. *Technical Guidance Document, Quality Assurance and Quality Control for Waste Containment Facilities [EPA/600/R-93/182].* United States Environmental Protection Agency, September 1993.
3. *Federal Register (Vol. 56, No. 196, pp. 50978 - 51119). Part II, Environmental Protection Agency, 40 CFR Parts 257 and 258 - Solid Waste Disposal Facility*

Criteria; Final Rule [EPA/OSW-FR-91-004 FRL-4011-9]. United States Environmental Protection Agency, October 9, 1991.

4. *California Code of Regulations, Title 27 - Combined SWRCB/CIWMB Regulations, Division 2, Subdivision 1, Chapter 3, Subchapter 2, Article 4, Section 20324.* Effective July 18, 1997.
5. *Caltrans Standard Specifications.* California Department of Transportation, 2010.
6. *Caltrans Standard Plans.* California Department of Transportation, 2010.
7. *California Test Methods. California Department of Transportation, Current Edition.*
8. *California Building Code. Current Edition.*

1.04 SOILS TESTING STANDARDS AND METHODS

A. The following standard soils testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM C 33	Standard Specification for Concrete Aggregates.
2.	ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates.
3.	ASTM D 422	Standard Test Method for Particle-Size Analysis of Soils.
4.	ASTM D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).
5.	ASTM D 2434	Standard Test Method for Permeability of Granular Soils (Constant Head).
6.	ASTM D 2487	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
7.	ASTM D 2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
8.	ASTM D 2922	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9.	ASTM D 3017	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
10.	ASTM D 4959	Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating.
11.	CTM 229	Method of Test for Durability Index.
12.	CTM 301	Method for Determining the Resistance "R" Value of Treated and Untreated Bases, Subbases, and Basement Soils by the Stabilometer.

1.05 GEOSNYTHETICS TESTING STANDARDS AND METHODS

A. The following standard geosynthetics testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM D 638	Standard Test Method for Tensile Properties of Plastics.
2.	ASTM D 746	Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
3.	ASTM D 792	Standard Test Method for Specific Gravity and Density of Plastics by Displacement.
4.	ASTM D 1004	Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
5.	ASTM D 1204	Standard Test Method for Linear Dimensional Changes to Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures.

6.	ASTM D 1505	Test Method for Density of Plastics by the Density-Gradient Technique.
7.	ASTM D 2256	Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method.
8.	ASTM D 3895	Standard Test Method for Copper Induced Oxidative Induction Time of Polyolefins by Thermal Analysis.
9.	ASTM D 4218	Test Method for Carbon Black Content.
10.	ASTM D 4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
11.	ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
12.	ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
13.	ASTM D 4595	Test Method for Tensile Product (MD/XD).
14.	ASTM D 4632	Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
15.	ASTM D 4716	Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
16.	ASTM D 4751	Standard Test Method for Determining the Apparent Opening Size of a Geotextile.
17.	ASTM D 4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
18.	ASTM D 5035	Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).
19.	ASTM D 5261	Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
20.	ASTM D 5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.
21.	ASTM D 5397	Standard Test Method for Notched Constant Tensile Load Test of Geomembrane.
22.	ASTM D 5596	Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
23.	ASTM D 5617	Standard Test Method for Multi-Axial Tension Test for Geosynthetics.
24.	ASTM D 5994	Sheet Thickness for Textured Geomembrane.
25.	ASTM D 6241	Standard Test Method for Static Puncture Strength Resistance of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
26.	ASTM D 6392	Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.
27.	ASTM D 6693	Standard Test Method for Determining of Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.
28.	ASTM D 6913	Standard Test Methods for Particle-Size Distribution.
29.	ASTM D 7277	Standard Test Method for Performance Testing of Articulating Concrete Block Systems in Open Channel Flow.

30.	ASTM D 7466	Standard Test Method for Measuring Asperity Height of Textured Geomembranes.
31.	ASTM D 96459	Standard Test Method for Determining Rainfall Induced Erosion.
32.	ASTM G 147	Standard Test Method for Determining the UV Stability of Engineered Fiber, Natural and Artificial Weathering Tests.
33.	ASTM G 1545(M)	Standard Test Method for Determining UV Stability (exposed), Modified Cycle, UVA340.
34.	FTMS 101C	Puncture Resistance.

1.06 LANDFILL GAS EXTRACTION SYSTEM TESTING STANDARDS AND METHODS

A. The following standard geosynthetics testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM A 193	Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service.
2.	ASTM A 325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength.
3.	ASTM D 1784	Standard Specification for Rigid PVC Compounds and Chlorinated PVC Compounds.
4.	ASTM D 1785	Standard Specification for PVC Plastic Pipe, Schedules 40, 80, and 120.
5.	ASTM D 2464	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 80.
6.	ASTM D 2466	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 40.
7.	ASTM D 2467	Standard Specification for Socket-Type PVC Plastic Pipe Fittings, Schedule 80.
8.	ASTM D 2513	Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
9.	ASTM D 2564	Standard Specification for Solvent Cements for PVC Plastic Piping Systems.
10.	ASTM D 2855	Standard Specification for Making Solvent-Cemented Joints with PVC Pipe and Fittings.
11.	ASTM D 3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
12.	ASTM D 3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
13.	ASTM D 3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
14.	ASTM D 3350	Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.
15.	ASTM D 3786	Standard Test Method for Methoxyl and Hydroxypropyl Substitution in Cellulose Ether Products by Gas Chromatography.
16.	ASTM D 7001	Standard Specification for Geocomposites for Pavement Edge Drains and Other High-Flow Applications.
17.	ASTM F 477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

18.	ASTM F 2648	Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Pipe Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.

1.07 CONCRETE TESTING STANDARDS AND METHODS

A. The following standard concrete testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2.	ASTM C 42	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
3.	ASTM C 143	Standard Test Method for Slump of Portland Cement Concrete.
4.	ASTM C 150	Standard Specification for Portland Cement.
5.	ASTM C 260	Standard Specification for Air-Entraining Admixtures for Concrete.
6.	CBC Section 1701	Structural Tests and Special Inspections.
7.	CBC Section 1905	Concrete Quality, Mixing and Placing.

1.08 STEEL TESTING STANDARDS AND METHODS

A. The following standard steel testing methods and procedures apply as referenced in these Technical Specifications and/or the CQA Plan.

1.	ASTM A 36	Standard Specification for Carbon Structural Steel.
2.	ASTM A 90	Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coating.
3.	ASTM A 185	Standard Specifications for Steel Welded Wire Reinforcement, Plain, for Concrete.
4.	ASTM A 313	Specification for Chromium-Nickel Stainless and Heat-Resisting Steel Spring Wire.
5.	ASTM A 370-97a	Test Methods and Definitions for Mechanical Testing of Steel Products.
6.	ASTM A 615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
7.	ASTM A 641	Specification for Zinc Coated (Galvanized) Carbon Steel Wire.
8.	ASTM A 764	Specification for Steel Wire, Carbon, Drawn Galvanized and Galvanized at Size for Mechanical Springs.
9.	ASTM A 975-97	Standard Specification for Double-Twisted Hexagonal Mesh Gabions and Revet Mattresses (Metallic-Coated Steel Wire or Metallic-Coated Steel Wire with Polyvinyl Chloride (PVC) Coating).

1.09 ACRONYMS

A. Whenever the following acronyms for standards, institutes and societies are referenced in the Technical Specifications or this CQA Plan, the following meanings apply:

1.	AASHTO	American Association of State Highway and Transportation Officials
2.	AISC	American Institute of Steel Construction
3.	ANSI	American National Standards Institute

4.	ASTM	American Society for Testing and Materials
5.	AWWA	American Water Works Association
6.	CAC	California Administrative Code
7.	CFR	Code of Federal Regulations
8.	CRSI	Concrete Reinforcing Steel Institute
9.	CTM	California Test Methods
10.	NEMA	National Electrical Manufacturer's Association
11.	NEC	National Electric Code
12.	NFPA	National Fire Protection Association
13.	OSHA	Occupational Health and Safety Administration
14.	RWQCB	Regional Water Quality Control Board
15.	SWANA	Solid Waste Association of North America
16.	SWRCB	State Water Resources Control Board
17.	UL	Underwriters Laboratories Inc.
18.	US	United States

B. Whenever the following acronyms for materials and units are referenced in the Technical Specifications or this CQA Plan, the following meanings apply:

1.	AC	acre
2.	AWG	American Wire Gauge
3.	cm	centimeter
4.	ClosureTurf™	Three (3) component final cover system composed of structured LLDPE geomembrane liner drainage studs and spike, engineered synthetic turf, and a specific grade of sand infill ballast.
5.	CMP	corrugated metal pipe
6.	Enginneer Turf	Synthetic turf component of ClosureTurf™
7.	EPDM	ethylene propylene diene monomer
8.	°F	degree Fahrenheit
9.	ft	foot
10.	g	gram
11.	LLDPE	Linear Low-Density Polyethylene
12.	HDPE	High Density Polyethylene
13.	HP	horse power
14.	HydroBinder	Cementious infill used for surface drainage conveyance areas of engineered turf.
15.	in	inch
16.	”	inch
17.	kN	kilonewtons
18.	lb	pound
19.	MARV	minimum average roll value
20.	m	meter
21.	mm	millimeter
22.	mil	1/1000 of 1 inch
23.	ml	milliliters
24.	min	minute
25.	No.	number
26.	oz	ounce
27.	%	percent
28.	psf	pounds per square foot
29.	psi	pounds per square inch
30.	psig	pounds per square inch gauge
31.	PVC	Polyvinyl Chloride

32.	SDR	Standard Dimension Ratio
33.	sec	second
34.	TFE	tetrafluoroethylene
35.	TRM	turf reinforcement mat
36.	yd	yard

C. Whenever the following miscellaneous acronyms are referenced in the Technical Specifications or this CQA Plan, the following meanings apply:

1.	AST	Above Ground Storage Tank
2.	@	at
3.	BMP	Best Management Practice
4.	CQA	Construction Quality Assurance
5.	CQC	Construction Quality Control
6.	CSMP	Construction Storm Water Management Plan
7.	EBA	EBA Engineering
8.	=	equals
9.	LFG	Landfill Gas
10.	max.	maximum
11.	min.	minimum
12.	MQC	Manufacturer's Quality Control
13.	MSDS	Material Data Safety Sheet
14.	NOI	Notice of Intent
15.	NPDES	National Pollutant Discharge Elimination System
16.	PDF	Portable Document Format
17.	POC	Point of Connection
18.	QSD	Qualified SWPPP Developer
19.	QSP	Qualified SWPPP Practitioner
20.	REAP	Rain Event Action Plan
21.	SAP	Storm Water Action Plan
22.	SMARTS	Storm Water Multiple Application and Report Tracking System
23.	SPC	Storm Water Pollution Control
24.	Std.	Standard
25.	SWPPP	Storm Water Pollution Prevention Plan
26.	TEFC	Totally Enclosed Fan Cooled
27.	UST	Underground Storage Tank
28.	UV	Ultra-violet
29.	WDID	Waste Discharge Identification
30.	WPC	Water Pollution Control

1.10 CONTACT ADDRESSES AND TELEPHONE NUMBERS

A. The following are addresses, telephone numbers, and fax numbers for individual contacts at each organization involved in the project.

City of Ukiah
Department of Public Works
300 Seminary Avenue
Ukiah, CA 95482
Telephone: (707) 463-6282
Fax: (707) 463-6204

EBA Engineering
825 Sonoma Avenue
Santa Rosa, CA 95404
Contact Name: Damon F. Brown, P.G., C.E.G., C.Hg.
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END OF CQA SECTION 01090
REFERENCES

CQA SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Submittal Control Log.

B. Submittal review and approval procedures.

1.02 SUBMITTAL CONTROL LOG

A. The Submittal Control Log lists all submittals required by the Technical Specifications. The Submittal Control Log will be maintained by the CQA Officer in coordination with the Contractor during construction. The Submittal Control Log documents: 1) submittal number; 2) referenced specification section; 3) submittal description; 4) submitter; 5) date received; 6) reviewer; 7) action taken determination; and 8) return date.

1.03 SUBMITTAL REVIEW AND APPROVAL PROCEDURES

A. Three (3) copies of each submittal listed in the Submittal Control Log will be submitted to the CQA Officer by the Contractor in accordance with the Technical Specifications. The submittals will be forwarded by the CQA Officer to the Design Engineer for review and approval. The Design Engineer may perform a preliminary review of submittals for compliance with the Technical Specifications and issue a verbal *Approval for Use* to the CQA Officer who, in turn, will notify the Contractor that no corrective action determinations were required prior to issuing a verbal *Approval for Use*. All submittals which are not in compliance with the Technical Specifications must be immediately forwarded to the Design Engineer for review and corrective action determinations.

B. At the completion of the review process, the Design Engineer will return two (2) copies of each submittal to the CQA Officer with *Action Taken* determinations stamped on both copies of the submittal. The *Action Taken* determinations and the return dates will be recorded on the Submittal Control Log. One copy of the reviewed submittal will be returned to the Contractor and the other copy will be archived by the CQA Officer in the submittal documentation control binder.

C. The Submittal Control Log will be reviewed and updated in coordination with the Contractor at the weekly progress meetings.

END OF CQA SECTION 01300
SUBMITTALS

CQA SECTION 01400
DOCUMENTATION

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Daily Summary Report.

B. Daily Field Log (Inspection Data Sheet).

C. Construction monitoring forms.

D. Laboratory testing reports.

E. Non-conformance/Corrective Action Form.

F. Acceptance Report.

G. Meeting/Discussion Summary Report.

H. Photograph Log.

I. Document Control.

J. As-built Record Documents.

K. CQA Certification Report.

L. Documentation archive storage.

1.02 DAILY SUMMARY REPORT

A. A summary report will be prepared daily by the CQA Officer. This report will organize and summarize all construction and CQA activities (monitoring and testing) completed during each day. The Daily Summary Report will contain or reference the following information:

1. Title block containing: 1) project name; 2) project number; 3) project location; 4) name of Owner; 5) name of Contractor; 6) date and day; 7) Document Control Number (see Part 1.10 of this Section); and 8) weather conditions.
2. Summary of construction activities for each unit of construction including equipment, personnel, and subcontractors utilized for each unit of construction and identification of the general area(s) where construction took place.
3. General summary of CQA activities (monitoring and testing) completed for each unit of construction with reference to attached Daily Field Logs (see Part 1.03 of this Section) which describe construction monitoring, construction testing results, and quality control procedures and test results.
4. General description of any non-conformance with the Plans or Technical Specifications and the corrective action measures taken with reference to attached Non-conformance/Corrective Action Forms (see Part 1.06 of this Section) which

contain a more detailed description of the non-conformance issue and its corrective action.

5. List of any materials received and status of submittal(s).
6. List of project meetings or pertinent discussions with reference to attached Meeting/Discussion Summary Report (see Part 1.08 of this Section).
7. Other miscellaneous information.
8. Signature of CQA Officer.

B. A sample Daily Summary Report is included in Appendix A, Project Documentation Forms.

1.03 DAILY FIELD LOG (INSPECTION DATA SHEET)

A. Each CQA Monitor will maintain an individual Daily Field Log (or Inspection Data Sheet) which will be assigned a cross-referencing Document Control Number (see Part 1.10 of this Section) and contain daily entries of the CQA Monitor.

B. On the Daily Field Log, the CQA Monitors will provide a written account of construction activities, construction monitoring, construction testing, and quality control procedures performed during the day for the monitored construction unit(s), as well as any observations (i.e., notes, charts, sketches, or photograph reference).

C. Construction monitoring forms (see Part 1.04 of this Section) and laboratory testing forms (see Part 1.05 of this Section) will be attached to, or referenced in, the Daily Field Log.

1.04 CONSTRUCTION MONITORING FORMS

A. Construction activities, construction monitoring, and construction testing will be recorded on appropriate construction monitoring forms. The following construction monitoring forms, or similar forms, will be issued by the CQA Officer for this project and are presented in the following appendices:

1. Soils Monitoring Forms (Appendix B)
    a. Soils Test Request - Sample Custody Log
    b. Nuclear Density/Moisture Test Data
2. Geosynthetics Monitoring Forms (Appendix C)
    a. Geomembrane Delivery and Control Log
    b. Engineered Turf Delivery and Control Log
    c. Geomembrane Test Request – Sample Custody Log
    d. Engineered Turf Test Request – Sample Custody Log
    e. Geomembrane Deployment/Seaming Log
    f. Geomembrane Repair Log
    g. Engineered Turf Deployment/Seaming Lot
    h. Engineered Turf Repair Log

B. Completed construction monitoring forms will be submitted by the CQA Monitor to the CQA Officer for review with Daily Field Logs, or at the completion of testing, and will be addressed by the CQA Officer in the Daily Summary Reports.

1.05 LABORATORY TESTING REPORTS

A. Laboratory testing reports will be issued by the Soils and Geosynthetics CQA Testing Laboratories for conformance and construction testing. Laboratory testing reports will be issued for the following testing during the project.

1. Moisture content, particle size analysis, Atterberg limits, Unified Soil Classification, and/or moisture-density relationship testing for miscellaneous aggregate materials, engineered fill, foundation layer, and erosion-resistant layer materials.
2. Particle size analysis for sand ballast.
3. Conformance testing for geomembrane.
4. Conformance testing for engineered turf.
5. Conformance testing for concrete.

B. Laboratory testing reports will be addressed by the CQA Officer in the Daily Summary Report on the date of receipt.

1.06 NON-CONFORMANCE/CORRECTIVE ACTION FORM

A. A Non-conformance/Corrective Action Form will be issued by the Owner to the CQA Officer who will notify the Contractor or Installer of construction or materials not in compliance with the Plans or Technical Specifications, or for defective workmanship or materials even if in compliance with the Plans and Technical Specifications. The Non-conformance/Corrective Action Form will contain or reference the following information:
1. Title block containing: 1) project name; 2) project number; 3) project location; 4) name of Owner; 5) name of Contractor; 6) date and day; and 7) Document Control Number (see Part 1.10 of this Section).
2. Description of the non-conformance issue, construction unit, and location.
3. Reference to the technical specification(s) and/or plan(s) for which materials or construction are not in compliance.
4. Description of corrective action measures necessary to fully correct the area of non-conformance with the Plans and/or Technical Specifications as determined by the Owner.
5. Specification variance or revisions to the As-built Record Drawings (see Part 1.11 of this Section) required.
6. If necessary, any Daily Field Log, construction monitoring forms, laboratory testing report(s), Meeting/Discussion Summary Report, or Photograph Log pertaining to the non-conformance issue will be referenced by Document Control or Photograph Number to fully substantiate the non-conformance issue and corrective action determination.
7. Signature of the CQA Officer verifying that corrective measures determined by the Owner have been taken by the Contractor or Installer.

B. A sample Non-conformance/Corrective Action Form is included in Appendix A, Project Documentation Forms.

1.07 ACCEPTANCE REPORT

A. An Acceptance Report will be prepared for each Construction Unit to verify that all materials and construction are in compliance with the Plans and Technical Specifications. The Acceptance Report will reference all relevant Daily Summary Reports, Daily Field Logs (Inspection Data Sheets), and Non-conformance/Corrective Action Forms by the Document Control Number.

B. A sample Acceptance Report is included in Appendix A, Project Documentation Forms.

1.08 MEETING/DISCUSSION SUMMARY REPORT

A. A Meeting/Discussion Summary Report will be prepared for each scheduled Project Meeting (see Section 01039 of this CQA Plan) and any pertinent discussion between the Contractor and CQA personnel. The Meeting/Discussion Summary Report will contain the following information:

1. Title block containing: 1) project name; 2) project number; 3) project location; 4) name of Owner; 5) name of Contractor; 6) date and time; 7) meeting location; and 8) Document Control Number (see Part 1.10 of this Section).
2. Meeting name or general discussion subject matter.
3. List of meeting attendees or discussion participants.
4. Minutes of scheduled Project Meetings or synopsis of discussion.
5. List of any items needing resolution resulting from the meeting or discussion.
6. Signature of CQA Officer.

B. A sample Meeting/Discussion Summary Report is included in Appendix A, Project Documentation Forms.

1.09 PHOTOGRAPH LOG

A. All construction activities will be continually photographed to clearly show and define construction methods and as-built conditions of completed units of construction. Photographs will include: 1) product or material sources; 2) construction methods in progress for each unit of construction; 3) completed units of construction; 4) damaged, rejected, or substandard materials and construction; 5) corrective action measures to rectify damaged, rejected, or substandard construction; 6) completed units of construction after completion of corrective action measures; and 7) design modifications. Photographs will be identified by number, date, and time of the photograph. The CQA Officer will maintain a cross-referencing photography log documenting the subject matter of each photograph.

B. A sample Photograph Log is included in Appendix A, Project Documentation Forms.

1.10 DOCUMENT CONTROL

A. A unique Document Control Number will be assigned to all CQA documents generated during construction and implementation of this CQA Plan.

B. The Document Control Number will organize and index all CQA documentation for cross-referencing, to allow easy access to all documents, and to enable a reviewer to identify and retrieve original CQA documentation for any completed unit of construction.

C. Complete documentation of all CQA activities will be controlled and secured in a series of 3-ring binders maintained by the CQA Officer with a duplicate copy maintained at the offices of the Owner, at the option of the Owner. This documentation control structure organizes and indexes all CQA documents and is intended to allow easy access to all documents for review and audit by the Owner, Design Engineer, or regulatory agencies. The following is a preliminary list and contents of the *CQA Documentation Binders* to be established and maintained by the CQA Officer.

1. Title: *Daily Summary Reports and Field Logs.*
   Color code (optional): Blue.
   Contents: Daily Summary Reports prepared by the CQA Officer and Daily Field Logs completed by the CQA Monitors.
2. Title: *Project Administration Documentation.*
   Color code (optional): Red.
   Contents: Non-conformance/Corrective Action Forms, Acceptance Reports, Meeting/Discussion Summary Reports, Owner correspondence, Design Engineer correspondence, Contractor correspondence, and miscellaneous correspondence.
3. Title: *Contractor Daily Field Reports.*
   Color code (optional): Green.
   Contents: Any Daily Field Reports prepared by the Contractor (or Installer).
4. Title: *Submittals.*
   Color code (optional): Purple.
   Contents: Updated Submittal Control Log, submittal transmittal cover sheets, and all reviewed and approved (or other status) submittals.
5. Title: *Soils CQA.*
   Color code (optional): White.
   Contents: Construction monitoring forms and laboratory testing reports for soils.
6. Title: *Geosynthetics CQA.*
   Color code (optional): Orange.
   Contents: Construction monitoring forms and laboratory testing reports for geosynthetics.
7. Title: *CQA Plan.*
   Color code (optional): Teal.
   Contents: CQA Plan.
8. Title: *Photography Log.*
   Color code (optional): Yellow.
   Contents: Construction and CQA photographs and cross-referencing Photograph Logs.

1.11 AS-BUILT RECORD DOCUMENTS

A. As-built Record Documents will be maintained by the CQA Officer and will be reviewed and verified by the Design Engineer.

B. The As-built Record Documents will show actual as-built conditions of construction, including an aerial topographic survey illustrating the final construction grades and configuration, and will adequately reflect that construction is in substantial compliance with the design intent of the Plans and Technical Specifications; irrelevant deviations in actual construction that do not substantially affect the design intent will not be incorporated into the As-built Record Documents, but will be addressed in the CQA Certification Report (see Part 1.12 of this Section).

C. As-built Record Documents will be prepared during the construction process by making modifications as they occur to a single set of construction drawings designated as the *Site As-built Record Documents*; at the completion of construction the CQA Officer will incorporate all as-built conditions into the *Final As-built Record Documents.*

D. The final As-built Record Documents will contain revision numbers, dates, and reviewer initials; and will be signed and stamped by the CQA Certifying Engineer.

1.12 CQA CERTIFICATION REPORT

A. At the completion of the project, the CQA Certifying Engineer will prepare a CQA Certification Report and submit it to the Owner. The CQA Certification Report will consist of information and data generated by the CQA program and will document that the final closure construction is in compliance with the design intent of the Plans and Technical Specifications. At a minimum, the CQA Certification Report will contain the following information.

1. Summary of construction methods for each unit of construction completed.
2. Summary of the CQA program implemented during construction and specific CQA activities (monitoring and testing) performed for each unit of construction completed.
3. Results of conformance testing and construction testing.
4. Revisions made to Plans and variances from Technical Specifications allowed.
5. Final As-built Record Documents.
6. Statement of compliance with the design intent of the Plans and Technical Specifications, signed and stamped by the CQA Certifying Engineer, a professional engineer or certified engineering geologist registered in the State of California.

1.13 DOCUMENTATION ARCHIVE STORAGE

A. At the completion of the project and after submittal of the CQA Certification Report and As-built Record Documents to the Owner, all original documentation generated by construction and the CQA program will be archived at the Owner's administrative office with duplicate copies stored at the offices of the Design Engineer and CQA Certifying Engineer.

END OF CQA SECTION 01400
DOCUMENTATION

DIVISION 2

CONSTRUCTION QUALITY ASSURANCE PROCEDURES

CQA SECTION 02207
AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the aggregate materials are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 AGGREGATE MATERIALS

A. Verify that the following aggregate materials meet the applicable product requirements of Section 02207 (Aggregate Materials) of the Technical Specifications:
1. Aggregate base.
2. Pipe bedding.
3. Sand ballast.
4. Loose rock riprap.
5. Grouted rock riprap.
6. Gravel pack.
7. Concrete aggregate.
8. Coarse rock for construction entrance.
9. Concrete sand.
10. Tank bedding and backfill.

2.02 CONFORMANCE TESTING

A. Prior to aggregate base, pipe bedding, tank bedding and tank backfill placement operations, sample these respective materials to be used at the Work site and send the samples to the Soils Testing Laboratory to perform following test as specified:
1. Moisture-Density Relationship (ASTM D 1557); one (1) per source.

B. Prior to sand ballast placement operations, sample the actual sand material to be used at the Work site and send the samples to the Soils Testing Laboratory to perform at least one (1) of each of the following tests as specified:
1. Sieve Analysis (ASTM C 136) per every 10,000 cubic yards.
2. Permeability (ASTM D 2434 [modified]) per every 10,000 cubic yards.

C. Verify that the respective aggregate materials are derived from the approved sources throughout the Work.

PART 3 EXECUTION

3.01 STOCKPILING

A. Verify that the Contractor places all aggregate materials in the appropriate stockpile areas designated in the Plans and in accordance with all requirements in the Technical Specifications.

B. Verify that provisions are made to direct surface water away from stockpile site(s) so as to prevent erosion or deterioration of materials.

END OF CQA SECTION 02207
AGGREGATE MATERIALS

CQA SECTION 02222
EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that all excavation work associated with the various construction tasks are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of the Contractor's Storm Water Pollution Prevention Plan (SWPPP) as required in the Technical Specifications.

B. Collect certified weight tags issued by the permitted transfer station or solid waste disposal facility for all loads of refuse transported off-site for disposal.

C. Verify compliance with the submittal schedule and update Submittal Log.

D. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning of any portion of general earthwork, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the Contractor has located all underground utilities prior to performing any excavation for drainage and/or erosion control structures outside the limits of Work shown on the Plans.

3.02 CLEARING AND GRUBBING

A. Verify that all areas delineated for construction as shown on the Plans, including interim cover soil on the landfill surface and natural ground surface within the limits of the on-site borrow area, are cleared of all vegetative growth, such as brush, grass, weeds, or other deleterious material.

B. Verify that clearing and grubbing is performed prior to beginning excavation of any area.

C. Verify that cleared and grubbed debris are stockpiled separately from excavated material in accordance with the requirements set forth in Part 3.05 of this Section.

3.03 REFUSE EXCAVATION AND RELOCATION

A. After clearing and grubbing, verify that residual existing interim cover soil overlying the designated refuse excavation areas is segregated and subsequently reused as foundation layer material.

B. Verify that refuse beneath the existing power lines is excavated to the lines, grades and dimensions shown on the Plans.

C. Verify that the excavated refuse is relocated to the designated refuse relocation area shown on the Plans.

D. Verify that the relocated refuse placed within the designated refuse relocation area is spread in uniform lifts not exceeding 2 feet in thickness and the each lift is compacted with a minimum of four (4) passes using a dozer.

E. Verify that the relocated refuse lifts is covered with a minimum of 6 inches of soil at the end of each working day to minimize vector hazards and odor nuisance.

F. Verify that within five (5) working days of completing the refuse excavation work beneath the existing power lines, the refuse relocation area is completely covered with a minimum of 12 inches of prepared and compacted foundation layer material in accordance with Section 02240 (Foundation Layer) of these Technical Specifications.

3.04 INCIDENTAL REFUSE EXCAVATION AND DISPOSAL

A. Verify that refuse is excavated at the locations and to the details shown on the Plans to accommodate the installation of drainage, LFG collection system, and condensate drain/discharge components.

B. Verify that excavated refuse is handled and managed in accordance with the procedures outlined in Section 02222 (Excavation) of the Technical Specifications, including placement of refuse in roll-off bins or dump trucks, covering of roll-off bins or dump trucks containing refuse at the end of each working day, and the removal of refuse from the site within 48 hours of being excavated.

C. Verify that the Contractor does not mix excess, surplus, or waste materials from other general construction activities with the refuse derived from the excavation work described in this Section.

3.05 SOIL EXCAVATION

A. Verify that excavation of swales for drainage and erosion control structures conforms to Section 19-4.01 of the Standard Specifications.

3.06 GRADING

A. Verify that the excavations for the on-site borrow area, drainage swales, and leachate UST are constructed in conformance with the lines, grades, and dimensions shown on the Plans.

B. Verify that unsuitable materials, as determined by the Design Engineer, encountered at the subgrade elevation are removed and stockpiled separately from excavated material or disposed of in accordance with Section 02222 (Excavation) of the Technical Specifications.

C. Verify that where excavation is inadvertently carried below subgrade elevations, suitable provision is made by the Contractor for adjustment of same as determined by the Design Engineer to meet requirements incurred by the deeper excavation; also, verify that inadvertent over-excavation in such locations is rectified by backfilling with engineered fill and compacting to provide a firm and unyielding subgrade in accordance with the requirements of the Technical Specifications.

3.07 HAUL ROAD CONSTRUCTION

A. Verify that haul road locations have been approved by the Design Engineer.

3.08 DUST CONTROL

A. Verify that dust control measures are implemented by the Contractor in accordance with the approved Dust Control Plan and are effective in preventing and controlling the generation of dust in construction zones, along haul roads, in equipment parking areas, and in other locations as may be required due to operations related to performing the Work, and as required by the Design Engineer.

3.09 EROSION CONTROL

A. Verify that erosion and sediment control measures are implemented by the Contractor in accordance with the approved SWPPP, and as directed by the Design Engineer for all excavation work areas including on-site borrow area, sedimentation basins, leachate UST, stockpile areas, adjacent areas which have been disturbed, or any other affected areas.

3.10 DRAINAGE CONTROL

A. Verify that the Contractor provides ample means and devices with which to promptly remove and dispose of all water from any source entering the stockpile area(s) and any other active Work areas, and maintains these at all times until authorization for their removal is issued by the Design Engineer.

3.11 CORRECTIVE ACTIONS

A. If any portion(s) of the excavation work does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02222
EXCAVATION

CQA SECTION 02224
ENGINEERED FILL

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that engineered fill materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 ENGINEERED FILL

A. Verify that the engineered fill materials meets the applicable product requirements of Section 02224 (Engineered Fill) of the Technical Specifications.

2.02 CONFORMANCE TESTING

A. Verify that engineered fill is obtained from one of the approved on-site borrow sources.

B. If engineered fill placement operations are being performed concurrently and from the same borrow source area as the foundation layer or erosion-resistant layer construction, use results from the foundation/erosion-resistant layer conformance testing to determine moisture-density relationship for compaction. If not, sample the actual engineered fill material to be used and send the samples to the Soils Testing Laboratory to perform the following test per the stated frequency of material to be placed or a minimum of two (2) tests, whichever results in the greater number of tests:

1. Moisture-Density Relationship Curve (ASTM D 1557) per every 5,000 cubic yards.

C. If engineered fill material appearance or properties are different from those identified from borrow source characterization or change within the same location at the on-site borrow source, based on visual observation, perform additional borrow source characterization tests in accordance with the aforementioned conformance testing program.

D. Notify the Design Engineer of a change in materials and receive approval from the Design Engineer for use of the material as engineered fill prior to excavating additional material from that location within the on-site borrow source.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to engineered fill placement operations, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Convey to the Contractor that the nuclear testing gauge shall be calibrated on a daily basis using the methods and materials recommended by the gauge manufacturer. The nuclear gauge serial number and the name of the soil technician performing the soil density testing shall be noted to demonstrate that both the technician and the nuclear gauge are certified.

3.02 PLACEMENT

A. Verify that prior to placement of engineered fill on native ground, the subgrade is scarified to a depth of approximately 6 inches, moisture conditioned to within 1 to 3 percentage points of optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557.

B. Verify that engineered fill material is spread in uniform loose lifts not exceeding 8 inches in thickness.

C. Verify that each loose lift is moisture conditioned and thoroughly mixed to ensure a uniformly distributed moisture content.

3.03 COMPACTION

A. Verify that the final thickness of compacted lifts does not exceed 6 inches.

B. Perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least four samples (4) per 1,000 cubic yards of material placed or four samples per day.
   a. For sedimentation basin improvements and former leachate pond backfill, perform at least one (1) test per every 5,000 cubic yards
2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

C. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the engineered fill does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02224
ENGINEERED FILL

CQA SECTION 02225
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that all trenching and backfilling work associated with the various construction tasks are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.02 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.03 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the pipe bedding and engineered fill as determined under CQA Section 02207 (Aggregate Materials) and CQA Section 02224 (Engineered Fill), respectively, of this CQA Plan.

PART 3 EXECUTION

3.01 TRENCH PREPARATION

A. Verify that the required points of connection, lines, levels, contours, and datum locations have been identified by the Contractor.

B. Verify that the Contractor has located all utilities to avoid mechanical and structural interference.

3.02 TRENCH EXCAVATION

A. Verify that trenches are excavated to the lines and grades as shown on the Plans.

B. Verify that any water or materials that interfere with the work is removed.

C. Verify that soft areas of trench subgrades not capable of compaction in place are cut out.

D. Verify that trench bottoms are firm, continuous, relatively smooth and free of rocks and/or unsuitable material prior to the installation of pipe bedding or trench backfill material.

3.03 SHORING, SHEETING, AND BRACING OF TRENCH

A. Verify that the Contractor has secured a trench permit from the California Division of Industrial Safety prior to excavating any trench over 5 feet in depth.

B. Verify that shoring and sheeting is removed as the backfill is completed in a manner that will not damage the pipe or permit voids in the backfill.

3.04 PIPE/CONDUIT TRENCH BACKFILLING

A. Verify that trenches are backfilled to the lines and grades as shown on the Plans.

B. Verify that the placement methods employed do not disturb or damage buried drainage pipes and conduits in the trench.

C. Verify that pipe bedding material is placed at trench bottom in one continuous level layer not exceeding 6 inches in compacted depth.

D. Verify that pipe bedding is placed around the sides and to the top of the pipe/conduit, tamped in place, and compacted.

E. Verify that optimum moisture content of pipe bedding material is maintained to attain required compaction density.

F. Perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift or at a change in material.
   2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

G. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

H. Verify that trenches are not jetted, unless allowed by the Design Engineer.

I. For buried pipe that does not require pipe bedding or engineered fill (condensate drain pipe), verify that the trench backfill is placed in a manner that will not damage the pipe and that the backfill is compacted to a firm consistency consistent with surrounding erosion-resistant layer material.

3.05 ANCHOR TRENCH BACKFILLING

A. Verify that the placement method employed does not damage the ClosureTurf™ in the trench.

B. Verify that the portion of the trench above the ClosureTurf™ is backfilled with engineered fill and field tested consistent with the procedures described in Part 3.04 of this Section.

C. Verify that trenches are not jetted, unless allowed by the Design Engineer.

D. Verify that the trenches are backfilled to the lines and grades as shown on the Plans.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the trenching and/or backfilling does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02225
TRENCHING AND BACKFILLING

CQA SECTION 02240
FOUNDATION LAYER

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the foundation layer materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 FOUNDATION LAYER MATERIAL

A. Verify that the foundation layer materials meet the applicable product requirements of Section 02240 (Foundation Layer) of the Technical Specifications.

B. Verify that residual interim cover soil derived from designated refuse excavation areas is free of refuse and suitable for reuse as new foundation layer material.

2.02 CONFORMANCE TESTING

A. Following clearing and grubbing of landfill surface but prior to fine grading and scarification operations, sample existing interim cover material to be incorporated into the foundation layer and send the samples to the Soils Testing Laboratory to perform at least one (1) of each of the following tests as specified:
   1. Particle Size Analysis (ASTM D 422) per every 5,000 cubic yards.
   2. Unified Soil Classification (ASTM D 2487) per every 5,000 cubic yards.
   3. Moisture-Density Relationship Curve (ASTM D 1557) per every 5,000 cubic yards.

B. Prior to new foundation layer placement operations, sample the actual foundation layer material to be used at the Work site and send the samples to the Soils Testing Laboratory to perform at least one (1) of each of the following tests as specified:
   1. Particle Size Analysis (ASTM D 422) per every 5,000 cubic yards.
   2. Unified Soil Classification (ASTM D 2487) per every 5,000 cubic yards.
   3. Moisture-Density Relationship Curve (ASTM D 1557) per every 5,000 cubic yards.

C. Verify that foundation layer material is obtained from the approved on-site borrow source as determined from the aforementioned conformance testing.

D. If foundation layer material appearance or properties are different from those identified from borrow source characterization or change within the same location at the on-site borrow source, based on visual observation, perform additional borrow source characterization tests in accordance with the aforementioned conformance testing program.

E. Notify the Design Engineer of a change in materials and receive approval from the Design Engineer for use of the material for foundation layer construction prior to excavating additional material from that location within the on-site borrow source.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to foundation layer placement operations, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Convey to the Contractor that the nuclear testing gauge shall be calibrated on a daily basis using the methods and materials recommended by the gauge manufacturer. The nuclear gauge serial number and the name of the soil technician performing the soil density testing shall be noted to demonstrate that both the technician and the nuclear gauge are certified.

3.02 PREPARATION OF EXISTING INTERIM COVER SOIL TO BE INCORPORATED INTO THE FOUNDATION LAYER

A. Perform visual soil classification of the interim cover soils per the following test method and frequency:
   1. *Visual Soil Classification (ASTM D 2488)*; at least one (1) test per every acre.

B. Verify that existing interim cover soils are scarified to a minimum depth of 12 inches.

C. Following scarification, verify that existing interim cover soils are moisture conditioned and thoroughly mixed to ensure a uniformly distributed moisture content to within 1 to 3 percentage points of the optimum moisture content.

D. Perform the following field tests at the frequency shown to verify that the compacted interim cover soils have a minimum dry density of 90 percent of the maximum dry density and within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*. Soil shall be sampled and tested at a frequency of four samples per 1,000 cubic yards (3/AC/lift) of material placed or four samples per day, whichever frequency results in the greatest number of tests.
   2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

3.03 PLACEMENT AND COMPACTION OF NEW FOUNDATION LAYER MATERIAL

A. Verify that foundation layer material is moisture conditioned and thoroughly mixed in the on-site borrow area to ensure a uniformly distributed moisture content. At time of placement, perform the following field test at the frequency shown to verify that the foundation layer material meets the soil classification requirements:
   1. *Soil Classification (ASTM D 2488)*; one (1) sample per three (3) acres per lift (2,400 cubic yards) of material placed or change in material, whichever results in the greater number of tests.

B. Record corresponding soil classification results on the Test Data form.

C. Continuously observe all placement operations to verify that the foundation layer material is consistent and has no oversized particles, overly wet or dry areas, or organic, deleterious, or other unsuitable matter.

D. Verify that foundation layer material is spread in uniform loose lifts not exceeding 8 or 12 inches in thickness.

E. Verify that each loose lift is moisture conditioned and thoroughly mixed to ensure a uniformly distributed moisture content.

F. Verify that the final thickness of compacted lifts for new foundation layer material does not exceed 6 inches.

G. Perform the following field tests on each 6-inch lift at the frequency shown to verify that the foundation layer has been compacted to 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*. Soil shall be sampled and tested at a frequency of four samples per 1,000 cubic yards (3/AC/lift) of material placed or four samples per day, whichever frequency results in the greatest number of tests.
2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

H. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 FINAL SURFACE PREPARATION

A. Verify that the completed foundation layer surface is free of individual particles or protrusions greater than 0.50 inches in diameter.

B. Verify that ruts and ridges on the completed foundation layer surface are limited to a maximum depth or height of 1.0 inch.

3.05 CONFORMANCE VERIFICATION

A. Verify by auger or survey that the completed foundation layer has a minimum thickness of 12 inches. Measurements by either method shall be conducted using a grid pattern with 100-foot centers.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the foundation layer does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02240
FOUNDATION LAYER

CQA SECTION 02310
ACCESS ROADS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the access road materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 REINFORCEMENT GEOTEXTILE

A. Verify reinforcement geotextile conformance under CQA Section 02771 (Reinforcement Geotextile) of this CQA Plan.

2.02 AGGREGATE BASE

A. Verify aggregate base conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the aggregate base as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

PART 3 EXECUTION

3.01 SUBGRADE

A. Where access roads are not constructed on engineered fill, verify that subgrade is scarified a minimum of 6 inches, uniformly moisture conditioned to within 1 to 3 percentages points of optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

B. Where access roads are constructed on engineered fill, verify that the engineered fill has been placed and compacted in accordance with the requirements of Section 02224 (Engineered Fill) of this CQA Plan.

C. Where access roads are constructed on installed engineered turf, verify that the following precautions and requirement are implemented:

1. Vehicle and equipment access on the installed engineered turf conform with applicable provisions outlined in Section 02772 (Geomembrane) of the Technical Specifications.

2. Verify that the initial lift of engineering filled placed atop the installed engineered turf is well graded and does not contain rocks or clods over 1 inch in greatest dimension.

3.02 REINFORCEMENT GEOTEXTILE

A. Verify that reinforcement geotextile is installed, including examination of subgrade surface, in accordance with the requirements for geotextile as set forth in Section 02771 (Geotextile) of this CQA Plan.

3.03 AGGREGATE BASE

A. Verify the stability of the subgrade by proof rolling with a roller or loaded water truck. Verify that any areas determined not to be suitable are allowed to air dry until stable or over-excavated and backfilled with aggregate base.

B. Verify that trucks do not back-dump aggregate base onto the reinforcement geotextile and that they only drive on previously dumped aggregate base to progress.

C. Verify that aggregate base material is spread in uniform loose lifts not exceeding 8 inches in thickness.

D. Perform the following field tests at the frequency shown to verify that the compacted aggregate base material has a minimum dry density of 95 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
   2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

E. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

F. Verify that access roads are "proof rolled" with a heavy wheel-load vehicle, such as a loaded water truck, to identify weak areas, and verify that any weak areas are reworked to the Design Engineer's satisfaction.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the access roads does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

B. If any portion(s) of the underlying installed engineered turf is damaged during the access road construction as determined by visual observations, verify that that portion(s) is repaired or removed and replaced to meet the requirements of the Technical Specifications and that the

corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02310
ACCESS ROADS

CQA SECTION 02722
DRAINAGE AND EROSION CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the drainage and erosion control materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 DRAINAGE AND EROSION CONTROL COMPONENTS

A. Verify that the following drainage and erosion control components meet the applicable product requirements of Section 02722 (Drainage and Erosion Controls) of the Technical Specifications:

1. Corrugated metal pipe (CMP), couplings and fabricated fittings.
2. High density polyethylene (HDPE) pipe, couplings and fabricated fittings.
3. CMP anchor assembly stakes and hardware.
4. Wood posts and railings.
5. Steel grates for drainage inlets.
6. Turf reinforcement mat (TRM).
7. TRM anchorage stakes.
8. Erosion control netting.
9. Erosion control netting anchors.

2.02 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 BACKFILL

A. Verify that backfill placed above pipe bedding consists of material excavated from the trench/excavation unless specified otherwise by the Design Engineer.

B. Review moisture-density relationship conformance test results for the erosion-resistant layer as determined under CQA Section 02250 (Erosion-Resistant Layer) of this CQA Plan.

2.04 ROCK RIPRAP

A. Verify rock riprap conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.05 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning construction of any drainage and erosion control structure, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

3.02 STOCKPILING

A. Verify that the Contractor places all drainage and erosion control materials in an area(s) approved by the Design Engineer.

3.03 EXCAVATION

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

3.04 DRAIN INLETS AND DRAIN PIPE

A. Verify trenching conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

B. Verify that drain inlets/buried drain pipe and associated bedding and backfill material are placed in conformance with Section 66-1 of the Standard Specifications and the Technical Specifications.

C. Verify that above ground drain pipes are placed and anchored in conformance with Section 66 of the Standard Specifications and as shown on the Plans.

3.05 SEDIMENTATION BASIN OUTLET STRUCTURES

A. Verify that vertical slots are cut in the sedimentation basin drainage risers to the dimensions, orientation and frequency as shown on the Plans.

B. Verify trenching conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

C. Verify that minor concrete installed for the drainage riser foundations is as shown on the Plans.

D. Verify concrete placement conformance under CQA Section 03300 (Concrete) of this CQA Plan.

E. Verify that bedding and backfill material are placed in conformance with Section 66-1 of the Standard Specifications and the Technical Specifications.

3.06 EARTHEN SWALES

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

3.07 EROSION MAT LINED SWALES

A. Verify that the TRM is installed as shown on the Plans and per manufacturer's recommendations.

B. Verify that trenches for terminal and check slots (anchorage) are excavated into the erosion-resistant layer as shown on the Plans.

C. Verify trench backfill conformance under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the trench backfill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

D. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

E. Verify that TRM placed at the top of swale (finish surface) is at or below the final grade so surface drainage can flow freely into the swale.

F. Verify that all splices are shingled downstream.

G. Verify that anchorage stakes are installed as shown on the Plans and per manufacturer's recommendations.

3.08 LOOSE ROCK RIPRAP LINED SWALES

A. Verify filter geotextile installation conformance under CQA Section 02771 (Geotextile) of this CQA Plan.

B. Verify that rock riprap is placed to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Verify that rock riprap is not be placed by dumping.

D. Verify that individual riprap stones are moved and placed as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire length of the swale.

E. Verify that the placed rock riprap is free of pockets of small stones or clusters of larger stones.

3.09 GROUTED ROCK RIPRAP OUTFALLS

A. Verify that the footprint of the outfall is excavated to the dimensions as shown on the Plans.

B. Verify that rock riprap is placed within the excavated footprint to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Verify that rock riprap is not be placed by dumping.

D. Verify that individual riprap stones are moved and placed as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution over the entire footprint of the outfall.

F. Verify that the placed rock riprap is free of pockets of small stones or clusters of larger stones.

G. Verify concrete placement conformance under CQA Section 03300 (Concrete) of this CQA Plan.

3.10 LOOSE ROCK RIPRAP INLETS AND OUTLETS

A. Verify that the footprint of the inlet or outfall is excavated to the dimensions as shown on the Plans.

B. Verify filter geotextile installation conformance under CQA Section 02771 (Geotextile) of this CQA Plan.

C. Verify that rock riprap is placed on the installed filter geotextile to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

D. Verify that rock riprap is not be placed by dumping.

E. Verify that individual riprap stones are moved and placed as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution over the entire footprint of the inlet or outfall.

F. Verify that the placed rock riprap is free of pockets of small stones or clusters of larger stones.

3.11 EROSION CONTROL

A. Verify that the finish surface has been track walked prior to placement of seeding, fertilizer and straw.

B. Verify that the straw is placed onto landfill surface slopes that are steeper than 10 percent.

C. Verify that the blown straw applied to the landfill surface slopes has a minimum thickness of 1.5 inches in place.

D. Verify that erosion control netting is placed over the applied straw and that the netting is secured with anchors at a frequency of 1 foot on center along the edges, and one (1) every 35 square feet for interior areas. Verify that butt joints are spaced 1 foot apart.

3.12 CONFORMANCE VERIFICATION

A. After construction of any portion of drainage and erosion control measures, verify all grades and dimensions of completed work by either field survey or physical measurement.

3.13 CORRECTIVE ACTIONS

A. If any portion(s) of the drainage and erosion control provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02722
DRAINAGE AND EROSION CONTROL

CQA SECTION 02771
GEOTEXTILE

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that reinforcement geotextile materials and installation are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal listed in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

1.03 TRANSPORT AND STORAGE

A. Upon delivery of the filter and reinforcement geotextile rolls to the Work site, verify that the rolls have been transported with opaque protective coverings and within a closed trailer.

B. During unloading of the filter and reinforcement geotextile rolls at the Work site, perform the following procedure:
   1. Obtain a copy of the packing list.
   2. Complete the Geotextile Delivery and Control Log for each shipment and attach a copy of the packing list. The Geotextile Delivery and Control Log documents the following:
      a. Delivery date.
      b. Roll numbers.
      c. Batch/lot numbers or production dates.
      d. Roll dimensions.
      e. Receipt of MQC test reports.
      f. CQA conformance test sampling.
      g. Receipt of CQA conformance test results.
      h. Manufacturer and Product Name or Designation.
      i. Name of CQA monitor observing delivery and storage.
      j. Total quantity delivered with each shipment and the cumulative total quantity delivered to date.
      k. Additional notes including rejection of materials, condition of delivered materials, and other materials included with the shipments.
   3. Obtain written certification from the Supplier that unloading and storage of the filter and reinforcement geotextile rolls has been done in accordance with the Manufacturer's recommended procedures.
   4. Verify that filter and reinforcement geotextile rolls are transported, unloaded, handled, and stored in a manner that does not damage the filter and reinforcement

geotextile rolls or their protective coverings in accordance with the Manufacturer's recommended procedures and the following requirements:

a. Nylon or other cloth straps were used to unload and handle the filter and reinforcement geotextile rolls to protect the rolls and their protective coverings from damage.

b. The filter and reinforcement geotextile rolls were stacked no more than five rolls high and with a 3-foot wide access path between the stacked rows.

5. Verify that damaged protective coverings are repaired or replaced.

6. Identify and separate damaged or rejected filter and reinforcement geotextile rolls.

PART 2 PRODUCTS

2.01 GEOTEXTILE COMPONENTS

A. Verify that the following filter and reinforcement geotextile components meet the applicable product requirements of Section 02771 (Geotextile) of the Technical Specifications:

1. Filter geotextile.
2. Reinforcement geotextile.
3. Sewing thread.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. Prior to filter and reinforcement geotextile installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Prior to filter and reinforcement geotextile installation, verify that all underlying material installation and construction has been completed in accordance with the Technical Specifications.

3.02 INSTALLATION

A. Verify that the filter and reinforcement geotextile is installed in accordance with Manufacturer's instructions for deployment, seaming, and exposure.

B. Verify that the filter and reinforcement geotextile is installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

C. Verify that the filter and reinforcement geotextile panels are overlapped with sufficient material to create a prayer fold for sewing operations.

D. Verify that the filter and reinforcement geotextile is adequately ballasted during installation and until geotextile is covered with the overlying material.

E. Verify that the reinforcement geotextile are permanently anchored as shown on the Plans when installation is complete.

F. Verify that filter and reinforcement geotextile damaged during installation is removed and/or repaired with a sewn patch.

G. Verify that terminal ends of reinforcement geotextile, where the type and purpose of the geotextile changes as shown on the Plans, are overlapped a minimum of 4 feet.

H. Verify that when cutting any filter and reinforcement geotextile above other geosynthetics, the Installer uses a knife with a hooked blade.

I. Verify that the underlying soil subgrade or installed geosynthetics are not damaged by filter and reinforcement geotextile installation equipment or methods and that any damaged soil subgrade or installed geosynthetics are completely repaired in accordance with the requirements of the applicable parts of Section 02771 (Geotextile) of the Technical Specifications.

J. Verify that rocks, excessive dust, excessive moisture or other matter that could cause damage, hamper sewing operations, or clog the filter and reinforcement geotextile are not trapped under the filter and reinforcement geotextile or within the overlap.

3.03 SEAMING AND REPAIR

A. Verify that all seams are sewn unless an alternate seaming method is allowed by the Design Engineer based on the Installer's demonstration of the alternative acceptability.

B. Verify that overlaps are clean and free of soil materials which could adversely affect sewing operations.

C. Verify that a prayer fold is made within the overlap prior to sewing.

D. Verify that a continuous 401 two-thread chain stitch is used to sew the prayer fold.

E. Verify that damaged filter and reinforcement geotextile is removed entirely and replaced or repaired in accordance with the following guidelines:
   1. Repair (patching) material shall be of the same type as the damaged filter and reinforcement geotextile.
   2. Patches shall extend a minimum of 12 inches in all directions beyond the damaged area with the machine direction of the patch aligned with the machine direction of the damaged filter and reinforcement geotextile.
   3. Patches shall be seamed using the same method used for seaming the damaged filter and reinforcement geotextile.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the filter and reinforcement geotextile provisions do not meet the requirements of the Plans and Technical Specifications, based on either observations and/or physical measurement, verify that that portion(s) is repaired or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02771
REINFORCEMENT GEOTEXTILE

CQA SECTION 02772
GEOMEMBRANE

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that geomembrane liner materials and installation are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three copies of each submittal listed in the Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

1.03 TRANSPORT AND STORAGE

A. During unloading of the geomembrane rolls at the site, perform the following procedure:

1. Obtain a copy of the packing list.
2. Complete the Geomembrane Delivery and Control Log for each shipment and attach a copy of the packing list. The Geomembrane Delivery and Control Log documents the following:
   a. Delivery date;
   b. Roll numbers;
   c. Batch/lot numbers or production dates;
   d. Roll dimensions;
   e. Receipt of MQC test reports;
   f. Manufacturer and Product Name or Designation;
   g. Name of CQA monitor observing delivery and storage;
   h. Total quantity delivered with each shipment and the a cumulative total quantity delivered to date; and
   i. Additional notes including rejection of materials, condition of delivered materials, and other materials included with the shipments.
3. Obtain written certification from the Supplier that unloading and storage of the geomembrane rolls has been done in accordance with the Manufacturer's recommended procedures.
4. Verify that geomembrane rolls are transported, unloaded, handled, and stored in a manner that does not damage the geomembrane rolls in accordance with the Manufacturer's recommended procedures and the following requirements:
   a. Stinger or straps (nylon or other cloth) shall be used to unload and handle the geomembrane rolls to protect the rolls from damage.
   b. The geomembrane rolls shall be stacked no more than three rolls high and with a 3-foot wide access path between the stacked rows.
5. Identify and separate damaged or rejected geomembrane rolls.

PART 2 PRODUCTS

2.01 GEOMEMBRANE

A. Verify that geomembrane material consists of a compounded Linear Low-density polyethylene (LLDPE) meeting the product requirements of the Technical Specifications.

2.02 EXTRUDATE ROD

A. Verify that extrudate rod is made from the same resin as the geomembrane.

2.03 GEOMEMBRANE SURFICIAL STRIPS

A. Verify that geomembrane surficial strip material consists of Super Gripnet or single-sided geocomposite (200 mil).

2.04 CLOSURE TURF™ COLLECTION FOOT ASSEMBLIES

A. Verify that ClosureTurf™ collection foot components are provided by the manufacturer of the ClosureTurf™ product.

B. Verify PVC assembly components conformance under CQA Section 15200 (LFG Collection System Components) of this CQA Plan.

C. Verify that wellhead adapter consists of 2-inch by 1.5-inch flexible coupling with stainless steel band clamps as manufactured by Fernco, or approved equivalent.

2.05 CLOSURE TURF™ PRESSURE RELIEF VALVES

A. Verify that ClosureTurf™ pressure relief valves are provided by the manufacturer of the ClosureTurf™ product.

2.06 FIELD TESTING EQUIPMENT

A. Verify that the Installer provides and uses a field tensiometer for seam testing that has been calibrated within the last year and is accurate to within 2 pounds.

B. Verify that the Installer provides and uses a 1-inch (width) by 6-inch (length) cutting die for cutting seam test specimens.

2.07 CONFORMANCE TESTING

A. Conduct sampling for CQA conformance testing at the site upon delivery or at the manufacturing plant prior to shipment and delivery to the site.

B. For every 100,000 square feet of material delivered to the site, select at least one geomembrane roll to sample for CQA conformance testing.

C. Sample the selected geomembrane rolls for CQA conformance testing using the following procedure:

1. Cut and discard the first three feet of geomembrane material from across the entire width of the roll.
2. Cut the next 12 inches of material from across the entire width of the roll; this section of material is the CQA conformance testing sample.
3. Assign a CQA test number to the sample and mark the following information directly on the sample with a paint marker:
    a. Machine direction of the sample.
    b. Manufacturer's roll number.
    c. CQA test number.
4. Complete the geomembrane Test Request and Sample Custody Log and ship samples to the Geosynthetics Testing Laboratory via overnight delivery.

D. The following CQA conformance tests will be performed by the Geosynthetics Testing Laboratory to verify compliance with the product requirements of the Specifications:
1. Tensile Properties (ASTM D 6693 / ASTM D 638).
2. Density (ASTM D 1505).
3. Carbon Black Content (ASTM D 4218).
4. Carbon Black Dispersion (ASTM D 5596).
5. Sheet Thickness (ASTM D 5994).

E. Upon completion of CQA conformance testing and receipt of the results, review all results for compliance with the Specifications and report any test results which are not in compliance with the Specifications to the Engineer.

F. Additional CQA conformance testing or corrective action to be performed in the event of test results which are not in compliance with the Specifications will be determined by the Engineer.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. Prior to geomembrane installation, hold a preparatory meeting in accordance with Section 01039 (Progress Meetings) of this CQA Plan.

B. Prior to geomembrane installation, verify that all underlying material installation and construction has been completed in accordance with the Technical Specifications.

C. Verify that prior to and at the middle of each geomembrane welding work shift and whenever adjustments are made to the welding machines, the Installer prepares and tests trial welds for each welding machine that is being used or will be used during that work shift.

D. Verify that trial welds are prepared for both fusion and extrusion welding machines and sampled using the following guidelines:
1. Trial weld samples for fusion welding machines should be a minimum of 6 feet in length.
2. Trial weld samples for extrusion welding machines should be a minimum of 3 feet in length.
3. The trial weld should be centered along and run the entire length of the sample.

E. Verify that trial welds are tested as follows:
   1. Trial welds should be allowed to cool to ambient conditions prior to testing.
   2. After cooling, excessive material should be cut from the beginning and the end of the trial weld sample (approximately 4-inches from each end).
   3. Using the cutting die, four 1-inch specimens should be cut at an even spacing along the length of the trial weld.
   4. Using the field tensiometer with a rate of separation of 2 inches per minute, two non-adjacent specimens shall be tested for peel adhesion (peel) and two for bonded seam strength (shear); both sides of fusion welds shall be tested for peel.

F. Record peel and shear test results for trial welds on the Geomembrane Deployment/Welding Log using the following criteria:
   1. Peel test specimens:
      a. The break is either a film tear bond (FTB-passing) or a non-film tear bond (NFTB-failing).
      b. Percent of peel penetration into the weld (maximum of 10%).
      c. Quantitative value for peel strength (minimum of 75 ppi).
   2. Shear test specimens:
      a. The break is either a film tear bond (FTB-passing) or a non-film tear bond (NFTB-failing).
      b. Elongation of shear specimen (minimum of 2 inches).
      c. Quantitative value for bonded seam strength (minimum of 120 ppi).

G. If any of the four test specimens do not meet the peel or shear criteria, reject the entire trial weld and verify that the welding machine is not used for installation of the geomembrane until passing a retest consisting of repeating the entire trial weld sampling and testing procedure on a new weld performed with the failing machine.

H. If the retested trial weld fails, verify that the welding machine is not used for installation of the geomembrane until proper adjustments or repairs are made and passing a retest; if the welding machine continually fails field trial weld testing, verify that the welding machine is tagged and completely removed from work area.

3.02 INSTALLATION

A. Verify that geomembrane panels are deployed parallel to the slope by unrolling down the entire length of the slope and that corrections or adjustments are made to panels which become askew to the parallel line of the slope.

B. Verify that adjacent geomembrane panel edges are overlapped a minimum of 4-inches for fusion welding and alignment of the overlap is kept consistent by marking overlap indicator points.

C. Verify that geomembrane damaged during handling, transport, or deployment is removed or repaired.

D. Verify that the underlying the soil subgrade or installed geosynthetics are not damaged by geomembrane installation equipment or methods and that any damaged soil subgrade or installed geosynthetics are completely repaired in accordance with the requirements of the applicable section of the Specifications.

E. Verify that the Installer only deploys the quantity of geomembrane which can be completely welded and anchored by the end of the work shift or day.

F. Verify that the Installer prepares an adequate number of sandbags to ballast the geomembrane during deployment in accordance with the following guidelines:
   1. Only plastic ties should be used to close sandbags; no metal or wire ties are allowed.
   2. Sandbags should be removed prior to deploying overlying materials and after completion of permanent geomembrane anchorage.
   3. Sandbag fill should not be disposed of within the limits of work unless the fill consists of material which meets the Specification for the material it is disposed upon.
   4. Geomembrane rolls may also be used for ballast provided that no damage to the deployed geomembrane occurs.

G. Verify that the Installer deploys and seams the geomembrane in a manner which minimizes wrinkles and provides the proper amount of slack in the installed geomembrane to compensate for contraction due to local temperature extremes prior to covering; no stress-bridging or "fishmouths" are allowed.

H. Verify that immediately after geomembrane panels running through ditch flow lines or at toes of slopes are welded, sandbags are placed end-to-end along the entire length of the flow or toe line to prevent stress-bridging at those locations; alternatively, to reduce the number of sandbags required and to further prevent stress-bridging, the Installer may anchor the geomembrane near the toes of slopes within a backfilled anchor trench constructed in accordance with the Specifications.

I. Verify that the geomembrane surficial strips, ClosureTurf™ collection foot assemblies, and ClosureTurf™ pressure relief valves are installed per the Plans and in accordance with manufacturer's recommendations.

J. Verify that geomembrane panels are not overlapped or seamed perpendicular to the slope on slopes with a gradient of more than 10 percent, within 20 feet of the top of any slope, and unless the geomembrane is anchored within a backfilled anchor trench constructed in accordance with the Specifications.

K. Verify that when cutting any geomembrane above another geomembrane, the Installer uses a knife with a hooked blade.

L. Record the following information on the Geomembrane Deployment/Welding Log:
   Note: The abbreviations in parenthesis following each verification procedure are used on the Geomembrane Deployment/Welding Log.
   1. Temperature (T). Ambient and geomembrane surface temperatures with a description of the current weather conditions. Record every two hours and document dramatic changes in temperature and weather conditions.
   2. Trial Welds (TW). Time of trial weld, type of welding equipment, welding equipment number, welding operator, and results of field peel and shear testing of trial welds.
   3. Panel (P). Assigned panel number, geomembrane roll number, panel dimensions, and area of panel.

M. Using a graph computation sheet, field sketch a panel layout drawing of the geomembrane panels deployed during the day and attach this field sketch to the completed Geomembrane Deployment/Welding Log; the daily field sketches will be transposed to the master panel layout drawing.

3.03 FUSION WELDING

A. Verify that fusion welding operations only take place when the ambient temperature is between 40°F and 110°F unless the special weather welding plans have been submitted by the Installer and approved by Engineer to weld outside this range; measure ambient temperature 6-inches above the in-place geomembrane and record readings every two hours on the Geomembrane Deployment/Welding Log.

B. Verify that all geomembrane seams are fusion welded by the double-track method leaving an air gap for leak testing; extrusion welding can only be used for repairs, patches, fabrications, and inaccessible areas.

C. Prior to welding, verify that all fusion welding machines have performed trial welds and passed field trial weld testing.

D. Verify that the Installer's power source is capable of producing sufficient and constant voltage under the combined line load of multiple welders and other equipment.

E. Verify that surfaces to be welded are thoroughly cleaned.

F. Verify that seams are welded at the same speed, temperature, roller pressure, and gauge settings used to prepare the trial weld and that the welding operators record welding machine numbers, operators, machine settings, times, and dates on each seam welded.

G. Closely observe each fusion welding machine to verify that the machine is not adversely affecting or damaging the parent geomembrane material outside the welding area.

H. Record the following information on the Geomembrane Deployment/Welding Log:
Note: The abbreviations in parenthesis following each verification procedure are used on the Geomembrane Deployment/Welding Log.

1. Seam (S). Assigned seam number, welding equipment number that welded the seam, welding operator, and length of the welded seam.
2. End of Seam Test. (EST). If the Installer's quality control program requires that specimens be taken from the end of each welded seam and tested for peel adhesion, record these results using the same criteria as for trial welds. If the Installer records these results, request a copy of the results and this information can be omitted from the Geomembrane Deployment/Welding Log.
3. Seam Test Sample (STS). Assigned sample number, seam number sample is located on, location of sample within the seam, welding machine number, welding operator, and results of field seam testing.

3.04 EXTRUSION WELDING

A. Verify that extrusion welding is used only for repairs, patches, fabrications, and inaccessible areas.

B. Prior to welding, verify that all extrusion welding machines have performed trial welds and passed field trial weld testing.

C. Verify that geomembrane patches overlap the underlying geomembrane panel a minimum of 4 inches.

D. Verify that geomembrane patches are cut square with rounded corners and are large enough to extend a minimum of 4 inches in all directions over the repair area.

E. Verify that geomembrane patches are tack-welded to the underlying geomembrane panel to prevent movement during grinding and extrusion welding operations.

F. Verify that the outer edge of repair patches and the adjacent underlying geomembrane are disc-ground to remove surface debris and oxidation and that grinding is not parallel to seam.

G. Verify that the nozzles of extrusion guns are purged before each use to remove solidified extrudate.

H. Verify that the extrusion weld completely covers the entire width of the grind area and that extrusion safety welds extend 4 inches up any intersecting fusion weld.

I. Verify that a cap strip patch is extrusion welded at all fusion welded seam intersections of three or more geomembrane panels.

3.05 QUALITY CONTROL

A. Verify that quality control procedures are performed by the Installer in accordance with the Installer's Geomembrane Installation Quality Control Manual except where amended or modified by the Engineer or the Specifications.

B. Verify that the Installer maintains the following quality control documentation during the geomembrane installation in accordance with the Specifications:
   1. An accurate geomembrane panel layout drawing which includes; 1) roll and panel numbers; 2) seam numbers; 3) geomembrane limits; 4) anchor trench locations; and 5) seam test sample locations.
   2. Daily deployment logs and panel layout drawings to be submitted to the CQA Officer daily which include; 1) panel and seam numbers; 2) panel dimensions; and 3) deployment quantities.
   3. Daily welding logs to be submitted to the CQA Officer daily which include; 1) welding machine numbers; 2) operators; 3) machine settings; and 4) times and dates for each seam welded.

C. Verify that the entire length of each fusion welded seam is air-pressure tested by the Installer, with an air pump capable of generating and maintaining 40 psi of pressure and equipped with a regulator and pressure gauge and pressure feed needles having pressure gauges accurate to 1 psi, in accordance with the following procedure:
   1. Seal both ends of the fusion welded seam with vise-grip plate clamps or an extrusion weld; heat may be applied to the seam ends to aid in sealing the seam in conjunction with the clamps but due to the potential hazard of igniting landfill gas, propane torches or any other flame producing device are not allowed.
   2. At one end of the seam, insert air pressure needle into the fusion weld channel.

3. Pressurize the channel to 30-35 psi and maintain pressure for 5 minutes.
4. Release air from the opposite end of the seam to verify that the entire length of the fusion weld channel was pressurized.
5. If channel pressure is not maintained with a maximum allowable pressure loss of 2 psi over the 5-minute test period or does not stabilize at all, locate the defective area, isolate it, and repeat air pressure test procedures in each direction from the defective area.

D. Verify that the Installer maintains air-pressure test logs on which are recorded seam numbers, beginning and ending air pressures, beginning and ending test times, lengths of tested seam, defective areas found, and confirmation of repair.

E. Record the following air-pressure testing information on the Geomembrane Deployment/Welding Log:
Note: The abbreviations in parenthesis following each verification procedure are used on the Geomembrane Deployment/Welding Log.
1. Air-Pressure Test (AP). Seam number tested, start time of the air pressure test and initial air pressure (psi), termination time of the air pressure test and ending air pressure (psi), and length of seam or portion of seam successfully tested.

F. Verify that the entire length of each extrusion welded seam and repair is vacuum tested by the Installer in accordance with the following procedures, with a vacuum pump capable of generating and maintaining 30 inches of mercury and equipped with a clean view window, regulator, and vacuum gauge accurate to 1 psi:
1. Saturate the extrusion weld with a soap and water solution.
2. Place view box over the saturated weld, create an air tight seal, and apply vacuum in the box.
3. Maintain the vacuum for 10 seconds and examine weld for forming bubbles which indicate leaks; mark detected leaks for follow-up extrusion weld repair and retest detected leaks after repair to verify that the leaks were successfully repaired.

G. Verify that the Installer maintains vacuum test logs on which are recorded repair numbers, vacuum test dates, and vacuum test results.

H. Record the following vacuum testing information on the Geomembrane Repair Log.
1. Assigned repair number, location and description of repair, vacuum test dates, and vacuum test results.

3.06 SEAM TEST SAMPLING

A. Determine seam analysis sample locations by the *stratified random sampling method*. The stratified random sampling method allows random selection of a single sewn analysis sample location anywhere within the required 500-lineal feet sampling interval required in the technical specifications. Have the Installer perform the following seam analysis sampling procedures.
1. Seam analysis samples will be 12-inches wide by 36-inches long with the weld centered down the length of the sample. Samples sizes may be modified at the request of the Installer or CQA Officer. Cut one 1-inch specimen from each end of the sample, and field test specimens for peel adhesion in accordance with the Technical specifications. If these specimens pass the field peel test, submit sample for

laboratory seam analysis. If either of the specimens fail the field peel test, perform Faded Seam Analysis Procedures in accordance with Section 3.08 of this Section.

2. Divide the sample into equal two sections, submit one Section for seam analysis and archive storage the second section.
3. Installer may obtain and test any seam analysis sample at its option.
4. Repair sample holes and vacuum test repair in accordance with Section 3.04 of this Section.

B. Based on the seam analysis *sampling method of attributes,* the CQA Officer may decrease or increase the 500-foot sampling interval based on the following control chart of passing percentages of seam analysis results.

Percent Of Passing Seam Analysis	Sampling Modifications
100	Decrease sampling interval to 1000 lf.
90 – 100	Decrease sampling interval to 750 lf.
60 – 90	Maintain sampling interval at 500 lf.
30 - 60	Increase sampling interval to 250 lf.

Note: Sampling modifications will be considered only after 20 percent of seam analysis is completed.

3.07 LABORATORY TESTING

A. Laboratory seam analysis will be performed at the Geosynthetics Testing Laboratory, which is independent of the geomembrane Manufacturer and Installer, and will be performed in accordance with the following procedures.

1. Seam analysis will include peel adhesion and bonded seam strength (ASTM D 6392). Five specimens will be tested for each method.
2. Both sides of fusion welded seams will be tested for peel adhesion.
3. All five of the specimens must meet the Fail Criteria specified in the technical specifications.

B. Acceptance of the welded geomembrane seams will be based on the results of laboratory seam analysis.

3.08 FAILED SEAM ANALYSIS PROCEDURES

A. In coordination with the Installer, perform the following quality assurance verification procedures in the event of a seam analysis sample failure determined by either field testing or laboratory seam analysis.

1. Track the welded seam 10 feet in both directions away from the failed seam analysis sample location. Cut a small 12-inch wide by 12-inch long sample from each location. Cut one 1-inch specimen from each end of the sample, and field test specimens for peel adhesion in accordance with Part 3.01 of this Section. If these specimens pass the field peel test, submit a 12-inch wide by 18-inch long re-test sample from both locations for laboratory seam analysis. If either of the specimens fail the field peel test at either location, continue tracking the welded seam at 10-foot intervals until specimens successfully pass the field peel tests and a sample can be

submitted for laboratory seam analysis. If specimens continually fail field peel tests at 10-foot intervals, the entire seam or portion of the welded seam will be repaired at the discretion of the CQA Officer.

2. Verify that the failed length of seam is repaired with an 18-inch wide extrusion welded cap strip. Tack and extrusion welding the leading flap of the fusion welded seam is not permitted. Verify that the extrusion welded cap strip is vacuum tested in accordance with the technical specifications.
3. If the re-test sample fails laboratory seam analysis, repeat the above procedures.

B. Sample extrusion welded cap strips exceeding 100 feet in length for seam analysis.

END OF CQA SECTION 02772
GEOMEMBRANE

CQA SECTION 02773
ENGINEERED TURF

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that geonet composite material and installation are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal listed in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 of this CQA Plan.

1.03 TRANSPORT AND STORAGE

A. Upon delivery of the engineered turf rolls to the Work site, verify that the rolls have been transported with opaque protective coverings and within a closed trailer or covered open trailer.

B. During unloading of the geonet composite rolls at the Work site, perform the following procedure:
   1. Obtain a copy of the packing list.
   2. Complete the Engineered Turf Delivery and Control Log for each shipment and attach a copy of the packing list. The Engineered Turf Delivery and Control Log documents the following:
      a. Delivery date.
      b. Roll numbers.
      c. Batch/lot numbers or production dates.
      d. Roll dimensions.
      e. Manufacturer and Product Name or Designation.
      f. Name of CQA monitor observing delivery and storage.
      g. Total quantity delivered with each shipment.
      h. Additional notes including rejection of materials, condition of delivered materials, and other materials included with the shipments.
   3. Verify unloading and storage of the engineered turf rolls has been done in accordance with the Manufacturer's recommended procedures.
   4. Verify that engineered turf rolls are transported, unloaded, handled, and stored in a manner that does not damage the engineered turf rolls or their protective coverings in accordance with the Manufacturer's recommended procedures and the following requirements:

a. Nylon or other cloth straps are used to unload and handle the geonet composite rolls to protect the rolls and their protective coverings from damage.
b. The engineered turf rolls are stacked no more than five (5) rolls high and with a 3-foot wide access path between the stacked rows.

5. Identify and separate damaged or rejected engineered turf rolls.
6. Verify that damaged protective coverings are repaired or replaced.
7. If CQA conformance test sampling, in accordance with Part 2.03C of this Section, is to be performed during delivery to the Work site, determine which geonet composite rolls will be sampled by either individual roll numbers, batch/lot numbers, or production dates, and position the rolls for convenient sampling.

PART 2 PRODUCTS

2.01 ENGINEERED TURF COMPONENTS

A. Verify that the following engineered turf components meet the applicable product requirements of Section 02773 (Engineered Turf) of the Technical Specifications:
1. Engineered turf geotextiles.
2. Engineered turf polyethylene yarns (grass blades).
3. Sewing thread.
4. Sand ballast infill.
5. HydroBinder®.
6. Water release vents.

2.02 CONFORMANCE TESTING

A. Conduct sampling for CQA conformance testing at the Work site upon delivery or at the manufacturing plant prior to shipment and delivery to the Work site.

B. For every 100,000 square feet of material delivered to the Work site, select at least one (1) engineered turf roll to sample for CQA conformance testing.

C. Sample the selected engineered turf rolls for CQA conformance testing using the following procedure:
1. Cut and discard the first 3 feet of engineered turf material from across the entire width of the roll.
2. Cut the next 18 inches of material from across the entire width of the roll; this section of material is the CQA conformance testing sample.
3. Mark the sample with the following information directly on the sample with a paint marker:
a. Machine direction of the sample.
b. Manufacturer's roll number.
c. CQA test number.
4. Immediately re-wrap the sampled engineered turf roll with its protective covering; use additional opaque plastic sheeting, if needed, to completely cover the roll.
5. Complete the Engineered Turf Test Request and Sample Custody Log and ship samples to the Geosynthetics Testing Laboratory.

D. The following CQA conformance tests will be performed by the Geosynthetics Testing Laboratory to verify compliance with the product requirements of the Technical Specifications at the following frequencies:

One (1) per every 100,000 square feet of Engineered Turf material components to be installed:

1. CBR Puncture (ASTM D 6241).
2. Tensile Properties (ASTM D 4595).
3. Rainfall Induced Erosion (ASTM D 96459).
4. Fiber UV Stability (ASTM G 147).
5. Backing System UV Stability, Exposed (ASTM G 1545 Modified Cycle 1.UVA340).
6. Steady State Hydraulic Overtopping, Turf with HydroBinder® (ASTM D 7277 / ASTM D 7276).
7. Transmissivity with underlying structure geomembrane (ASTM D 4716).
8. Internal Friction of combined components (ASTM D 5321).
9. Sand Infill Gradation and Ballast (ASTM D 6913).
10. Yarn Weight (ASTM D 5261).
11. Tensile Strength of Yarn (ASTM D 2256).

E. Upon completion of CQA conformance testing and receipt of the results, review all results for compliance with the Technical Specifications and report any test results which are not in compliance with the Technical Specifications to the Design Engineer.

F. Additional CQA conformance testing or corrective action to be performed in the event of test results which are not in compliance with the Technical Specifications will be determined by the Design Engineer.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. Prior to engineered turf installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 of this CQA Plan.

B. Prior to engineered turf installation, verify that all underlying material installation and construction has been completed in accordance with the Technical Specifications.

3.02 INSTALLATION

A. Verify that engineered turf is installed in accordance with the Manufacturer's instructions.

B. Verify that engineered turf is installed with the machine (lengthwise) direction of the roll oriented down the slope.

C. Verify that the engineered turf panels are deployed from the top of the slope in a way that the engineered turf is laid substantially smooth and filaments are pointing upslope after deployment is complete.

D. Verify that the first engineered turf panel deployed has the turf filaments facing upward. Verify that subsequent panels are deployed turf side down, and on top of the previously installed panel. Verify that after seaming each panel, the panel is flipped onto the geomembrane component with care to avoid pulling of tufts in the drainage studs.

E. Verify that end-to-end panel overlaps only occur on benches, unless the length of a slope between benches exceeds the total length of a full engineered turf roll.

F. Verify that the engineered turf is installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

G. Verify that a single stitch prayer type seam is constructed using a Nulong sewing machine or equivalent. Verify that sewing thread is 207 Polyester or equivalent and that sewing occurs between the 1st and 2nd row of engineered turf stitches.

H. Verify that the engineered turf is ballasted during installation and until the engineered turf is covered with the sand ballast infill material.

I. Verify that water release vents are installed per the Plans and in accordance with manufacturer's recommendations.

J. Verify that on slopes exceeding 15%, no equipment is allowed on the partially constructed turf cap system until after the completed installation of the sand ballast infill. Verify that on slopes less than 15%, ATV type vehicles are allowed prior to infill placement if the tire /track pressure is less than 5 psi.

K. Verify that following full specified sand ballast infill thickness installation, traffic be limited to light duty vehicles with drivability tire/track pressures of less than 35 psi.

L. Verify that engineered turf damaged during installation is removed and/or repaired with a sewn or fastened patch at the direction of the Design Engineer.

M. Verify that portions of the engineered turf wasted by the Installer, and rendered unusable, as determined by the Design Engineer, are transported by the Contractor and disposed of off-site at a permitted transfer station or solid waste disposal facility.

3.03 SAND BALLAST INFILL PLACEMENT

A. Verify that sand ballast infill is placed between the tufts of the engineered turf and:
   1. Is per plan either 5/8 inch thick or 2 1/8 inch thick, with a thickness tolerance of +/- 1/8 inch.
   2. Consists wholly of sand meeting ASTM C-33-03 for fine aggregates.
   3. Turf areas that are to receive sand ballast infill are accepted by the CQA Officer before placement of sand ballast infill takes place

B. Verify that sand ballast infill is worked into the engineered turf between the synthetic yarn blades.

C. Verify that conveyor systems and/or Express Blowers are used to spread and place the sand ballast infill.

D. Verify that the Contractor has explained with detail in the Preparatory Meeting the method of sand infill deployment to be used.

E. Verify that previously installed components are not displaced or damaged as a result of the sand ballast infill component installation.

F. Verify that a standard washer is utilized as a plate for the point of entry into the sand ballast infill for consistent depth control.

3.04 INFILL – HYDROBINDER® PLACEMENT

A. Verify that the HydroBinder® infill layer is placed using appropriate equipment capable of completing the work.

B. Verify that the Contractor has explained in detail during the Preparatory Meeting the method of HydroBinder® infill deployment.

C. Verify that installation of HydroBinder® infill is only be performed by a Manufacture's approved installer using techniques and equipment approved by the Manufacture.

D. Verify that the HydroBinder® is installed into the turf while it is in a dry state and that the HydroBinder® is worked into the tufts so the tufts are in an upright position.

E. Verify that the HydroBinder® infill is placed dry to a thickness of 7/8 inch with a tolerance of +/- 1/8 inch.

F. Verify that the hydration process occurs on the same day as the HydroBinder® infill placement and that the required HydroBinder® infill thickness is achieved prior to the hydration process.

G. Verify that the cemented infill is hydrated thoroughly and that care is taken to avoid displacement of the non-hydrated infill.

H. Verify that once hydration is completed as described, backfill and compaction of the vertical anchor trenches (if applicable) take place.

I. Verify that the HydroBinder® is at minimum performance levels within 24 hours.

3.05 DOCUMENTATION

A. Document daily observations of the deployment and seaming operations.

3.06 REPAIRS

A. Verify that all damaged areas or holes are repaired with a patch that extends 2 feet beyond the edge of the damaged area or hole.

3.07 CORRECTIVE ACTIONS

A. If any portion(s) of the engineered turf components do not meet the requirements of the Plans and Technical Specifications, based on either observations and/or physical measurement,

verify that that portion(s) is repaired or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02773
ENGINEERED TURF

CQA SECTION 02900
SEEDING AND FERTILIZING

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that revegetation materials and placement methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 REVEGETATION MATERIALS

A. Verify that the following revegetation materials meet the applicable product requirements of Section 02900 (Seeding and Fertilizing) of the Technical Specifications:
1. Seed.
2. Fertilizer.
3. Tackifier.
4. Fiber.

B. Verify that fertilizer conforms to Section 20-2.02 of the Standard Specifications.

C. Verify that seed conforms to Section 20-2.10 of the Standard Specifications.

D. Verify that fiber and/or stabilizing emulsion, if used, conforms to Sections 20-2.07 and 20-2.11, respectively, of the Standard Specifications.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning of revegetation activities, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the method and equipment to be used to spread the seed, fertilizer and mulch has been approved by the Design Engineer.

C. Verify that the access roads, drainage structures, and erosion-resistant layer have been placed to grade before seed, fertilizer and mulch is applied and verify with the Contractor that revegetation shall not occur on the access roads, lined drainage swales, and sedimentation basins.

3.02 APPLICATION

A. Verify that seed and fertilizer (including fiber and/or stabilizing emulsion, if applicable) are applied to the areas designated on the Plans.

B. Verify that all products are spread uniformly over all areas subject to revegetation.

3.03 CONFORMANCE VERIFICATION

A. Verify application rates on a daily basis for the respective materials by comparing the amount used (as determined from weight tags) to the total acreage covered.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the seeding and fertilizing provisions do not meet the requirements of the Plans and Technical Specifications, based on either observations and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02900
SEEDING AND FERTILIZING

CQA SECTION 02960
TEMPORARY EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the temporary erosion and sediment control materials and installation methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (NOT USED)

PART 2 PRODUCTS

2.01 EROSION AND SEDIMENT CONTROL COMPONENTS

A. Verify that the following erosion and sediment control components meet the applicable product requirements of Section 02960 (Temporary Erosion and Sediment Controls) of the Technical Specifications:
1. Straw bales.
2. Straw wattles.
3. Silt fencing.

2.02 ROCK FOR CONSTRUCTION ENTRANCE

A. Verify rock conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION AND SCHEDULE

A. Prior to beginning installation of any temporary erosion and sediment control components, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the Storm Water Pollution Prevention Plan (SWPPP) has been prepared by a Qualified SWPPP Developer (QSD), been submitted to the State Water Resources Control Board, and that a WDID number has been received for the project.

C. Verify that temporary erosion and sediment control measures are implemented year round during the course of the Project, and that temporary erosion control features are installed and maintained between October 15 and May 15 of each year.

3.02 PROTECTION

A. Verify that temporary erosion and sediment control measures are implemented in all areas of exposed earth created by the Contractor beyond what is shown on the Plans and referred to in

the Technical Specifications and areas cleared and grubbed prior to excavation or embankment operations which are subject to wind erosion and runoff.

3.03 TEMPORARY EROSION CONTROL FACILITIES

A. Verify that the Contractor conducts his operations in such a manner that storm water runoff is contained within the Work site or channeled into the storm drain system which serves the runoff area.

B. Verify that storm water runoff from one area is not diverted to another runoff area.

C. Verify that temporary down drains, drainage structures, and other devices are provided to channel storm water runoff water into the respective permanent storm drain systems during construction. Also verify that permanent drainage structures, not fully completed, are modified as required to accept de-silted runoff.

D. Verify that fill areas, while being brought to grade and during periods of completion prior to final construction, are protected by various measures to eliminate erosion and the siltation of downstream facilities and adjacent areas.

E. Verify that contour graded areas are protected against erosion and the resulting siltation of downstream facilities and adjacent areas during grading operations.

F. Verify that incorporation of culvert pipe used in conjunction with temporary erosion control measures for final construction improvements has been approved by the Design Engineer.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the temporary erosion and sediment controls does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02960
TEMPORARY EROSION AND SEDIMENT CONTROLS

CQA SECTION 03300
CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the concrete materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 CONCRETE COMPONENTS

A. Verify that the following concrete components meet the applicable product requirements of Section 03300 (Concrete) of the Technical Specifications:
1. Concrete.
2. Reinforcement.
3. Forms.
4. Epoxy.

2.02 AGGREGATE BASE

A. Verify aggregate base conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.04 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the aggregate base as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

B. Verify that concrete and aggregate base materials are obtained from the approved sources throughout the Work.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning construction of any drainage and erosion control structure, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the locations and dimensions of the concrete pads are as shown on the Plans or as staked by the Design Engineer.

C. Verify that the footprint areas for the flare station concrete pads as shown on the Plans are properly cleared and grubbed and that the underlying subgrade conforms to the engineered fill requirements per CQA Section 02224 (Engineered Fill) of this CQA Plan.

D. Verify that aggregate base for the flare station concrete pad is spread in a uniform loose lift not exceeding 8 inches in thickness.

E. Perform the following field tests at the frequency shown to verify that the compacted aggregate base material has a minimum dry density of 95 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one test beneath each concrete pad.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

F. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.02 REINFORCEMENT

A. Verify that all reinforcement is installed in conformance with Concrete Reinforcing Steel Institute's (CRSI's) "Manual of Standard Practice".

B. Verify that all reinforcement is free from rust, oil, dirt, or any other coating.

C. Verify that continuous reinforcing bars are lapped at splices at a minimum of 32 diameters.

D. Verify that reinforcement has a minimum concrete cover of 3 inches (unless otherwise noted).

E. Verify that reinforcement is not damaged and is securely supported and anchored to avoid movement during placement of concrete.

3.03 FORMWORK

A. Verify that the strength of concrete formwork is sufficient to hold the concrete with minimal or no leakage and that shoring and bracing is provided to ensure stability of formwork.

B. Verify that 3/4-inch chamfer strips are used at exposed corners.

3.04 CONCRETE SLAB AND DRAIN INLET PLACEMENT

A. Verify that the subgrade and forms are moistened prior to placing concrete.

B. Verify that care is taken to not damage or displace the reinforcing steel components.

C. Verify that concrete is placed in a continuous operation and thoroughly vibrated to ensure consolidation around reinforcement.

D. Collect samples of the concrete to be used at the Work site and perform the following tests to verify that the concrete has the slump and compressive strength characteristics specified in the Technical Specifications:
   1. *Slump (ASTM C 143)*; one test per each concrete pour.
   2. *Compressive Strength (ASTM C 31 and ASTM C 39)*; one test per each concrete pour.

E. Verify that the final surfaces of the concrete slabs have a non-slip broom finish.

F. Verify that all significant cracks, spalls and irregularities in formed or finished surfaces or other defects are properly repaired or patched.

3.05 MINOR CONCRETE PLACEMENT

A. Verify that minor concrete for post footings and the sedimentation basin outlet structure foundations are installed as shown on the Plans and in conformance with Sections 51 and 90-10 of the Standard Specifications, as applicable.

B. Verify that minor concrete for the grouted rock riprap is placed in conformance with Section 72-5.04 of the Standard Specifications.

3.06 EPOXY SECURED DOWELS OR ANCHORS

A. Verify that the diameter and depth of the drill hole is as indicated. If not included, verify that the hole is drilled 1/8-inch larger and ten (10) times deeper than the diameter of the dowel or anchor.

B. Verify that the hole is thoroughly cleaned by blowing it out with compressed air and by using a wire brush.

C. Verify that placement of epoxy in the hole is performed using a dispensing tool provided by, or recommended by the manufacturer and that the hole shall is completely filled with epoxy.

D. Verify that the dowel or anchor is placed in the hole and the epoxy allowed sufficient time to completely cure before disturbing the dowel or anchor.

3.07 CONFORMANCE VERIFICATION

A. After construction, verify by survey that the flare station concrete pads are completed at the elevations shown on the plans.

3.08 CORRECTIVE ACTIONS

A. If any portion(s) of the concrete provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 03300
CONCRETE

CQA SECTION 15100
LANDFILL GAS (LFG) EXTRACTION WELLS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the LFG extraction well materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 LFG EXTRACTION WELL COMPONENTS

A. Verify that the following LFG extraction well components meet the applicable product requirements of Section 15100 (Landfill Gas [LFG] Extraction Wells) of the Technical Specifications:
1. PVC well casing and fittings.
2. Bentonite Seal.
3. PVC well bore seal.
4. Prefabricated well head assemblies.

2.02 GRAVEL PACK

A. Verify gravel pack conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 SOIL BACKFILL

A. Verify soil backfill conformance under CQA Section 02250 (Erosion-Resistant Layer) of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to LFG extraction well drilling and installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the LFG extraction well locations conform to the locations staked by the Design Engineer.

C. Verify that a drilling permit(s), if required, has been obtained by the Contractor.

D. Verify that drilling contractor is licensed (Class C-57) in the State of California.

E. Verify that the Contractor understands that individual LFG extraction wells must be drilled and installed in a single day so as to minimize the potential for LFG emissions from the borehole. In the event of equipment breakdown or other unforeseen circumstance that prohibits complete installation of the LFG extraction well within the same working day, verify that provisions are made to cover and seal the exposed borehole at the surface to prevent LFG emissions.

3.02 DRILLING

A. Verify that the boreholes for the LFG extraction wells are drilled using a bucket auger drill rig capable of drilling 24-inch diameter boreholes.

B. Verify that a safety screen is placed over the top of the borehole as soon as drilling is completed and that the screen is kept in place until backfilling is within 4 feet of the surface. Verify that the safety screen size is large enough to accommodate all backfill materials and activities yet not large enough for any human to accidentally fall through.

C. Verify that the borehole is straight and the well casing is installed in the center of the borehole. Verify that the Contractor takes all tension off of the pipe by mechanical means and centers the well casing in the middle of the borehole before starting to backfill.

D. Verify that PVC well casing joints are solvent cemented and secured with 3/8-inch long Type 316 stainless steel lag screws.

E. Verify that the completion height of the well casing above ground surface is such that the final height of the installed prefabricated well head assembly is 5 feet above final grade.

F. Verify that the top of the casing is capped until installation of the prefabricated well head assembly.

G. Verify that spoils generated as part of the drilling process are handle and managed in conformance with CQA Section 02222 (Excavation) of this CQA Plan.

H. In the event obstructions and/or saturated conditions are encountered during drilling, verify that the Contractor makes a reasonable effort to drill through obstructions and saturated conditions and that abandonment of the borehole is not performed without written approval obtained from the Design Engineer.

3.03 BACKFILLING

A. Verify that backfilling operations commence immediately after well drilling is completed and the well casing has been installed in the borehole. Verify that backfill materials are installed as shown on the Plans and as directed by the Design Engineer.

B. Verify that the gravel pack is poured or scooped through the safety screen at a rate that will not endanger the integrity of the well casing.

C. Verify that the upper and lower bentonite seals are formed by evenly distributing the bentonite material around the annulus of the well casing and that fresh water is added in a manner that will allow for a thorough saturation of the bentonite. Verify that the proportion of water added versus bentonite material is in accordance with the bentonite manufacturer's recommendations.

D. Verify that soil backfill is placed from the top of the lower bentonite seal to the bottom of the upper bentonite seal in a manner that will promote self compaction and avoid bridging of the soil backfill material.

E. Verify that the PVC well bore seal is installed in accordance with the manufacturer's recommendations around the well casing and placed at the location shown on the Plans.

F. Verify that the boot portion of the well bore seal is secured around the well casing with stainless steel straps to provide an air-tight connection. Following placement of erosion-resistant layer material, verify that the boot is installed in a collapsed position above the final grade to accommodate potential settlement.

G. Verify that the PVC well bore seal is covered with the overlying GCL material or soil (temporary) if the PVC well bore seal is going to be exposed for more than three (3) working days.

3.04 INSTALLATION OF PREFABRICATED WELL HEAD ASSEMBLY

A. Verify that the prefabricated well head assemblies are handled and installed in accordance with the manufacturer's recommendations and as shown on the Plans.

B. Verify that the well head is installed such that the interior extension tube assembly is concentric within the well casing.

C. Verify that the final completion height of the well head assembly is 5 feet above final grade as shown on the Plans.

D. Verify that the PVC flexible hose connection between the well head and LFG collection system piping is installed with sufficient slack (6 to 8 inches) to accommodate expansion and contraction. Verify that "IPS Weld-On 795" plastic pipe cement, or approved equivalent, is used for flexible hose connections to the well head and LFG collection system piping.

3.05 ABANDONMENT OF LFG EXTRACTION WELL BOREHOLE (IF REQUIRED)

A. Verify that boreholes approved by the Design Engineer for abandonment are backfilled with refuse and/or soil to the final grade and compacted. If refuse is used, verify that the refuse is mechanically compacted within the borehole using the bucket auger to eliminate potential voids.

B. Upon completion of borehole abandonment activities, verify that the area around the borehole is restored to meet the surrounding grades as shown on the Plans.

3.06 PERFORMANCE TESTING

A. Verify that performance testing of the prefabricated well head assemblies is performed in conformance with Section 15100 (Landfill Gas [LFG] Extraction Wells) of the Technical Specifications.

3.07 CORRECTIVE ACTIONS

A. If any portion(s) of the LFG extraction well provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15100
LANDFILL GAS (LFG) EXTRACTION WELLS

CQA SECTION 15200
LFG COLLECTION SYSTEM COMPONENTS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the LFG collection system component materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 LFG COLLECTION SYSTEM COMPONENTS

A. Verify that the following LFG collection system components meet the applicable product requirements of Section 15200 (LFG Collection System Components) of the Technical Specifications:

1. PVC pipe and fittings.
2. PVC butterfly valves (isolation valves).
3. PVC ball valves.
4. PVC cement.
5. Vacuum/sample test ports.
6. HDPE pipe and fittings.
7. PVC-HDPE transition coupling.
8. Flexible couplings.
9. Block type pipe supports and anchors (including concrete masonry blocks, pipe clamps and miscellaneous fittings).
10. Metal frame pipe supports (including metal frames, pipe clamps and miscellaneous fittings).
11. CMP.
12. Steel pipe protective sleeves.
13. Reinforced concrete pipe (RCP) protective sleeve.

2.02 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

2.03 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.04 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.05 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the pipe bedding and engineered fill as determined under CQA Section 02207 (Aggregate Materials) and CQA Section 02224 (Engineered Fill), respectively, of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to LFG collection system construction, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

3.02 LFG COLLECTION SYSTEM PIPING

A. Verify that the LFG collection system piping, including flexible couplings, isolation valves and condensate drop-out points are installed as shown on the Plans.

B. Verify that all PVC pipe, fittings and valves are inspected for cuts, scratches, or other damages prior to painting and installation.

C. Verify that prior to installation, all PVC pipe and fittings to be left exposed are steam cleaned and allowed to dry, then painted in conformance with Section 15200 (LFG Collection System Components) of the Technical Specifications.

D. Verify that PVC pipe, fittings and valves are joined with socket and solvent cement welding in accordance with ASTM D 2855 and that the joining of PVC pipe, fittings and valves are in accordance with the pipe manufacturer's recommendations and the Technical Specifications.

E. Verify that PVC pipe cuts are square and perpendicular to the centerline of the pipe and that PVC pipe ends are beveled prior to applying primer and solvent cement so that the primer or cement are not wiped off during insertion into the fitting socket.

F. Verify that all burrs, chips, etc. generated as a result of cutting operations are removed from the pipe interior and exterior and that the inside of the piping is kept clean of dirt and debris. Also verify that any piping left overnight is capped.

G. Verify that a coating of CPS primer as recommended by the PVC pipe supplier is applied to the entire interior surface of the fitting socket, and to an equivalent area on the exterior of the pipe prior to applying solvent cement.

H. Verify that the solvent cement used complies with the requirements of ASTM D 2564 and is applied in strict accordance with manufacturer's specifications.

I. Verify that PVC pipe, fittings and valves are not primed or solvent welded when it is raining or when ambient temperature is below 40°F or above 100°F.

J. Verify that after solvent welding, the PVC pipe, fittings and valves are allowed to remain undisturbed until cement has thoroughly set.

K. Verify that flexible couplings are installed at the locations shown on the Plans and that the flexible couplings are installed per the pipe separation criteria specified in the Plans based on the ambient temperature at the time of installation. Also verify that stainless steel band clamps are secured around the ends of the flexible coupling in such a manner as to provide an air-tight joint.

L. Verify that vacuum/sample test ports are installed at the locations and orientations shown on the Plans and in accordance with the procedures described in Section 15200 (LFG Collection System Components) of the Technical Specifications.

M. Verify that block type pipe supports are installed under the selected pipe segments as specified on the Plans and that they are spaced at 6 feet on-center along the full length of the pipe segments.

N. Verify that block type pipe anchors are installed every 50 linear feet (minimum) of LFG collection system piping, as well as at the locations of all tee, elbow and wye fittings (both ends, but not on the fittings themselves) and that the pipe clamps are secured around the LFG header system pipe to ensure that the pipe does not move.

O. Verify that strap type pipe anchors are installed at the various locations shown on the Plans and in accordance with manufacturer's recommendations.

P. Verify that metal frame pipe supports are installed at the locations shown on the Plans and that they are spaced at 6 feet on-center. Verify that the height of cross-bar pipe supports are adjusted as appropriate to ensure positive slope of LFG collection system piping. Verify concrete placement conformance under CQA Section 03300 (Concrete) of this CQA Plan.

3.03 BURIED HEADER CROSSINGS

A. Verify that trenching across bench sections are to the depth and dimensions shown on the Plans.

B. Verify that LFG collection system piping is sloped at a minimum of 3 percent to maintain proper condensate drainage capabilities.

C. Verify backfill conformance under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.

2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

D. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 ROAD CROSSINGS

A. Verify that pipe support/drainage CMPs and steel pipe/RCP protective sleeves are installed in the orientations shown on the Plans and that the pipe support/drainage CMPs are aligned with the center line of the drainage swale.

B. Verify that reinforcement geotextile is wrapped around the steel pipe protective sleeve where it will be in direct contact with the underlying pipe support/drainage CMP.

C. Verify that LFG collection system piping is inserted through the steel pipe/RCP protective sleeves in a manner that does not damage or compromise the LFG collection system piping.

D. Verify engineered fill placement conformance under CQA Section 02224 (Engineered Fill) and perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

E. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.05 CONDENSATE DRAIN PIPE AND FITTINGS

A. Prior to installation, verify that all HDPE pipe and fittings are inspected for cuts, scratches, or other damages and that pipe and/or fittings with imperfections are not used.

B. Verify that trench excavation and backfill for buried HDPE pipe and fittings are as shown on the Plans.

C. Verify that HDPE pipe connection ends and fittings are joined by butt fusion procedures in accordance with the HDPE pipe and fitting manufacturer's recommended procedures.

D. Verify during construction that the HDPE pipe is not bent to a degree greater than the minimum radius recommended by the manufacturer and that the HDPE pipe is not subjected to strains that will overstress or buckle piping or impose excessive stress on joints.

E. Verify that open ends of fused HDPE pipe are covered or capped at the end of each working day to prevent entry by animals or debris.

F. Verify that sufficient slack is provided for segments completed above ground to allow for thermal expansion and contraction so as to not promote excessive stress on the piping following installation.

G. Verify that allowance is provided for thermal expansion or contraction of buried HDPE pipe within trenches and is coordinated with the pipe backfill operations to avoid buildup of thermal stresses.

H. Verify that sufficient time (per manufacturer's recommendations) is provided following placement of HDPE pipe to allow the pipe to adjust to trench temperature prior to testing, segment tie-ins, or backfilling activities.

3.06 CONDENSATE DROP-OUTS

A. Verify that the condensate drop-outs, including u-trap assemblies, are installed at the locations and to the dimensions shown on the Plans.

B. Verify that excavations are not deeper than necessary to maintain adequate buffer above the underlying GCL.

C. Verify that the transition from PVC to HDPE is conducted at the flange connection as shown on the Plans.

D. Verify PVC and HDPE pipe, fittings and valves installation conformance under Parts 3.01 and 3.05 of this Section.

E. Verify installation of strap type pipe anchors at various points on the u-trap piping as shown on the Plans.

F. Verify that the u-trap assemblies are filled with clean water following construction and prior to start of LFG collection system operations.

3.07 CONDENSATE DISCHARGE POINTS

A. Verify that the Condensate discharge points are installed at the locations and to the dimensions shown on the Plans.

B. Verify soil and/or refuse excavation and handling conformance under CQA Section 02222 (Excavation) of this CQA Plan.

C. Verify PVC and HDPE pipe and fittings installation conformance under Parts 3.01 and 3.05 of this Section.

D. For condensate discharge points located within the limits of the final cover system, verify placement conformance of the engineered fill and respective final cover system components above the condensate discharge points per the applicable sections of this CQA Plan.

E. For condensate discharge points located outside the limits of the final cover system, verify engineered fill placement conformance under CQA Section 02224 (Engineered Fill) and perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.

2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

F. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.08 PERFORMANCE TESTING

A. Verify that performance testing of the PVC LFG collection system pipe, HDPE condensate drain pipe, and condensate discharge points is performed in conformance with Section 15200 (LFG Collection System Components) of the Technical Specifications.

3.09 CORRECTIVE ACTIONS

A. If any portion(s) of the LFG collection system components provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15200
LFG COLLECTION SYSTEM COMPONENTS

CQA SECTION 15300
FLARE STATION

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the flare station materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 FLARE STATION COMPONENTS

A. Verify that the following flare station components meet the applicable product requirements of Section 15300 (Flare Station) of the Technical Specifications:
1. Skid-mounted packaged combustion system.
2. Electrical conduit, wire and fittings.
3. Chain link fence.

2.02 PVC PIPE, FITTINGS AND BALL VALVE

A. Verify PVC pipe, fittings and ball valve conformance under CQA Section 15200 (LFG Collection System Components) of this CQA Plan.

2.03 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.04 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.05 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

2.06 AGGREGATE BASE

A. Verify aggregate base conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.07 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the aggregate base as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

PART 3 EXECUTION

3.01 FLARE STATION ASSEMBLY

A. Prior to flare station assembly activities, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that Contractor has obtained all required building permits.

C. Verify that Contractor's laborers are skilled and experienced in the installation of similar equipment.

D. Verify that the skid-mounted packaged combustion system is installed in strict accordance with the manufacturer's specifications.

3.02 CONDENSATE DRAINAGE LINE

A. Verify that the condensate drain line between the flare station and leachate wet well is installed as shown on the Plans.

B. Verify trenching and pipe bedding conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

C. Verify PVC pipe, fittings and ball valve installation conformance under CQA Section 15200 (LFG Collection System Components) of this CQA Plan.

D. Verify that the condensate drainage line is installed at a minimum slope of 1 percent in the direction of the leachate wet well.

E. Verify that the condensate drainage line penetrates the wall of the leachate wet well at the appropriate depth and that the annular space between the condensate drainage line and the wall of the leachate wet well is sealed using non-shrink grout.

F. Verify engineered fill placement conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

3.03 SECURITY FENCE

A. Verify that the chain link fence and gates are installed as shown on the Plans and in accordance with the requirements of Section 80-4.02 of the Standard Specifications.

B. Verify that all line, corner, and gate post assemblies are constructed with concrete post footings.

C. Verify that soil between fence posts is leveled to create a 2-inch clearance under the fence fabric.

3.04 FLARE STATION AGGREGATE BASE

A. Verify that the aggregate base within and around the flare station is placed to the dimensions shown on the Plans.

B. Verify that the aggregate base is spread in uniform loose lifts not exceeding 8 inches in thickness.

C. Perform the following field tests at the frequency shown to verify that the compacted aggregate base material has a minimum dry density of 95 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at one test per every 1,200 square feet.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

D. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

E. Verify that the final compacted thickness is a minimum of 6 inches.

3.05 PERFORMANCE TESTING

A. Verify that performance testing of the skid-mounted packaged combustion system and condensate drainage line is performed in conformance with Section 15300 (Flare Station) of the Technical Specifications.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the flare station provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15300
FLARE STATION

CQA SECTION 15400
FLARE STATION ELECTRICAL AND TELEPHONE FEED

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the flare station electrical and telephone feed materials and installation methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 ELECTRICAL AND TELEPHONE FEED COMPONENTS

A. Verify that the following electrical and telephone feed components meet the applicable product requirements of Section 15400 (Flare Station Electrical and Telephone Feed) of the Technical Specifications:
1. Wire.
2. Conduit and fittings.
3. Meter socket.
4. Junction and outlet boxes.
5. Warning tape.

2.02 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.04 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

2.05 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for pipe bedding and the engineered fill used for backfilling the former leachate pond as determined under CQA Section 02207 (Aggregate Base) and CQA Section 02224 (Engineered Fill), respectively, of this CQA Plan.

PART 3 EXECUTION

3.01 GENERAL

A. Prior to electrical and telephone feed installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that Contractor has obtained all required electrical permits.

C. Verify that Contractor has furnished and installed all temporary power and lighting systems needed for construction and their subsequent removal after construction is completed.

D. Verify that Contractor has verified that the wire and conduit sizes for the main power supply and automatic telephone dialer system are appropriate for the intended use.

E. Verify that all electrical components are in accordance with the National Electric Code (NEC), National Fire Protection Association (NFPA) and local codes and regulations for installation in a Class 1, Division 1 or Class 1, Division 2 classified locations.

F. Verify that electrical and telephone feed installations are performed in accordance with the local electrical and telephone company rules and regulations.

G. Verify that the electrical and telephone feed from the existing service points to the flare station control panel is completed below grade as shown on the Plans.

H. Verify that Contractor has confirmed service and panel locations and all other service requirements prior to starting Work.

3.02 PREPARATION

A. Verify that all materials are inspected for damage and imperfections prior to installation and that damaged materials or materials with imperfections are not used.

3.03 TRENCHING AND BACKFILLING

A. Verify trenching and pipe bedding placement conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

B. Perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at least one (1) test per 100 linear feet per lift or at a change in material.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

C. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 INSTALLATION

A. Verify that all equipment, motors, conduit and outlets, as applicable, are permanently and effectively grounded in accordance with NEC, California Administrative Code (CAC) - Title 24 and local codes.

B. Verify that all conduits are sloped towards pull boxes and run in straight lines except where a change in direction is necessary. Also verify that couplings are staggered for maximum duct line strength.

C. Verify that the ends of buried conduit are kept closed with approved conduit seals during construction and that immediately prior to pulling wire or cable, a swab is drawn through all conduits to force out water and foreign materials.

D. Verify that junction boxes are installed in an accessible location as required for splicing, connections and pulling of wire.

E. Verify that all above ground conduit is properly secured on pipe supports or concrete slabs.

F. Verify that the meter socket installed at the existing service pole complies with the height and fastening specifications outlined in the local electric company rules and regulations.

3.05 CLEAN-UP

A. Verify that all exposed portions of electrical installation are thoroughly cleaned, including the removal of all traces of soil, labels, grease, oil, and other foreign matter.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the flare station electrical and telephone feed provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15400
FLARE STATION ELECTRICAL AND TELEPHONE FEED

CQA SECTION 15500
LEACHATE OVERFLOW COLLECTION AND STORAGE SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the leachate overflow collection and storage system materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 COLLECTION AND STORAGE SYSTEM COMPONENTS

A. Verify that the following leachate overflow collection and storage system components meet the applicable product requirements of Section 15500 (Leachate Overflow Collection and Storage System) of the Technical Specifications:
1. Pipe materials.
2. Pipe accessories.
3. Concrete junction boxes.
4. Lining material for leachate sediment chamber/wet well.
5. Leachate UST and accessories.

2.02 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 TANK BEDDING AND BACKFILL

A. Verify tank bedding and backfill conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.04 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.05 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the pipe bedding and tank bedding and backfill as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

B. Review moisture-density relationship conformance test results for the engineered fill as determined under CQA Section 02224 (Engineered Fill) of this CQA Plan.

PART 3 EXECUTION

3.01 BRACING AND SHORING

A. Verify that Bracing and shoring complies with Section 5-1.02A and 7-1.01E of the Standard Specifications.

3.02 GENERAL PIPE INSTALLATION

A. Verify that Contractor confirms the location of point of connection (POC) at the existing leachate collection piping as shown the Plans by potholing to determine the location and depth (elevation).

B. Verify that the trench subgrade for the gravity drain pipe provides uniform support at a uniform slope along full length of pipe.

3.03 PIPE INSTALLATION

A. Verify trench conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

B. Verify that the bottom of the trench is graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

C. Verify that pipe, fittings, and accessories are installed in accordance with manufacturer's instructions and that the sealed joints are watertight.

D. Verify that pipe is placed to the lines and grades as shown on the Plans.

E. Verify that the pipe is laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe.

F. Verify that the horizontal alignment of the pipe is laid such that no points vary more than 0.10 feet from the design alignment established and shown on the Plans.

G. Verify backfill conformance under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at least one (1) test per 100 linear feet per lift or at a change in material.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

H. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 CONCRETE JUNCTION BOXES

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

B. Verify that concrete junction boxes are installed in accordance with manufacturer's instructions and that their placement into the excavation is performed in a manner that will not induce damage or compromise future stability.

C. Verify that backfilling operations conform to the provisions in Section 19-3 of the Standard Specifications.

3.05 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Prior to start of Work, verify that provisions have been made to divert leachate from the existing leachate drain from discharging into the leachate sediment chamber and document how the leachate is being diverted and managed.

B. Verify that all leachate is pumped from the leachate sediment chamber and wet well and document where the leachate is pumped and managed.

C. Verify that any sediment present at the base of the leachate sediment chamber and/or wet well is removed and document how the sediment is removed and managed.

D. Verify that existing pumps and any other equipment/features that may inhibit application product are removed and stored in a dry and secure location

E. Verify that the interior walls and base of the sediment chamber and wet well are steam cleaned to remove residual grime and residues. Also verify that residual rinseate generated by the steam cleaning operations is removed and document how the removed rinseate is managed.

F. Verify that sufficient time is provided to allow the surfaces of the interior walls and base to dry and document the nature of any mechanical means employed to expedite the drying time, as applicable.

G. Verify that the lining product is applied to provide full and sufficient coverage of all interior walls and base and that the application is performed in strict accordance with recommended manufacturer’s procedures.

H. Verify that pumps and any other equipment/features that were removed are re-installed and verify that normal operation of the leachate sediment chamber/wet well is restored per pre-existing conditions.

3.06 TANK HOLDING

A. Verify that the tank is not dropped, rolled or impacted during unloaded and that the tank is set on smooth ground, free of rocks and foreign objects, and chock tanks to prevent movement.

3.07 TANK INSTALLATION

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

B. Verify that the tank excavation is large enough to provide 2 feet of clearance between the tank sides and ends and the excavation walls in stable soil and 12 inches of bedding under the tank.

C. Verify that the tank and all related piping and accessories are installed as per manufacturer's printed instructions.

D. Verify that the tank bedding and backfill is placed in accordance with the sequence and procedures outlined in Section 15500 (Leachate Overflow Collection and Storage System) of the Technical Specifications.

E. Following placement of the tank bedding and backfill, verify backfill conformance for the remainder of the excavation under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   a. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at one test per every 1,200 square feet.
   b. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

F. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.08 PERFORMANCE TESTING

A. Verify that performance testing of the leachate sediment chamber/wet well and leachate UST is performed in conformance with Section 15500 (Leachate Overflow Collection and Storage System) of the Technical Specifications.

3.09 CORRECTIVE ACTIONS

A. If any portion(s) of the leachate overflow connection and storage system provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15500
LEACHATE OVERFLOW COLLECTION AND STORAGE SYSTEM

APPENDIX A

PROJECT DOCUMENT FORMS

DAILY SUMMARY REPORT

Project: **Date:**

Day:

Owner: **Document Control No.:**

Contractor: **Weather:** AM
PM

Construction Activity Summary

Construction Unit/Area:

Equipment:

Personnel:

Subcontractors:

CQA Monitoring/Testing Summary

(Attach Inspection Data Sheets or Daily Field Logs)

Non-Conformance/Corrective Action

(Attach Non-conformance/Corrective Action Form)

Materials Received/Submittal Status

Meetings

Other Information

Signature: _____

NON-CONFORMANCE/CORRECTIVE ACTION FORM

Project: **Date:**

Day:

Owner: **Document Control No.:**

Contractor:

Non-conformance Summary

Description:

Specification or Drawing Reference:

Corrective Action

Description:

Specification Variance or Drawing Revision:

(Record any Drawing Revision on the Site As-built Record Drawings)

Signature: _____

ACCEPTANCE REPORT

Project: **Date:**

Day:

Owner: **Document Control No.:**

Contractor:

Acceptance Statement

All materials and construction processes for the Construction Unit stated below comply with the Design Plans and Specifications.

Construction Unit (Section No.)

Daily Summary Reports Referenced

(List Document Control Nos.)

Non-Conformance/Corrective Action Forms Referenced

(List Document Control Nos.)

Signature: _____

MEETING/DISCUSSION SUMMARY REPORT

Project: **Date:**

Time:

Owner: **Document Control No.:**

Contractor: **Location:**

Meeting Name or Subject Matter

Attendees

Minutes (if scheduled meeting) or Synopsis

Items for Resolution

Signature: _____

PHOTOGRAPH LOG

Project: **Date(s):**

Roll No.:

Owner:

Contractor:

DATE TIME	PICTURE NO.	SUBJECT MATTER

Signature: _____

SUBGRADE SOIL SURFACE ACCEPTANCE

Project: **Date:**
Day:

Owner:
CQA Monitor: **Document Control No.:**
Contractor:
Material Description: **Cell No.:**

Description of Soil Surface to be Lined:

I hereby certify that the above surface area is suitable for the installation of geosynthetics, and that (Contractor and Installer) shall be responsible for its integrity and suitability in accordance with the Specifications from this date to the completion of the installation

Installer Representative:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

Subgrade Contractor:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

Witness:

CQA Monitor:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

Owner Representative:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

APPENDIX B

SOILS MONITORING FORMS

NUCLEAR DENSITY / MOISTURE TEST DATA

Project:
Project No.:

Test No.									Test Notes
Soil Type									
Northing									
Easting									
Elevation (ft)									
Test Depth (in)									
Density Count									
Wet Density (pcf)									
Moisture Count									
Moisture (pcf)									
Dry Density (pcf)									
Moisture Content (%)									
Reference Curve (pcf)									
Reference OMC (%)									
Oven Moisture Content (%)									
Dry Density Correction (pcf)									
Relative Compaction (%)									

Standard Count Density:	Nuclear Gauge No.:	Additional Notes:
Standard Count Moisture:	CQA Monitor:	
Date:	Reviewer:	Sheet No.: of

SOILS TEST REQUEST
SAMPLE CUSTODY LOG

Project:
Project No.:

Sample No.	Atterberg Limits	Unified Soil Classification	Moisture Density Relationship	Particle Size Analysis	Moisture Content	Sample Instructions
ASTM	D 4318	D 2487	D 1557	D 422	D 2216	

Laboratory:	**Shipped by:**	**Special Instructions:**
Request Date:	**Shipped Via:**	
Results Date:	**Received by:**	

APPENDIX C

GEOSYNTHETICS MONITORING FORMS

GEOMEMBRANE DELIVERY AND CONTROL LOG

(Attach packing list)

Project:

Project No.:

Roll No.	Lot No.	Length (ft)	Width (ft)	Area (ft^2)	QC Test Report	QAVT Sample	QAVT Results	Condition Notes

Manufacturer:	CQA Monitor:	Additional Notes:
Material:	Shipment Quanity (ft^2):	
Date:	Accumulated Quanity (ft^2):	Shipment No.:

GEOMEMBRANE DEPLOYMENT/SEAMING LOG

(Attach field sketch of daily panel layout)

Project:
Project No.:

Abbreviations: Panel(P), Roll(R), Seam(S), Cross-seam(CS), Air Pressure(AP), Vacuum Test(VT), Seam Analysis Sample(SAS) End of Seam Test(EST), Trial Weld(TW), Subgrade Acceptance(SA), Temperature(T), Note(N).

Date: CQA Monitor: Sheet No.: of

GEOMEMBRANE REPAIR LOG

Project No.:

Repair No.	Repair Description	Repair Location	Repair Date	VT Date	VT Result

Abbreviations: Panel(P), Seam(S), Cross-seam(CS), Air Pressure(AP), Anchor Trench(AT), Seam Analysis Sample(SAS), End of Seam Test(EST), Safety Patch(SP), Vacuum Test(VT), North(N), South(S), East(E), West(W).

Date:	CQA Monitor:	Sheet No.: of

APPENDIX D

SUBMITTAL CONTROL LOG

SUBMITTAL CONTROL LOG

Project: Final Closure Construction, City of Ukiah Landfill
Project No.: 02-907
Owner: City of Ukiah, Department of Public Works
CQA Certifying Engineer: EBA Engineering

Contractor: _____
Installer: _____
Geosynthetics Supplier: _____

Submittal No.	Specification Section	Submittal Description	Submitted By	When Required	Date Received	Reviewer	Action Taken/Determination	Date Returned
DIVISION 1	**GENERAL PROJECT REQUIREMENTS**							
GPR-1	01060-3.03	Surveying and Field Engineering (Name and Qualifications)		Prior to Commencement of Work				
GPR-2	01310-1.01(A)	Project Schedule		Prior to Commencement of Work				
GPR-3	01500-1.03(A)	Dust Control Plan		Prior to Commencement of Work				
GPR-4	01550-1.07(A)	Storm Water Pollution Prevention Plan (SWPPP)		14 Days of Authorization to Proceed				
GPR-5	01550-1.07(F)	Storm Water Inspection Training Records		5 Days Prior to Commencement of Work				
GPR-6	01800-3.02(A, C)	Health and Safety Plan with Emergency Contact List		Prior to Commencement of Work				
DIVISION 2	**SITE WORK**							
SW-1	02200-1.03(A)	Materials used for replacement or adjustment of existing facilities		14 Days Prior to Delivery				
SW-2	02207-1.04(A)	Name & Location of source and laboratory test results for aggregate base		15 Days Prior to Delivery				
SW-3	02722-1.04(A)	Riprap Stone (Sources, Lab Test Results, Product Data Sheets)		14 Days Prior to Construction				
SW-4	02722-1.05(B)	Concrete (Sources, Lab Test Results, Mix Design)		14 Days Prior to Construction				
SW-5	02722-1.05(C)	Erosion Control (Samples, Product Data Sheets, Installation Guidelines)		14 Days Prior to Delivery				
SW-6	02722-2.01	Drain Inlets		14 Days Prior to Delivery				
SW-7	02722-2.02	Drain Pipe		14 Days Prior to Delivery				
SW-8	02771-1.04(A)(1)	Geotextile Reinforcement (Samples & Product Data Sheets)		14 Days Prior to Delivery				
SW-9	02771-1.04(A)(2)	Geotextile Reinforcement (MQC Test Results)		14 Days Prior to Delivery				
SW-10	02771-1.04(A)(3)	Geotextile Reinforcement (Manufacture's Recommended Procedures)		14 Days Prior to Delivery				
SW-11	02771-1.04(A)(4)	Geotextile Sewing Thread (Samples & Product Data Sheets)		14 Days Prior to Delivery				
SW-12	02772-1.03(A)(1)	Geomembrane Resin (Single Source Compliance Certificate)		14 Days before Delivery				
SW-13	02772-1.03(A)(2)	Geomembrane Base Resin (MQC Test Results)		14 Days before Delivery				
SW-14	02772-1.03(A)(3)	Geomembrane (Samples & Product Data Sheets)		14 Days before Delivery				
SW-15	02772-1.03(A)(4)	Geomembrane (2-foot by 2-foot Sample Geomembrane specimen)		14 Days before Delivery				
SW-16	02772-1.03(A)(5)	Geomembrane (MQC Test Results)		14 Days before Delivery				
SW-17	02772-1.03(A)(6)	Geomembrane (Manufacture's Recommended Procedures)		14 Days before Delivery				
SW-18	02772-1.03(A)(7)	Geomembrane (Certificate of Compliance for Extrudate Rod Material)		14 Days before Delivery				
SW-19	02772-1.03(B)(1)	Geomembrane (Quality Control Plan)		14 Days prior to Installation				
SW-20	02772-1.03(B)(2)	Geomembrane (Installer's Qualifications)		14 Days prior to Installation				
SW-21	02772-1.04(C)(1)	Geomembrane (Installer's Warranty)		Upon Completion of the work				
SW-22	02773-1.03(A)(1)	Engineered Turf (Samples & Product Data Sheets)		14 Days before Delivery				
SW-23	02773-1.03(A)(2)	Engineered Turf (MQC Test Results)		14 Days before Delivery				
SW-24	02773-1.03(A)(3)(a)	Engineered Turf Resin (Single Source Compliance Certificate)		14 Days before Delivery				
SW-25	02773-1.03(A)(3)(b)	Engineered Turf Base Resin (MQC Test Results)		14 Days before Delivery				
SW-26	02773-1.03(A)(4)	Engineered Turf (Manufacture's Recommended Procedures)		14 Days before Delivery				
SW-27	02773-1.03(A)(5)	Plastic Fasteners (ties) (Samples/Product Data Sheets)		14 Days before Delivery				
SW-28	02773-1.03(A)(6)	Engineered Turf Panel Layout Drawing		14 Days before Delivery				
SW-29	02900-1.03(A)	Seeding (Sources, Lab Test Results, Product Data Sheets)		Prior to Seeding				
SW-30	02900-1.03(B)	Seeding (Certified Tags from Seed Bags)		After Seeding				
SW-31	02960-1.03(A)	Storm Water Pollution Prevention Plan (SWPPP)		14 Days of Authorization to Proceed				

SUBMITTAL CONTROL LOG

Project: Final Closure Construction, City of Ukiah Landfill
Project No.: 02-907
Owner: City of Ukiah, Department of Public Works
CQA Certifying Engineer: EBA Engineering

Contractor: _____
Installer: _____
Geosynthetics Supplier: _____

Submittal No.	Specification Section	Submittal Description	Submitted By	When Required	Date Received	Reviewer	Action Taken/Determination	Date Returned
SW-32	03300-1.04(A)	Concrete (Sources, Lab Test Results, Mix Design)		14 Days before Delivery				
SW-33	15100-1.03(A)(1)	Drilling Subcontractor Information		14 Days Prior to Drilling				
SW-34	15100-1.03(A)(2)	Name & Location of source and laboratory test results for LFG well components		14 Days Prior to Drilling				
SW-35	15100-1.03(A)(3)	Well head assembly manufacturer's recommended installation procedure		14 Days Prior to Drilling				
SW-36	15200-1.02(A)(1)	Manufacturer's Product Data Sheets (HDPE and PVC pipe, fitting, and valves)		14 Days before Delivery				
SW-37	15200-1.02(A)(1)	Manufacturer's Product Data Sheets (Valve boxes)		14 Days before Delivery				
SW-38	15200-1.02(A)(2)	Manufacturer's Recommended Procedures for HDPE pipe, fittings and valves		14 Days before Delivery				
SW-39	15200-3.08	Proposed Procedures - Vacuum Pressure Test of LFG Collection Pipe		14 Days Prior to Construction				
SW-40	15400-3.08	Test Results - LFG Collection Pipe, Well head Assemblies		14 Days After Completion of Performance Testing				
SW-41	15300-1.04(A)	Flare Station Assembly Building Permit		14 Days Prior to Construction				
SW-42	15300-1.04(B)	Flare Station Assembly Building Inspection Reports		14 Days Prior to Completion				
SW-43	15300-1.04(C)	Flare Station procedures for combustion system and pressure testing		14 Days Prior to Testing				
SW-44	15300-1.04(D)	Flare Station Test Results		14 Days of Completion of Testing				
SW-45	15400-1.03(A)	Electrical Manufacturer's Product Data Sheets (Wire, conduit, boxes, etc.)		14 Days before Delivery				
SW-46	15400-1.03(B)	Electrical Permits		14 Days Prior to Construction				
SW-47	15400-1.03©	Electrical Permit Inspection Reports		14 Days Prior to Completion				
SW-48	15500-1.04(A)	Leachate Collection System Manufacturere's Product Data (UST, pipe, boxes)		14 Days before Delivery				
SW-49	15500-1.04(B)	Leachate UST Field Test Report		14 Days After Completion of Testing				
SW-50	15500-1.0(C)	Leacheat Sediment Chamber and Well Lining Procedures		14 Days Prior to Construction				

APPENDIX J

FINAL CLOSURE CONSTRUCTION DRAWINGS

CONSTRUCTION DRAWINGS

FOR

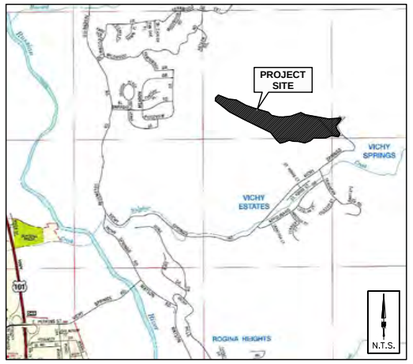
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

APN 178-130-01

3100 VICHY SPRINGS ROAD

UKIAH, CALIFORNIA

LOCATION MAP



SITE MAP



SHEET INDEX

000	TITLE SHEET
001	NOTES, LEGEND AND ABBREVIATIONS
100	SITE MAP (EXISTING CONDITIONS)
101	SITE MAP (FINISHED GRADE)
102	REFUSE RELOCATION PLAN
200	LANDFILL COVER MATERIALS PLAN
201	LANDFILL COVER MATERIALS PLAN
202	LANDFILL COVER MATERIALS PLAN
300	FINISHED GRADE (LANDFILL)
301	FINISHED GRADE (LANDFILL)
302	FINISHED GRADE (LAND FILL)
303	FINISHED GRADE (BORROW AREA)
304	SECTIONS
305	SECTIONS
306	SECTIONS
307	SECTIONS
308	SECTIONS & EROSION CONTROL DETAILS
309	PLAN ENLARGEMENTS
400	FLARE STATION AREA BLOW UP
500	GRADING DETAILS
501	GRADING DETAILS
502	GRADING DETAILS
503	GRADING DETAILS
504	GRADING DETAILS
505	GRADING DETAILS
506	GRADING DETAILS
600	LFG COLLECTION SYSTEM LAYOUT - WEST PORTION
601	LFG COLLECTION SYSTEM LAYOUT - CENTRAL PORTION
602	LFG COLLECTION SYSTEM LAYOUT - EAST PORTION
700	LFG COLLECTION SYSTEM DETAILS
701	LFG COLLECTION SYSTEM DETAILS
702	LFG COLLECTION SYSTEM DETAILS
703	LFG COLLECTION SYSTEM DETAILS
704	LFG COLLECTION SYSTEM DETAILS
705	LFG COLLECTION SYSTEM DETAILS
706	LFG COLLECTION SYSTEM DETAILS

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REGISTERED GEOLOGIST
DAMON F. BROWN
No.
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

TITLE SHEET

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No: 02-907
Drawn By: WC
Checked By: DFB
Date: 2019-04-30

Sheet Number

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GENERAL NOTES

1. ALL CONSTRUCTION MATERIALS AND METHODS SHALL CONFORM TO THE REQUIREMENTS OF THE COUNTY OF MENDOCINO. ALL REFERENCES TO STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS SHALL REFER TO THE MAY, 2006 EDITION OF THE STANDARD SPECIFICATIONS. ATTENTION IS ALSO DIRECTED TO THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD PLANS (MAY 6, 2006) WHICH, WHEN APPLICABLE, ARE INCLUDED IN THESE DRAWINGS AND REFERENCED BY STANDARD PLAN NUMBER.
2. PUBLIC SAFETY AND TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH COUNTY REQUIREMENTS AND AS DIRECTED BY THE ENGINEER. SAFE VEHICULAR AND PEDESTRIAN ACCESS SHALL BE PROVIDED AT ALL TIMES DURING CONSTRUCTION.
3. A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR SHALL DO ALL FIELD STAKING AT THE EXPENSE OF THE CONTRACTOR.
4. ANY DISCREPANCY DISCOVERED BY THE CONTRACTOR IN THESE PLANS OR ANY FIELD CONDITIONS DISCOVERED BY THE CONTRACTOR THAT MAY DELAY OR OBSTRUCT THE PROPER COMPLETION OF THE WORK PER THESE PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY UPON DISCOVERY. SAID NOTIFICATION SHALL BE IN WRITING.
5. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, GENERAL CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
6. CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING MONUMENTS AND OTHER SURVEY MARKERS. MONUMENTS, SURVEY MARKERS, GAS, WATER AND MONITORING DEVICES DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
7. CONTRACTOR SHALL MAINTAIN ADEQUATE DUST CONTROL PER SECTION 10, CALTRANS STANDARD SPECIFICATIONS.
8. DURING CONSTRUCTION , THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING NOISE, ODORS, DUST, AND DEBRIS TO MINIMIZE IMPACTS ON SURROUNDING PROPERTIES AND ROADWAYS. CONTRACTOR SHALL BE RESPONSIBLE THAT ALL CONSTRUCTION EQUIPMENT IS EQUIPPED WITH MANUFACTURER'S APPROVED MUFFLER BAFFLES. FAILURE TO DO SO MAY RESULT IN THE ISSUANCE OF AN ORDER TO STOP WORK.
9. CONTRACTOR SHALL INDEPENDENTLY REVIEW GROUND, TOPOGRAPHY, AND EXISTING CONDITIONS THROUGHOUT THE LIMITS OF WORK, AND ASSUME WHOLLY AND UNCONDITIONALLY THE RISK OF COMPLETING THE WORK SET OUT ON THESE PLANS, REGARDLESS OF ROCK, WATER TABLE, OR OTHER CONDITIONS WHICH THE CONTRACTOR MAY ENCOUNTER IN THE COURSE OF THE WORK.
10. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS BEFORE LAYING OUT THE WORK AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE STARTING WORK. HE SHALL BE RESPONSIBLE FOR ANY ERRORS RESULTING FROM HIS FAILURE TO DO SO.
11. DIMENSION TAKE PRECEDENCE OVER SCALE.
12. ALL WORK TO BE COMPLETED IS ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
13. CONTRACTOR IS RESPONSIBLE FOR CONTACTING PG&E WITH REGARD TO OVERHEAD POWER LINES AND ASSOCIATED HEALTH AND SAFETY PROVISIONS PRIOR TO THE COMMENCEMENT OF WORK.

EROSION CONTROL NOTES

GENERAL

1. PERFORM EROSION PREVENTION AND SEDIMENT CONTROL IN ACCORDANCE WITH THE COUNTY OF MENDOCINO STANDARDS, CALIFORNIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND THE PROJECT CONSTRUCTION DOCUMENTS.
2. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING STORM WATER POLLUTION GENERATED FROM THE CONSTRUCTION SITE YEAR ROUND. WORK SITES WITH INADEQUATE EROSION AND SEDIMENT CONTROL MAY BE SUBJECT TO A STOP WORK ORDER.
3. IF DISCREPANCIES OCCUR BETWEEN THESE NOTES, MATERIAL REFERENCED HEREIN OR MANUFACTURER'S RECOMMENDATIONS, THEN THE MOST PROTECTIVE SHALL APPLY.
4. AT ALL TIMES THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND COMPLYING WITH THE STATE OF CALIFORNIA NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION ACTIVITY. CONSTRUCTION ACTIVITIES INCLUDE BUT ARE NOT LIMITED TO CLEARING, GRADING, EXCAVATION, STOCKPILING, AND RECONSTRUCTION OF EXISTING FACILITIES INVOLVING REMOVAL AND REPLACEMENT.

RAINY SEASON OPERATIONS

1. THE CONTRACTOR MUST IMPLEMENT AN EFFECTIVE COMBINATION OF EROSION PREVENTION AND SEDIMENT CONTROL ON ALL DISTURBED AREAS DURING THE RAINY SEASON (OCTOBER 15 - APRIL 15). CONSTRUCTION GRADING AND DRAINAGE IMPROVEMENT SHALL BE PERMITTED DURING THE RAINY SEASON ONLY WHEN ON-SITE SOIL CONDITIONS PERMIT THE WORK TO BE PERFORMED. STORM WATER BMPS REFERENCED OR DETAILED IN THE PERMIT AUTHORITY'S BEST MANAGEMENT PRACTICES GUIDE SHALL BE IMPLEMENTED AND FUNCTIONAL ON THE SITE AT ALL TIMES.

YEAR ROUND REQUIREMENTS

1. DURING THE NON-RAINY SEASON, ON ANY DAY WHEN THE NATIONAL WEATHER SERVICE FORECAST IS A CHANCE OF RAIN OF 30% OR GREATER WITHIN THE NEXT 24 HOURS, STORM WATER BMPS REFERENCED OR DETAILED IN PRMD'S BEST MANAGEMENT PRACTICES GUIDE SHALL BE IMPLEMENTED, INSTALLED, AND FUNCTIONAL ON THE SITE TO PREVENT SOIL AND OTHER POLLUTANT DISCHARGES. AT ALL OTHER TIMES, BMPS SHOULD BE STORED ON SITE IN PREPARATION FOR INSTALLATION PRIOR TO RAIN EVENTS.
2. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED BY THE CONTRACTOR BEFORE FORECASTED STORM EVENTS AND AFTER STORM EVENTS TO ENSURE MEASURES ARE FUNCTIONING PROPERLY. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES THAT HAVE FAILED OR ARE NO LONGER EFFECTIVE SHALL BE PROMPTLY REPLACED. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED.
3. THE LIMITS OF GRADING SHALL BE DEFINED AND MARKED ON SITE TO PREVENT DAMAGE TO SURROUNDING VEGETATION. PRESERVATION OF EXISTING VEGETATION SHALL OCCUR TO THE MAXIMUM EXTENT PRACTICABLE. ANY EXISTING VEGETATION WITHIN THE LIMITS OF GRADING THAT IS TO REMAIN UNDISTURBED BY THE WORK SHALL BE IDENTIFIED AND PROTECTED FROM DAMAGE BY MARKING, FENCING, OR OTHER MEASURES.
4. CHANGES TO THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN MAY BE MADE TO RESPOND TO FIELD CONDITIONS AND SHALL BE NOTED ON THE PLAN.
5. DISCHARGES OF POTENTIAL POLLUTANTS FROM CONSTRUCTION SITES SHALL BE PREVENTED USING SOURCE CONTROLS TO THE MAXIMUM EXTENT PRACTICABLE. POTENTIAL POLLUTANTS INCLUDE BUT ARE NOT LIMITED TO: SEDIMENT, TRASH, NUTRIENTS, PATHOGENS, PETROLEUM HYDROCARBONS, METALS, CONCRETE, CEMENT, ASPHALT, LIME, PAINT, STAINS, GLUES, WOOD PRODUCTS, PESTICIDES, HERBICIDES, CHEMICALS, HAZARDOUS WASTE, SANITARY WASTE, VEHICLE OR EQUIPMENT WASH WATER, AND CHLORINATED WATER.
6. ENTRANCE(S) TO THE CONSTRUCTION SITE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF POTENTIAL POLLUTANTS OFFSITE. POTENTIAL POLLUTANTS DEPOSITED ON PAVED AREAS WITHIN THE COUNTY RIGHT-OF-WAY, SUCH AS ROADWAYS AND SIDEWALKS, SHALL BE PROPERLY DISPOSED OF AT THE END OF EACH WORKING DAY OR MORE FREQUENTLY AS NECESSARY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING CONSTRUCTION VEHICLES LEAVING THE SITE ON A DAILY BASIS TO PREVENT DUST, SILT, AND DIRT FROM BEING RELEASED OR TRACKED OFFSITE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AT THE END OF EACH WORKING DAY OR MORE OFTEN AS NECESSARY.
7. ALL DISTURBED AREAS SHALL BE PROTECTED BY USING EROSION PREVENTION MEASURES TO THE MAXIMUM EXTENT PRACTICABLE, SUCH AS ESTABLISHING VEGETATION COVERAGE, HYDROSEEDING, STRAW MULCH, BLANKETS OR MATS. TEMPORARY OR PERMANENT REVEGETATION SHALL BE INSTALLED AS SOON AS PRACTICAL AFTER VEGETATION REMOVAL BUT IN ALL CASES PRIOR TO OCTOBER 15. PRIOR TO FINAL INSPECTION, ALL DISTURBED AREAS SHALL BE REVEGETATED OR LANDSCAPING SHALL BE INSTALLED.
8. WHENEVER IT IS NOT POSSIBLE TO USE EROSION PREVENTION MEASURES ON EXPOSED SLOPES, SEDIMENT CONTROL DEVICES SUCH AS FIBER ROLLS AND SILT FENCES SHALL BE INSTALLED TO PREVENT SEDIMENT MIGRATION. FIBER ROLLS AND SILT FENCES SHALL BE TRENCHED AND KEYED INTO THE SOIL AND INSTALLED ON CONTOUR. SILT FENCES SHALL BE INSTALLED APPROXIMATELY 2 TO 5 FEET FROM TOE OF SLOPE.
9. HYDROSEEDING SHALL BE CONDUCTED IN A THREE STEP PROCESS. FIRST, EVENLY APPLY SEED MIX AND FERTILIZER TO THE EXPOSED SLOPE. SECOND, EVENLY APPLY MULCH OVER THE SEED AND FERTILIZER. THIRD, STABILIZE THE MULCH IN PLACE. AN EQUIVALENT SINGLE STEP PROCESS, WITH SEED, FERTILIZER, WATER, AND BONDED FIBERS IS ACCEPTABLE. APPLICATIONS SHALL BE BROADCASTED MECHANICALLY OR MANUALLY AT THE RATES SPECIFIED IN THE PROJECT CONSTRUCTION DOCUMENTS.
10. DUST CONTROL SHALL BE PROVIDED BY CONTRACTOR DURING ALL PHASES OF CONSTRUCTION.
11. STORM DRAIN INLETS SHALL BE PROTECTED FROM POTENTIAL POLLUTANTS UNTIL DRAINAGE CONVEYANCE SYSTEMS ARE FUNCTIONAL AND CONSTRUCTION HAS BEEN COMPLETED.
12. ENERGY DISSIPATERS SHALL BE INSTALLED AT STORM DRAIN OUTLETS WHICH MAY CONVEY EROSIVE STORM WATER FLOW.
13. SOIL AND MATERIAL STOCKPILES SHALL BE PROPERLY PROTECTED TO MINIMIZE SEDIMENT AND POLLUTANT TRANSPORT FROM THE CONSTRUCTION SITE.
14. SOLID WASTE, SUCH AS TRASH, DISCARDED BUILDING MATERIALS AND DEBRIS, SHALL BE PLACED IN DESIGNATED COLLECTION AREAS OR CONTAINERS. THE CONSTRUCTION SITE SHALL BE CLEARED OF SOLID WASTE DAILY OR AS NECESSARY. REGULAR REMOVAL AND PROPER DISPOSAL SHALL BE COORDINATED BY THE CONTRACTOR.
15. A CONCRETE WASHOUT AREA, SUCH AS A TEMPORARY PIT, SHALL BE DESIGNATED TO CLEAN CONCRETE TRUCKS AND TOOLS. AT NO TIME SHALL CONCRETE PRODUCTS AND WASTE BE ALLOWED TO ENTER COUNTY WATERWAYS SUCH AS CREEKS OR STORM DRAINS. NO WASHOUT OF CONCRETE, MORTAR MIXERS, OR TRUCKS SHALL BE ALLOWED ON SOIL.
16. PROPER APPLICATION, CLEANING, AND STORAGE OF POTENTIALLY HAZARDOUS MATERIALS, SUCH AS PAINTS AND CHEMICALS, SHALL BE CONDUCTED TO PREVENT THE DISCHARGE OF POLLUTANTS.
17. TEMPORARY RESTROOMS AND SANITARY FACILITIES SHALL BE LOCATED AND MAINTAINED DURING CONSTRUCTION ACTIVITIES TO PREVENT THE DISCHARGE OF POLLUTANTS.
18. APPROPRIATE VEHICLE STORAGE, FUELING, MAINTENANCE, AND CLEANING AREAS SHALL BE DESIGNATED AND MAINTAINED TO PREVENT DISCHARGE OF POLLUTANTS.

ABBREVIATIONS

AGG	AGGREGATE	LF	LINEAL FEET
BC	BEGIN OF CURVE	MIN	MINIMUM
CDF	CONTROL DENSITY FILL	MAX	MAXIMUM
CO	CLEAN-OUT	MFR	MANUFACTURER
CONC	CONCRETE	(N)	NEW
CL	CENTER LINE	NO.	NUMBER
CMP	CORRUGATED METAL PIPE	O.C.	OFF CENTER
CMU	CONCRETE MASONRY UNIT	POC	POINT OF CONCENTRATION
CT	CLOSURE TURF	PVC	POLY VINYL CHLORIDE
DIA, Ø	DIAMETER	PVI	POINT OF VERTICAL INDEX
(E)	EXISTING	PT	POINT
EA	EACH	R.C.	RELATIVE COMPACTION
EG	EXISTING GROUND	REIN	REINFORCED
EC	END OF CURVE	S	SLOPE
EOR	EDGE OF ROAD	SCH	SCHEDULE
FL	FLOW LINE	SO	SIDE OPENING
FG	FINISH GRADE	SS	STAINLESS STEEL
GB	GRADE BREAK	TOB	TOP OF BANK
HDPE	HIGH DENSITY POLYETHYLENE	TW	TOP OF WALL
INV	INVERT ELEVATION	TYP	TYPICAL
LCS	LEACHATE COLLECTION SYSTEM	W/	WITH
LCRS	LEACHATE COLLECTION & REMOVAL SYSTEM	WMU	WASTE MANAGEMENT UNIT
LDS	LEAK DETECTION SYSTEM	WWF	WELDED WIRE FABRIC

LEGEND

Symbol	Description
350	DESIGN CONTOUR (MAJOR)
348	DESIGN CONTOUR (MINOR)
350	EXISTING CONTOUR (MAJOR)
348	EXISTING CONTOUR (MINOR)
OH OH OH OH OH	EXISTING OVERHEAD ELECTRIC
	EPHEMERAL CREEK
	EXISTING FENCE
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
	PROPOSED GRADING LIMITS OR LIMIT OF WORK
	PROPOSED GRADE BREAK, TOE OF SLOPE, BENCH, OR ACCESS ROAD
	EXISTING LIMITS OF REFUSE
	PROPOSED CLOSURE TURF LIMIT
	PROPOSED DITCH AND FLOW LINE
	PROPERTY LINE (APPROXIMATE)
	SUBGRADE / FOUNDATION LAYER / EXISTING INTERIM COVER
	ENGINEERED FILL / TRENCH BACKFILL
	REFUSE
	ACCESS ROAD OR PAD CLASS II AGGREGATE BASE
	CLOSURE TURF/ HYDROBINDER TURF INFILL (SEE SHEETS 200-202)
	CLOSURE TURF ACCESS ROAD WITH 1.5FT OF ENGINEERED FILL AND 0.5FT OF CLASS II AGGREGATE BASE (SEE SHEETS 200-202)
	CLASS II AGGREGATE BASE ROCK
	ROCK RIPRAP (GROUTED OR LOOSE)
	EROSION MAT
	CLOSURE TURF SWALE WITH ROCK RIPRAP
	CONCRETE
90-1	DETECTION GROUNDWATER MONITORING WELL
90-3	CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1	SURFACE WATER SAMPLING STATION
GAS-1	PERIMETER LANDFILL GAS MONITORING POINT
	PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1	LEACHATE WELL
	CONTROL POINT
×325.84 G	SPOT ELEVATION (EXISTING GROUND)

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NOTES, LEGEND AND ABBREVIATIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By: DFB
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LEGEND

- 90-1 ● DETECTION GROUNDWATER MONITORING WELL
- 90-3 ● CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 ▲ SURFACE WATER SAMPLING STATION
- GAS-1 ◆ PERIMETER LANDFILL GAS MONITORING POINT
- ■ PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 ⊞ LEACHATE WELL

EXISTING LEACHATE STORAGE TANK
FORMER LEACHATE POND
EXISTING GRAVEL ACCESS ROAD
APPROXIMATE LOCATION OF 4" LEACHATE FORCE MAIN
APPROXIMATE LIMITS OF REFUSE (TYP)
EPHEMERAL CREEK (TYPICAL)
EXISTING DRAIN PIPE (TYPICAL)
EXISTING DIRT ACCESS ROAD (TYP)
EXISTING 115 KV OVERHEAD POWER LINES
EXISTING GRAVEL ACCESS ROAD (TYP)
APPROXIMATE LOCATION OF EXISTING LEACHATE COLLECTION SYSTEM (TYP)
POND
SITE ENTRANCE
VICHY SPRINGS ROAD

PONTE 1 CP-9 (KRSL PANEL) N=2190775.45000 E=4228910.05000 699.24
PONTE 2 CP-13 (KRSL PANEL) N=2191586.13000 E=4233004.13000 821.22
PONTE 3 CP-10 (KRSL PANEL) N=2190210.05000 E=4230067.65000 747.26
PONTE 4 CP-8 (KRSL PANEL) N=2189397.55000 E=4230936.37000 835.33
PONTE 5 CP-11 (KRSL PANEL) N=2189527.11000 E=4231994.14000 837.02
PONTE 6 CP-21 (KRSL PANEL) N=2190613.58000 E=4232316.70000 810.18
PONTE 7 CP-22 (KRSL PANEL) N=2190963.74000 E=4233314.42000 1018.90

150 0 150
SCALE : 1" = 150'

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SITE MAP (EXISTING CONDITIONS)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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LEGEND

- 90-1 ● DETECTION GROUNDWATER MONITORING WELL
- 90-3 ● CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 ▲ SURFACE WATER SAMPLING STATION
- GAS-1 ◆ PERIMETER LANDFILL GAS MONITORING POINT
- ■ PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 ⊞ LEACHATE WELL

PROPOSED FLARE SYSTEM

EXISTING SEDIMENTATION BASIN TO REMAIN

EXISTING LEACHATE POND TO BE FILLED

PROPOSED ACCESS ROAD AND BENCH SYSTEM

PROPOSED DRAINAGE SYSTEM (TYP)

EPHEMERAL CREEK (TYPICAL)

PROPOSED LIMITS OF CLOSURE TURF (TYPICAL)

PROPOSED LIMITS OF GRADING (TYPICAL)

APPROXIMATE LOCATION OF EXISTING 4" LEACHATE FORCE MAIN

"CAUTION" EXISTING 115 KV OVERHEAD POWER LINES. CONTACT PG&E PRIOR TO START OF WORK FOR SAFETY PRECAUTIONS

PROPOSED ROCK LINED SWALE (TYPICAL)

APPROXIMATE LIMITS OF REFUSE (TYP)

PROPOSED ACCESS ROAD GRADING

PROPOSED BORROW AREA

PROPOSED BENCH (TYPICAL)

EXISTING NATIVE GRASS PRESERVATION AREA (TYP)

EXISTING WETLAND PRESERVATION AREA (TYP)

EXISTING SEDIMENTATION BASIN TO REMAIN

EXISTING SEDIMENTATION BASIN TO REMAIN

SITE ENTRANCE

VICHY SPRINGS ROAD

SCALE : 1" = 150'

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SITE MAP (FINISHED GRADE)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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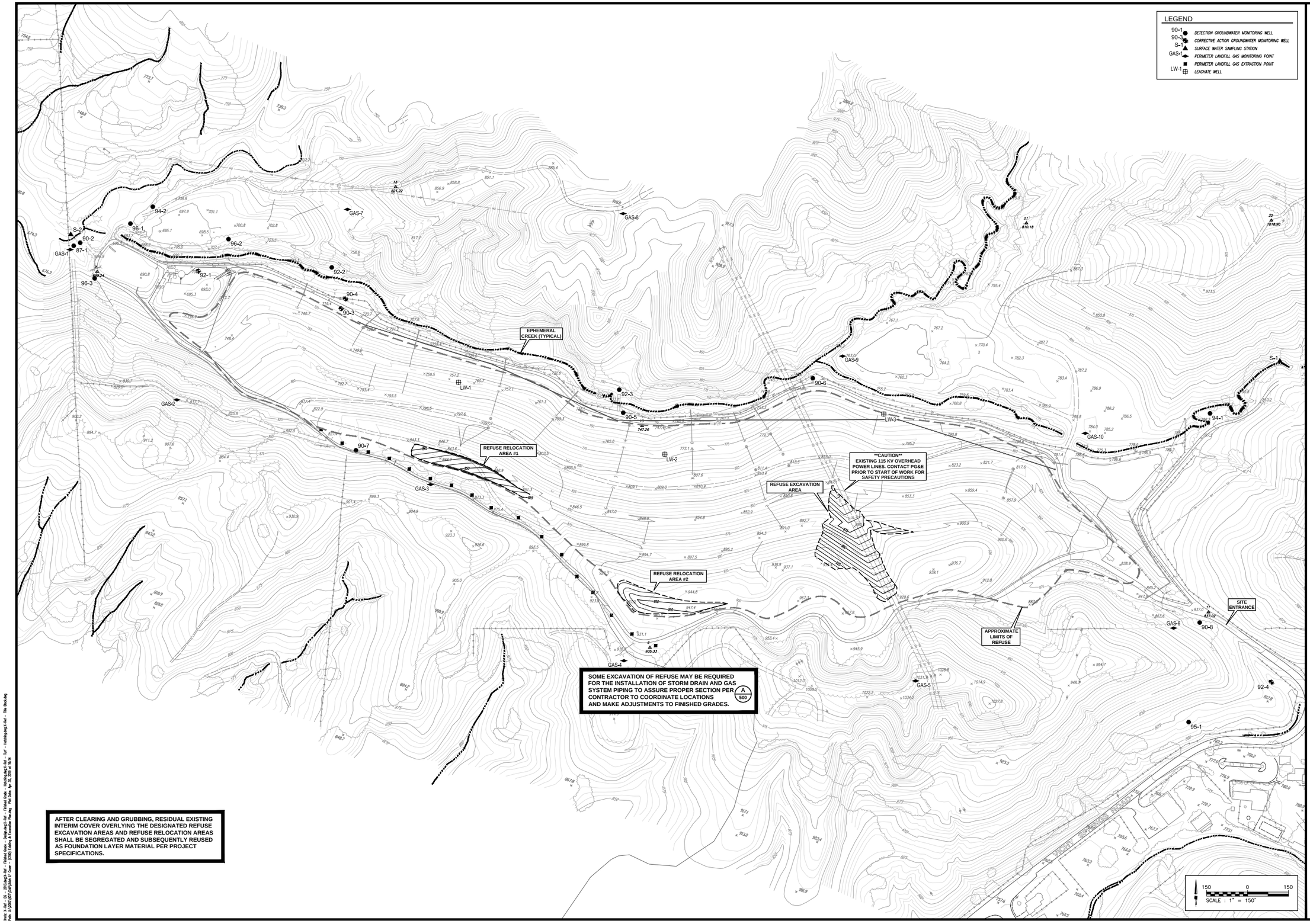

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REFUSE RELOCATION PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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LEGEND

- INSTALL CLOSURE TURF WITH 5/8" SAND INFILL PER PROJECT SPECIFICATIONS. CONSTRUCT PER DETAIL A, SHEET 500.
- INSTALL CLOSURE TURF WITH 1.5" ENGINEERED FILL AND 6" AGGREGATE BASE PER PROJECT SPECIFICATIONS
- INSTALL CLOSURE TURF WITH 7/8" HYDROBINDER INFILL PER PROJECT SPECIFICATIONS.
- CONSTRUCT ACCESS ROAD PER DETAIL D, SHEET 500
- 90-1 DETECTION GROUNDWATER MONITORING WELL
- 90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 SURFACE WATER SAMPLING STATION
- GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 LEACHATE WELL

MATCH LINE
SEE SHEET 201

BOTTOM PERIMETER ROAD (TYP) B/504

CLOSURE TURF ANCHOR TRENCH (TYP, ALL AROUND) I/502

EPHEMERAL CREEK (TYPICAL)

LIMIT OF WORK

SIDE SLOPE DRAINAGE CHANNEL (TYP) C/501

A/504 TYPE III ACCESS ROAD OVER CLOSURE TURF (TYP)

CORRECTIVE ACTION GROUNDWATER MONITORING WELL TO BE ADJUSTED TO GRADE - SEE FINISHED GRADE PLANS

(E) LEACHATE COLLECTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

LEACHATE DRAIN MANHOLE TO BE ADJUSTED TO GRADE - SEE FINISHED GRADE PLANS

APPROXIMATE LIMIT OF REFUSE

PROPOSED LIMIT OF CLOSURE TURF

LIMIT OF WORK

D/500 ACCESS ROAD TYPE I (TYP)

C/501 CLOSURE TURF DRAINAGE CHANNEL WITH HYDROBINDER (TYP)

APPROXIMATE LIMIT OF REFUSE

B/701 SACRIFICIAL COLLECTION STRIP, SEE SHTS 600-602 (TYP)

LEACHATE WELL TO BE ADJUSTED TO GRADE SEE FINISHED PLAN FOR DETAIL

B/500 15' BENCH (TYP)

C/500 30' BENCH (TYP)

C/501 SIDE SLOPE DRAINAGE CHANNEL (TYP)

C/501 SIDE SLOPE DRAINAGE CHANNEL (TYP)

I/502 CLOSURE TURF ANCHOR TRENCH (TYP, ALL AROUND)

(E) LEACHATE FORCEMAIN EXACT PIPING LOCATION UNKNOWN

EXIST GAS SYSTEM VAULT TO BE ADJUSTED TO GRADE - SEE FINISHED GRADE PLANS

PERIMETER GAS EXTRACTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

I/502 CLOSURE TURF ANCHOR TRENCH (TYP, ALL AROUND)

EXISTING VEGETATION TO REMAIN

LIMIT OF WORK

D/500 ACCESS ROAD TYPE I (TYP)

MATCH LINE
SEE SHEET 201

50 0 50
SCALE : 1" = 50'

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LANDFILL COVER MATERIALS PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Xrefs: S:\Ref - CD - 2013\dwg\C-Ref - Finished Grade - Overlay.dwg C-Ref - Finished Grade - Hatching.dwg C-Ref - Excavation Layer - Overlay.dwg C-Ref - Turf - Hatching.dwg C-Ref - Title Block.dwg C-Ref - Geo Boundary
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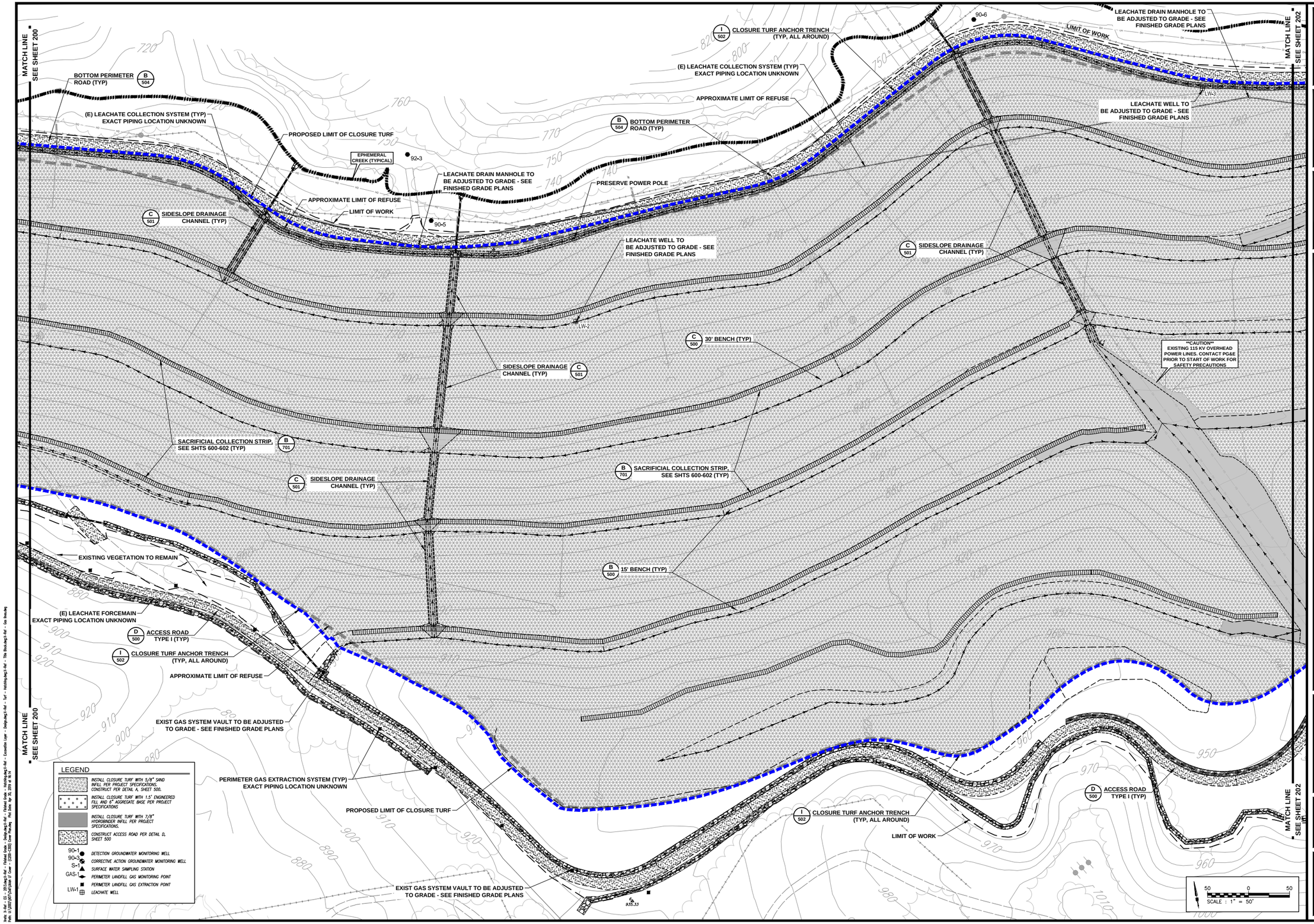

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REGISTERED GEOLOGIST
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No. 1
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LANDFILL COVER MATERIALS PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No: 02-907
Drawn By: WC
Checked By: DFB
Date: 2019-04-30

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Note: X:\Ref - CS - 2015\dwg\Ref - Finished Grade - Vichy\dwg\S-Ref - Finished Grade - Vichy.dwg, S-Ref - Excavation Layer - Design.dwg, S-Ref - Turf - Vichy.dwg, S-Ref - Title Block.dwg, S-Ref - Geo Boundary
Plot: 5/1/2019 9:07:24 AM by Mark C. Crow - CSDA-2000 (Local Windows) Pen Data: By Color, Fit to Fill

MATCH LINE
SEE SHEET 303

MATCH LINE
SEE SHEET 201

BOTTOM PERIMETER ROAD (TYP) B/504

(E) LEACHATE COLLECTION SYSTEM (TYP)
EXACT PIPING LOCATION UNKNOWN

LIMIT OF WORK

PROPOSED LIMIT OF CLOSURE TURF

LW-3

GAS-10

EPHEMERAL CREEK (TYPICAL)

LEACHATE DRAIN MANHOLE TO BE ADJUSTED TO GRADE - SEE FINISHED GRADE PLANS

EXISTING SEDIMENTATION POND TO REMAIN

PRESERVE POWER POLE E/501

CLOSURE TURF ANCHOR TRENCH (TYP, ALL AROUND) I/502

30' BENCH (TYP) C/500

C/501 SIDESLOPE DRAINAGE CHANNEL (TYP)

15' BENCH (TYP) B/500

ACCESS ROAD TYPE II (TYP) D/500

B/500 15' BENCH (TYP)

PROPOSED LIMIT OF CLOSURE TURF

APPROXIMATE LIMITS OF REFUSE (TYP)

PRESERVE POWER POLE

B/701 SACRIFICIAL COLLECTION STRIP, SEE SHTS 600-602 (TYP)

LIMIT OF WORK

ACCESS ROAD TYPE II (TYP) D/500

D/500 ACCESS ROAD TYPE I (TYP)

90-8

GAS-8

"CAUTION"
EXISTING 115 KV OVERHEAD POWER LINES. CONTACT PG&E PRIOR TO START OF WORK FOR SAFETY PRECAUTIONS

LIMIT OF WORK

APPROXIMATE LIMIT OF REFUSE

I/502 CLOSURE TURF ANCHOR TRENCH (TYP, ALL AROUND)

ACCESS ROAD TYPE I (TYP) D/500

GAS-5

95-1

MATCH LINE
SEE SHEET 201

50 0 50
SCALE : 1" = 50'

LEGEND

- INSTALL CLOSURE TURF WITH 5/8" SAND INFILL PER PROJECT SPECIFICATIONS. CONSTRUCT PER DETAIL A, SHEET 500.
- INSTALL CLOSURE TURF WITH 1.5" ENGINEERED FILL AND 6" AGGREGATE BASE PER PROJECT SPECIFICATIONS
- INSTALL CLOSURE TURF WITH 7/8" HYDROBINDER INFILL PER PROJECT SPECIFICATIONS.
- CONSTRUCT ACCESS ROAD PER DETAIL D, SHEET 500
- 90-1 DETECTION GROUNDWATER MONITORING WELL
- 90-2 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S- SURFACE WATER SAMPLING STATION
- GAS- PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 LEACHATE WELL

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FOUNDATION LAYER GRADING PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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Xrefs: X:\Ref - GS - 2015\dwg\X-Ref - Finished Grade - Daily.dwg>X-Ref - Finished Grade - Daily.dwg>X-Ref - Excavation Layer - Daily.dwg>X-Ref - Turf - Hatching.dwg>X-Ref - Title Block.dwg>X-Ref - Gas Areas.dwg
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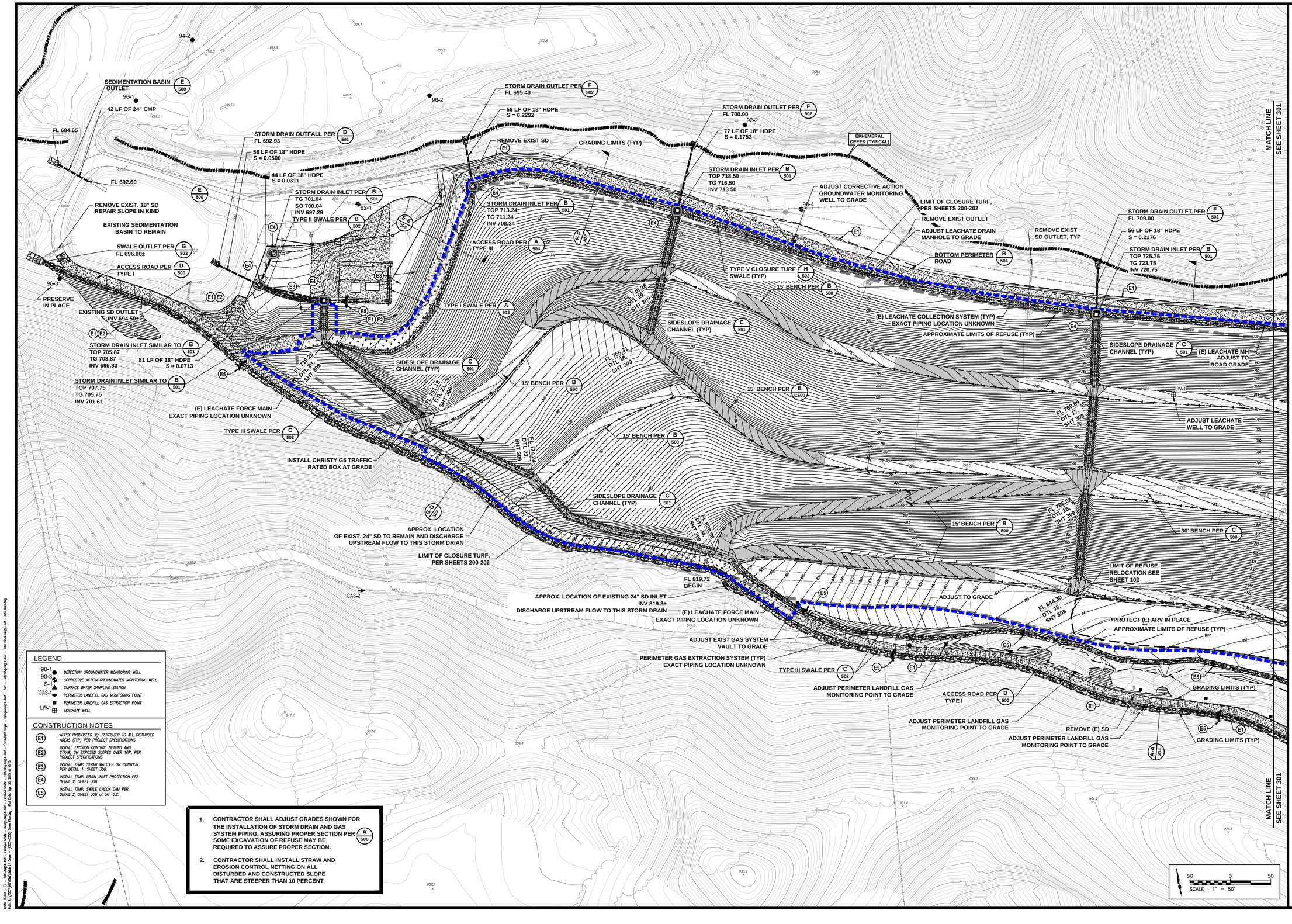

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

FINISHED GRADE (LANDFILL)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No: 02-907
Drawn By: WC
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MATCH LINE SEE SHEET 300

MATCH LINE SEE SHEET 302

REMOVE EXIST OUTLET

GRADING LIMITS (TYP)

STORM DRAIN OUTLET PER FL 724.26 (F 502)

72 LF OF 18" HDPE S = 0.1408

92-3

TYPE V CLOSURE TURF SWALE (TYP) (H 502)

(E) MONITORING WELL ADJUST TO GRADE

(E) BRIDGE DTL 2a, SHT 309

(E) LEACHATE COLLECTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

STORM DRAIN INLET PER TOP 739.40 TG 737.40 INV 734.40 (B 501)

SIDESLOPE DRAINAGE CHANNEL (TYP) (C 501)

REMOVE (E) STORM DRAIN

FL 762.10 DTL 14 SHT 309

ADJUST LEACHATE DRAIN MANHOLE TO GRADE

STORM DRAIN OUTLET PER FL 733.50; D_{50} = 9" (F 502)

71 LF OF 18" HDPE S = 0.1166

90-5

STORM DRAIN INLET PER TOP 746.78 TG744.78 INV 741.78 (B 501)

FL 767.65 DTL 13 SHT 309

SIDESLOPE DRAINAGE CHANNEL (TYP) (C 501)

EPHEMERAL CREEK (TYPICAL)

REMOVE EXIST OUTLET

PRESERVE (E) POWER POLE AND GUY WIRES (E 501)

APPROXIMATE LIMITS OF REFUSE (TYP)

ADJUST LEACHATE WELL TO GRADE

FL 811.05 DTL 12 SHT 309

LIMIT OF EXCAVATION SEE SHEET 102

GRADING LIMITS (TYP)

(E) LEACHATE FORCE MAIN EXACT PIPING LOCATION UNKNOWN

TYPE III SWALE PER (C 502)

STORM DRAIN OUTLET PER FL 891.61 (F 502)

82 LF OF 18" CMP S = .0474

STORM DRAIN INLET PER TOP 901.00 TG 899.00 INV 895.50 (B 501)

REMOVE EXISTING BOX AND INSTALL CHRISTY B2426 TRAFFIC RATED BOX WITH CHECKER PLATE TOP. INSTALL RISERS WHERE NEEDED.

FL 922.95 RAISE (E) ARV TO GRADE

GRADING LIMITS (TYP)

PERIMETER GAS EXTRACTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

REMOVE EXISTING BOX AND INSTALL CHRISTY B2426 TRAFFIC RATED BOX WITH CHECKER PLATE TOP. INSTALL RISERS WHERE NEEDED.

SWALE OUTLET PER FL 932.74± (G 502)

LIMIT OF WORK

LIMIT OF CLOSURE TURF, PER SHEETS 200-202

ACCESS ROAD PER TYPE I (D 500)

TYPE III SWALE PER (C 502)

LIMIT OF REFUSE RELOCATION SEE SHEET 102

APPROXIMATE LIMITS OF REFUSE (TYP)

FL 957.67

FL 958.20

GB/HP 959.45

GB/FL 958.00

TYPE II SWALE PER (B 502)

GRADING LIMITS (TYP)

TYPE III SWALE PER (C 502)

FL 882.40 DTL 4 SHT 309

STORM DRAIN OUTLET PER FL 743.20; D_{50} = 12" (F 502)

50 LF OF 18" HDPE S = 0.1828

BOTTOM PERIMETER ROAD (B 504)

STORM DRAIN INLET PER TOP 757.34 TG 755.34 INV 752.34 (B 501)

(E) MONITORING WELL ADJUST TO GRADE

ADJUST LEACHATE WELL TO GRADE

ADJUST LEACHATE DRAIN MANHOLE TO GRADE

(E) LEACHATE COLLECTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

TYPE V CLOSURE TURF SWALE (TYP) (H 502)

FL 786.35 DTL 8 SHT 309

FL 812.12 DTL 7 SHT 309

15' BENCH PER (B 500)

SIDESLOPE DRAINAGE CHANNEL (TYP) (C 501)

"CAUTION" EXISTING 115 KV OVERHEAD POWER LINES. CONTACT PG&E PRIOR TO START OF WORK FOR SAFETY PRECAUTIONS

FL 847.80 DTL 6 SHT 309

LIMIT OF EXCAVATION SEE SHEET 102

GB 824.35 HP

GB 859.75

FL 811.05 DTL 12 SHT 309

GB 859.30 HP

FL 847.05 DTL 11 SHT 309

GB 901.92

GB 864.10 HP

FL 868.40 DTL 9 SHT 309

FL 872.95 DTL 5 SHT 309

15' BENCH PER (B 500)

L-L (308)

15' BENCH PER (B 500)

15' BENCH PER (B 500)

GB 824.35 HP

LW-1

LW-2

LW-3

LW-4

LW-5

LEGEND

- 90-1 DETECTION GROUNDWATER MONITORING WELL
- 90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 SURFACE WATER SAMPLING STATION
- GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 LEACHATE WELL

CONSTRUCTION NOTES

- E1 APPLY HYDROSEED W/ FERTILIZER TO ALL DISTURBED AREAS (TYP) PER PROJECT SPECIFICATIONS
- E2 INSTALL EROSION CONTROL NETTING AND STRAW, ON EXPOSED SLOPES OVER 10%, PER PROJECT SPECIFICATIONS
- E3 INSTALL TEMP. STRAW WATTLES ON CONTOUR PER DETAIL 1, SHEET 308.
- E4 INSTALL TEMP. DRAIN INLET PROTECTION PER DETAIL 2, SHEET 308
- E5 INSTALL TEMP. SWALE CHECK DAM PER DETAIL 2, SHEET 308 at 50' O.C.

1. CONTRACTOR SHALL ADJUST GRADES SHOWN FOR THE INSTALLATION OF STORM DRAIN AND GAS SYSTEM PIPING, ASSURING PROPER SECTION PER SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE PROPER SECTION. (A 500)

2. CONTRACTOR SHALL INSTALL STRAW AND EROSION CONTROL NETTING ON ALL DISTURBED AND CONSTRUCTED SLOPE THAT ARE STEEPER THAN 10 PERCENT

SCALE : 1" = 50'

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FINISHED GRADE (LANDFILL)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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MATCH LINE
SEE SHEET 303

MATCH LINE
SEE SHEET 301

MATCH LINE
SEE SHEET 303

MATCH LINE
SEE SHEET 301

GRADING LIMITS (TYP)

TYPE V CLOSURE TURF SWALE (TYP) (H 502)

B 504 BOTTOM PERIMETER ROAD

LIMIT OF WORK

(E) LEACHATE COLLECTION SYSTEM
EXACT PIPING LOCATION UNKNOWN

LW-3

FL 783.9

CB 804.33 HP

FL 820.00
DTL 3,
SHT 309

15' BENCH PER (B 500)

C 501 SIDESLOPE DRAINAGE CHANNEL (TYP)

CB 862.88 HP

FL 858.56
DTL 2,
SHT 309

15' BENCH PER (B 500)

CB 868.15 HP

FL 902.30
DTL 1,
SHT 309

15' BENCH PER (B 500)

CB 868.55 HP

FL 840.00

FL 867.12

GAS-10

E 500 SEDIMENTATION BASIN
OUTLET STRUCTURE
FL 782.70

EPHEMERAL CREEK (TYPICAL)

24 LF OF 24" CMP
S = 0.0500

FL 783.90

ACCESS ROAD PER TYPE I (D 500)

STORM DRAIN OUTFALL (D 501)
FL 785.00
REMOVE (E) OUTLET

EXISTING SEDIMENTATION BASIN TO REMAIN

58 LF OF 18" HDPE
S = 0.0402

STORM DRAIN INLET PER (B 501)
TOP 792.33
TG 790.33
INV 787.33

ADJUST HDPE LEACHATE DRAIN MANHOLE TO GRADE

PRESERVE (E) POWER POLE AND GUY WIRES (E 501)

ACCESS ROAD PER TYPE II (D 500)

PRESERVE EXISTING 12" SD INLET
INV. UNKNOWN

APPROXIMATE LIMITS OF REFUSE (TYP)
GRADING LIMITS (TYP)

PRESERVE (E) PP AND GUYS

TYPE V CLOSURE TURF SWALE (TYP) (H 502)

TYPE II SWALE PER (B 502)

ACCESS ROAD PER TYPE I (D 500)

CONFORM TO EXIST ROAD
837.02

90-8

SWALE OUTLET PER (G 502)
FL 836.04±

GAS-6

TYPE V CLOSURE TURF SWALE (H 502)

TYPE III SWALE PER (C 502)

"CAUTION"
EXISTING 115 KV OVERHEAD POWER LINES. CONTACT PG&E PRIOR TO START OF WORK FOR SAFETY PRECAUTIONS

STORM DRAIN INLET PER (B 501)
TOP 916.30
TG 914.30
INV 911.30

TYPE IV SWALE PER (D 502)

CB 851.69 HP

FL 851.69

TYPE V CLOSURE TURF SWALE (H 502)

UPPER LINER TERMINATION (A 505) (TYP)

APPROX. LOCATION OF EXISTING 24" SD INLET INV 846.0±

SWALE OUTLET PER (G 502)
FL 836.04±

EG 932.50

FL 930.00

ACCESS ROAD PER TYPE I (D 500)

GRADING LIMITS (TYP)

67 LF OF 18" CMP
S = .0269

STORM DRAIN OUTLET PER (F 502)
FL 909.50

TYPE II SWALE PER (B 502)

STORM DRAIN OUTLET PER (F 502)
FL 928.00

77 LF OF 18" CMP
S = .0300

STORM DRAIN INLET PER (B 501)
TOP 935.00
TG 933.00
INV 930.30

TYPE II SWALE PER (B 502)

TYPE III SWALE PER (C 502)

GAS-5

95-1

LEGEND

- 90-1 DETECTION GROUNDWATER MONITORING WELL
- 90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 SURFACE WATER SAMPLING STATION
- GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 LEACHATE WELL

CONSTRUCTION NOTES

- E1 APPLY HYDROSEED W/ FERTILIZER TO ALL DISTURBED AREAS (TYP) PER PROJECT SPECIFICATIONS
- E2 INSTALL EROSION CONTROL NETTING AND STRAW, ON EXPOSED SLOPES OVER 10%, PER PROJECT SPECIFICATIONS
- E3 INSTALL TEMP. STRAW WATTLES ON CONTOUR PER DETAIL 1, SHEET 308.
- E4 INSTALL TEMP. DRAIN INLET PROTECTION PER DETAIL 2, SHEET 308
- E5 INSTALL TEMP. SWALE CHECK DAM PER DETAIL 2, SHEET 308 at 50' O.C.

1. CONTRACTOR SHALL ADJUST GRADES SHOWN FOR THE INSTALLATION OF STORM DRAIN AND GAS SYSTEM PIPING, ASSURING PROPER SECTION PER (A 500) SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE PROPER SECTION.
2. CONTRACTOR SHALL INSTALL STRAW AND EROSION CONTROL NETTING ON ALL DISTURBED AND CONSTRUCTED SLOPE THAT ARE STEEPER THAN 10 PERCENT

SCALE : 1" = 50'

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FINISHED GRADE (LANDFILL)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Drawn By: WC
Checked By: DFB
Date: 2019-04-30

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Date: 2-Apr — 15 - 2019 dwg-L-Plot — Plotted Date — Dwg-dwg-L-Plot — Plotted Date — Hatching-dwg-L-Plot — Excavation Layer — Dwg-dwg-L-Plot — Turf — Hatching-dwg-L-Plot — Title Block-dwg-L-Plot — Gas Insulwg
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LEGEND

- 90-1 — DETECTION GROUNDWATER MONITORING WELL
- 90-3 — CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 — SURFACE WATER SAMPLING STATION
- GAS-1 — PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 — LEACHATE WELL

CONSTRUCTION NOTES

- (E1) APPLY HYDROSEED W/ FERTILIZER TO ALL DISTURBED AREAS (TYP) PER PROJECT SPECIFICATIONS
- (E2) INSTALL EROSION CONTROL NETTING AND STRAW, ON EXPOSED SLOPES OVER 10%, PER PROJECT SPECIFICATIONS
- (E3) INSTALL TEMP. STRAW WATTLES ON CONTOUR PER DETAIL 1, SHEET 308.
- (E4) INSTALL TEMP. DRAIN INLET PROTECTION PER DETAIL 2, SHEET 308
- (E5) INSTALL TEMP. SWALE CHECK DAM PER DETAIL 2, SHEET 308 at 50' O.C.

1. CONTRACTOR SHALL INSTALL STRAW AND EROSION CONTROL NETTING ON ALL DISTURBED AND CONSTRUCTED SLOPE THAT ARE STEEPER THAN 10 PERCENT

CONFORM TO EXIST
GRADING LIMITS (TYP)
ACCESS ROAD TYPE I (TYP) D 500
22' 1018.90
CONFORM TO EXIST
GRADING LIMITS (TYP)
D 502 BENCH SWALE
B 503 CMP DRAIN INLET TG 917.18 SO 915.68 INV 912.68
CMP DRAIN INLET B 503 TG 882.73 SO 881.23 INV 878.23
FL 882.79
FL 918.33
151 LF OF 18" CMP
D 502 BENCH SWALE
GRADING LIMITS (TYP)
135 LF OF 18" CMP
11.25" EL INV 910.08
52 LF OF 18" CMP S = 0.0500
TYPE IV BENCH SWALE (TYP) D 502
D 502 TYPE IV BENCH SWALE (TYP)
FL 835.93
37 LF OF 18" CMP S = 0.0500
11.25" EL INV 876.38
15' ACCESS ROAD TYPE I (TYP) D 500
FL 932.49
GRADING LIMITS (TYP)
B 503 CMP DRAIN INLET TG 835.34 SO 833.84 INV 830.84
LIMIT OF WORK
15' BENCH D 500
41 LF OF 18" CMP S = 0.0500
11.25" EL INV 828.79
FL 893.03
15' ACCESS ROAD TYPE I (TYP) D 500
CONFORM TO EXIST
GRADING LIMITS (TYP)
FL 788.47
152 LF OF 18" CMP
78 LF OF 18" CMP S = 0.0212
B 503 CMP DRAIN INLET TG 791.50 SO 790.00 INV 785.95
FL 787.55
FL 853.82
LIMIT OF WORK
B 503 CMP DRAIN INLET TOP 788.90 TG 787.40 INV 784.30
TYPE I SWALE (TYP) A 502
EXISTING PURPLE NEEDLE GRASS TO BE PRESERVED (TYP.)
D 501 STORM DRAIN OUTFALL FL 761.00
267 LF OF 18" CMP S = 0.0869
GRADING LIMITS (TYP)
B 503 CMP DRAIN INLET TOP 785.94 TG 783.94 INV 781.94
D 500 ACCESS ROAD TYPE I (TYP)
EXISTING SEDIMENTATION BASIN (TO REMAIN)
122 LF OF 18" CMP S = 0.0446
D 501 STORM DRAIN OUTFALL FL 776.50
FL 787.53
EXIST. WETLAND TO REMAIN, PROTECT IN PLACE (TYP.)
94-1
FL 761.70
REMOVE EXIST OVERFLOW PIPE AND INSTALL NEW CMP OVERFLOW PIPE PER E 500
FL 759.90
GAS-9
37 LF OF 18" HDPE S = 0.0500
CONFORM TO EXIST.
GRADING LIMITS (TYP)
MATCH LINE SEE SHEET 302
GAS-10
EPHEMERAL CREEK (TYPICAL)
MATCH LINE SEE SHEET 302
LW-3
50 0 50
SCALE : 1" = 50'

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

FINISHED GRADE (BORROW AREA)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No: 02-907
Drawn By: WC
Checked By: DFB
Date: 2019-04-30

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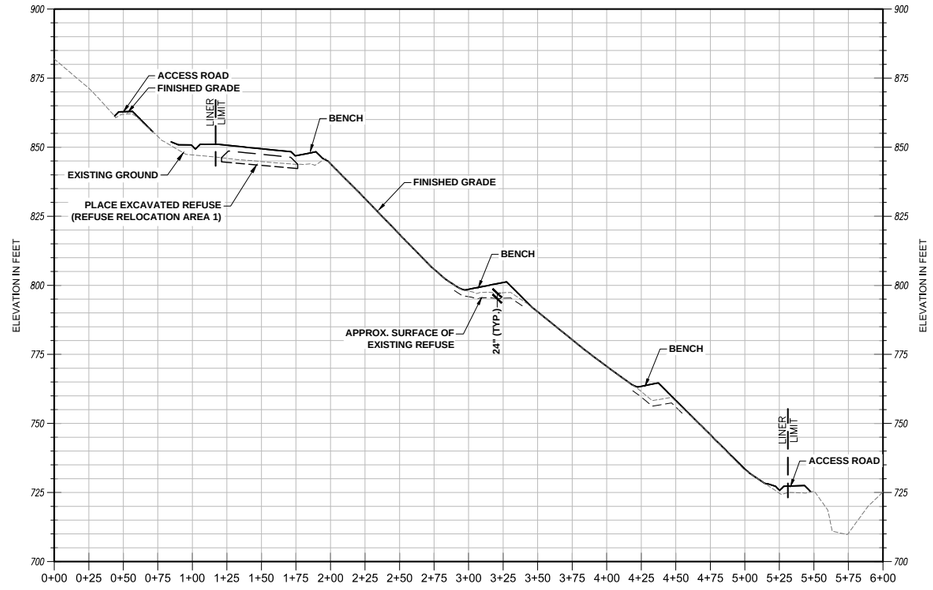
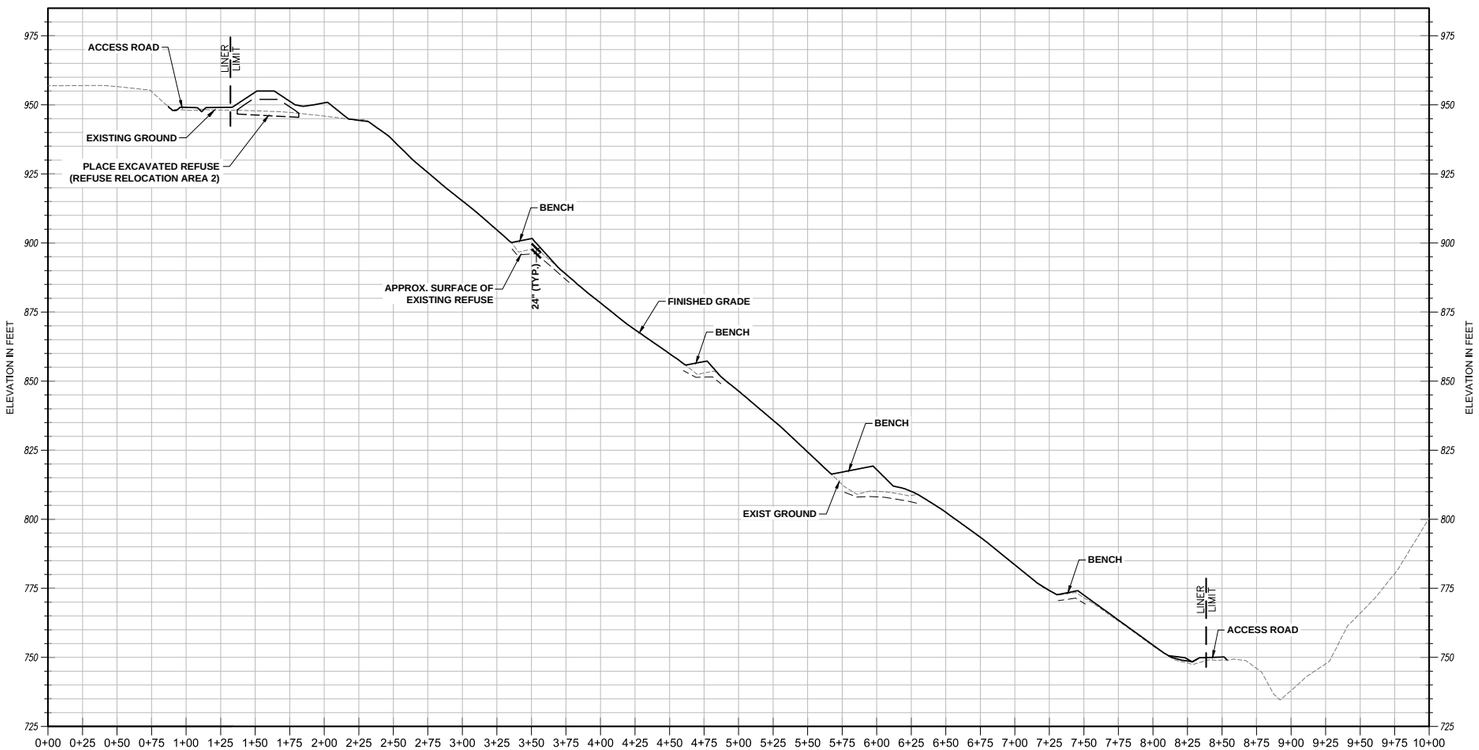


SECTION A-A

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'



SECTION B-B

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'

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REGISTERED GEOLOGIST
No. 2
DAMON F. BROWN
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Drawn By:	WC
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Date:	2019-04-30

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Xrefs: X-Ref - GS - 2015.dwg X-Ref - Finished Grade - Design.dwg X-Ref - Finished Grade - Existing.dwg X-Ref - Excavation Layer - Design.dwg X-Ref - Turf - Matching.dwg X-Ref - Title Block.dwg X-Ref - Geo Grass.dwg
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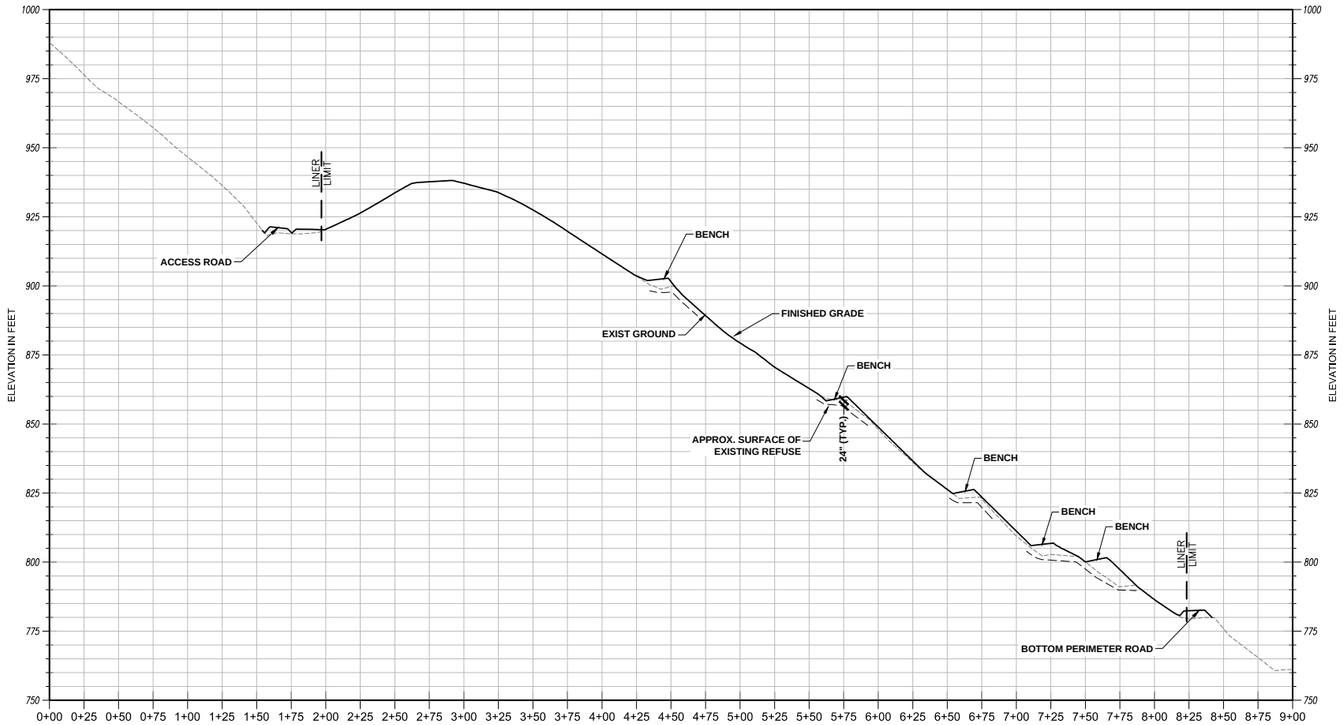

SECTION C-C

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'

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REGISTERED GEOLOGIST
DAMON F. BROWN
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CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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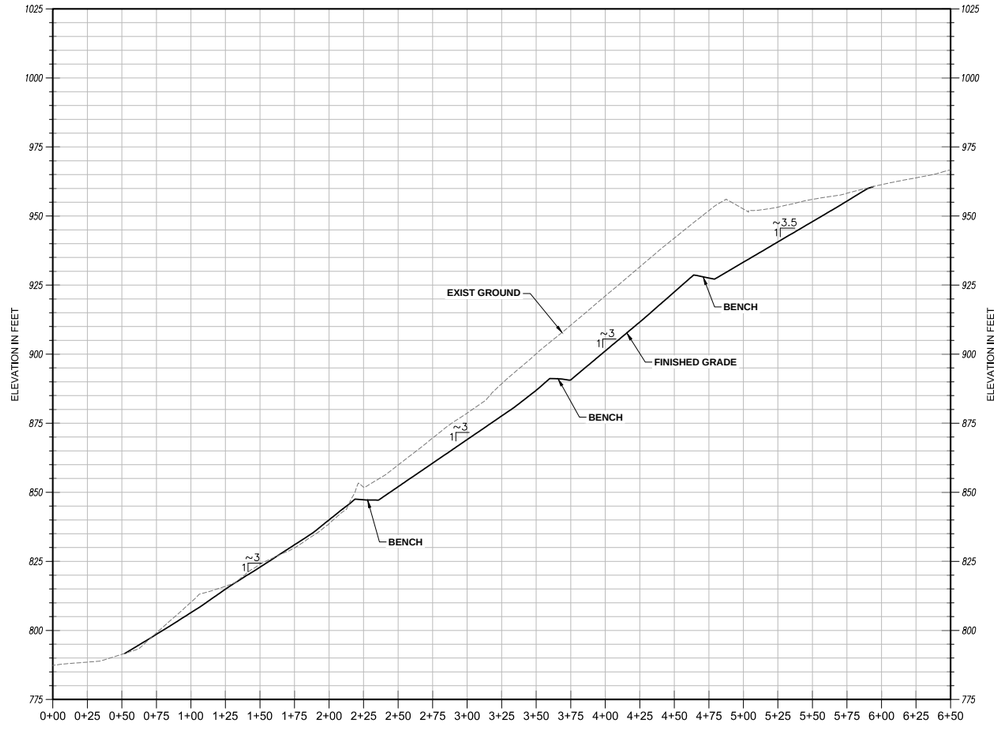
Xrefs: X-Ref - 01 - 2019.dwg X-Ref - Finished Grade - Overlay.dwg X-Ref - Finished Grade - Hatching.dwg X-Ref - Excavation Layer - Overlay.dwg X-Ref - Turf - Hatching.dwg X-Ref - Title Block.dwg X-Ref - Geo Grouting
Plot By: Wendy Cartwright-Jones (EBA-SONO) User Profile: Wendy Plot Date: Apr 30, 2019 at 16:16



SECTION D-D

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

REGISTERED GEOLOGIST
DAMON F. BROWN
No.
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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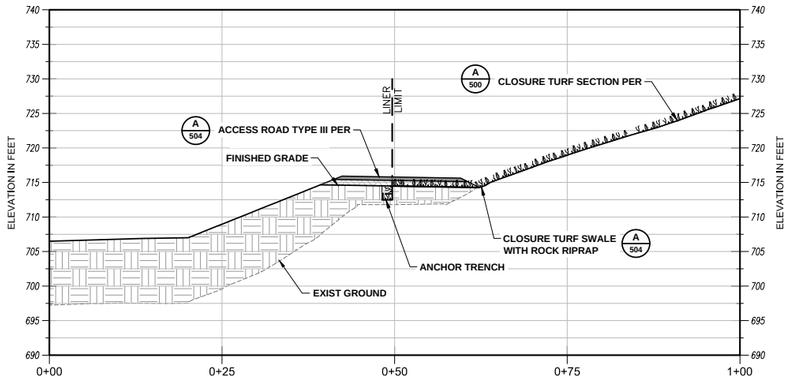
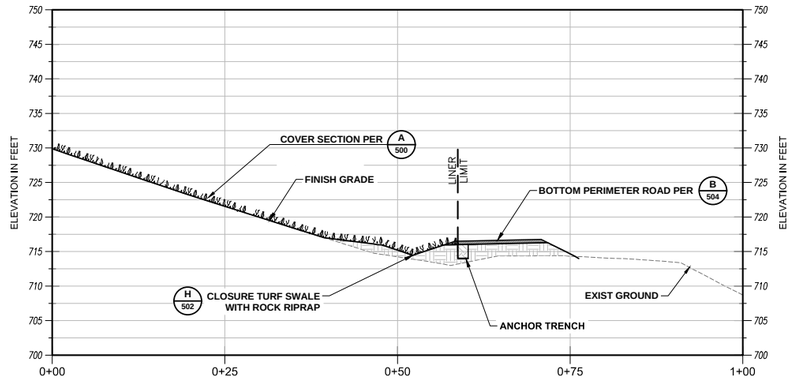


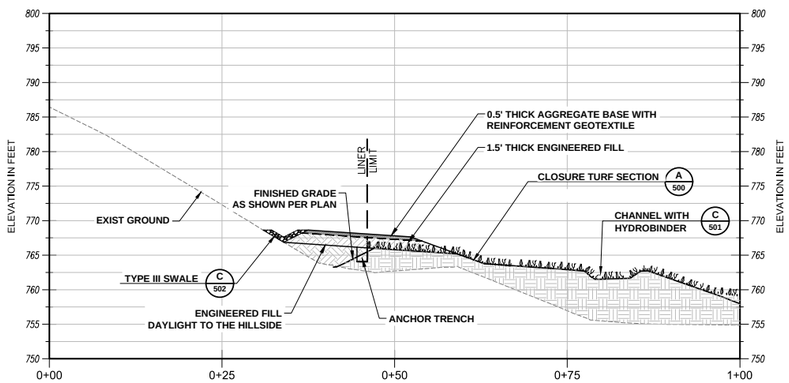
SECTION E-E

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



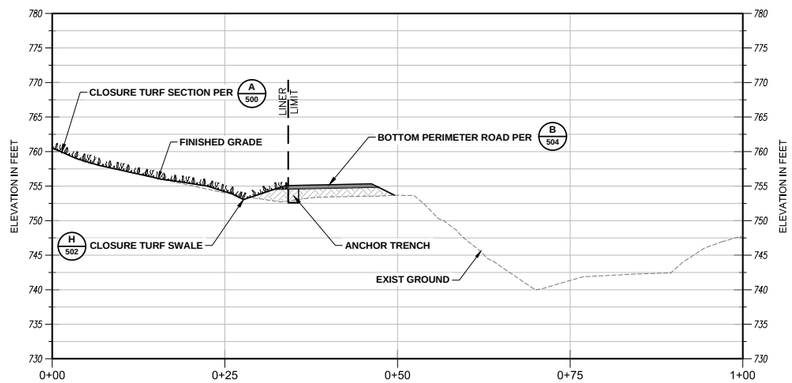
SECTION F-F

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



SECTION G-G

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



SECTION H-H

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'

EBA ENGINEERING
825 SONOMA AVENUE
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SANTA ROSA, CA 95404
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SECTIONS

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3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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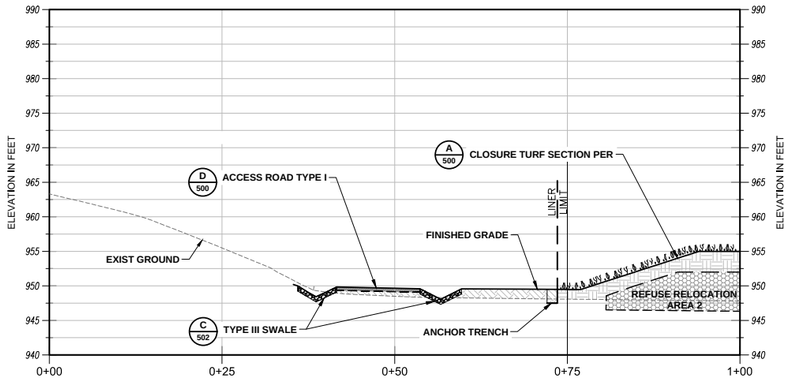
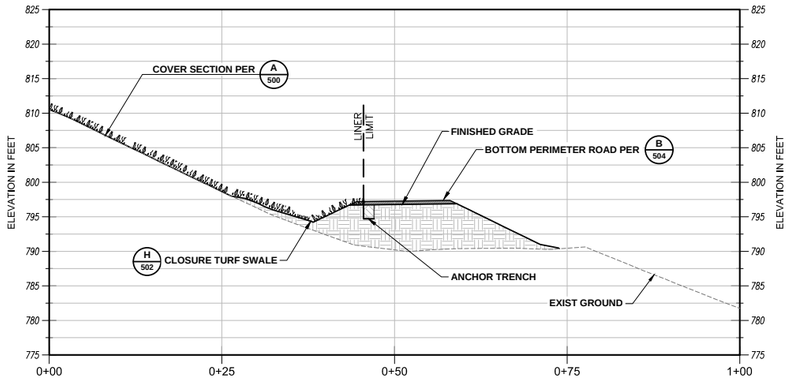
Date: 5 /Mar - 03 - 2019,Apr1 /Ref - Fished Grade - Sheet.dwg|-Ref - Fished Grade - Sheet.dwg|-Ref - Location Layer - Design.dwg|-Ref - Turf - Hatching.dwg|-Ref - Title Block.dwg|-Ref - Gas Recovery
File: S:\proj\02-907\CAD\Sheet 1 Cover - 2019-04-30.dwg Plot Date: Apr 30, 2019 at 8:48



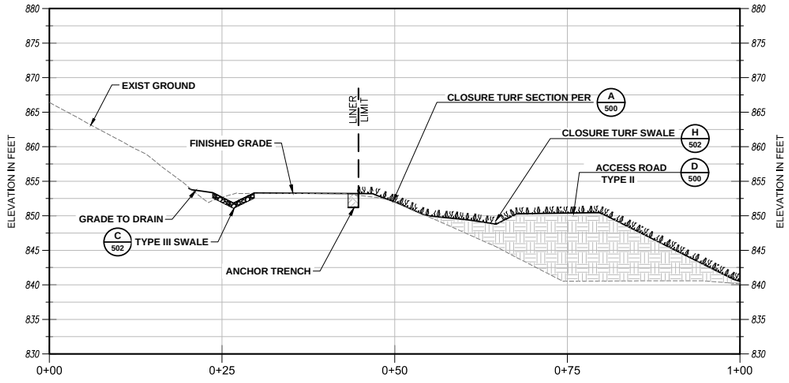
SECTION I-I

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



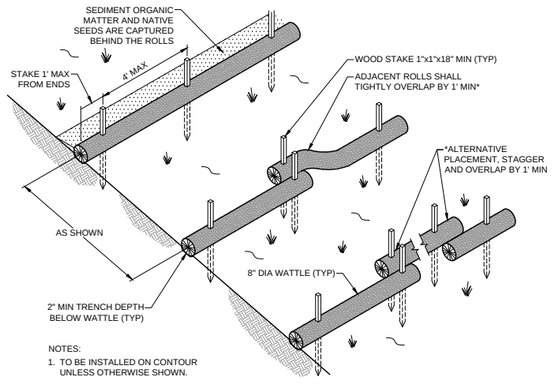
SECTION J-J

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



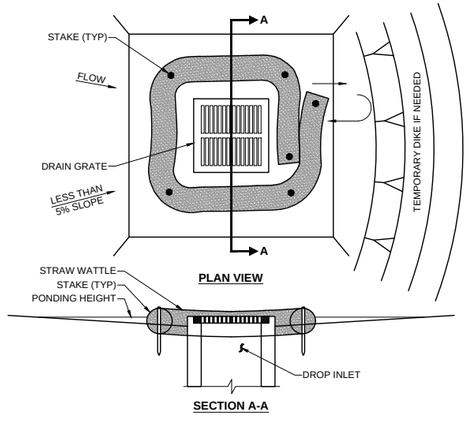
SECTION K-K

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



1 STRAW WATTLE DETAIL

NOT TO SCALE



NOTES:

1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)

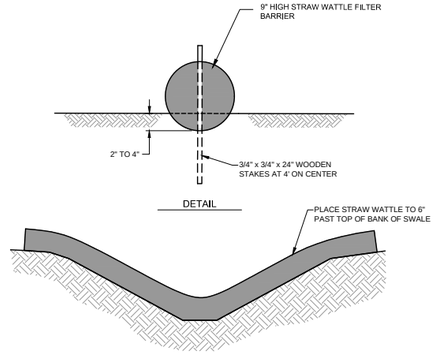
2. USE 1X4 WOOD OR EQUIVALENT METAL STAKES, (3FT. MIN. LENGTH)

3. THE TOP OF THE FRAME (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BY-PASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

4. WATTLES SHALL BE COMPOSED OF COMPOSTABLE FILTER MATERIAL SUCH AS SILTSOXX AS MANUFACTURED BY FILTREXX (440-926-2067) OR EQUIVALENT

2 DRAIN INLET PROTECTION

NOT TO SCALE



3 CHECK DAM AT SWALE

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

SECTIONS & EROSION CONTROL DETAILS

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3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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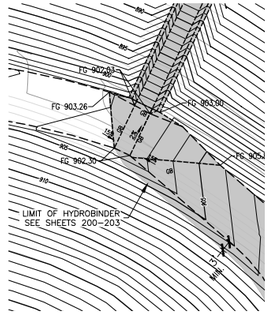
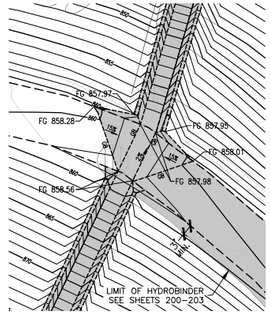
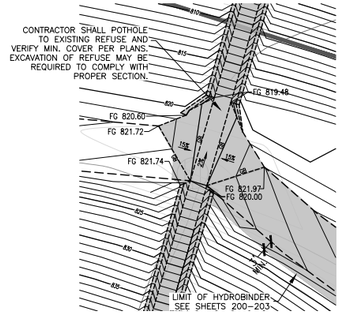
Date: X:\AE - CC - 2013\Jobs\2-Ref - Finished Grade - 2nd\dwg\2-Ref - Finished Grade - Hatching.dwg 2-Ref - Excavation Layer - 2nd\dwg\2-Ref - Turf - Hatching.dwg 2-Ref - Title Block.dwg 2-Ref - Gas Area.dwg
User: G:\2019\02-907\Admin\AF Cover (2004-2008).dwg By: Wendy Apr 30, 2019 at 10:16



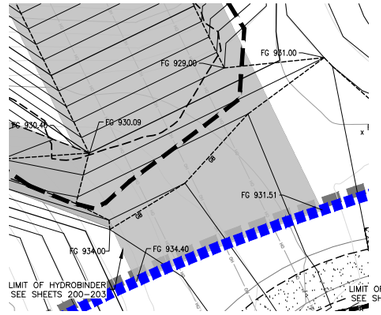
1 CHANNEL AT POC #2 1"=20'



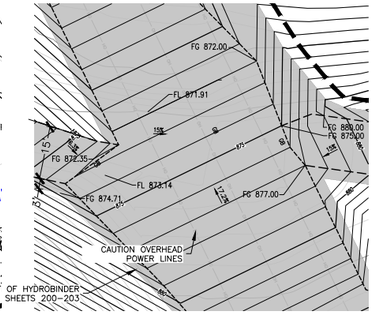
2 CHANNEL AT POC #3 1"=20'



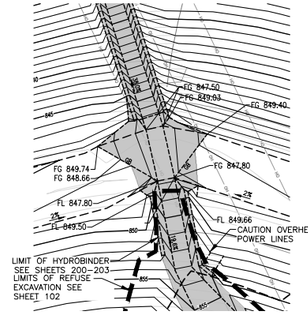
3 CHANNEL AT POC #4 1"=20'



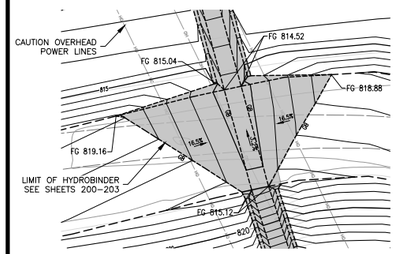
4 CHANNEL AT POC #7A 1"=20'



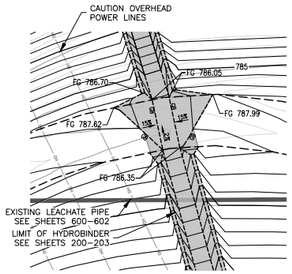
5 CHANNEL AT POC #8 1"=20'



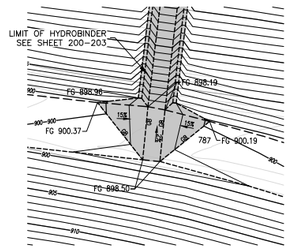
6 CHANNEL AT POC #9 1"=20'



7 CHANNEL AT POC #10 1"=20'

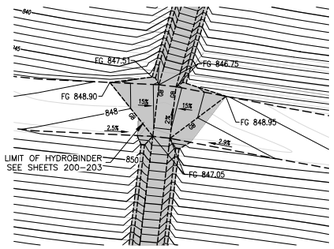


8 CHANNEL AT POC #11 1"=20'

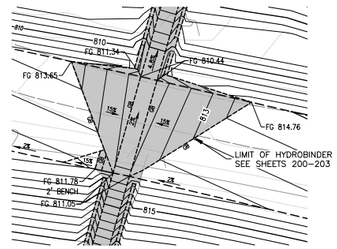


9 CHANNEL AT POC #14 1"=20'

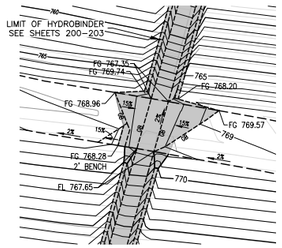
10 NOT USED 1"=20'



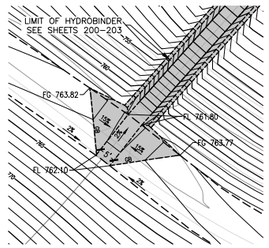
11 CHANNEL AT POC #16 1"=20'



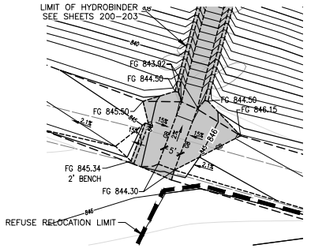
12 CHANNEL AT POC #17 1"=20'



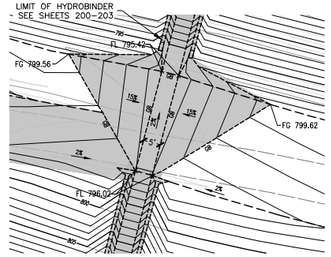
13 CHANNEL AT POC #18 1"=20'



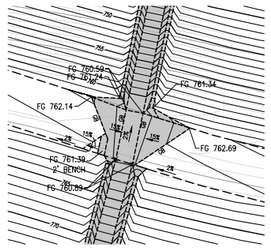
14 CHANNEL AT POC #21 1"=20'



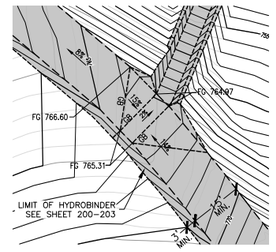
15 CHANNEL AT POC #24 1"=20'



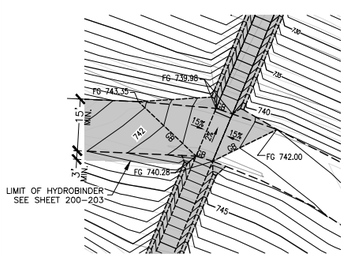
16 CHANNEL AT POC #25 1"=20'



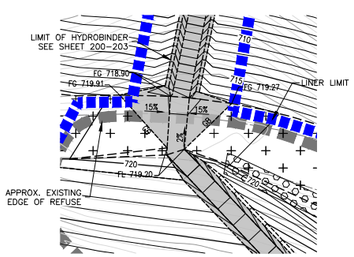
17 CHANNEL AT POC #26 1"=20'



18 CHANNEL AT POC #29 1"=20'



19 CHANNEL AT POC #30 1"=20'



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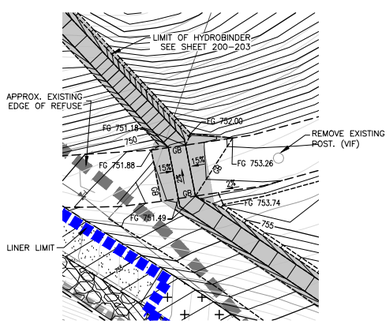
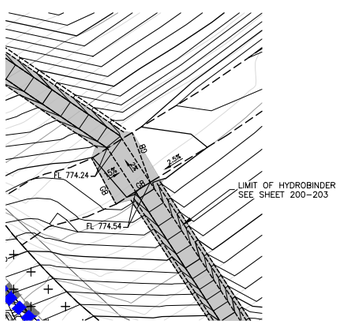


21 CHANNEL AT POC #36 1"=20'



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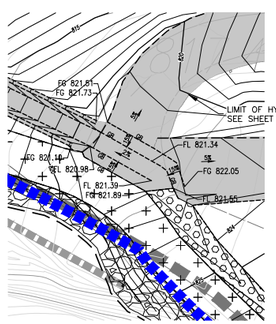
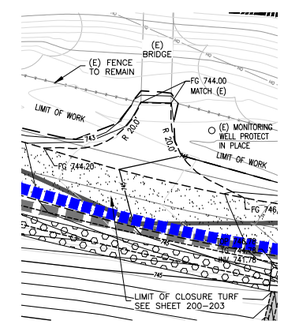


24 CHANNEL AT POC #34 1"=20'



24 (E) BRIDGE ACCESS AT POC #19 1"=20'

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REGISTERED GEOLOGIST
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CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

PLAN ENLARGEMENTS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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(E) EPHEMERAL CREEK

PRESERVE (E) 4" MAIN FROM WET WELL

PRESERVE (E) WET WELL AND SEDIMENT BASIN

(E) INV ±707.0

CUT AND CAP AT (E) VALVE

±20 LF 10" OVERFLOW FROM (E) OUTLET AT WET WELL TO NEW CONC. BOX

(E) 12" LEACHATE

(E) 6" RETURN (ABANDON IN PLACE)

(E) 10" OVERFLOW (ABANDON IN PLACE)

(E) 10" CLEANOUT (ABANDON IN PLACE)

70 LF 12" LEACHATE LINE S=0.050

INV IN 706.0

INV IN ±705 (VERIFY)

INV OUT 704.0

REMOVE ±80 LF (E) 12" BYPASS

INSTALL 3'x3' PRECAST CONC. BOX IN (E) LEACHATE LINE WITH SOLID COVER FG 710.0

PRESERVE (E) 4" FORCE

92-1

PROTECT (E) MONITORING WELL

(E) LEACHATE STORAGE TANK (63,500 GAL)

APPROXIMATE LIMITS OF NEW AGG BASE

PLACE 6" CLASS II AGG BASE

APPROXIMATE EDGE OF (E) ROCKED

FG 702.52

INV IN 698.13

INV 700.50

INV 700.50

INSTALL 3'x3' PRECAST CONC. BOX WITH SOLID COVER FG 706.5

32 LF 12" LEACHATE LINE S=0.0741

(E) TANK DRAIN

(E) 12" TANK OVERFLOW

(E) 3'x3' PRECAST CONC. BOX

INV ± 698.8

CUT 6" WYE INTO (E) 6" DRAIN (VERIFY INV)

±44 LF 6" DRAIN S=0.020 (MIN)

INV ± 699.0

47 LF 12" LEACHATE LINE S=0.010

INV ± 698.60

REMOVE ±17 LF (E) 6" DRAIN

± 17 LF

± 10 LF

(E) 6" DRAIN

PRESERVE (E) 4" FORCE MAIN FROM FORCE MAIN PUMP STATION

FG 701.51

GRADE BREAK

FG 700.57

4" SUCTION WITH CHRISTY G8 BOX AT SURFACE

2" VENT WITH GOOSE-NECK AND SCREEN

22" MANWAY & FRP RISER SUMP

10,000 GAL FRP LEACHATE OVERFLOW STORAGE TANK, 8' DIA.

E 703

INSTALL 3'x3' PRECAST CONC. BOX IN (E) 12" DRAIN, WITH SOLID COVER FG 703.0

REMOVE ± 10LF (E) 12" DRAIN

LIMITS OF NEW AGG BASE

148 LF 2" LEACHATE LINE

PLACE 6" CLASS II AGG BASE

FL 706.10

FG 707.00

FG 707.00

PLACE 6" CLASS II AGG BASE

GRADE 12" DEEP EARTHER SWALE SIMILAR TO

A 502

GB 707.45

FL 703.90

LIMITS OF NEW AGG BASE

CONCRETE PAD

CONCRETE PAD

FG 706.30

FG 707.00

FG 707.00

FL 704.74

FL 705.52

GRADE 12" DEEP EARTHEN SWALE WITH EROSION MAT

FL 704.74

APPROXIMATE LIMITS OF WASTE LINE (TYPICAL)

LEGEND

90-1	DETECTION GROUNDWATER MONITORING WELL
90-5	CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1	SURFACE WATER SAMPLING STATION
GAS-1	PERIMETER LANDFILL GAS MONITORING POINT
	PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1	LEACHATE WELL

10 0 10
SCALE : 1" = 10'

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STATE OF CALIFORNIA

FLARE STATION AREA BLOW UP

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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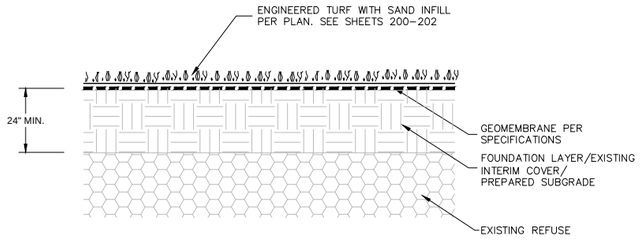
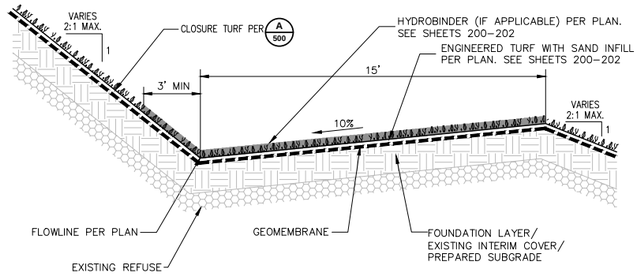


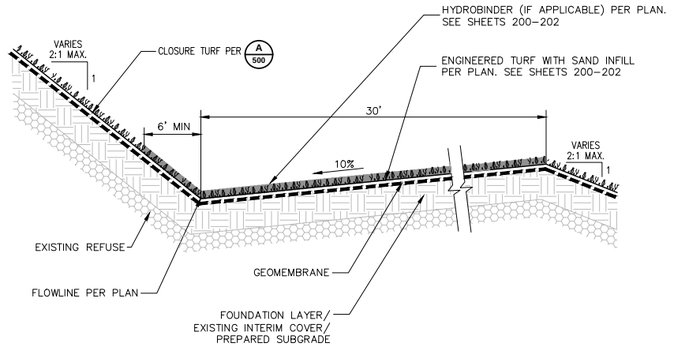
A TYPICAL CLOSURE TURF SECTION

NOT TO SCALE



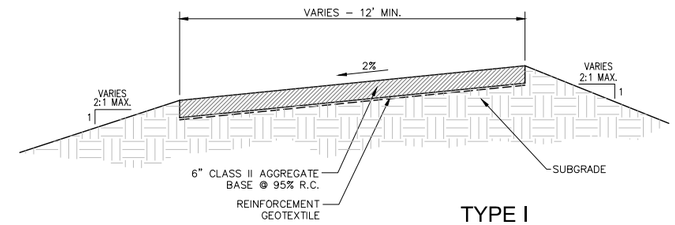
B TYPICAL 15' BENCH SECTION

NOT TO SCALE



C TYPICAL 30' BENCH SECTION

NOT TO SCALE



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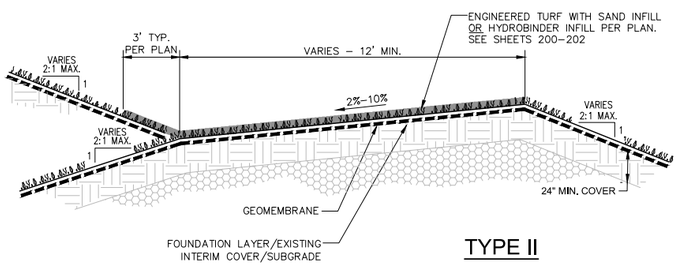

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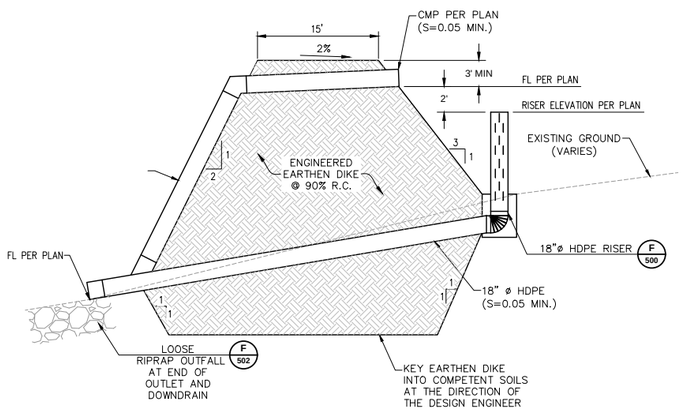
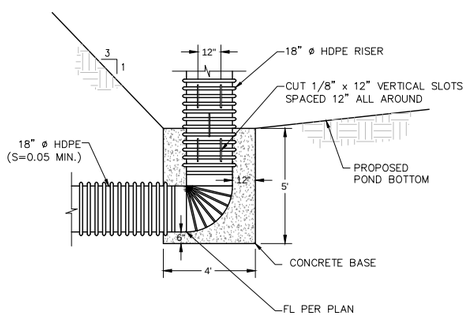
D TYPICAL ACCESS ROAD SECTION

NOT TO SCALE



E SEDIMENTATION BASIN OUTLET STRUCTURE

NOT TO SCALE



F DRAINAGE RISER DETAIL

NOT TO SCALE

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
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TEL: (707) 544-0784

REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

GRADING DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Drawn By: WC
Checked By: DFB
Date: 2019–04–30

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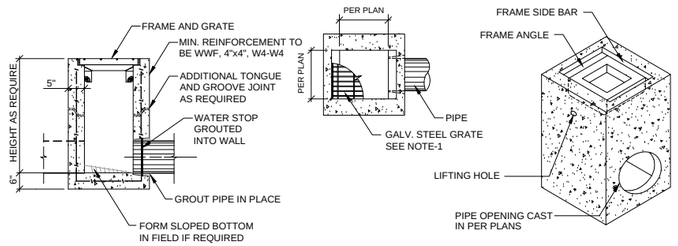
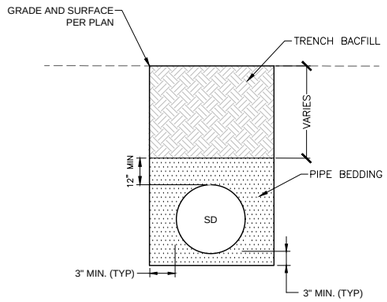


NOTE:
1. FRAMES SHALL BE HEAVY DUTY FOR H20 TRAFFIC LOADING.

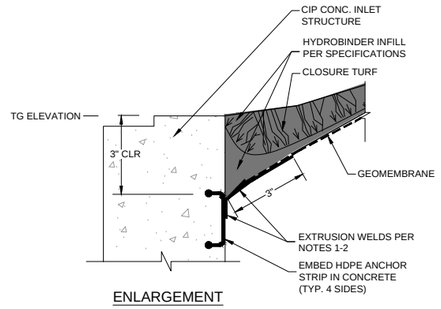


TRENCH SECTION

A 2'x2' CONCRETE DRAINAGE INLET

(NON-CLOSURE TURF AREAS)

NOT TO SCALE



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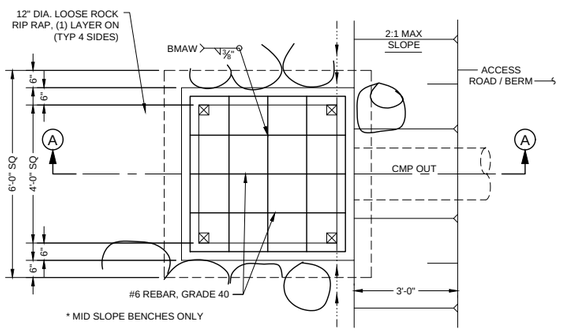
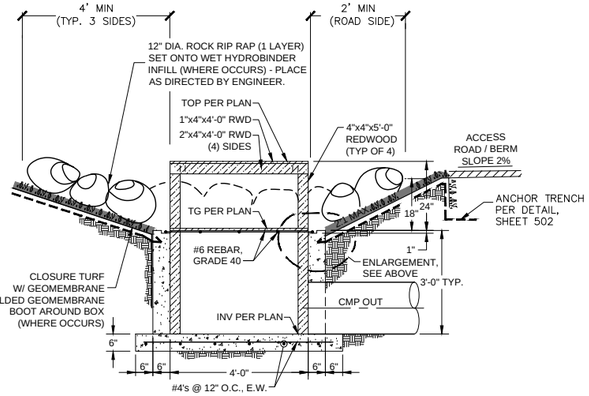


PLAN

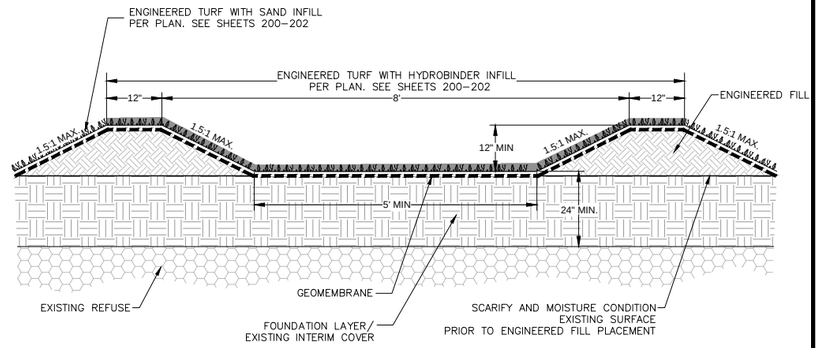
NOTES:
1. HDPE EMBEDMENT STRIP TO FORM BOOT AROUND INLET STRUCTURE. ALL CORNER SEEMS TO BE WELDED TO FORM IMPERVIOUS SEAL.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO HDPE EMBEDMENT STRIP USING EXTRUSION WELD METHOD, 3"MIN. OVERLAP.
3. CONTRACTOR TO CONSTRUCT REDWOOD (RWD) TOP USING #8 EPOXY COATED WOOD SCREWS



SECTION 'A-A'

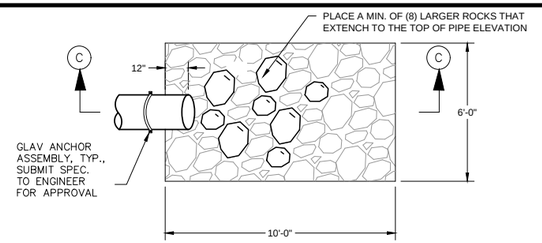
B 4'x4' CONCRETE DRAINAGE INLET IN CLOSURE TURF

SCALE: 1/2" = 1'-0"



C SIDESLOPE DRAINAGE CHANNEL WITH HYDROBINDER

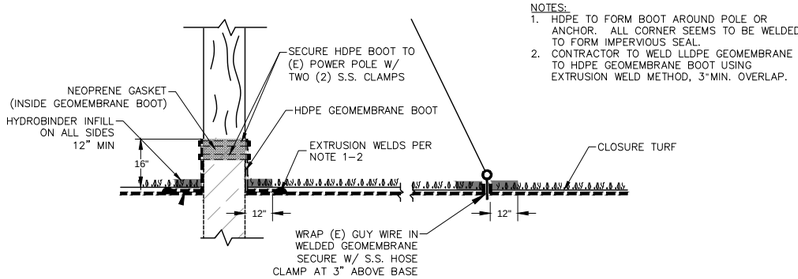
NOT TO SCALE



SECTION 'C-C'

D GROUTED RIPRAP OUTFALL

NOT TO SCALE



E POWER POLE PENETRATION

NOT TO SCALE

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FOR CONSTRUCTION

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Checked By:	DFB
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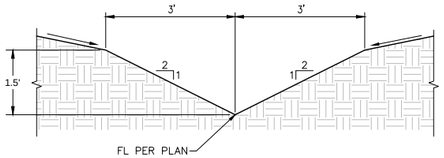
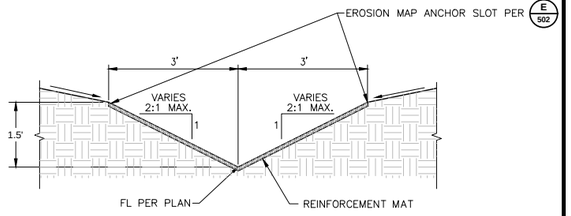


A TYPE I SWALE - EARTHEN

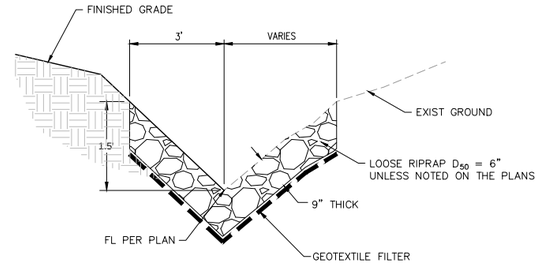
NOT TO SCALE



B TYPE II SWALE - EARTHEN W/ EROSION MAT

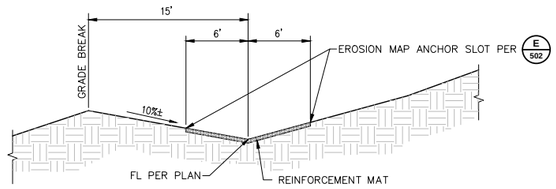
(NON-CLOSURE TURF AREAS)

NOT TO SCALE



C TYPE III SWALE - EARTHEN W/ ROCK RIPRAP

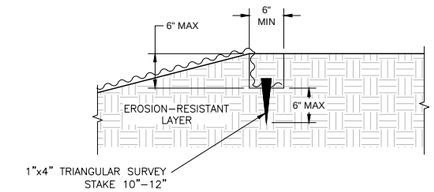
NOT TO SCALE



D TYPE IV BENCH SWALE- EARTHEN W/ EROSION MAT

(NON-CLOSURE TURF AREAS)

NOT TO SCALE

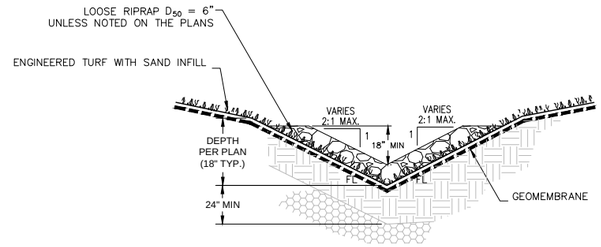


NOTE:
STAKES TO BE PLACED AT 3 FEET ON CENTER
EACH WAY PER ENTIRE TURF REINFORCEMENT MAT

E REINFORCEMENT MAT: ANCHOR SLOT

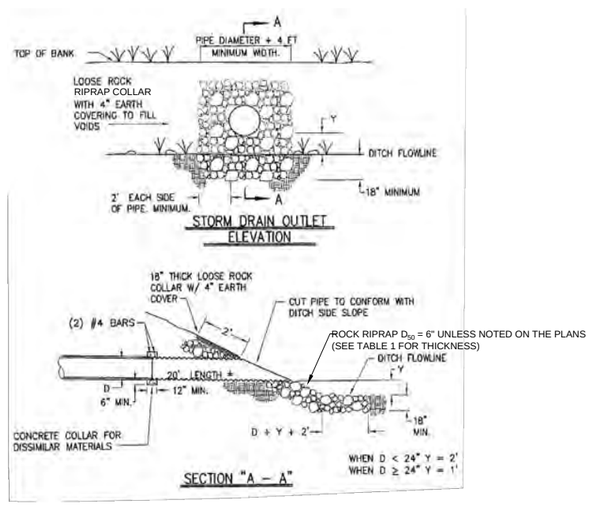
(NON-CLOSURE TURF AREAS)

NOT TO SCALE



H TYPE V CLOSURE TURF SWALE W/ ROCK RIPRAP

NOT TO SCALE



F LOOSE ROCK RIPRAP STORM DRAIN OUTLET

NOT TO SCALE

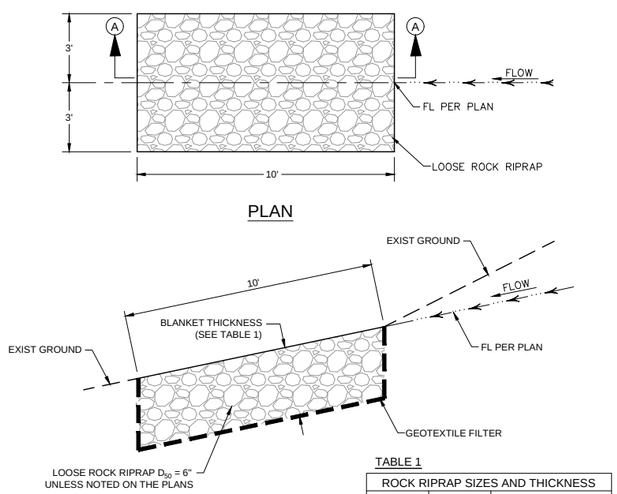
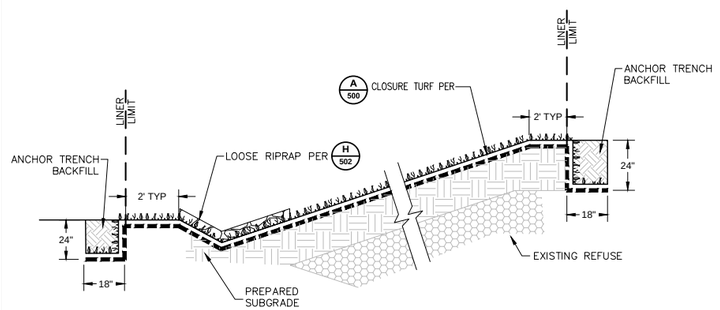


TABLE 1

ROCK RIPRAP SIZES AND THICKNESS		
D_{50} (in.)	D_{MAX} (in.)	MINIMUM BLANKET THICKNESS (in.)
2	4	6
6	9	14
9	14	20
12	18	27

G SWALE OUTLET DETAIL

NOT TO SCALE



I TYP. CLOSURE TURF ANCHOR TRENCH

NOT TO SCALE

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3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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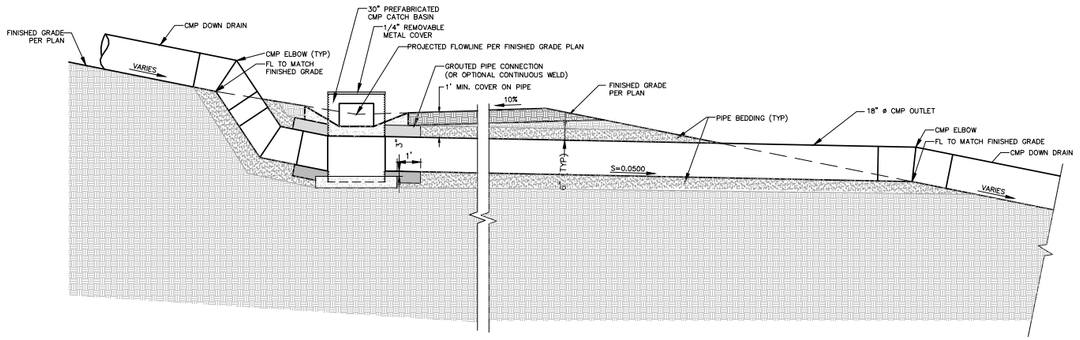

A SECTION - DOWN DRAIN AT CMP CATCH BASIN

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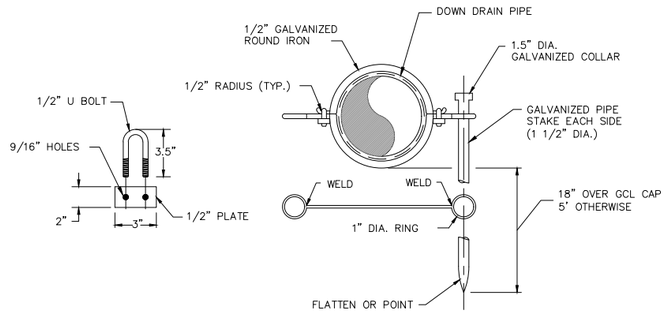

C DOWN DRAIN ANCHOR ASSEMBLY

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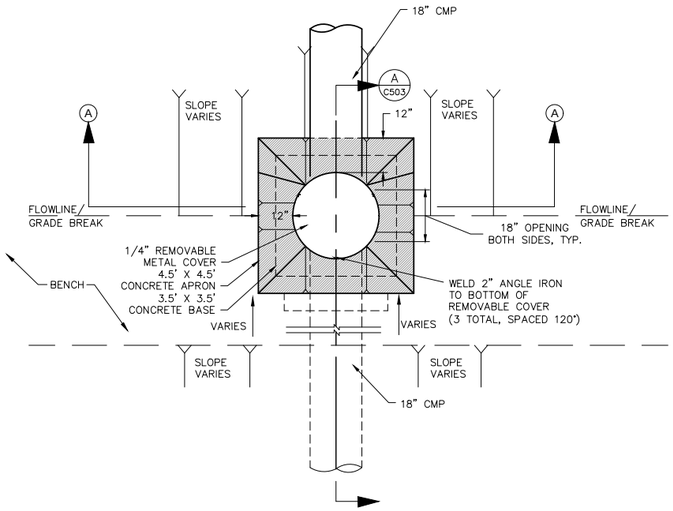

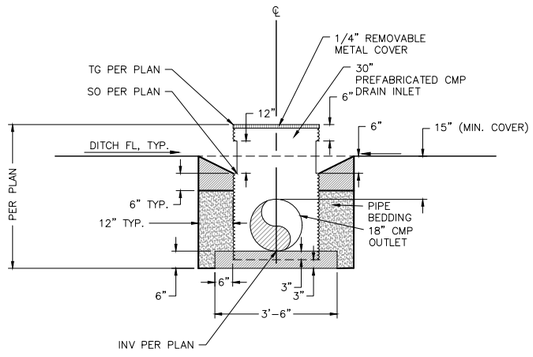

SECTION 'A'

B DOWN DRAIN AT CMP DRAIN INLET

NOT TO SCALE

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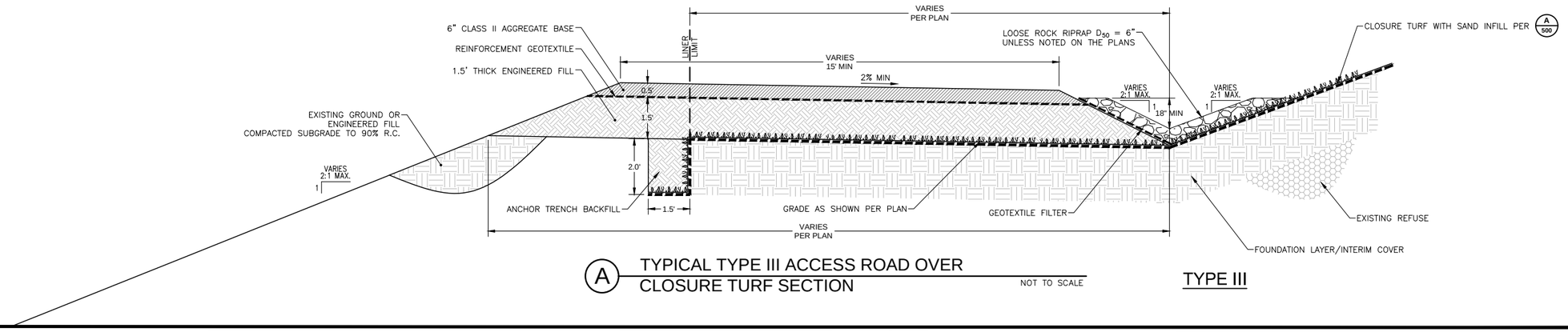
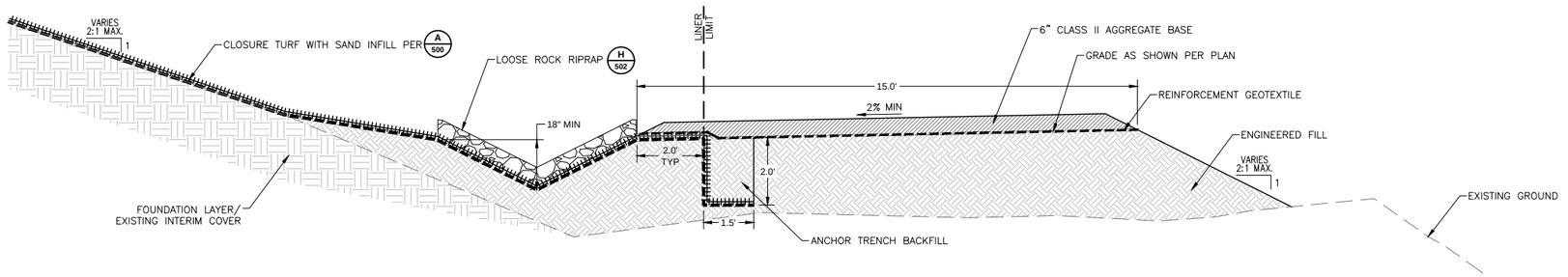


A TYPICAL TYPE III ACCESS ROAD OVER CLOSURE TURF SECTION

NOT TO SCALE

TYPE III



B TYPICAL BOTTOM PERIMETER ROAD SECTION

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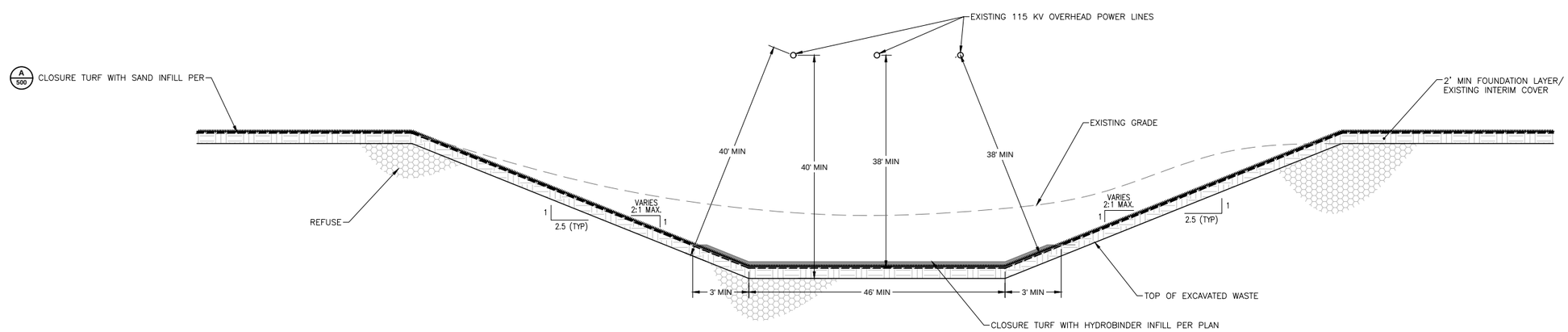

C TYPICAL REFUSE EXCAVATION SECTION UNDER 115KV POWER LINE

NOT TO SCALE

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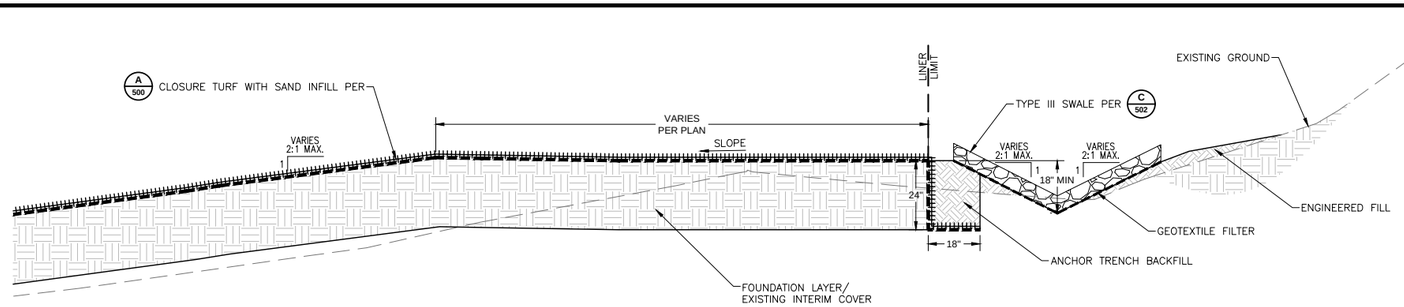

A TYPICAL UPPER LINER TERMINATION WITH UPPER DIVERSION SWALE

NOT TO SCALE

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825 SONOMA AVENUE
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TEL: (707) 544-0784

REGISTERED GEOLOGIST
DAMON F. BROWN
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Checked By:	DFB
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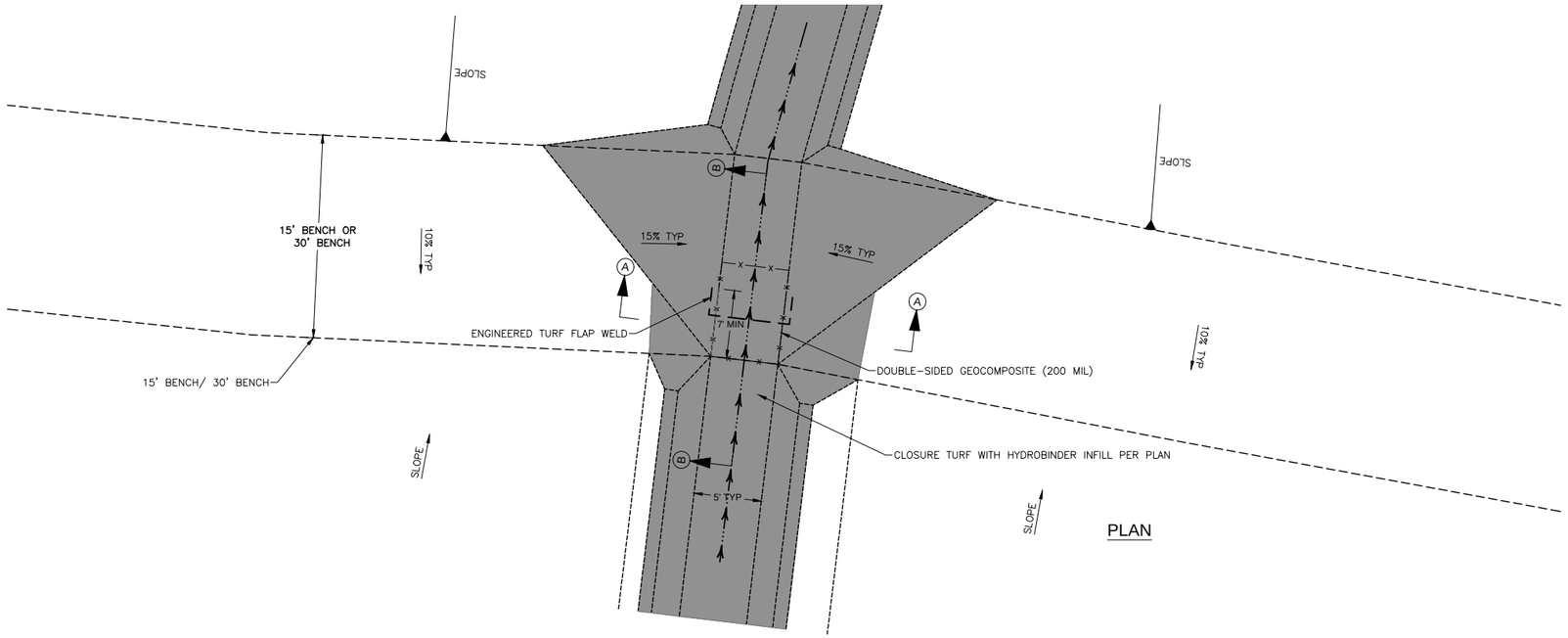
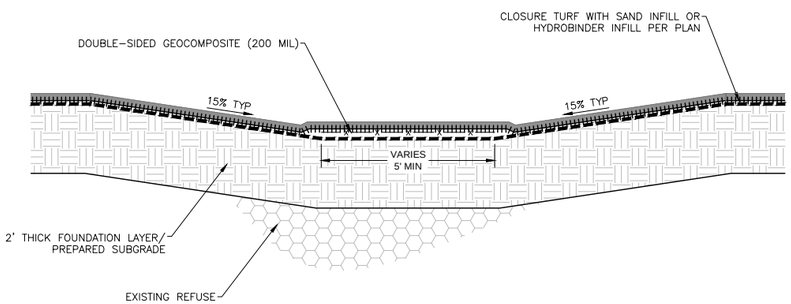
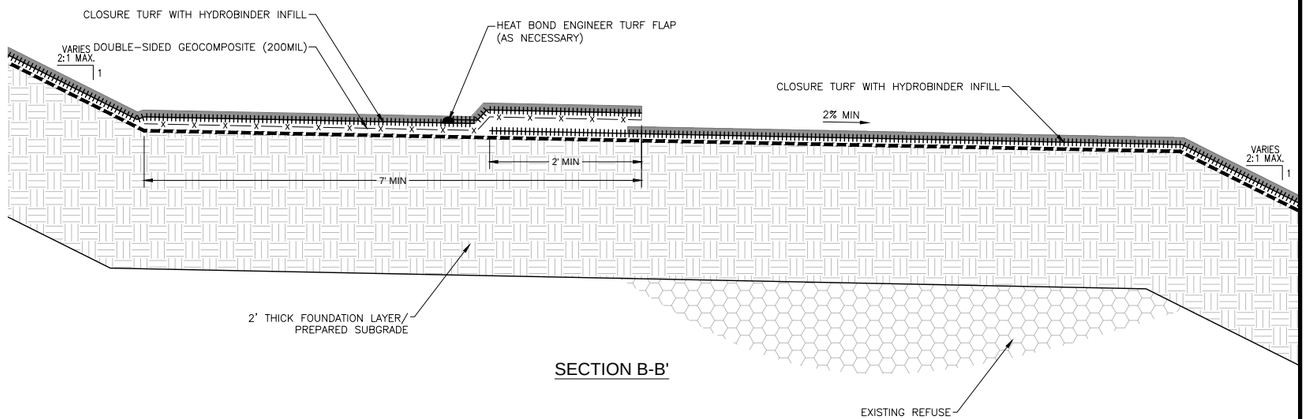


PLAN



SECTION A-A'



SECTION B-B'

A TYPICAL CLOSURE TURF WATER RELEASE VENT ON BENCH

NOT TO SCALE

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825 SONOMA AVENUE
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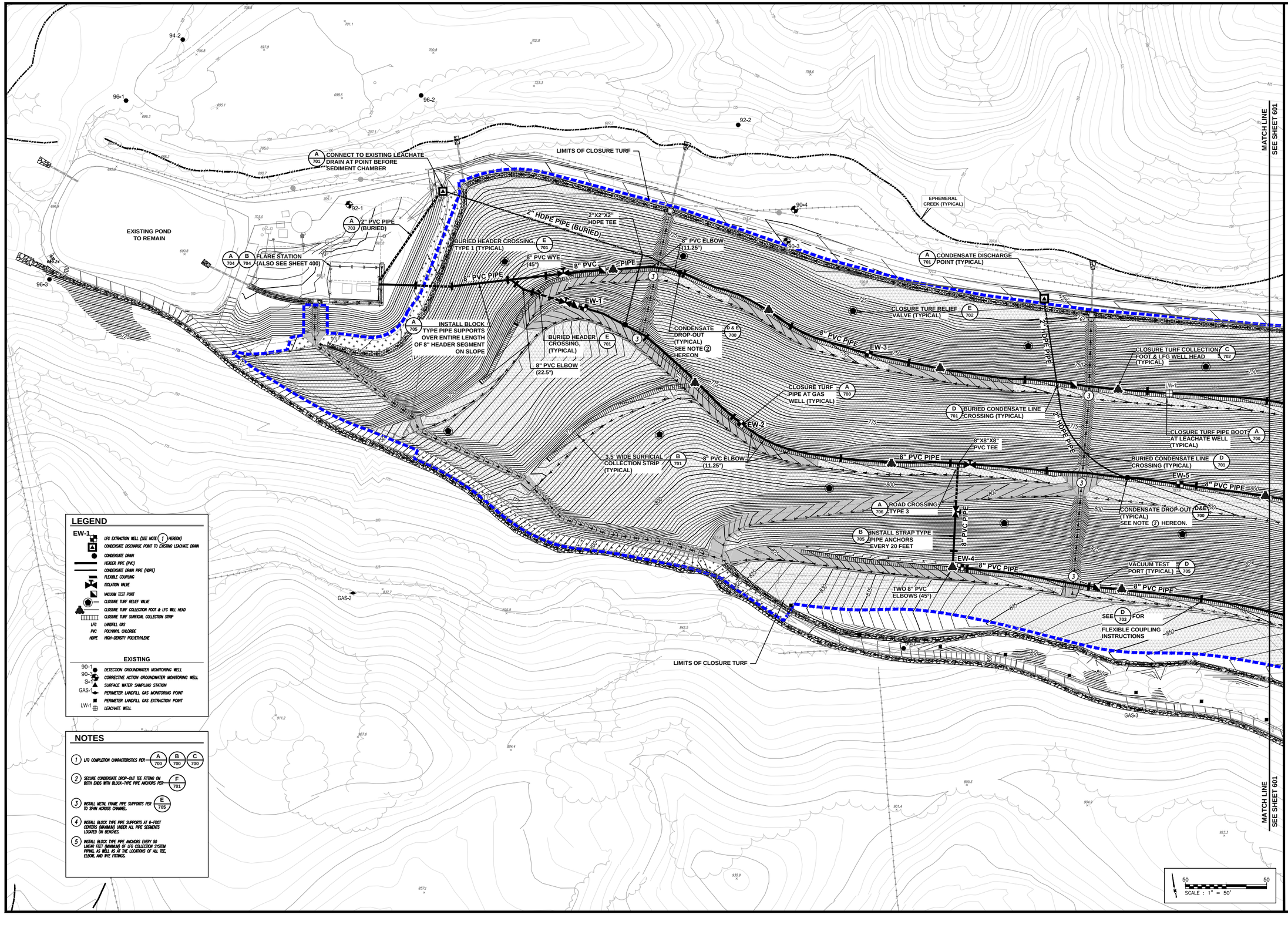

LEGEND

EW-1 LFG EXTRACTION WELL (SEE NOTE 1 HEREON)

CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN

CONDENSATE DRAIN

HEADER PIPE (PVC)

CONDENSATE DRAIN PIPE (HDPE)

FLEXIBLE COUPLING

ISOLATION VALVE

VACUUM TEST PORT

CLOSURE TURF RELIEF VALVE

CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD

CLOSURE TURF SURFICIAL COLLECTION STRIP

LFG LANDFILL GAS

PVC POLYVINYL CHLORIDE

HDPE HIGH-DENSITY POLYETHYLENE

EXISTING

90-I DETECTION GROUNDWATER MONITORING WELL

90-C CORRECTIVE ACTION GROUNDWATER MONITORING WELL

S- SURFACE WATER SAMPLING STATION

GAS- PERIMETER LANDFILL GAS MONITORING POINT

PERIMETER LANDFILL GAS EXTRACTION POINT

LW-1 LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER A 700, B 700, C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER F 701
3. INSTALL METAL FRAME PIPE SUPPORTS PER E 705 TO SPAN ACROSS CHANNEL.
4. INSTALL BLOCK TYPE PIPE SUPPORTS AT 6-FOOT CENTERS (MAXIMUM) UNDER ALL PIPE SEGMENTS LOCATED ON BENCHES.
5. INSTALL BLOCK TYPE PIPE ANCHORS EVERY 50 LINEAR FEET (MINIMUM) OF LFG COLLECTION SYSTEM PIPING, AS WELL AS AT THE LOCATIONS OF ALL TEE, ELBOW, AND WYE FITTINGS.

EBA ENGINEERING
825 SONOMA AVENUE
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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM LAYOUT - WEST PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By: DFB
Date: 2019-04-30

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MATCH LINE SEE SHEET 600

MATCH LINE SEE SHEET 602

EW-1 EW-2 EW-3 EW-4 EW-5 EW-6 EW-7 EW-8 EW-9 EW-10 EW-11 EW-12 EW-13 EW-14 EW-15

90-5 90-6 92-3

EPHEMERAL CREEK (TYPICAL)

A 701 CONDENSATE DISCHARGE POINT (TYPICAL)

D&E 700 CONDENSATE DROP-OUT (TYPICAL) SEE NOTE 2 HEREON.

D 701 BURIED CONDENSATE LINE CROSSING (TYPICAL)

CONDENSATE DROP-OUT (TYPICAL) SEE NOTE 2 HEREON. CONNECT CONDENSATE U-TRAP TO CONDENSATE LINE FROM UPPER BENCH (TYPICAL)

C 703 ISOLATION VALVE (TYPICAL)

B 705 INSTALL STRAP TYPE PIPE ANCHORS EVERY 20 FEET

D 705 VACUUM TEST PORT (TYPICAL)

A 700 CLOSURE TURF PIPE BOOT AT GAS WELL (TYPICAL)

E 702 CLOSURE TURF RELIEF VALVE (TYPICAL)

B 701 3.5' WIDE SURFICIAL COLLECTION STRIP (TYPICAL)

C 702 CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD (TYPICAL)

A&B 702 ROAD CROSSING, TYPE 1 (TYPICAL)

C 701 ROAD CROSSING, TYPE 2

E 701 BURRIED HEADER CROSSING (TYPICAL)

D 703 SEE FOR FLEXIBLE COUPLING INSTRUCTIONS

F 701 TWO 8" PVC ELBOWS (45°)

2" HDPE WYE (45°)

2" HDPE PIPE (BURIED)

8" PVC ELBOW (11.25°)

8"x8"x8" PVC TEE

8"x8"x4" PVC TEE

8"x8"x6" PVC TEE

8"x8"x6" REDUCING BUSHING

8" PVC END CAP

6" PVC END CAP

8" PVC PIPE

6" PVC PIPE

2" HDPE PIPE

PROPOSED LIMITS OF GRADING (TYPICAL)

LIMITS OF CLOSURE TURF

LEGEND

EW-1 LFG EXTRACTION WELL (SEE NOTE 1 HEREON)

CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN

CONDENSATE DRAIN

HEADER PIPE (PVC)

CONDENSATE DRAIN PIPE (HDPE)

FLEXIBLE COUPLING

ISOLATION VALVE

VACUUM TEST PORT

CLOSURE TURF RELIEF VALVE

CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD

CLOSURE TURF SURFICIAL COLLECTION STRIP

LFG LANDFILL GAS

PVC POLYVINYL CHLORIDE

HDPE HIGH-DENSITY POLYETHYLENE

EXISTING

90-1 DETECTION GROUNDWATER MONITORING WELL

90-2 CORRECTIVE ACTION GROUNDWATER MONITORING WELL

S-1 SURFACE WATER SAMPLING STATION

GAS-1 PERIMETER LANDFILL GAS MONITORING POINT

PERIMETER LANDFILL GAS EXTRACTION POINT

LW-1 LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER – A 700 B 700 C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER– F 701
3. INSTALL METAL FRAME PIPE SUPPORTS PER E 705 TO SPAN ACROSS CHANNEL.
4. INSTALL BLOCK TYPE PIPE SUPPORTS AT 6-FOOT CENTERS (MAXIMUM) UNDER ALL PIPE SEGMENTS LOCATED ON BENCHES.
5. INSTALL BLOCK TYPE PIPE ANCHORS EVERY 50 LINEAR FEET (MINIMUM) OF LFG COLLECTION SYSTEM PIPING, AS WELL AS AT THE LOCATIONS OF ALL TEE, ELBOW, AND WYE FITTINGS.

SCALE : 1" = 50'

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

SYSTEM LAYOUT - CENTRAL PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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MATCH LINE
SEE SHEET 601

EW-15
EW-17
EW-16
EW-18
LW-3
LW-4
LW-5
GAS-10
GAS-5
GAS-6
90-8
95-1

EPHEMERAL CREEK (TYPICAL)

6" PVC PIPE
8" PVC PIPE
4" PVC PIPE
2" HDPE PIPE (BURIED)

2" X2" X2" HDPE TEE
8" X4" PVC REDUCING BUSHING
4" PVC ELBOW (11.25°)
4" PVC END CAP
2" HDPE WYE (45°)
8" PVC ELBOW (22.50°)
8" PVC ELBOW (11.25°)
4" PVC ELBOW (30°)
8" X 4" PVC REDUCING BUSHING
TWO 8" PVC ELBOWS (45°)
4" PVC ELBOW (45°)

CONDENSATE DROP-OUT (TYPICAL) SEE NOTE (2) HEREON. CONNECT CONDENSATE U-TRAP TO CONDENSATE LINE FROM UPPER BENCH (TYPICAL)
D&E 700 CONDENSATE DROP-OUT (TYPICAL) SEE NOTE (2) HEREON.
CONDENSATE DISCHARGE POINT (TYPICAL) A 701
LIMITS OF CLOSURE TURF
D 701 BURIED CONDENSATE LINE CROSSING (TYPICAL)
ROAD CROSSING, TYPE 1 (TYPICAL) A&B 702
INSTALL STRAP TYPE PIPE ANCHORS EVERY 20 FEET B 705
SEE D 703 FOR FLEXIBLE COUPLING INSTRUCTIONS
CLOSURE TURF PIPE BOOT AT GAS WELL (TYPICAL) A 700
2.5' WIDE SURFICIAL B 701 COLLECTION STRIP (TYPICAL)
PROPOSED LIMITS OF GRADING (TYPICAL)
CLOSURE TURF RELIEF E 702 VALVE (TYPICAL)
CLOSURE TURF COLLECTION C 702 FOOT & LFG WELL HEAD (TYPICAL)
ROAD CROSSING, TYPE 1 (TYPICAL) A&B 702
INSTALL BLOCK TYPE PIPE SUPPORTS OVER ENTIRE LENGTH OF 4" LATERAL SEGMENT ON SLOPE (TYPICAL) B 705

LEGEND

EW-1 LFG EXTRACTION WELL (SEE NOTE (1) HEREON)
CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
CONDENSATE DRAIN
HEADER PIPE (PVC)
CONDENSATE DRAIN PIPE (HDPE)
FLEXIBLE COUPLING
ISOLATION VALVE
VACUUM TEST PORT
CLOSURE TURF RELIEF VALVE
CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD
CLOSURE TURF SURFICIAL COLLECTION STRIP
LFG LANDFILL GAS
PVC POLYVINYL CHLORIDE
HDPE HIGH-DENSITY POLYETHYLENE

EXISTING

90-1 DETECTION GROUNDWATER MONITORING WELL
90-2 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1 SURFACE WATER SAMPLING STATION
GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1 LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER A 700, B 700, C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER F 701
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SCALE : 1" = 50'

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CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

SYSTEM LAYOUT - EASTERN PORTION
CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By: DFB
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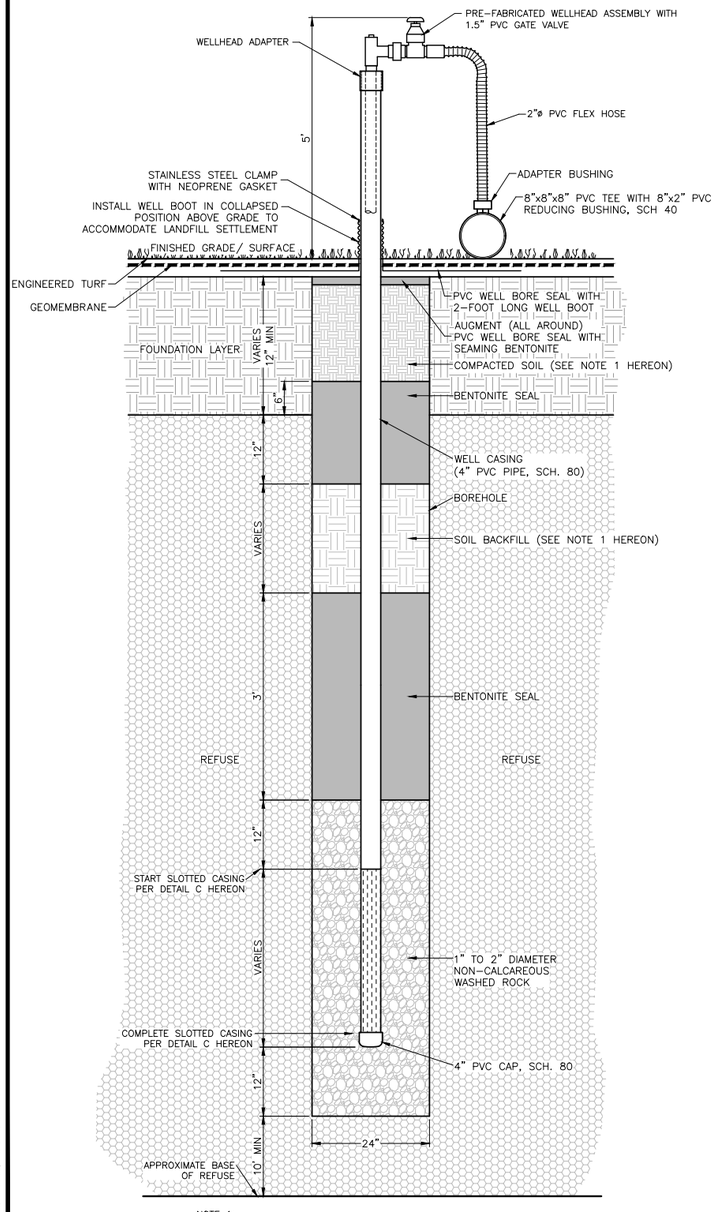
Xrefs: S:\Ref - CD - 2014\dwg\C-Ref - Finished Grade - Existing.dwg C-Ref - Finished Grade - Existing.dwg L-Ref - Liner - Existing.dwg L-Ref - Liner - Existing.dwg L-Ref - Liner

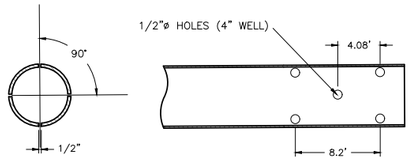


NOTE 1:

SOIL BACKFILL MATERIAL SHALL BE OBTAINED FROM THE BORROW AREA AND MEET THE MATERIAL SPECIFICATIONS FOR ENGINEERED FILL.

A LFG EXTRACTION WELL (TYPICAL)

NOT TO SCALE



B CASING PERFORATIONS FOR LFG EXTRACTION WELLS (TYPICAL)

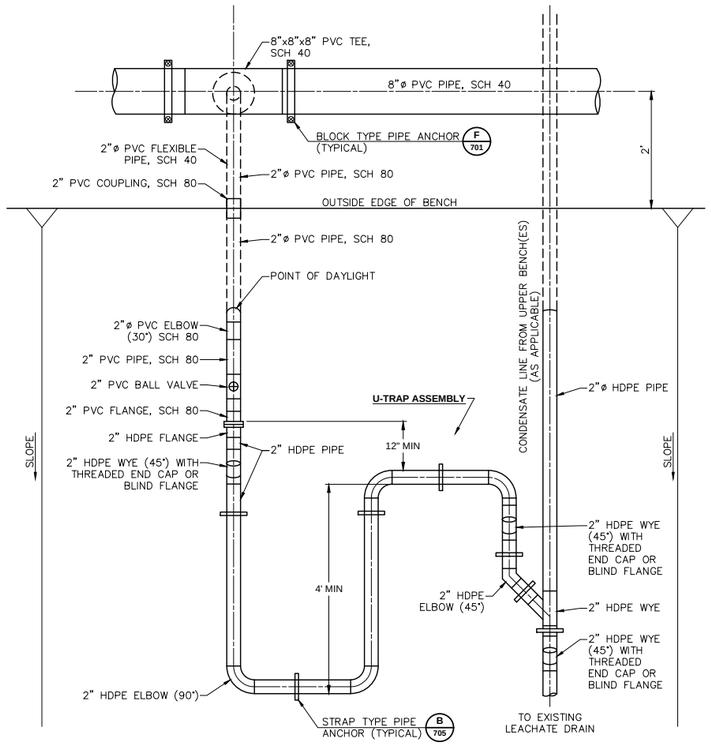
NOT TO SCALE

Extraction Well	Bottom Completion Depth (Feet BGS)	Perforated Interval (Feet BGS)	Gravel Pack Interval (Feet BGS)	Surface Seal Interval (Feet BGS)
EW-1	35	21 - 34	20 - 35	0 - 20
EW-2	45	21 - 44	20 - 45	0 - 20
EW-3	35	21 - 34	20 - 35	0 - 20
EW-4	60	21 - 59	20 - 60	0 - 20
EW-5	70	21 - 69	20 - 70	0 - 20
EW-6	70	21 - 69	20 - 70	0 - 20
EW-7	35	21 - 34	20 - 35	0 - 20
EW-8	70	21 - 69	20 - 70	0 - 20
EW-9	60	21 - 59	20 - 60	0 - 20
EW-10	50	21 - 49	20 - 50	0 - 20
EW-11	25	16 - 25	15 - 25	0 - 15
EW-12	70	21 - 69	20 - 70	0 - 20
EW-13	80	21 - 79	20 - 80	0 - 20
EW-14	45	21 - 44	20 - 45	0 - 20
EW-15	35	21 - 34	20 - 35	0 - 20
EW-16	60	21 - 59	20 - 60	0 - 20
EW-17	35	21 - 34	20 - 35	0 - 20
EW-18	60	21 - 59	20 - 60	0 - 20

BGS: Below Ground Surface (as referenced from top of final grade following placement of final cover system)

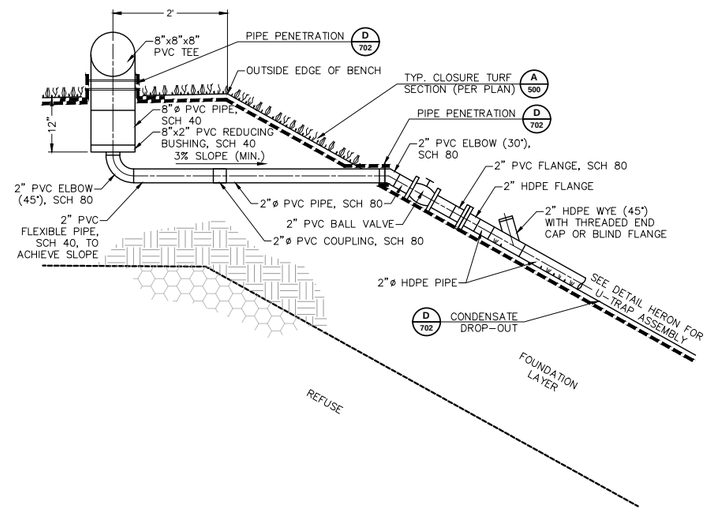
C LFG EXTRACTION WELL COMPLETION CHARACTERISTICS

NOT TO SCALE



D CONDENSATE DROP-OUT - PLAN VIEW (TYPICAL)

NOT TO SCALE



E CONDENSATE DROP-OUT - DETAIL (TYPICAL)

NOT TO SCALE

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REGISTERED GEOLOGIST
No. 2
DAMON F. BROWN
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Drawn By:	WC
Checked By:	DFB
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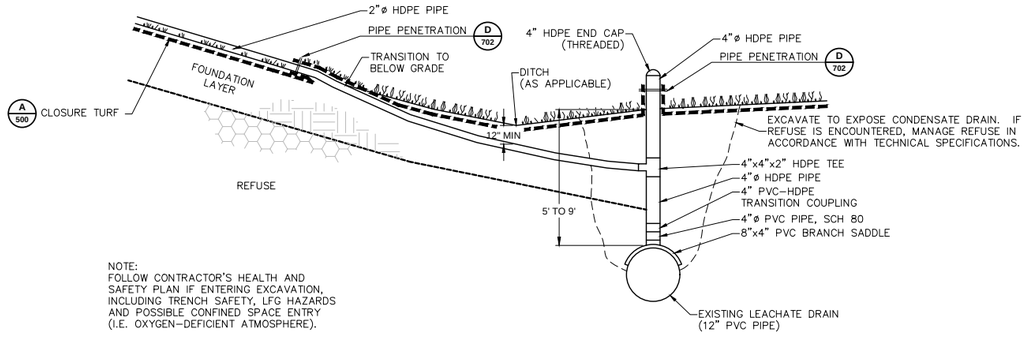
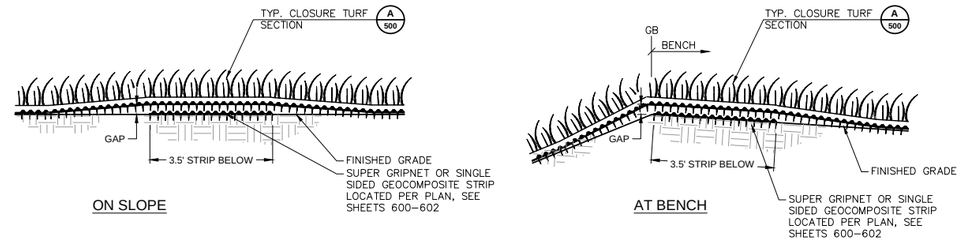
File: G:\JOBS\02-907\Drawings\LF Cover — (700) Con Details.dwg Plot Date: Apr 30, 2019 at 16:19



A CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN (TYPICAL)

NOT TO SCALE

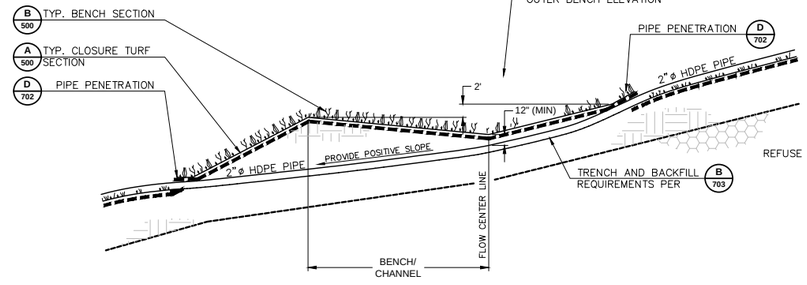


B CLOSURE TURF SURFICIAL COLLECTION STRIP

NOT TO SCALE

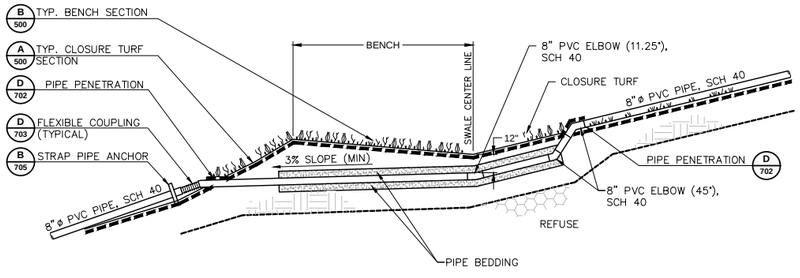
C ROAD CROSSING, TYPE 2 - DETAIL

NOT TO SCALE



D BURIED CONDENSATE LINE CROSSING (TYPICAL)

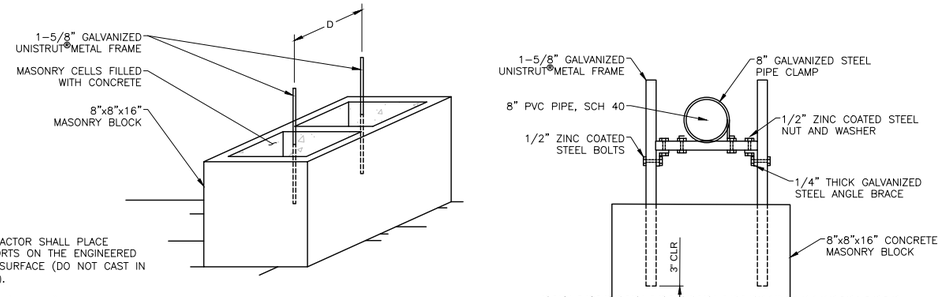
NOT TO SCALE



* CONTRACTOR SHALL ADJUST FOUNDATION GRADE PLAN FOR INSTALLATION OF LFG COLLECTION PIPING, ASSURING PROPER SECTION PER A 500. SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE SECTION.

E BURIED HEADER CROSSING (TYPICAL, TYPE 1)

NOT TO SCALE



F BLOCK TYPE PIPE ANCHOR (TYPICAL)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Drawn By:	WC
Checked By:	DFB
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Date: 2-Mar — Title Block Mod
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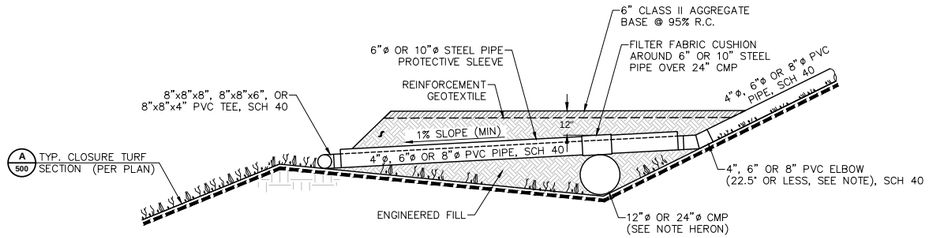
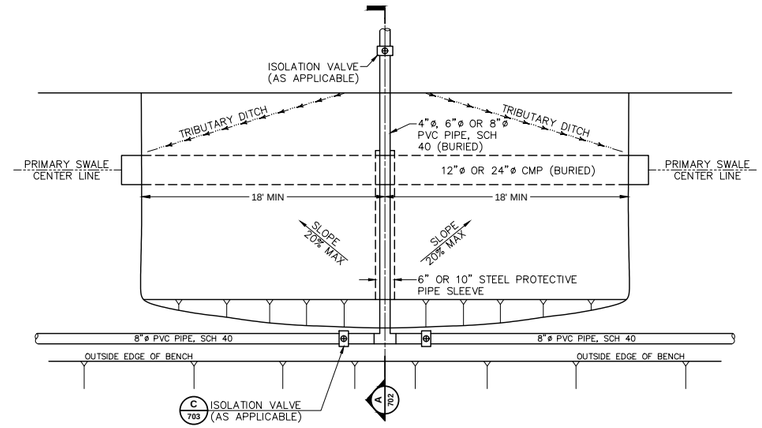


NOTE:
ADJUST AS NECESSARY TO ATTAIN MINIMUM 1 PERCENT PIPE SLOPE WHILE MINIMIZING HEIGHT OF ROAD CROSSING.

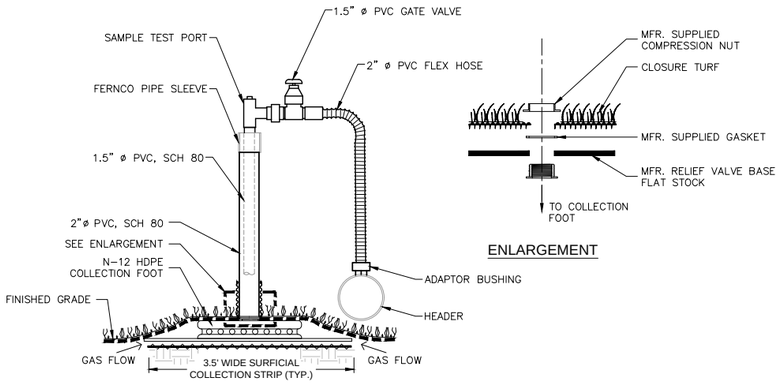
A ROAD CROSSING TYPE 1 - DETAIL (TYPICAL)

NOT TO SCALE



B ROAD CROSSING, TYPE 1 - PLAN VIEW (TYPICAL)

NOT TO SCALE

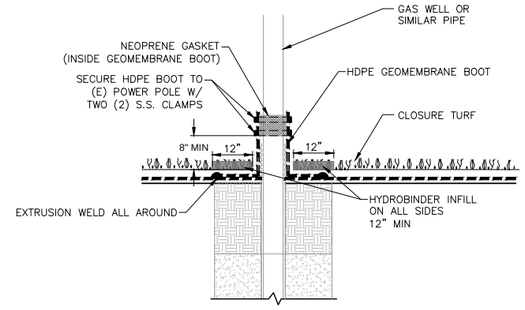


C CLOSURE TURF COLLECTION FOOT & LFG WELLHEAD

NOT TO SCALE

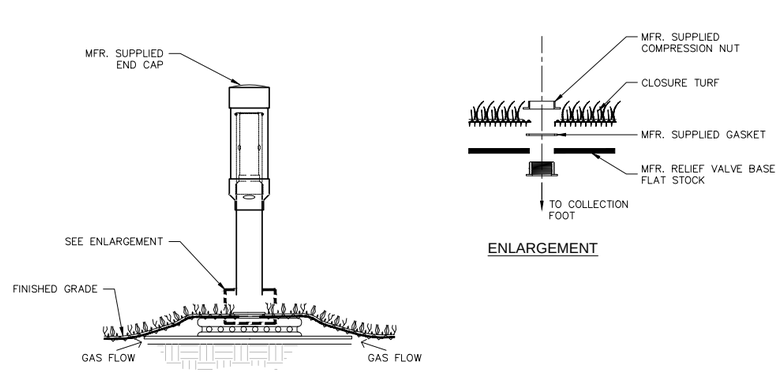
NOTES:

1. PIPE AND GEOMEMBRANE SHALL BE CLEAN TO PROVIDED AIRTIGHT CONNECTION.
2. CONTRACTOR SHALL TIGHTEN HOSE CLAMP TO ENSURE PROPER SEAL OF GEOMEMBRANE AROUND PIPE WHILE PREVENTING PIPE DAMAGE.



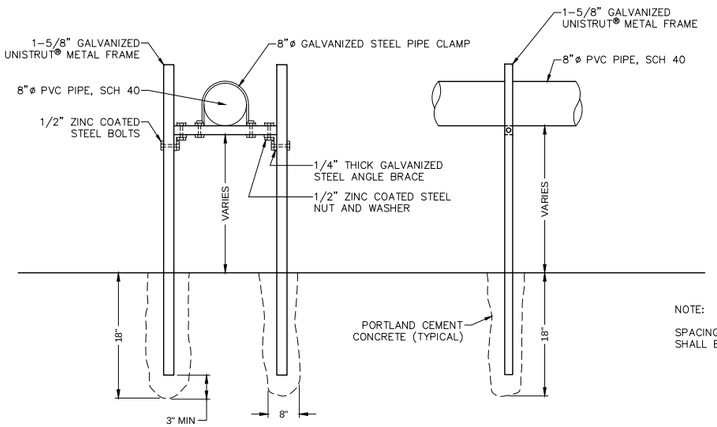
D PIPE PENETRATION (TYPICAL)

NOT TO SCALE



E CLOSURE TURF RELIEF VALVE

NOT TO SCALE



NOTE:

SPACING OF PIPE SUPPORTS SHALL BE 6 FEET ON CENTER.

F METAL FRAME PIPE SUPPORT OUTSIDE WASTE BOUNDARY (TYPICAL)

(NON-CLOSURE TURF AREAS)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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Date: 2-Apr — Time: 8:44:44a
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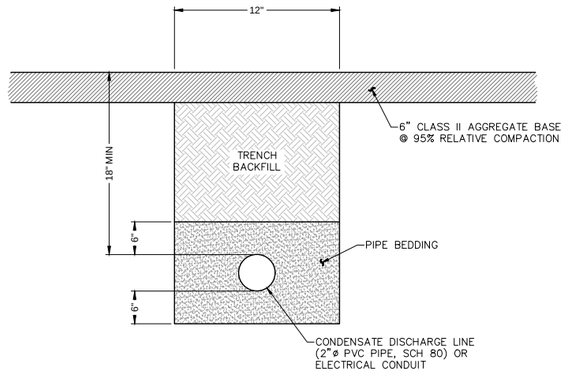
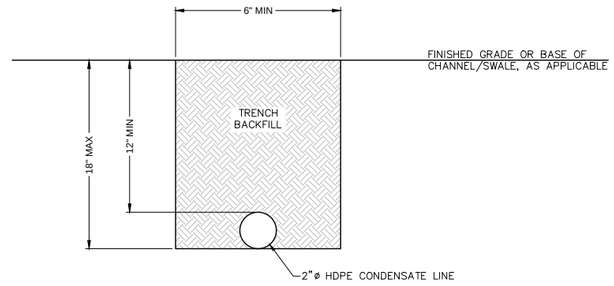


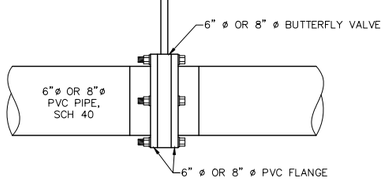
A FLARE STATION TRENCH DETAIL

NOT TO SCALE



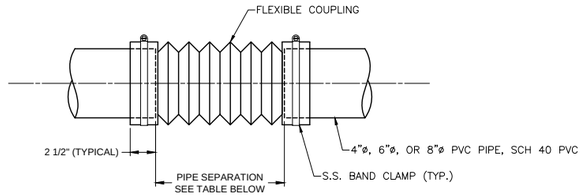
B BURIED CONDENSATE LINE TRENCH DETAIL (TYPICAL)

NOT TO SCALE



C ISOLATION VALVE ASSEMBLY (TYPICAL)

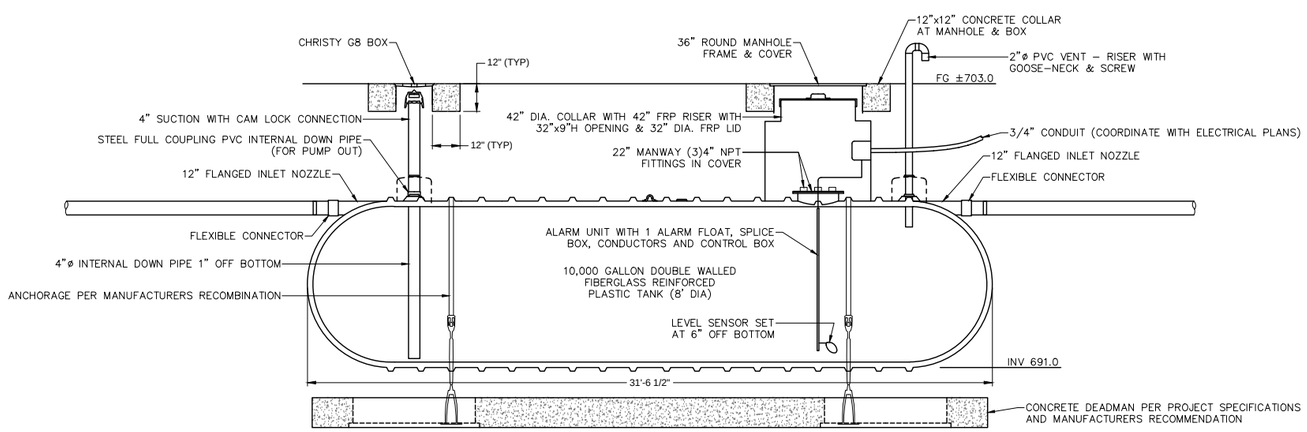
NOT TO SCALE



PIPE SEPARATION TABLE								
INSTALLATION TEMPERATURE (F°)	30	40	50	60	70	80	90	100
PIPE SEPARATION (in)	13	12	12	11	11	10	10	9

D FLEXIBLE COUPLING (TYPICAL)

NOT TO SCALE



E LEACHATE OVERFLOW STORAGE TANK-ELEVATION

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Job No:	02–907
Drawn By:	WC
Checked By:	DFB
Date:	2019–04–30

Sheet Number

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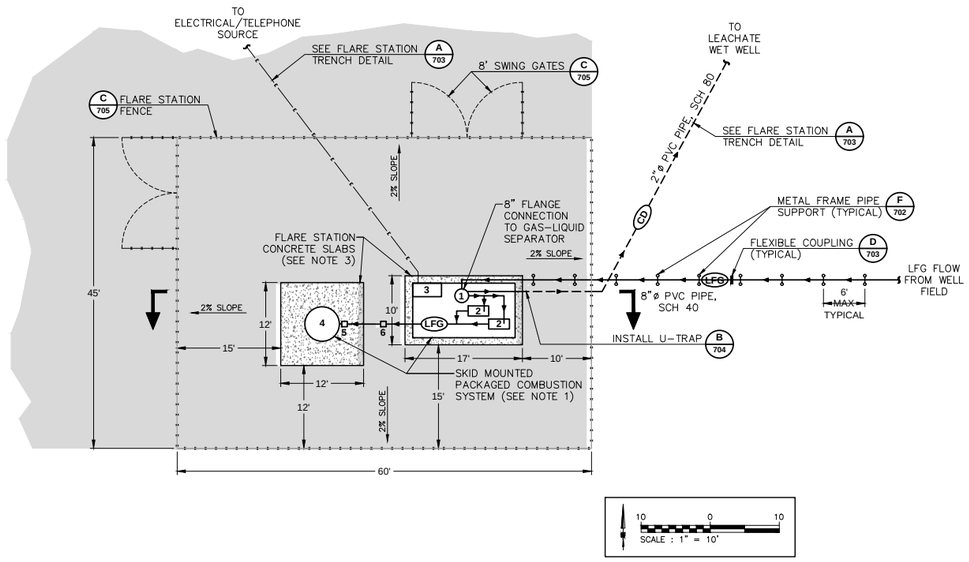
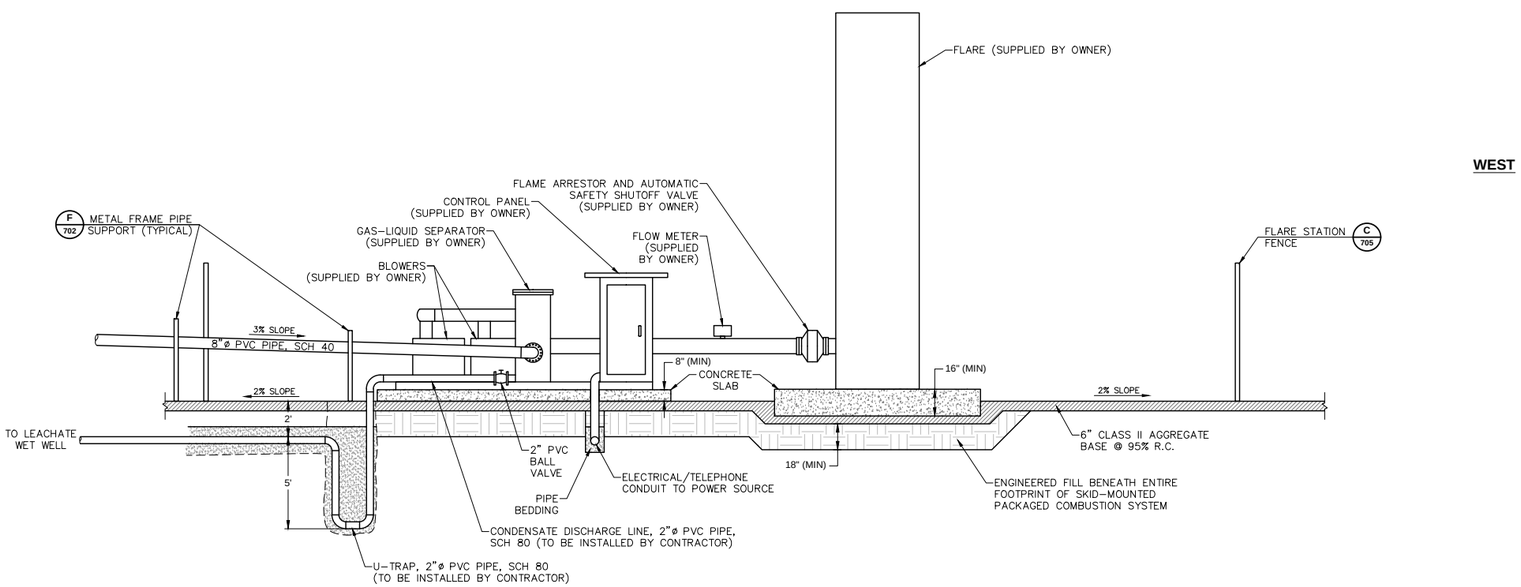


A FLARE STATION - PLAN VIEW

SCALE: 1"=10'



B FLARE STATION - SECTION VIEW

SCALE: 1"=4'

LEGEND

1 GAS-LIQUID SEPARATOR (SUPPLIED BY OWNER)
2 BLOWER (SUPPLIED BY OWNER)
3 CONTROL PANEL (SUPPLIED BY OWNER)
4 FLARE (SUPPLIED BY OWNER)
5 FLAME ARRESTOR AND AUTOMATIC SAFETY SHUTOFF VALVE (SUPPLIED BY OWNER)
6 FLOW METER (SUPPLIED BY OWNER)
CD CONDENSATE DISCHARGE LINE, 2" PVC PIPE, SCH 80
LFG LANDFILL GAS PRIMARY HEADER PIPE

ABOVE GROUND LINE/PIPE
UNDERGROUND LINE/PIPE
ELECTRICAL/TELEPHONE LINE
8' HIGH CHAIN LINK FENCE
FLEXIBLE COUPLING
PIPE SUPPORT

NOTES

1. THE ORIENTATION OF THE SKID-MOUNTED PACKAGED COMBUSTION SYSTEM COMPONENTS SHOWN HEREON ARE FOR ILLUSTRATION PURPOSES ONLY. THE ACTUAL ORIENTATION OF THESE COMPONENTS ON THE CONCRETE SLAB ARE SUBJECT TO CHANGE BASED ON MANUFACTURER'S FINAL DESIGN.
2. ALL CONDUIT AND PIPING OUTSIDE LIMITS OF FLARE STATION CONCRETE SLAB SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR.
3. THE CONCRETE SLAB FOR THE FLARE (12'x12') SHALL BE 16" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY AT TOP AND BOTTOM OF SLAB. THE OTHER SLAB (10'x17') SHALL BE 8" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY.
4. COMPLETION HEIGHTS OF PIPE SUPPORTS SHALL BE ADJUSTED ACCORDINGLY TO MAINTAIN POSITIVE SLOPE (3% MINIMUM) OF LFG COLLECTION SYSTEM PIPING TOWARDS THE GAS-LIQUID SEPARATOR.

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

REGISTERED GEOLOGIST
No. 2
DAMON F. BROWN
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Drawn By: WC
Checked By: DFB
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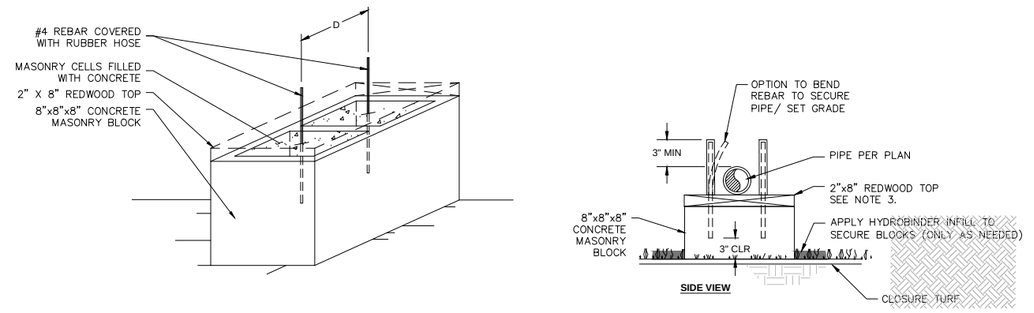
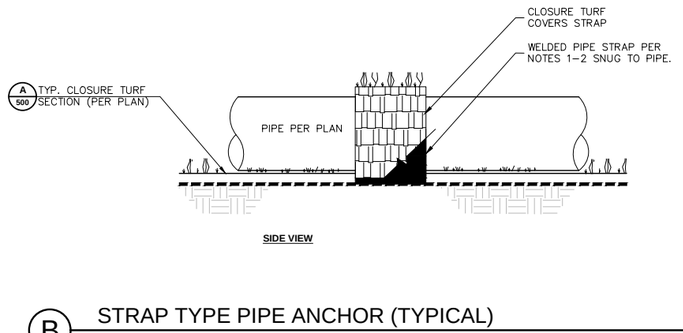


NOTES:

1. CONTRACTOR SHALL PLACE SUPPORTS ON THE ENGINEERED TURF SURFACE (DO NOT CAST IN PLACE).
2. D = 11" FOR 8" PVC
   D = 9" FOR 6" PVC
   D = 7" FOR 4" PVC
3. 6" HEIGHT CONCRETE MASONRY BLOCK OR ADDITIONAL 1X REDWOOD TOP MAY BE USED TO ADJUST SUPPORT HEIGHT.
4. PIPE SUPPORTS SHALL BE SPACED AT 6 FEET ON CENTERS FOR ALL PIPING INSTALLED ON BENCHES.

A BLOCK TYPE PIPE SUPPORT (TYPICAL)

NOT TO SCALE

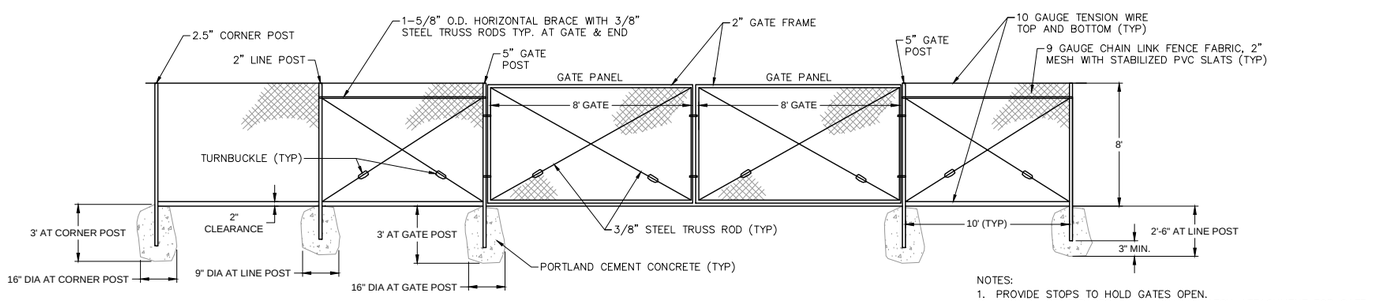


NOTES:

1. HDPE OR LLDPE (GEOMEMBRANE) MATERIAL STRIP TO CROSS PIPE PERPENDICULAR AND FORM SNUG FIT PREVENTING MOVEMENT.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO STRAP USING EXTRUSION WELD METHOD, 3"MIN. OVERLAP.
3. CONTRACTOR TO ENSURE NO PENETRATION OF THE GEOMEMBRANE. ANY DAMAGE TO THE GEOMEMBRANE SHALL BE REPARED AT CONTRACTOR'S EXPENSE.

B STRAP TYPE PIPE ANCHOR (TYPICAL)

NOT TO SCALE



NOTES:
1. PROVIDE STOPS TO HOLD GATES OPEN.
2. PROVIDE CENTER REST AND LOCKING LATCH ATTACHMENT FOR GATE.
3. LINE POST SPACING SHALL NOT EXCEED 10 FEET.

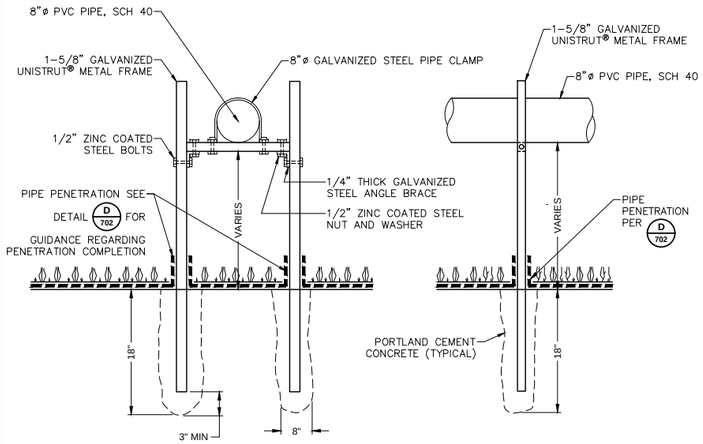
C FLARE STATION FENCE AND GATES

NOT TO SCALE



D VACUUM TEST PORT (TYPICAL)

NOT TO SCALE



NOTE:

SPACING OF PIPE SUPPORTS SHALL BE 6 FEET ON CENTER.

E METAL FRAME PIPE SUPPORT WITHIN WASTE BOUNDARY (TYPICAL)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Drawn By:	WC
Checked By:	DFB
Date:	2019–04–30

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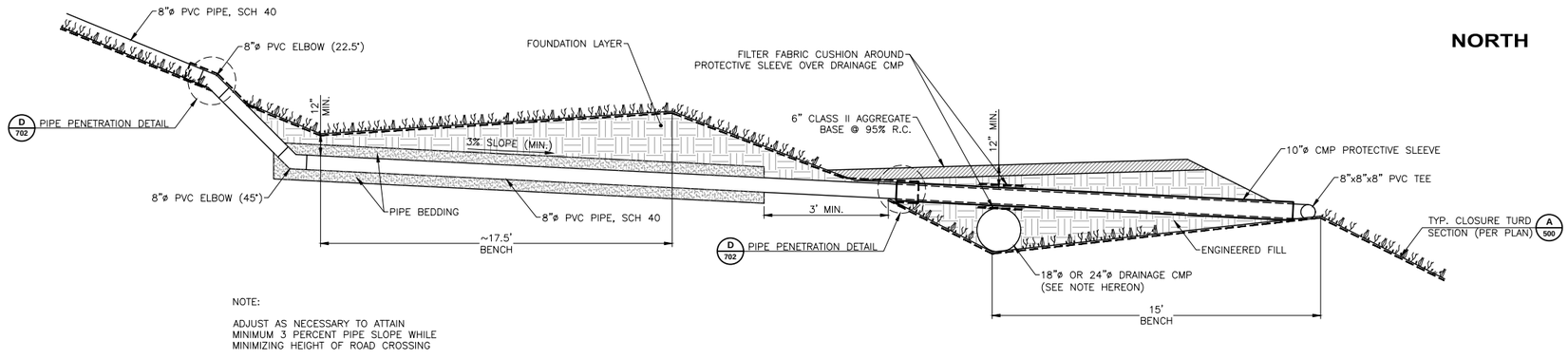
SOUTH **NORTH**



NOTE:

ADJUST AS NECESSARY TO ATTAIN MINIMUM 3 PERCENT PIPE SLOPE WHILE MINIMIZING HEIGHT OF ROAD CROSSING

A ROAD CROSSING, TYPE 3

NOT TO SCALE

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3100 VICHY SPRINGS ROAD
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Job No:	02-907
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APPENDIX K

EMERGENCY RESPONSE PLAN

Emergency Response Plan

City of Ukiah Landfill

Mendocino County, California

April 2019

Prepared For:

City of Ukiah
Public Works Department
Ukiah, California

Prepared By:

EBA ENGINEERING
825 Sonoma Avenue
Santa Rosa, California
EBA Job No. 02-907

1.0 INTRODUCTION

Division 2, Title 27, Article 2, Section 21130 of the California Code of Regulations (effective date: 7/18/98) requires the development of an Emergency Response Plan at landfill closure to address potential events that could impact the integrity of the landfill cover and related appurtenances resulting in the release of waste products. These regulations are included here for review.

27CCR, §21130

(a) the operator shall maintain a written postclosure Emergency Response Plan at the facility or at an alternate location as approved by the EA. The Emergency Response Plan must identify occurrences that may exceed the design of the site and endanger public health or the environment. The plan shall describe specific procedures that minimize these hazards to protect public health and safety. The events that the plan shall address include, but are not limited to: vandalism, fires, explosions, earthquakes, floods, the collapse or failure of artificial or natural dikes, levees or dams; surface drainage problems; and other waste releases.

(b) The Emergency Response Plan shall contain the following:

(1) identification of events which could require the implementation of emergency response actions: This section shall not apply to the gas monitoring provisions;

(2) a description of the actions to be taken, and the sequence and implementation timetable needed to mitigate the conditions;

(3) a statement regarding the general availability of equipment required to mitigate each type of emergency.

(c) The operator shall amend the Emergency Response Plan under the following conditions:

(1) whenever a failure or release occurs for which the plan did not provide an adequate response;

(2) when the postclosure land use and/or structures on the site change and these changes are not addressed in the existing plan; or

(3) if the EA notifies the operator in writing that the current Emergency Response Plan is inadequate under the provision of this section. The notifying agency shall include within the written notice the items that plan needs to consider for it to comply with this section. The operator shall submit an amended Emergency Response Plan to the EA within thirty (30) days of notification of an inadequacy.

(d) Whenever the operator amends the Emergency Response Plan pursuant to (c) (1 or 2), the operator shall submit a written copy of the amended plan to the EA.

2.0 SPECIFIC EVENTS AND RESPONSES

The following presents a summary of specific events requiring correction action at the City of Ukiah Landfill (Landfill) and actions to be taken to minimize the release of waste products.

Earthquake

Given the final closure configuration of the Landfill, a seismic event within the area should not result in slope failure or a release of waste products; however, such an event could impact the integrity of the final cover, drainage conveyance systems, or monitoring systems. The following is the sequence and schedule of actions to be taken in the event of an earthquake to minimize potential hazards.

- In event of an earthquake, the site will be inspected by a qualified engineer within 24-hours to evaluate the integrity of the landfill cover, ancillary facilities and the potential for hazardous conditions.
- Within 5 days, notify the Local Enforcement Agency (LEA), the Sheriff's Department, California Regional Water Quality Control Board – North Coast Region (RWQCB), and the California Department of Resources Recycling and Recovery (CalRecycle) of any failure.
- Contact with areas of damaged landfill cover or potentially hazardous areas/conditions will be limited.
- Areas of concern will be stabilized pending reconstruction activities.
- Reconstruction requirements and construction scheduling will be evaluated and prepared for submittal to the LEA, RWQCB, and CalRecycle within 7 days.
- Areas requiring repair will be reconstructed in accordance with the Construction Quality Assurance Plan to original design specifications and contours, or the Final Closure Plan will be amended/revised and approved by the LEA, CalRecycle, and RWQCB.
- The LEA, RWQCB, and CalRecycle will be notified as to completion of construction activities.

Fires, Subsurface Fire, or Explosion

The potential for fire, subsurface fire, and/or explosion exists due to the presence of landfill gas. In the event of a fire or explosion, mitigative actions, sequence of actions, and timetable to minimize potential hazards will include the following:

- Immediately make a determination of the severity of the fire or explosion.

- If the fire or explosion is deemed severe, the Sheriff's Department and the Fire Department will be immediately notified. Also notify CalRecycle, RWQCB, LEA, and Mendocino County Air Quality Management District, and other authorities necessary to evaluate extent of damage.

- In the case of a surface fire or explosion, an area will be cordoned off from the incident and personnel will be retained on-site until the area has been declared safe.

- In the case of a subsurface fire that is not deemed severe, within 24 hours, turn off extraction wells in the adjoining area, then proceed with locating the source of the oxygen infiltration and repair the breach accordingly. If repair of breach will take longer than 48 hours, temporarily cover area of breach with soil to minimize further oxygen intrusion.

- If a subsurface fire is deemed severe:

    A. Secure the services of a consultant experienced in subsurface fires.

    B. Identify surface fractures, geologic features, or other cover features which may act as a conduit for oxygen infiltration.

    C. Determine the extent of subsurface fire through subsurface vapor and temperature monitoring.

    D. Cordon off area affected by fire.

    E. Evaluate the feasibility of extinguishing the fire by 1) remediation of conduits of air infiltration, 2) excavation of affected areas and extinguishing the fire using conventional means (water or foam vapor suppressant), 3) extinguishing the fire through CO2 injection, or 4) other methods identified by the consultant.

    F. Implement procedures to extinguish the fire.

- Repairs shall be made in accordance with the Construction Quality Assurance Plan.

- The LEA, RWQCB, and CalRecycle will be notified as to completion of construction activities.

Wild fires also represent a potential hazard. Whereas the ClosureTurf material should provide greater protection against flame propagation than a vegetative cover, the potential remains for damage to occur. Thus, a post-fire inspection will

be performed following such an incident to evaluate the integrity and potential damage to pertinent site components, including the ClosureTurf final cover system, landfill gas collection system (including the totally-enclosed vertical ground flare), leachate management system, monitoring system components, and perimeter security fencing and signage. Any damaged components identified by the inspection will be recorded and provisions made to implement the repairs accordingly.

Surface Drainage Failures and Floods

In the event of a wash out due to a surface drainage failure or flood, mitigative actions, sequence of actions, and timetable to minimize potential hazards will include the following:

- Inspection and evaluation of any damage incurred to the landfill cover and determination of the potential for hazardous conditions.
- Areas identified as potentially hazardous will be cordoned off.
- The LEA, RWQCB, and CalRecycle will be notified of the failure.
- Reconstruction requirements and construction scheduling will be evaluated and prepared for submittal to the LEA, RWQCB, and CalRecycle within 7 days.
- Repairs will be made in accordance with the Construction Quality Assurance Plan.
- The LEA, RWQCB, and CalRecycle will be notified as to completion of construction activities.

Vandalism

In the event that vandalism occurs that impacts the integrity of landfill closure facilities, mitigative actions, sequence of actions, and timetable to minimize potential hazards include the following:

- Inspection and evaluation of any damage incurred to the landfill cover and determination of the potential for hazardous conditions.
- Areas identified as potentially hazardous will be cordoned off.
- The LEA, RWQCB, and CalRecycle will be notified of the vandalism.
- Reconstruction requirements and construction scheduling will be evaluated and prepared for submittal to the LEA, RWQCB, and CalRecycle within 7 days.

- Repairs will be made in accordance with the Construction Quality Assurance Plan.
- The LEA, RWQCB, and CalRecycle will be notified as to completion of construction activities.

3.0 AVAILABLE EQUIPMENT

Standby equipment is available from the City of Ukiah Public Works Department on a priority basis.

4.0 EMERGENCY CONTACTS AND TELEPHONE NUMBERS

City of Ukiah Public Works Department:	(707) 463-6280
Fire Department:	911
Mendocino County Sheriff's Department:	911
Ambulance Service:	911
RWQCB:	(707) 576-2220
CalRecycle:	(916) 341-6360
LEA:	(707) 234-6625
Mendocino County Air Quality Management District:	(707) 463-4354

APPENDIX L

CLOSURE AND POSTCLOSURE MAINTENANCE COST ESTIMATES

CLOSURE

UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION COST ESTIMATE

The objective is to determine the estimated total cost of closure activities at the Ukiah Landfill. Costs are based on the plans prepared by EBA Engineering titled: Construction Drawings for City of Ukiah Landfill Final Closure Construction. Individual cost items were determined as bid items for the construction contract and include:

- Miscellaneous items for mobilization, removal, adjustments, and demolition;
- Final cover items;
- Drainage system items;
- Access road items;
- Landfill gas extraction system items;
- Landfill leachate collection system items; and
- Revegetation.

In addition, costs are provided for design support engineering services during construction and construction quality assurance during construction that includes inspections, testing, and reporting.

References used to estimate construction costs included the following:

- Contractor bids and contracts for previous landfill closure projects that have recently been completed, adjusted for inflation. These previously completed landfill closure projects were all subject to the prevailing wage requirements.

- Manufacturers and suppliers/installers information for specialized items such as the Engineered Turf product for material and installation costs.

- General Prevailing Wage Determination Made by the Director of Industrial Relations Pursuant to California Labor Code Part 7, Chapter 1, Article 2, Section 1770, 1773, and 1773.1, current edition.

- Labor Surcharge and Equipment Rental Rates, State of California Business, Transportation, and Housing Agency, Department of Transportation Division of Construction, Effective April 1, 2019 through March 31, 2020.

- Discussions with local contractors and suppliers for actual material and installation costs.

The following tables present a summary of the final closure costs, a breakdown of individual cost items (bid items) including reference footnotes for each cost item, a breakdown of the inspection, testing, reporting, and design support engineering costs during construction (CQA), and the applicable Prevailing Wage and Labor Surcharge and Equipment Rental Rate tables. For those cost items where previous contractor costs were not available or not applicable, unit costs were determined by estimating the production rate, labor, and equipment that would be needed and applying the prevailing wage rates and the labor surcharge and equipment rental rates referenced above. The worksheets for these items are included.

FINAL CLOSURE COST ESTIMATE WORKSHEET
CITY OF UKIAH LANDFILL

PROJECT DESCRIPTION

The information presented herein provides an itemized breakdown of costs to implement the final closure construction activities summarized in the Construction Drawings for the Final Closure of the City of Ukiah Landfill

PREPARED BY:	EBA ENGINEERING		
GENERAL SITE INFORMATION			
Name of Solid Waste Landfill:	City of Ukiah Landfill		
Solid Waste Facilities Permit No.:	23-AA-0019		
Facility Operator:	City of Ukiah, Department of Public Works		
Site Owner:	City of Ukiah, Department of Public Works		
Site Location (CA coordinates, township & range or longitude/latitude, preferred)	SE 1/4, Section 10 Township 15 North, Range 12 West		
Assessors Parcel Number:	178-130-010		
Site Address :	3100 Vichy Springs Road Ukiah, CA		

FINAL CLOSURE COSTS

1. Final Closure Costs			
a. Miscellaneous - Mobilization, Removal, Adjustment, Demolition	$	137,676	See Cost Estimate Worksheet - Item 1-13
b. Final Cover	$	6,871,169	See Cost Estimate Worksheet - Items 14-20, 37-44, 46 and 52
c. Drainage Facilities	$	656,766	See Cost Estimate Worksheet - Items 23-36
d. Access Roads	$	233,360	See Cost Estimate Worksheet - Items 21 and 22
e. Landfill Gas Extraction System	$	620,168	See Cost Estimate Worksheet - Items 47-51 and 53-77
f. Landfill Leachate Collection System Modifications	$	55,954	See Cost Estimate Worksheet - Items 78-82
g. Revegetation	$	26,435	See Cost Estimate Worksheet - Item 45
h. Signage	$	1,680	See Cost Estimate Worksheet -Item 83
Contractor Bid Subtotal	$	8,603,207	
2. Design Support Engineering	$	18,600	
3. Construction Quality Assurance for Closure Construction	$	534,740	
4. Landfill Structure Removal	$	-	Included in Above
5. Groundwater Monitoring Installations	$	-	None
6. Security	$	-	Included in Above
Final Closure Subtotal	$	9,156,547	
Final Closure Subtotal 20% Contingency	$	1,831,309	
TOTAL FINAL CLOSURE	$	10,987,856	

ENGINEER'S COST ESTIMATE
FINAL CLOSURE CONSTRUCTION
CITY OF UKIAH LANDFILL

ITEM No.	*ITEM*	*UNIT*	*UNIT PRICE*	*SOURCE (Footnote)*	*QTY*	*TOTAL PRICE*
1	Mobilization	LS	$ 106,000.00	1	1	$ 106,000
2	Adjust Existing Groundwater Monitoring Well to Grade	EA	$ 530.00	2	3	$ 1,590
3	Adjust Existing Leachate Wells to Grade	EA	$ 530.00	2	2	$ 1,060
4	Remove Existing CMP and HDPE Downdrains and Drain Outlets	LS	$ 5,151.00	3	1	$ 5,151
5	Remove Existing Leachate Piping	LS	$ 2,575.00	3	1	$ 2,575
6	Adjust Existing Leachate Manholes To Grade	EA	$ 1,130.00	3	5	$ 5,650
7	Install G5 Traffic Vault with Checker Plate Top	EA	$ 1,100.00	2	1	$ 1,100
8	Adjust Existing Gas Vault to Grade	EA	$ 530.00	2	2	$ 1,060
9	Install B2436 Gas Extraction Vault with Checker Plate Top	EA	$ 1,100.00	2	5	$ 5,500
10	Adjust Existing ARV and Vault to Grade	EA	$ 530.00	2	1	$ 530
11	Adjust Existing LFG Perimeter Monitoring Wells to Grade	EA	$ 530.00	2	4	$ 2,120
12	Remove Existing Fencing	LF	$ 2.10	2	90	$ 189
13	Structure Demolition	LS	$ 5,151.00	3	1	$ 5,151
14	Clearing and Grubbing	AC	$ 900.00	2	58.4	$ 52,533
15	Refuse Excavation and Relocation	CY	$ 11.00	2	6,700	$ 73,700
16	Refuse Disposal	TON	$ 130.00	4	75	$ 9,750
17	Subgrade Preparation	SF	$ 0.11	2	1,887,100	$ 207,581
18	Excavation	CY	$ 1.60	2	1,630	$ 2,608
19	Fill (Refuse Excavation Interim Cover Soils)	CY	$ 4.00	2	5,600	$ 22,400
20	Fill (Foundation Layer and Engineered Fill)	CY	$ 3.70	2	91,200	$ 337,440
21	Access Roads	SF	$ 1.40	2	135,400	$ 189,560
22	Access Roads over Engineered Turf	SF	$ 3.00	2	14,600	$ 43,800
23	Concrete Drain Inlets (4' x 4')	EA	$ 2,650.00	2	13	$ 34,450
24	30" CMP Drain Inlets	EA	$ 1,100.00	2	5	$ 5,500
25	CMP Drain Pipe (Above Ground)	LF	$ 43.00	2	840	$ 36,120
26	CMP Drain Pipe (Buried)	LF	$ 58.00	2	280	$ 16,240
27	HDPE Drain Pipe (Buried)	LF	$ 58.00	2	620	$ 35,960
28	Sedimentation Basin Outlet Structures	EA	$ 7,500.00	2	3	$ 22,500
29	Side Slope Drainage Channel Grading	LF	$ 11.00	2	2,530	$ 27,830
30	Type I Swales	LF	$ 1.60	2	630	$ 1,008
31	Type II Swales	LF	$ 6.40	2	1,020	$ 6,528
32	Type III Swales	LF	$ 37.00	2	6,520	$ 241,240
33	Type IV Swales	LF	$ 8.50	2	1,030	$ 8,755
34	Type V Swales	LF	$ 37.00	2	3,500	$ 129,500
35	Grouted Riprap Outlets	EA	$ 2,110.00	2	4	$ 8,440
36	Loose Rock Riprap Inlets and Outlets	SF	$ 37.00	2	2,235	$ 82,695
37	Erosion Control	SF	$ 0.24	2	253,465	$ 60,832
38	Geomembrane	SF	$ 1.10	5	1,885,100	$ 2,073,610
39	Geomembrane Surficial Strips	LF	$ 3.70	5	10,861	$ 40,186
40	Engineered Turf with 5/8" Sand Ballast Infill	SF	$ 2.00	5	1,734,100	$ 3,468,200
41	Engineered Turf without Sand Ballast Infill	SF	$ 1.60	5	11,500	$ 18,400
42	Engineered Turf with HydroBinder Infill	SF	$ 2.80	5	139,600	$ 390,880
43	Engineered Turf/Geomembrane Anchor Trench	LF	$ 5.30	5	8,500	$ 45,050
44	Water Release Vents	EA	$ 500.00	5	20	$ 10,000
45	Seeding and Fertilizing	AC	$ 2,650.00	2	10.0	$ 26,435
46	Temporary Erosion and Sediment Control	LS	$ 16,000.00	2	1	$ 16,000
47	Flare Station Concrete Slabs	CY	$ 845.00	2	11.5	$ 9,718
48	LFG Extraction Wells	VLF	$ 95.00	2	940	$ 89,300
49	Prefabricated Wellhead Assemblies	EA	$ 790.00	2	18	$ 14,220
50	Additional Borehole Setup	EA	$ 370.00	2	3	$ 1,110
51	Borehole Abandonment	VLF	$ 48.00	2	100	$ 4,800
52	LFG Collection Foot Assembly	EA	$ 1,000.00	5	42	$ 42,000
53	8" PVC Pipe and Fittings	LF	$ 17.00	2	8,750	$ 148,750
54	6" PVC Pipe and Fittings	LF	$ 16.00	2	410	$ 6,560
55	4" PVC Pipe and Fittings	LF	$ 15.00	2	1,175	$ 17,625
56	8" Isolation Valves	EA	$ 1,600.00	2	14	$ 22,400
57	6" Isolation Valve	EA	$ 1,265.00	2	1	$ 1,265
58	8" Flexible Couplings	EA	$ 265.00	2	63	$ 16,695
59	6" Flexible Couplings	EA	$ 225.00	2	2	$ 450

ENGINEER'S COST ESTIMATE
FINAL CLOSURE CONSTRUCTION
CITY OF UKIAH LANDFILL

ITEM No.	*ITEM*	*UNIT*	*UNIT PRICE*	*SOURCE (Footnote)*	*QTY*	*TOTAL PRICE*
60	4" Flexible Couplings	EA	$ 172.00	2	12	$ 2,064
61	Vacuum Test Ports	EA	$ 53.00	2	12	$ 636
62	Block Type Pipe Supports	EA	$ 40.00	2	1,230	$ 49,200
63	Block Type Pipe Anchors	EA	$ 110.00	2	248	$ 27,280
64	Strap Type Pipe Anchors	EA	$ 50.00	2	45	$ 2,250
65	Metal Frame Pipe Supports - Within Waste Boundary	EA	$ 250.00	2	67	$ 16,750
66	Metal Frame Pipe Supports - Outside Waste Boundary	EA	$ 160.00	2	11	$ 1,760
67	Buried Header Crossing	EA	$ 1,250.00	3	2	$ 2,500
68	Road Crossing - Type 1	EA	$ 6,050.00	3	10	$ 60,500
69	Road Crossing - Type 2	EA	$ 4,405.00	3	1	$ 4,405
70	Road Crossing - Type 3	EA	$ 7,260.00	3	1	$ 7,260
71	Condensate Drain Piping	LF	$ 16.00	2	2,275	$ 36,400
72	Condensate Drop Outs	EA	$ 2,110.00	2	14	$ 29,540
73	Condensate Discharge Points	EA	$ 1,055.00	2	5	$ 5,275
74	Flare Station Assembly	LS	$ 11,805.00	3	1	$ 11,805
75	Security Fencing	LF	$ 27.00	2	210	$ 5,670
76	Flare Station Aggregate Base	SF	$ 1.40	2	9,600	$ 13,440
77	Electrical and Telephone Feed	LS	$ 10,540.00	6	1	$ 10,540
78	12" Leachate Collection Piping	LF	$ 48.00	2	149	$ 7,152
79	6" Leachate Collection Piping	LF	$ 43.00	2	44	$ 1,892
80	Concrete Junction Boxes	EA	$ 2,110.00	2	3	$ 6,330
81	Leachate Sediment Chamber/Wet Well Lining	LS	$ 3,690.00	5	1	$ 3,690
82	Leachate UST	LS	$ 36,890.00	2	1	$ 36,890
83	Signage - Perimeter (Methane Hazard)	EA	$ 105.00	2	16	$ 1,680
	TOTAL					**$8,603,207**

LS	Lump Sum	EA	Each
CY	Cubic Yard	PVC	Polyvinyl Chloride
AC	Acre	HPDE	High-Density Polyethylene
SF	Square Feet	LFG	Landfill Gas
LF	Linear Feet	UST	Underground Storage Tank
VLF	Vertical Linear Feet		

SOURCE (FOOTNOTES)	
1	Mobilization lump sum cost estimated to be no more than 1.2% of the estimated construction cost.
2	Based on previous construction costs for actual or similar item of similar size and/or physical configuration.
3	Estimate based on prevailing wage rates and equipment rental rates with estimated production rate, labor and equipment. See worksheet for item.
4	Estimate based on actual cost as verified with provider.
5	This is a specialized item and the unit cost is based on the manufacture's/installer's cost estimate that is from actual construction at similar sites.
6	Estimated based on discussions with contractors and providers.

CONSTRUCTION LABOR RATES
PREVAILING WAGE AND APPLICABLE SURCHARGES
CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS

Description	*Group [A]*	*Basic Hourly Rate [A]*	*11% Labor Surcharge [B]*	*33% Overhead and Profit [C]*	*Extended Hourly Rate*
General Laborer	3	$ 53.49	$ 5.88	$ 17.65	$ 77.03
Excavator Operator	3	$ 74.79	$ 8.23	$ 24.68	$ 107.70
Spreading Dozer Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Push Dozer Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Grading Dozer Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Loader Operator	3	$ 74.79	$ 8.23	$ 24.68	$ 107.70
Scraper Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Compactor Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Grader Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Backhoe Operator	3	$ 74.79	$ 8.23	$ 24.68	$ 107.70
Water Truck Operator	3	$ 53.49	$ 5.88	$ 17.65	$ 77.03
Dump Truck Operator	3	$ 53.49	$ 5.88	$ 17.65	$ 77.03
Foreman	----	$ 70.00	$ 7.70	$ 23.10	$ 100.80
Supervisor	----	$ 90.00	$ 9.90	$ 29.70	$ 129.60
Crane Operator	3	$ 74.79	$ 8.23	$ 24.68	$ 107.70

EQUIPMENT RENTAL RATES
CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)[B]

Description	*CALTRANS Code*	*Basic Rental Hourly Rate*	*15% Overhead and Profit*	*Extended Unit Hourly Rate*	*Extended Unit Daily Rate*
Excavator - CAT 320C	0312C	$ 93.76	$ 14.06	$ 107.82	$ 862.59
Scraper - CAT 631E	2185	$ 245.29	$ 36.79	$ 282.08	$ 2,256.67
Loader - CAT 938F	2130	$ 82.80	$ 12.42	$ 95.22	$ 761.76
Backhoe - CAT 426	1862	$ 39.87	$ 5.98	$ 45.85	$ 366.80
Grader - CAT 140G	3260	$ 82.74	$ 12.41	$ 95.15	$ 761.21
Spreading Dozer - CAT D-6D	3720	$ 76.35	$ 11.45	$ 87.80	$ 702.42
Push Dozer - CAT D-8N	4864	$ 165.43	$ 24.81	$ 190.24	$ 1,521.96
Grading Dozer - CAT D-6N XL	3755	$ 87.97	$ 13.20	$ 101.17	$ 809.32
Compactor - CAT 815B	2310	$ 134.17	$ 20.13	$ 154.30	$ 1,234.36
Compactor - Hand Guided	250	$ 9.43	$ 1.41	$ 10.84	$ 86.76
Water Truck - 4,000 Gallons	48-60	$ 61.92	$ 9.29	$ 71.21	$ 569.66
Dump Truck - 5 axles/on-Highway	5AXL	$ 87.29	$ 13.09	$ 100.38	$ 803.07
Pickup Truck - Light	00-06	$ 26.15	$ 3.92	$ 30.07	$ 240.58
Concrete Mixer - Portable	16-Nov	$ 6.14	$ 0.92	$ 7.06	$ 56.49
Generator	025-050	$ 14.42	$ 2.16	$ 16.58	$ 132.66
Crane-Link Belt HTS 35	4509	$ 101.17	$ 15.18	$ 116.35	$ 930.76

(A): General Prevailing Water Determination Made by the Director of Industrial Relations (current edition).

(B): Caltrans Labor Surcharge and Equipment Rental Rates (April 1, 2019 through March 31, 2020).

(C): Caltrans Specifications.

ITEM #4 - REMOVE EXISTING CMP AND HDPE DOWNDRAINS AND DRAIN OUTLETS

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Removal of downdrains and inlets	LS	days			1
Item Duration:					1

NOTES:
1. Production rate based on an estimate of 1 day for removal of existing downdrains and drain inlets

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	10	$ 1,541
Backhoe operator	1	$ 107.70	/hr.	10	$ 1,077
Dump truck operator	1	$ 77.03	/hr.	10	$ 770
Labor Total:					$ 3,388

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	10	$ 459
Pickup truck	1	$ 30.07	/hr.	10	$ 301
Dump truck	1	$ 100.38	/hr.	10	$ 1,004
Equipment Total:					$ 1,763

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total Lump Sum Cost for Labor, Equipment, and Materials: $ 5,151

ITEM #5 - REMOVE EXISTING LEACHATE PIPING

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Removal of existing leachate piping	LS	days			0.5
Item Duration:					0.5

NOTES:
1. Production rate based on an estimate of 0.5 day for removal of existing downdrains and drain inlets

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	5	$ 770
Backhoe operator	1	$ 107.70	/hr.	5	$ 539
Dump truck operator	1	$ 77.03	/hr.	5	$ 385
Labor Total:					$ 1,694

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	5	$ 229
Pickup truck	1	$ 30.07	/hr.	5	$ 150
Dump truck	1	$ 100.38	/hr.	5	$ 502
Equipment Total:					$ 882

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total Lump Sum Cost for Labor, Equipment, and Materials: $ 2,575

ITEM #6 - ADJUST EXISTING LEACHATE MANHOLES TO GRADE

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Adjust existing leachate manholes	5	ea	3	/day	1.7
Item Duration:					1.7

NOTES:
1. Production rate based on an estimate of 3 manhole adjustments per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	17	$ 2,568
Backhoe operator	1	$ 107.70	/hr.	17	$ 1,795
Labor Total:					$ 4,363

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	17	$ 764
Pickup truck	1	$ 30.07	/hr.	17	$ 501
			/hr.	17	$ -
Equipment Total:					$ 1,265

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total for Labor, Equipment, and Materials:	$	5,628
Quantity of Unit Item		5
Unit Cost:	$	1,130

ITEM #13 - STRUCTURE DEMOLITION

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Removal of structures	LS	days			1
Item Duration:					1

NOTES:
1. Production rate based on an estimate of 1 day for removal of existing structure.

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	10	$ 1,541
Backhoe operator	1	$ 107.70	/hr.	10	$ 1,077
Dump truck operator	1	$ 77.03	/hr.	10	$ 770
Labor Total:					$ 3,388

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	10	$ 459
Pickup truck	1	$ 30.07	/hr.	10	$ 301
Dump truck	1	$ 100.38	/hr.	10	$ 1,004
Equipment Total:					$ 1,763

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total Lump Sum Cost for Labor, Equipment, and Materials: $ 5,151

ITEM #67 - BURIED HEADER CROSSING

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Construction of buried header crossings	2	ea	2	/day	1
Item Duration:					1

NOTES:
1. Production rate based on an estimate of 2 buried header crossing constructions per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	8	$ 1,232
Backhoe operator	1	$ 107.70	/hr.	8	$ 862
Labor Total:					$ 2,094

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	8	$ 367
Equipment Total:					$ 367

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Pipe Bedding	2	$ 17.25	/ton	1	$ 34.50
Materials Total:					$ 34.50

Total for Labor, Equipment, and Materials:	$ 2,495
Quantity of Unit Item	2
Unit Cost:	$ 1,250

ITEM #68 - ROAD CROSSING - TYPE 1

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Construction of Type 1 road crossings	10	ea	1	/day	10
Item Duration:					10

NOTES:

1. Production rate based on an estimate of 1 Type 1 road crossing constructions per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	80	$ 12,325
Backhoe operator	1	$ 107.70	/hr.	80	$ 8,616
Labor Total:					$ 20,941

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	80	$ 3,668
Hand Guided Compactor	1	$ 10.84	/hr.	80	$ 867
Equipment Total:					$ 4,535

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
10" Steel Pipe Protective Sleeve	10	$ 85.10	/LF	20	$ 17,020.00
12 HDPE Corrugated Pipe	10	$ 26.45	/LF	40	$ 10,580.00
Aggregate Base	10	$ 1.37	/SF	540	$ 7,398.00
Materials Total:					$ 34,998.00

Total for Labor, Equipment, and Materials:	$ 60,474
Quantity of Unit Item	10
Unit Cost:	$ 6,050

ITEM #69 - ROAD CROSSING - TYPE 2

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Construction of Type 2 road crossing	1	ea	1	/day	1
Item Duration:					1

NOTES:
1. Production rate based on an estimate of 1 Type 2 road crossing construction per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	8	$ 1,232
Backhoe operator	1	$ 107.70	/hr.	8	$ 862
Labor Total:					$ 2,094

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	8	$ 367
Hand Guided Compactor	1	$ 10.84	/hr.	8	$ 87
Equipment Total:					$ 454

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
12" RCP Protective Sleeve	1	$ 20.70	/LF	50	$ 1,035.00
Aggregate Base	1	$ 1.37	/SF	600	$ 822.00
Materials Total:					$ 1,857.00

Total for Labor, Equipment, and Materials:	$	4,405
Quantity of Unit Item		1
Unit Cost:	$	4,405

ITEM #70 - ROAD CROSSING - TYPE 3

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Construction of Type 3 road crossing	1	ea	0.67	/day	1.5
Item Duration:					1

NOTES:
1. Production rate based on an estimate of 0.67 Type 3 road crossing construction per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	12	$ 1,840
Backhoe operator	1	$ 107.70	/hr.	12	$ 1,286
Labor Total:					$ 3,125

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	12	$ 547
Hand Guided Compactor	1	$ 10.84	/hr.	8	$ 87
Equipment Total:					$ 634

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
10" Steel Pipe Protective Sleeve	1	$ 85.10	/LF	20	$ 1,702.00
12 HDPE Corrugated Pipe	1	$ 26.45	/LF	40	$ 1,058.00
Aggregate Base	1	$ 1.37	/SF	540	$ 739.80
Materials Total:					$ 3,499.80

Total for Labor, Equipment, and Materials:	$ 7,260
Quantity of Unit Item	1
Unit Cost:	$ 7,260

ITEM #74 - FLARE STATION ASSEMBLY

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Flare station assembly	LS	days			5
Item Duration:					5

NOTES:
1. Production rate based on an estimate of 5 days to assembly flare station

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	50	$ 7,703
Crain Operator	1	$ 107.70	/hr.	8	$ 862
Foreman	1	$ 100.80	/hr.	8	$ 806
Labor Total:					$ 9,371

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Crain	1	$ 116.35	/hr.	8	$ 931
Pickup truck	1	$ 30.07	/hr.	50	$ 1,504
			/hr.	50	$ -
Equipment Total:					$ 2,434

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total Lump Sum Cost for Labor, Equipment, and Materials: $ 11,805

POSTCLOSURE MAINTENANCE

FINAL POSTCLOSURE MAINTENANCE COST ESTIMATE WORKSHEET
CITY OF UKIAH LANDFILL

PROJECT DESCRIPTION

The information presented herein provides an itemized breakdown of costs to implement postclosure maintenance activities for the City of Ukiah Landfill during the 30-year postclosure maintenance period.

PREPAREAD BY: EBA ENGINEERING

GENERAL SITE INFORMATION

Name of Solid Waste Landfill: City of Ukiah Landfill

Solid Waste Facilities Permit Number: 23-AA-0019

Facility Operator: City of Ukiah, Department of Public Works

Site Owner: City of Ukiah, Department of Public Works

Site Location (CA coordinates, township & range or longitude/latitude, preferred): SE 1/4, Section 10 Township 15 North, Range 12 West

Assessors Parcel Number: 178-130-010

Site Address: 3100 Vichy Springs Road
Ukiah, CA

FINAL POSTCLOSURE MAINTENANCE COSTS

1. Revegetation		
a. Regrading / Erosion Control / Reseeding	$	2,795
2. Leachate Management		
a. Leachate System Maintenance	$	2,750
b. Leachate/Condensate Disposal	$	822
c. Leachate Monitoring and Reporting	$	2,596
d. Leachate 5-year Constituents of Concern Testing (normalized to cost per year)	$	435
3. Environmental Monitoring		
a. LFG Collection System Operation, Monitoring and Maintenance	$	39,033
b. Annual Source Testing of Flare	$	4,459
c. AB32 Surface Emissions Monitoring and Reporting	$	13,657
d. Perimeter LFG Monitoring and Reporting	$	5,932
e. Perimeter Monitoring Probe Replacement (normalized to cost per year)	$	4,163
f. Perimeter Monitoring Probe Maintenance	$	465
g. Groundwater Monitoring and Reporting	$	47,306
h. Groundwater 5-year Constituents of Concern Testing (normalized to cost per year)	$	4,081

3. Environmental Monitoring *(continued)*		
i. Monitoring Well Replacement (normalized to cost per year)	$	6,744
j. Monitoring Well Maintenance	$	570
k. Surface Water Monitoring and Reporting	$	1,803
l. Surface Water 5-year Constituents of Concern Testing (normalized to cost per year)	$	484
4. Drainage Maintenance	$	3,034
5. Security	$	1,462
6. Inspection	$	3,884
7. Other		
a. ClosureTurf - Sand Ballast Infill Maintenance	$	2,393
b. 5-year Iso-Settlement Analysis (normalized to cost per year)	$	4,151
c. Geomembrane Replacement (normalized to cost per year)	$	86,715
Final Postclosure Maintenance Subtotal	$	239,731
Subtotal x 30 years Postclosure Care	**$**	**7,191,931**

LEACHATE MONITORING & MAINTENANCE
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

LEACHATE MAINTENANCE AND MONITORING

LEACHATE SYSTEM MAINTENANCE

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Annual Maintenance	$ 2,750.00	LS	1.00	$ 2,750.00	Assumed.
			Extended Total:	*$ 2,750.00*	

LEACHATE DISPOSAL

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Leachate Disposal (per day)	$ 0.0044	/gal.	300	$ 1.32	
			Subtotal (per day):	$ 1.32	
			Extended Subtotal (per year):	$ 481.80	
Sr. Hydrogeologist - Mgmt	$ 170.00	/hr.	2.00	$ 340.00	Engineering consultant wage rate.
			Extended Total:	*$ 821.80*	

SEMI-ANNUAL LEACHATE LEVEL MONITORING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00	/hr.	0.50	$ 52.50	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58	/mi.	0.00	$ -	Included under GW monitoring.
Water Level Meter	$ 33.00	/day	0.00	$ -	Included under GW monitoring.
			Subtotal:	$ 52.50	
			Extended Total (2 Events):	*$ 105.00*	

QUARTERLY LEACHATE MONITORING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00	/hr.	0.50	$ 52.50	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58	/mi.	0.00	$ -	Included under GW monitoring.
Parameter Meter	$ 33.00	/day	0.00	$ -	Included under GW monitoring.
Materials - Disposable Bailer	$ 12.00	ea.	1.00	$ 12.00	Engineering consultant equipment/material rate.
Total Dissolved Solids	$ 15.00	ea.	1.00	$ 15.00	Lab Quote
Chloride	$ 18.00	ea.	1.00	$ 18.00	Lab Quote

QUARTERLY LEACHATE MONITORING *(Continued)*

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Sulfate	$ 18.00	ea.	1.00	$ 18.00	Lab Quote
Nitrate as N	$ 18.00	ea.	1.00	$ 18.00	Lab Quote
COD	$ 30.00	ea.	1.00	$ 30.00	Lab Quote
BOD	$ 33.00	ea.	1.00	$ 33.00	Lab Quote
Total Ammonia	$ 25.00	ea.	1.00	$ 25.00	Lab Quote
Total Alkalinity	$ 15.00	ea.	1.00	$ 15.00	Lab Quote
VOCs (8260)	$ 140.00	ea.	1.00	$ 140.00	Lab Quote
Total Purgeable/Extractable Petroleum Hydrocarbons	$ 100.00	ea.	1.00	$ 100.00	Lab Quote
QA/QC - Trip Blank for VOCs (8260)	$ 140.00	ea.	0.00	$ -	Included under GW monitoring.
Geotracker EDD File	10 Percent of Total Lab Cost			$ 41.20	
Project Manager - Mgmt	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
			Subtotal:	$ 517.70	
			Extended Total (4 Events):	*$ 2,070.80*	

ANNUAL LEACHATE TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Inorganics	$ 370.00	ea.	1.00	$ 370.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	1.00	$ 50.00	Lab Quote
			Extended Total:	*$ 420.00*	

LEACHATE REPORTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
Drafting	$ 100.00	/hr.	0.00	$ -	Included under GW monitoring.
Sr. Hydrogeologist (MD) - Mgmt & Review	$ 170.00	/hr.	0.00	$ -	Included under GW monitoring.
Clerical	$ 65.00	/hr.	0.00	$ -	Included under GW monitoring.
			Extended Total:	***$ -***	

5-YEAR CONSTITUENTS OF CONCERN TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
SVOCs (8270)	$ 295.00	ea.	1.00	$ 295.00	Lab Quote
Organochlorine Pesticides + PCBs	$ 130.00	ea.	1.00	$ 130.00	Lab Quote
Organophosphorus Compounds	$ 190.00	ea.	1.00	$ 190.00	Lab Quote
Chlorophenoxy Herbicides	$ 175.00	ea.	1.00	$ 175.00	Lab Quote
			Testing Subtotal:	$ 790.00	

5-YEAR CONSTITUENTS OF CONCERN TESTING *(Continued)*

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Additional Report Prep / Mgmt	$ 105.00	/hr.	8.00	$ 840.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Additional Report Review	$ 170.00	/hr.	3.00	$ 510.00	Engineering consultant wage rate.
Clerical - Additional Clerical	$ 65.00	/hr.	0.50	$ 32.50	Engineering consultant wage rate.
			Reporting Subtotal:	$ 1,382.50	
			Extended Subtotal:	$ 2,172.50	
Total 5-year COC Testing Costs:	$ 2,172.50	/ea.	6.00	$ 13,035.00	6 events during 30-year PM period.
			Normalized 5-year COC Testing Costs per Year:	*$ 434.50*	
TOTAL ANNUAL COST				***$ 6,602.10***	

LANDFILL GAS MONITORING
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

LFG COLLECTION SYSTEM

WELLHEAD MONITORING & SYSTEM MAINTENANCE

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Field Technician - Well Field Tuning	$ 105.00	/hr.	8.00	$ 840.00	Engineering consultant wage rate. Assumes once per month.
Mileage (1 Round Trip)	$ 0.58	/mi.	130.00	$ 75.40	Engineering consultant equipment/material rate.
Meter	$ 100.00	/day	1.00	$ 100.00	Engineering consultant equipment/material rate.
Field Technician - Data Entry/Management	$ 105.00	/hr.	1.00	$ 105.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt	$ 170.00	/hr.	2.00	$ 340.00	Engineering consultant wage rate.
			Subtotal:	$ 1,460.40	
Annual Maintenance	$ 3,200.00	LS	1.00	$ 3,200.00	Assumed.
			Extended Total (12 Events):	*$ 20,724.80*	

UTILITIES

Description	Unit Rate		Hours	Extended Cost	Source / Assumptions
Electricity (assume 10 HP)	$ 0.22	/kw-hr.	8760.00	$ 18,308.40	Assumes unit power use of 9.5 kw
			Extended Total:	*$ 18,308.40*	

ANNUAL SOURCE TEST

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Source Testing - Contractor	$ 3,000.00	LS	1.00	$ 3,000.00	Contactor Quote
Hydraulic Personnel Lift (Boom Type - Code 50-74)	$ 413.76	LS	1.00	$ 413.76	Equipment Rental Rates - California Department of Transportation.
Field Technician - Well Field Support	$ 105.00	/hr.	6.00	$ 630.00	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58	/mi.	130.00	$ 75.40	Engineering consultant equipment/material rate.
Sr. Hydrogeologist - Mgmt	$ 170.00	/hr.	2.00	$ 340.00	Engineering consultant wage rate.
			Extended Total:	*$ 4,459.16*	

AB32 SURFACE EMISSIONS MONITORING & REPORTING

FIELD MONITORING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Field (Travel)	$ 105.00	/hr.	2.00	$ 210.00	Engineering consultant wage rate.
Staff Geologist - Field (Set-up Windlog)	$ 105.00	/hr.	1.00	$ 105.00	Engineering consultant wage rate.
Staff Geologist - Field (Emissions Monitoring)	$ 105.00	/hr.	8.00	$ 840.00	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58	/mi.	130.00	$ 75.40	Engineering consultant equipment/material rate.
FID Rental + Shipping	$ 575.00	LS	1.00	$ 575.00	Contactor Quote

FIELD MONITORING *(Continued)*

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Windlog Rental	$ 100.00 /ev.	1.00	$ 100.00	Engineering consultant equipment/material rate.
Staff Geologist - Data Reduction	$ 105.00 /hr.	1.00	$ 105.00	Engineering consultant wage rate.
Staff Geologist - Mgmt	$ 105.00 /hr.	3.00	$ 315.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt	$ 170.00 /hr.	3.00	$ 510.00	Engineering consultant wage rate.
Clerical	$ 65.00 /hr.	1.00	$ 65.00	Engineering consultant wage rate.
		Subtotal:	$ 2,900.40	
		Extended Total (4 Events):	*$ 11,601.60*	

ANNUAL REPORTING

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00 /hr.	12.00	$ 1,260.00	Engineering consultant wage rate.
Drafting	$ 100.00 /hr.	0.50	$ 50.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt & Review	$ 170.00 /hr.	4.00	$ 680.00	Engineering consultant wage rate.
Clerical	$ 65.00 /hr.	1.00	$ 65.00	Engineering consultant wage rate.
		Extended Total:	*$ 2,055.00*	

QUARTERLY PERIMETER MONITORING & REPORTING

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Field Monitoring	$ 105.00 /hr.	6.00	$ 630.00	Engineering consultant wage rate.
RKI Eagle Meter	$ 100.00 /day	1.00	$ 100.00	Engineering consultant equipment/material rate.
Mileage (1 Round Trip)	$ 0.58 /mi.	130.00	$ 75.40	Engineering consultant equipment/material rate.
Staff Geologist - Mgmt	$ 105.00 /hr.	1.00	$ 105.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt	$ 170.00 /hr.	0.50	$ 85.00	Engineering consultant wage rate.
Staff Geologist - Report Preparation	$ 105.00 /hr.	2.00	$ 210.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Report Review	$ 170.00 /hr.	1.00	$ 170.00	Engineering consultant wage rate.
Drafting	$ 100.00 /hr.	0.75	$ 75.00	Engineering consultant wage rate.
Clerical	$ 65.00 /hr.	0.50	$ 32.50	Engineering consultant wage rate.
		Subtotal:	$ 1,482.90	
		Extended Total (4 Quarters):	*$ 5,931.60*	

MONITORING PROBE REPLACEMENT

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Work Plan	$1,500 LS	1	$ 1,500.00	Engineering consultant wage rates.
Permitting	$600 LS	1	$ 600.00	Assumes average completion depth of 115 feet BGS.
Drill Rig - Mobilization / Drilling	$475 /hr.	12	$ 5,700.00	Contactor Quote
Materials	$13 /ft.	115	$ 1,495.00	Contactor Quote
Staff Geologist - Installation / Management	$105 /hr.	16	$ 1,680.00	Engineering consultant wage rate.
Surveying	$650 LS	1	$ 650.00	Engineering consultant wage rate.

MONITORING PROBE REPLACEMENT *(Continued)*

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$105 /hr.	6	$ 630.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Report Review	$170 /hr.	1	$ 170.00	Engineering consultant wage rate.
Clerical	$65 /hr.	1	$ 65.00	Engineering consultant wage rate.
		Subtotal:	$ 12,490.00	
Total Monitoring Network Replacement Cost:	$ 12,490.00 /ea.	10.00	$ 124,900.00	Assumes each probe replaced once in 30 years.
		Normalized Cost per Year:	*$ 4,163.33*	

MONITORING PROBE MAINTENANCE

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Field Technician - Maintenance	$105 /hr.	3	$315	Engineering consultant wage rate.
Materials	$150 LS	1	$150	Assumes $15 per probe.
		Extended Total:	*$465*	

TOTAL ANNUAL COST ***$ 67,708.89***

GROUNDWATER MONITORING & MAINTENANCE
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

GROUNDWATER MAINTENANCE AND MONITORING

QUARTERLY GROUNDWATER MONITORING

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00 /hr.	8.00	$ 840.00	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58 /mi.	20.00	$ 11.60	Engineering consultant equipment/material rate.
Water Level Meter	$ 33.00 /day	1.00	$ 33.00	Engineering consultant equipment/material rate.
Parameter Meter	$ 50.00 /day	1.00	$ 50.00	Engineering consultant equipment/material rate.
Sample Rental Equipment	$ 310.00 /event	1.00	$ 310.00	Contactor Quote
Materials - Disposable Bailers	$ 12.00 ea.	5.00	$ 60.00	Engineering consultant equipment/material rate.
Total Dissolved Solids	$ 15.00 ea.	5.00	$ 75.00	Lab Quote
Chloride	$ 18.00 ea.	5.00	$ 90.00	Lab Quote
Sulfate	$ 18.00 ea.	5.00	$ 90.00	Lab Quote
Nitrate as N	$ 18.00 ea.	5.00	$ 90.00	Lab Quote
Manganese	$ 30.00 ea.	5.00	$ 150.00	Lab Quote
Boron	$ 33.00 ea.	5.00	$ 165.00	Lab Quote
Total Ammonia	$ 25.00 ea.	5.00	$ 125.00	Lab Quote
Total Alkalinity	$ 15.00 ea.	5.00	$ 75.00	Lab Quote
VOCs (8260)	$ 140.00 ea.	5.00	$ 700.00	Lab Quote
Total Purgeable/Extractable Petroleum Hydrocarbons	$ 100.00 ea.	5.00	$ 500.00	Lab Quote
QA/QC - Trip Blank for VOCs (8260)	$ 140.00 ea.	1.00	$ 140.00	Lab Quote
Geotracker EDD File	10 Percent of Total Lab Cost		$ 220.00	Lab Quote
Project Manager - Mgmt	$ 105.00 /hr.	2.00	$ 210.00	Engineering consultant wage rate.
		Subtotal:	$ 3,934.60	
		Extended Total (2 Events):	*$ 7,869.20*	

SEMI-ANNUAL GROUNDWATER MONITORING

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00 /hr.	24.00	$ 2,520.00	Engineering consultant wage rate.
Mileage (3 Round Trips)	$ 0.58 /mi.	60.00	$ 34.80	Engineering consultant equipment/material rate.
Parameter Meter	$ 50.00 /day	3.00	$ 150.00	Engineering consultant equipment/material rate.
Sample Rental Equipment	$ 310.00 /event	1.00	$ 310.00	Contactor Quote
Materials - Disposable Bailers	$ 12.00 ea.	16.00	$ 192.00	Engineering consultant equipment/material rate.
Total Dissolved Solids	$ 15.00 ea.	16.00	$ 240.00	Lab Quote
Chloride	$ 18.00 ea.	16.00	$ 288.00	Lab Quote

SEMI-ANNUAL GROUNDWATER MONITORING ***(Continued)***

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Sulfate	$ 18.00	ea.	16.00	$ 288.00	Lab Quote
Nitrate as N	$ 18.00	ea.	16.00	$ 288.00	Lab Quote
Manganese	$ 30.00	ea.	16.00	$ 480.00	Lab Quote
Boron	$ 33.00	ea.	16.00	$ 528.00	Lab Quote
Total Ammonia	$ 25.00	ea.	16.00	$ 400.00	Lab Quote
Total Alkalinity	$ 15.00	ea.	16.00	$ 240.00	Lab Quote
VOCs (8260)	$ 140.00	ea.	16.00	$ 2,240.00	Lab Quote
Total Purgeable/Extractable Petroleum Hydrocarbons	$ 100.00	ea.	16.00	$ 1,600.00	Lab Quote
QA/QC - Trip Blank for VOCs (8260)	$ 140.00	ea.	1.00	$ 140.00	Lab Quote
Geotracker EDD File	10 Percent of Total Lab Cost			$ 673.20	Lab Quote
Project Manager - Mgmt	$ 105.00	/hr.	2.00	$ 210.00	Engineering consultant wage rate.
			Subtotal:	$ 10,822.00	
			Extended Total (2 Events):	*$ 21,644.00*	

ANNUAL GROUNDWATER TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Inorganics	$ 370.00	ea.	16.00	$ 5,920.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	16.00	$ 800.00	Lab Quote
			Extended Total:	*$ 6,720.00*	

SEMI-ANNUAL GROUNDWATER REPORTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00	/hr.	20.00	$ 2,100.00	Engineering consultant wage rate.
Statistical Analysis	$ 960.00	/event	1.00	$ 960.00	Contactor Quote
Drafting	$ 100.00	/hr.	3.00	$ 300.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt & Review	$ 170.00	/hr.	4.00	$ 680.00	Engineering consultant wage rate.
Clerical	$ 65.00	/hr.	4.00	$ 260.00	Engineering consultant wage rate.
			Extended Total:	*$ 4,300.00*	

ANNUAL GROUNDWATER REPORTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00	/hr.	40.00	$ 4,200.00	Engineering consultant wage rate.
Statistical Analysis	$ 960.00	/event	1.00	$ 960.00	Contactor Quote
Drafting	$ 100.00	/hr.	3.00	$ 300.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt & Review	$ 170.00	/hr.	6.00	$ 1,020.00	Engineering consultant wage rate.
Clerical	$ 65.00	/hr.	4.50	$ 292.50	Engineering consultant wage rate.
			Extended Total:	*$ 6,772.50*	

5-YEAR CONSTITUENTS OF CONCERN TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
SVOCs (8270)	$ 295.00	ea.	16.00	$ 4,720.00	Lab Quote
Organochlorine Pesticides + PCBs	$ 130.00	ea.	16.00	$ 2,080.00	Lab Quote
Organophosphorus Compounds	$ 190.00	ea.	16.00	$ 3,040.00	Lab Quote
Chlorophenoxy Herbicides	$ 175.00	ea.	16.00	$ 2,800.00	Lab Quote
Inorganics	$ 370.00	ea.	16.00	$ 5,920.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	16.00	$ 800.00	Lab Quote
			Testing Subtotal:	$ 19,360.00	
Staff Geologist - Additional Report Prep / Mgmt	$ 105.00	/hr.	8.00	$ 840.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Additional Report Review	$ 170.00	/hr.	1.00	$ 170.00	Engineering consultant wage rate.
Clerical - Additional Clerical	$ 65.00	/hr.	0.50	$ 32.50	Engineering consultant wage rate.
			Reporting Subtotal:	$ 1,042.50	
			Extended Subtotal:	$ 20,402.50	
Total 5-year COC Testing Costs:	$ 20,402.50	/ea.	6.00	$ 122,415.00	6 events during 30-year PM period.
			Normalized Cost per Year:	*$ 4,080.50*	

MONITORING WELL REPLACEMENT

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Work Plan	$1,500	LS	1	$ 1,500.00	Engineering consultant wage rates.
Permitting	$600	LS	1	$ 600.00	Assumes 2" well with average completion depth of 50 feet BGS.
Drill Rig - Mobilization / Drilling	$475	/hr.	8	$ 3,800.00	Contactor Quote
Materials	$10	/ft.	50	$ 500.00	Contactor Quote
Staff Geologist - Installation / Management	$105	/hr.	12	$ 1,260.00	Engineering consultant wage rate.
Well Development Rig	$100	/hr.	8	$ 800.00	Contactor Quote
Materials + Equipment	$125	LS	1	$ 125.00	Contactor Quote
Surveying	$650	LS	1	$ 650.00	Engineering consultant wage rate.
Staff Geologist - Reporting	$105	/hr.	13	$ 1,365.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Report Review	$170	/hr.	3	$ 510.00	Engineering consultant wage rate.
Clerical	$65	/hr.	2	$ 130.00	Engineering consultant wage rate.
			Subtotal:	$ 11,240.00	
Total Monitoring Network Replacement Cost:	$ 11,240.00	/ea.	18.00	$ 202,320.00	Assumes each well replaced once in 30 years.
			Normalized Cost per Year:	*$ 6,744.00*	

MONITORING WELL MAINTENANCE

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Field Technician - Maintenance	$105 /hr.	2	$210	Engineering consultant wage rate.
Materials	$360 LS	1	$360	Assumes $20 per well.
		Extended Total:	*$570*	

TOTAL ANNUAL COST ***$ 58,700.20***

SURFACE WATER MONITORING & MAINTENANCE
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

SURFACE WATER MONITORING

SEMI-ANNUAL SURFACE WATER MONITORING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00	/hr.	0.75	$ 78.75	Engineering consultant wage rate.
Mileage (3 Round Trips)	$ 0.58	/mi.	0.00	$ -	Included under GW monitoring.
Parameter Meter	$ 50.00	/day	0.00	$ -	Included under GW monitoring.
Total Dissolved Solids	$ 15.00	ea.	2.00	$ 30.00	Lab Quote
Chloride	$ 18.00	ea.	2.00	$ 36.00	Lab Quote
Sulfate	$ 18.00	ea.	2.00	$ 36.00	Lab Quote
Total Nitrogen	$ 45.00	ea.	2.00	$ 90.00	Lab Quote
Total Ammonia	$ 25.00	ea.	2.00	$ 50.00	Lab Quote
COD	$ 30.00	ea.	2.00	$ 60.00	Lab Quote
Total Suspended Solids	$ 17.00	ea.	2.00	$ 34.00	Lab Quote
Total Settleable Solids	$ 15.00	ea.	2.00	$ 30.00	Lab Quote
Geotracker EDD File	10 Percent of Total Lab Cost			$ 36.60	Lab Quote
Project Manager - Mgmt	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
			Subtotal:	$ 481.35	
			Extended Total (2 Events):	*$ 962.70*	

ANNUAL SURFACE WATER TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Inorganics	$ 370.00	ea.	2.00	$ 740.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	2.00	$ 100.00	Lab Quote
			Extended Total:	*$ 840.00*	

SEMI-ANNUAL SURFACE WATER REPORTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
Drafting	$ 100.00	/hr.	0.00	$ -	Included under GW monitoring.
Sr. Hydrogeologist - Mgmt & Review	$ 170.00	/hr.	0.00	$ -	Included under GW monitoring.
Clerical	$ 65.00	/hr.	0.00	$ -	Included under GW monitoring.
			Extended Total:	*$ -*	

5-YEAR CONSTITUENTS OF CONCERN TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
SVOCs (8270)	$ 295.00	ea.	2.00	$ 590.00	Lab Quote
Organochlorine Pesticides + PCBs	$ 130.00	ea.	2.00	$ 260.00	Lab Quote
Organophosphorus Compounds	$ 190.00	ea.	2.00	$ 380.00	Lab Quote
Chlorophenoxy Herbicides	$ 175.00	ea.	2.00	$ 350.00	Lab Quote
Inorganics	$ 370.00	ea.	2.00	$ 740.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	2.00	$ 100.00	Lab Quote
			Testing Subtotal:	$ 2,420.00	
Staff Geologist - Additional Report Prep / Mgmt	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
Sr. Hydrogeologist - Additional Report Review	$ 170.00	/hr.	0.00	$ -	Included under GW monitoring.
Clerical - Additional Clerical	$ 65.00	/hr.	0.00	$ -	Included under GW monitoring.
			Reporting Subtotal:	$ -	
			Extended Subtotal:	$ 2,420.00	
Total 5-year COC Testing Costs:	$ 2,420.00	/ea.	6.00	$ 14,520.00	6 events during 30-year PM period.
			Normalized Cost per Year:	*$ 484.00*	

TOTAL ANNUAL COST ***$ 2,286.70***

MISCELLANEOUS POSTCLOSURE MAINTENANCE ITEMS
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

REVEGETATION

Regrading / Erosion Control / Reseeding

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Coordination and Management	$105 /hr.	2	$210	Engineering consultant wage rate.
Backhoe (CAT 426)	$45.85 /hr.	8	$367	Equipment Rental Rates - California Department of Transportation.
Backhoe Operator	$107.70 /hr.	8	$862	General Prevailing Wage - California Department of Industrial Relations.
General Laborer	$77.03 /hr.	8	$616	General Prevailing Wage - California Department of Industrial Relations.
Pickup Truck - Light	$30.07 /hr.	8	$241	Equipment Rental Rates - California Department of Transportation.
Materials	$500 LS	1	$500	Assumed.
		Extended Total:	*$2,795*	

DRAINAGE MAINTENANCE

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Coordination and Management	$105 /hr.	2	$210	Engineering consultant wage rate.
General Laborer	$77.03 /hr.	8	$616	General Prevailing Wage - California Department of Industrial Relations.
Pickup Truck - Light	$30.07 /hr.	8	$241	Equipment Rental Rates - California Department of Transportation.
Materials	$450 LS	1	$450	Assumed.
		Subtotal per Event:	$1,517	
		Number of Events per Year:	2	
		Extended Total:	*$ 3,034*	

SECURITY

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Coordination and Management	$105 /hr.	1	$105	Engineering consultant wage rate.
General Laborer	$77.03 /hr.	8	$616	General Prevailing Wage - California Department of Industrial Relations.
Pickup Truck - Light	$30.07 /hr.	8	$241	Equipment Rental Rates - California Department of Transportation.
Materials	$500 LS	1	$500	Assumed.
		Extended Total:	*$1,462*	

INSPECTION

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Inspections	$105 /hr.	4	$420	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58 /mi.	20.00	$12	Engineering consultant equipment/material rate.
		Subtotal per Event:	$432	
		Number of Events per Year:	9	
		Extended Total:	*$3,884*	

ClosureTurf - SAND BALLAST INFILL MAINTENANCE

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Coordination and Management	$105 /hr.	4	$420	Engineering consultant wage rate.
General Laborer (2 labors, one 8-hr work day)	$77.03 /hr.	16	$1,232	General Prevailing Wage - California Department of Industrial Relations.
Pickup Truck - Light	$30.07 /hr.	8	$241	Equipment Rental Rates - California Department of Transportation.
Materials	$500 LS	1	$500	Quote for purchase and delivery of 10 cubic yards of sand ballast material.
		Extended Total:	*$2,393*	

5-YEAR ISO-SETTLEMENT ANALYSIS

Description	Unit Rate	Quantity	Extended Cost	
Aerial Topographic Survey	$16,500 LS	1	$16,500	Contactor Quote
Staff Engineer - Data Reduction / Calculations	$105 /hr.	24	$2,520	Engineering consultant wage rate.
Senior Engineer - Report Preparation / Management	$170 /hr.	10	$1,700	Engineering consultant wage rate.
Clerical	$65 /hr.	0.5	$33	Engineering consultant wage rate.
		Subtotal:	$20,753	
		Frequency Interval:	5	
		Normalized Cost per Year:	*$4,151*	

GEOMEMBRANE REPLACEMENT

Description	Unit Rate	Quantity	Extended Cost	
Geomembrane - Material and Installation	$1.38 /sf	1,885,100	$2,601,438	Contactor Quote
	Duration of Postclosure Maintenance Period (years):		30	
		Normalized Cost per Year:	*$86,715*	

APPENDIX M

FUND DISBURSEMENT SCHEDULE

FUND DISBURSEMENT SCHEDULE
FINAL CLOSURE CONSTRUCTION PROJECT
CITY OF UKIAH LANDFILL

Payment	*Task*	*Description*	*Completion Date*	*Disbursement Cost*
I	1	Mobilization	5/31/20	$ 106,000
	2	Removal / Adjustment of Existing Components	5/31/20	$ 31,676
	3	Clearing and Grubbing	5/31/20	$ 52,533
	4	Temporary Erosion Control Provisions	5/31/20	$ 16,000
	5	Refuse Excavation and Relocation / General Excavation	5/31/20	$ 86,056
	6	Subgrade Preparation	5/31/20	$ 207,581
	7	Fill Placement (Refuse Excavation Interim Cover Soils)	5/31/20	$ 22,400
	8	Fill Placement (Foundation Layer and Engineered Fill)	5/31/20	$ 168,720
	9	Landfill Gas Extraction System Installation	5/31/20	$ 86,824
	10	Engineering / CQA Inspection / Testing	5/31/20	$ 75,348
			Payment I Subtotal:	**$ 853,138**
II	8	Fill Placement (Foundation Layer and Engineered Fill)	6/30/20	$ 168,720
	11	ClosureTurf Installation	6/30/20	$ 1,461,198
	9	Landfill Gas Extraction System Installation	6/30/20	$ 117,832
	10	Engineering / CQA Inspection / Testing	6/30/20	$ 100,464
			Payment II Subtotal:	**$ 1,848,214**
III	11	ClosureTurf Installation	7/31/20	$ 1,582,965
	9	Landfill Gas Extraction System Installation	7/31/20	$ 117,832
	10	Engineering / CQA Inspection / Testing	7/31/20	$ 100,464
			Payment III Subtotal:	**$ 1,801,261**
IV	11	ClosureTurf Installation	8/31/20	$ 1,582,965
	12	Drainage Facilities	8/31/20	$ 197,030
	9	Landfill Gas Extraction System Installation	8/31/20	$ 117,832
	10	Engineering / CQA Inspection / Testing	8/31/20	$ 100,464
			Payment IV Subtotal:	**$ 1,998,291**
V	11	ClosureTurf Installation	9/30/20	$ 1,461,198
	12	Drainage Facilities	9/30/20	$ 394,060
	13	Access Roads	9/30/20	$ 233,360
	14	Leachate Collection System Modifications	9/30/20	$ 55,954
	9	Landfill Gas Extraction System Installation	9/30/20	$ 117,832
	15	Final Erosion Control / Revegetation	9/30/20	$ 43,634
	10	Engineering / CQA Inspection / Testing	9/30/20	$ 100,464
			Payment V Subtotal:	**$ 2,406,502**

(Continued)

FUND DISBURSEMENT SCHEDULE
FINAL CLOSURE CONSTRUCTION PROJECT
CITY OF UKIAH LANDFILL
(Continued)

Payment	*Task*	*Description*	*Completion Date*	*Disbursement Cost*
VI	12	Drainage Facilities	10/31/20	$ 65,676
	15	Final Erosion Control / Revegetation	10/31/20	$ 43,633
	16	Sign Installation	10/31/20	$ 1,680
	9	Landfill Gas Extraction System Installation	10/31/20	$ 62,016
	10	Engineering / CQA Inspection / Testing	10/31/20	$ 25,116
			Payment VI Subtotal:	**$ 198,121**
VII	17	CQA Certification Report	1/31/21	$ 32,420
			Payment VII Subtotal:	**$ 32,420**
			TOTAL	***$ 9,137,947***

CQA: Construction Quality Assurance

Public Draft
ATTACHMENT 2

Environmental Impact Report
City of Ukiah's Landfill Closure Project

SCH#: 2017022009



City of Ukiah

SMB ENVIRONMENTAL

November 2019

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Acronyms

F	degrees Fahrenheit
µg/m3	micrograms per cubic meter
µm	micrometer
AB	Assembly Bill
ABAG	Association of Bay Area Governments
APE	Area of Potential Effect
AST	aboveground storage tank
ATC	Authority to Construct
B	Beneficial Impacts
bgs	below ground surface
B.P.	Before Present
BMP	best management practice
BOD	Biological Oxygen Demand
CalEEMOD	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CAMP	Corrective Action Monitoring Program
CAPCOA	California Air Pollution Officers Association
CARB	California Air Resources Board
CARs	Certified Analytical Reports
CBD	Continental Basin Deposits
CCAA	California Clean Air Act
CCL	compacted clay liner
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDMG	California Division of Mines and Geology
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations

cfs	cubic feet per second
CGP	Construction General Permit
CGS	California Geologic Survey
CH_4	Methane
City	City of Ukiah
CIWMB	California Integrated Waste Management Board
CMP	corrugated metal pipe
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide
CO2	carbon dioxide.
COCs	constituents of concern
COD	Chemical Oxygen Demand
CQA	Construction Quality Assurance
CRHR	California Register of Historical Resources
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	decibel
dBA	A-weighted decibel
DMP	Detection Monitoring Program
DPM	Diesel particulate matter
DWR	Department of Water Resources
EFS	Engineering Feasibility Study
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
FCAAA	Federal Clean Air Act Amendments
FEMA	Federal Emergency Management Agency
FIP	Federal Implementation Plan
FIRM	Flood Insurance Rate Map
FOS	Factor of Safety

FPCMP	Final Postclosure Maintenance Plan
FTA	Federal Transit Administration
GCL	geosynthetic clay liner
GHG	Greenhouse Gas
gpm	gallons per minute
HAP	Hazardous air pollutants
HDPE	high-density polyethylene
HFCs	hydrofluorocarbons
IPAC	Information on Planning and Conservation
IS/MND	Initial Study/Mitigated Negative Declaration
JTD	Joint Technical Document
kg/day	kilogram per day
Km	kilometers
KOP	Key observation point
LCRS	leachate collection and removal system
LEA	Local Enforcement Agency
Leq	equivalent sound level
LFG	Landfill Gas
LHCL	low-hydraulic conductivity layer
LLDPE	linear low-density polyethylene
Lmax	highest sound pressure level in a specific time period
LS	Less-than-significant
LSAA	Lake and streambed alteration agreements
LTSM	Less-than-significant with mitigation
LUP	Linear underground project
M	magnitude
M&RP	Monitoring and Reporting Plan
MBTA	Migratory Bird Treaty Act
MCAQMD	Mendocino County Air Quality Management District
MFZ	Maacama Fault Zone
Mi	miles

MM	Modified Mercalli Scale
MPE	Maximum probable earthquake
MRP	Monitoring and Reporting Program
msl	mean sea level
MSW	municipal solid waste
MtBE	methyl tertiary-butyl ether
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCAB	North Coast Air Basin
NCRWQCB	North Coast Regional Water Quality Control Board
NELs	numeric effluent limitations
NEPA	National Environmental Policy Act of 1969
NI	No Impact
NMFS	National Marine Fisheries Service
NMOC	Non-methane organic compounds
NO2	nitrogen dioxide
NOA	naturally occurring asbestos
NOP	Notice of Preparation
NOT	Notice of Termination
NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historical Places
NWIC	Northwest information center
NWPs	Nationwide permits
O3	ozone
OEHHA	California Office of Environmental Health Hazard Assessment
OHP	Office of Historic Preservation
PAH	polycyclic aromatic hydrocarbons
Pb	lead

PCB	Polychlorinated Biphenyls
PFCs	perfluorinated compounds
PGA	peak ground acceleration
PM10	particulate matter sized 10 microns or less
PM2.5	particulate matter sized 2.5 microns or less
ppm	parts per million
ppmv	parts per million by volume
PRC	Public Resources Code
PSHA	Probabilistic Seismic Hazard Assessment
PTO	Permit to Operate
PVC	polyvinyl chloride
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
RCRA	Resource Conservation and Recovery Act
REL	Reference exposure level
ROG	reactive organic gas
ROWD	report of waste discharge
RWQCB	Regional Water Quality Control Board
SCE	Candidate-endangered species
SCH	Governor's Office of Planning and Research State Clearinghouse
SCT	Candidate-threatened species
sf	square feet
SF_6	Hexafluoride
SIP	State Implementation Plan
SMARTS	Stormwater multi-application reporting and tracking system
SO2	sulfur dioxide
SR	State Route
SSC	Special species of concern
SU	Significant
SWAT	Solid Waste Assessment Test
SWPPP	Storm Water Pollution Prevention Plan

SWRCB	State Water Resources Control Board
TAC	toxic air contaminants
TDS	total dissolved solids
TMDL	total maximum daily load
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound
WDR	Waste Discharge Requirement
WMU	Waste Management Unit
WQPS	Water Quality Protection Standards

Executive Summary

The City of Ukiah (City) has prepared this Draft Environmental Impact Report (EIR) to provide the public and responsible agencies with information about the potential environmental effects of the City's proposed Ukiah Landfill Closure Project (Proposed Project). Please see Appendix A for the Final Closure and Postclosure Maintenance Plan (Final CPMP) for the Ukiah Landfill. The City will be the lead agency under the California Environmental Quality Act (CEQA).

ES.1 Purpose of the Environmental Impact Report

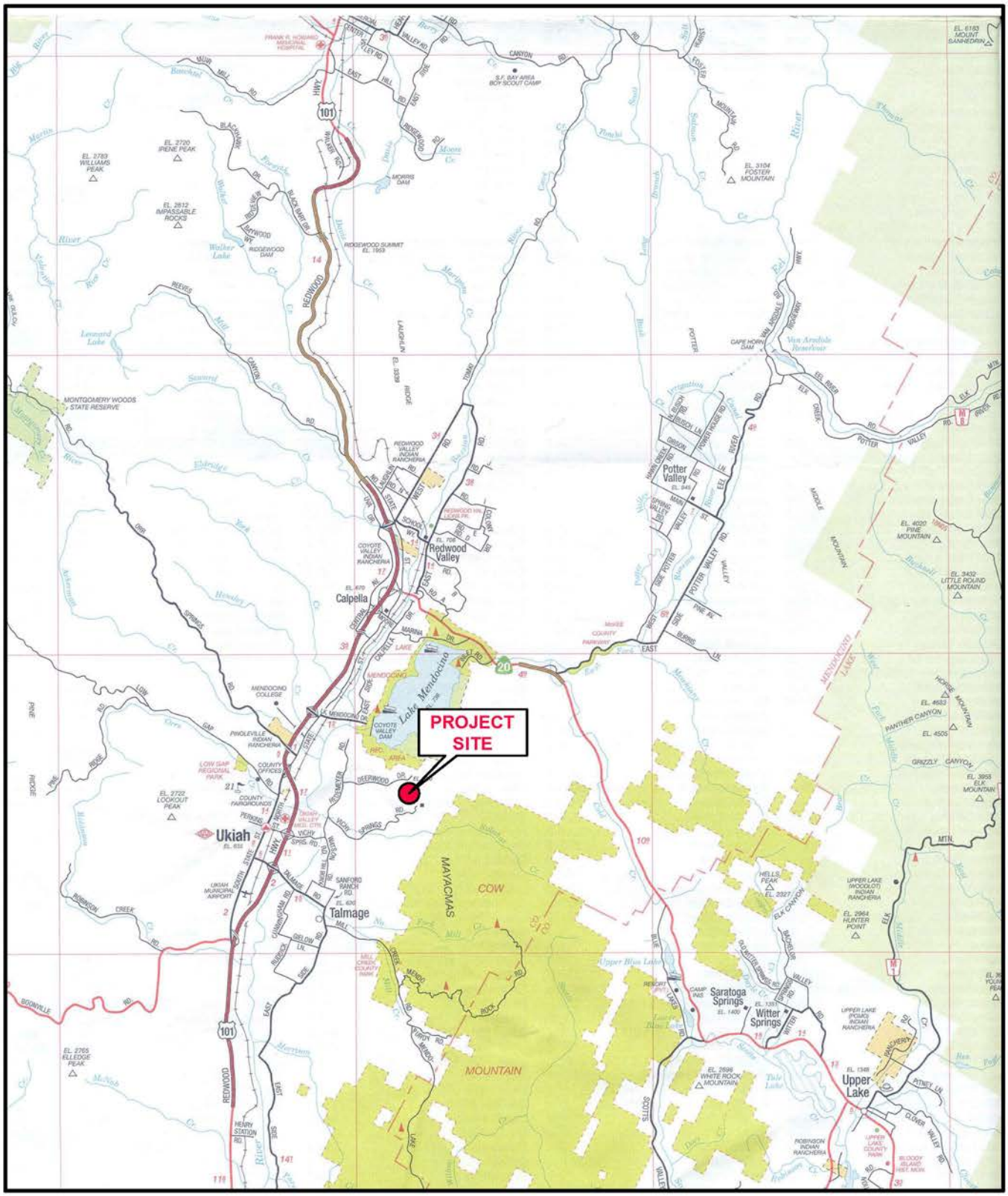
The purpose of this EIR is to provide the public and responsible and trustee agencies with information about the potential environmental effects of the Proposed Project. This Draft EIR was prepared in compliance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000et seq.) of 1970 (as amended), and the CEQA Guidelines (California Code of Regulations, Title 14). As described in CEQA guidelines Section 15121(a), an EIR is a public information document that assesses potential environmental effects of the Proposed Project, and identifies mitigation measures and alternatives to the Proposed Project that would reduce or avoid adverse environmental impacts. CEQA requires that state and local government agencies consider the environmental consequences of projects over which they have discretionary authority.

ES.2 Project Location and Background

The City of Ukiah, with a population of 16,075 people, is located approximately 115-miles north of San Francisco, CA on the US Highway 101 corridor. Ukiah is also the retail service hub to an area reaching a 50-mile perimeter and experiences a daytime service population exceeding 35,000 people. As shown on Figure ES-1, the Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah Landfill has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01.

As shown on Figure ES-2, the Ukiah Landfill occupies approximately 40-acres of a 283.5-acre parcel having a maximum width of approximately 1,000-feet in the north-south direction and a maximum length of about 3,500-feet in the east-west direction. Existing ground surface elevations at the landfill range from approximately 710-feet above mean sea level (MSL) near the western footprint, to about 970-feet MSL along the southeast footprint. The Ukiah Landfill has a very steep (2:1) slope and has been graded to form a series of flat terraces stepping down from south to north. The Landfill surface is covered with seasonal grasses. A City-owned shooting range is situated on the Ukiah Landfill property approximately 2,000-feet northeast of the waste management unit footprint. Zoning for the Project site is designated as Public Facilities by the Mendocino County General Plan.

Land adjacent to the Ukiah Landfill property is zoned primarily as rangeland and is used for grazing. Dwellings around the Ukiah Landfill property include a group of structures owned by the Vichy Springs Resort that are located within 500-feet of the City's south property line, but are well over 1,250 feet from the actual Ukiah Landfill area that is also separated visually by an elevation barrier/ridge. A rural



SMB ENVIRONMENTAL

Figure ES-1
General Location Map



Source: Google Earth

SMB ENVIRONMENTAL

Figure ES-2
Aerial View of Ukiah Landfill

residential development is located approximately one-quarter mile west of the Ukiah Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000-feet southward of the Ukiah Landfill property boundary and is also separated from the Landfill by an intervening ridge.

It should be noted that the City owns an approximate 97-acre parcel (Assessor's Parcel No. 178-210-01) that adjoins a portion of the landfill's southern property boundary. This property, which has been previously identified as the "Gun Club Parcel", was purchased as a buffer zone to limit future development adjacent to the Ukiah Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the Ukiah Landfill property.

Waste disposal operations at the Ukiah Landfill began in 1955 at the eastern end of the landfill footprint and progressed upslope and westward. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the landfill to separate the waste from the realigned creek channel. The method of operation during the Landfill's development was a fill and cover approach in a canyon/gully terrain. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing the City of Ukiah and the surrounding area. The types of waste received included garbage, rubbish, demolition and construction waste, brush, stumps, large appliances diverted as scrap metal and street refuse. The Landfill ceased operations in September 2001.

Environmental monitoring at the Landfill was originally regulated under Waste Discharge Requirements (WDR) Order No. 75-43 in conformance with Title 23 of the California Code of Regulations (23CCR). In September 1993, WDR Order No. 75-43 was amended by WDR Order No.93-83 as a mechanism to implement State Water Resources Control Board Resolution No. 93-62 and federal municipal solid waste regulations (i.e., "Subtitle D") per Title 40 of the Code of Federal Regulations (40 CFR), Parts 257 and 258. Concurrent with this amendment was the preparation of a Report of Waste Discharge (RoWD) (EBA, 1993) for the purpose of formally updating the Landfill's WDRs and to address groundwater impacts previously identified at the site. The combination of these two documents was subsequently used by the California Regional Water Quality Control Board, North Coast Region (RWQCB) to issue a new WDR (WDR Order No.94-123) for the site in October 1994. In August 1999, the initial Final CPMP (EBA, 1999) was submitted for the Landfill which resulted in the eventual issuance of interim closure WDRs (WDR Order No. R1-2002-0061) by the RWQCB in June 2002. WDR Order No. R1-2002-0061 represents the current WDR regulating environmental monitoring at the Landfill.

The purpose of the Final CPMP is to identify and describe the tasks necessary to close and maintain the Landfill in a manner which will protect the public health and safety and the environment. The Final CPMP describes the tasks that will be employed to comply with the requirements of 27CCR, Division 2, Subdivision 1 for a Class III landfill facility. Please note that this Final CPMP supersedes all previous closure/postclosure maintenance documents submitted to date. The original Final CPMP was submitted in August 1999 (EBA, 1999) that proposed a prescriptive standard final cover system (i.e., compacted clay liner [CCL] for the low-hydraulic conductivity layer [LHCL]). In March 2003, an engineered alternative analysis (EBA, 2003) was submitted to the RWQCB for approval that incorporated a geosynthetic clay liner (GCL) to replace the CCL as the LHCL due to the significantly higher cost associated with the CCL final cover system. This alternative was proposed again as part of a Joint Technical Document (JTD) dated January 2008 (EBA, 2008) and subsequent addendum dated June 2013 (EBA, 2013a).

In August 2015, a second addendum (Addendum No. 2) to the JTD (EBA, 2015) was submitted for approval that incorporated a new engineered alternative design ("ClosureTurf™") to replace the previously proposed GCL final cover system. The alternative design was pursued due to the significant increase in cover system stability as well as cost savings over the associated GCL final cover system scenario. Whereas the California Department of Resources Recycling and Recovery (CalRecycle) and Mendocino County Health & Human Services Agency (i.e., Local Enforcement Agency [LEA]) conditionally approved the proposed alternative design (separate letters dated October 21 and November 9, 2015, respectively), both agencies requested that the design and associated provisions be summarized in a new stand-alone Final CPMP. A new standalone Final CPMP (EBA, 2016a) was subsequently submitted on March 8, 2016. Following its submittal, miscellaneous comments were issued by the respective regulatory agencies. The various issues were addressed in an updated Final CPMP dated May 2016 (EBA, 2016b).

In January 2016, EBA prepared an Initial Study/Mitigated Negative Declaration (2016 IS/MND) for the City on a Final CPMP (See Appendix B). Subsequently, the City determined that an EIR should be prepared due in part to concerns expressed by Vichy Springs Investment Group/Resort that is located within approximately 500-feet of the Ukiah Landfill's southern property line. These concerns included issues regarding aesthetic/visual resources, air quality and geology/hydrology concerns. Subsequently, the City prepared a Notice of Preparation (NOP) of the Draft EIR and published it on February 2, 2017 (SCH #2017022009). Please see Appendix C.

As part of the regulatory review of the May 2016 Final CPMP, several unresolved issues remained pertaining to the final cover design and maintenance provisions. The most prominent of these issues corresponded to the proposed thicknesses of the foundation layer (i.e., one-foot versus two-feet) and geomembrane thickness (50-millimeters versus 60-millimeters). After multiple deliberations, an agreement was reached to adhere to the 2-foot thick foundation layer standard, while the 50-millimeter geomembrane thickness was conditionally approved with provisions for increased postclosure maintenance funding. These items, along with the other previous regulatory comments, have been incorporated into this latest version of the Final CPMP and is the subject of this Draft EIR.

ES.3 Proposed Project Vision, Purpose, Need, Goals, and Objectives

The overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, groundwater/surface water monitoring systems, and site security.

ES.4 Public Review

This Draft EIR document is being circulated to relevant local, state, and federal agencies as well as to interested organizations and individuals who may wish to review and comment on the report and Proposed Project. Publication of this Draft EIR marks the beginning of a 45-day public review period, **beginning on November13 and ending on December 31, 2019**. During this review period, written comments will be received by the City at the following address:

Jarod Thiele, Management Analyst

The City of Ukiah
300 Seminary Avenue
Ukiah, California 95482-5400

The Draft EIR is also available on the City's website at https://cityofukiah.box.com/UkiahLandfillClosureProject

ES.5 Proposed Project Description

Closure of the Ukiah Landfill will be performed in accordance with the applicable regulatory standards. The components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water/leachate monitoring systems, and site security.

ES.6 Alternatives

As detailed in Chapter 3 – Environmental Analysis, the construction and operation of the Proposed Project would have several potentially significant impacts to the environment. However, with the implementation of the identified and corresponding mitigation measures, all of the potentially significant impacts can be reduced to less-than-significant levels. As a result, the only alternative that needs to be evaluated in this EIR is the CEQA required No Project Alternative. Among others, alternatives considered, but eliminated from further consideration include the following:

- Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative
- Relocation of the Ukiah Landfill
- Alternative/Synthetic Specialized Tufted Geotextile Landfill Turf Cover Color.

The No Project Alternative is discussed below.

No Project Alternative

Under the No Project Alternative, the City would not close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, none of the components and systems required for closure of the landfill would be implemented. This includes, but is not limited to the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, and landfill slope stability as well as drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, and groundwater/surface water monitoring systems.

The No Project Alternative would result in less significant temporary construction related impacts than the Proposed Project. All of the potentially significant impacts associated with the construction and operation of the Project would not occur under this alternative. However, the No Project Alternative would fail to meet any and/or all of the objectives of the Project. Under the No Project Alternative, the Ukiah Landfill would not be properly closed according to state and local regulations and would be susceptible to slope instability, potential water quality impacts to surface water and groundwater resources due to inadequate cover leading to drainage and erosion issues during inclement weather/stormwater, and the potential for inadequate LFG control and monitoring leading to air quality issues and impacts. Under the No Action

Alternative, the City would be potentially susceptible for a variety of water quality and air quality violations and fines.

ES.7 Summary of Environmental Impacts and Mitigation Measures

Table ES-1 provides a summary of the potential environmental impacts of the construction and operation of the Proposed Project as identified in this EIR and the potential mitigation measures if required. The level of significance of each potential environmental impact is indicated before and after the application of any proposed or recommended mitigation measures.

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
3.1 Aesthetic/Visual Resources			
Impact 3.1-1: Would the Proposed Project have a substantial adverse effect on a scenic vista?	No Impact	None Required.	No Impact
Impact 3.1-2: Would the Proposed Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.1-3: Would the Proposed Project substantially degrade the existing visual character or quality of the site and its surroundings.	Less-than-Significant Impact	None Required Precautionary Mitigation Measure 3.1-1: Provide Proper Fencing and/or Shielding from Sensitive Receptors.	Less-than-Significant Impact No Impact with Mitigation
Impact 3.1-4: Would the Proposed Project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	No Impact	None Required	No Impact
3.2 Air Quality			
Impact 3.2-1: Would the Proposed Project Conflict with or Obstruct Implementation of the Applicable Air Quality Management Plan?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.2-2: Would Construction of the Proposed Project Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard?	Potential Significant Impact	Mitigation Measure 3.2-1: Fugitive Dust Control Measures	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Impact 3.2-3: Would Operation of the Proposed Project Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.2-4: Would Construction and/or Operation of the Proposed Project Expose Sensitive Receptors to Substantial Pollutant Concentrations?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.2-5: Would Construction and/or Operation of the Proposed Project Result in Other Emissions (Such as Those Leading to Odors) Adversely Affecting a Substantial Number of People?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.2-6: Would Construction of the Proposed Project Result in Other Emissions (Such as Naturally Occurring Asbestos) Adversely Affecting a Substantial Number of People?	Potential Significant Impact	Mitigation Measure 3.2-6: Develop and Submit NOA Dust Mitigation Plan	Less-than-Significant Impact
3.3 Biological Resources			
Impact 3.3-1: Would the Proposed Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Potential Significant Impact	Mitigation Measure 3.3-1a: Conduct A Preconstruction Survey for Special Status Wildlife Species. Mitigation Measure 3.3-1b: Conduct Bird Breeding and Nesting Surveys Mitigation Measure 3.3-1c: Conduct a Bat Habitat Assessment of Trees Mitigation Measure 3.3-1d: Environmental Awareness Training Mitigation Measure 3.3-1e: Biological Monitor	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
		Mitigation Measure 3.3-1f: Staging Areas and Access Routes	
Impact 3.3-2 Would the Proposed Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations adopted by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Potential Significant Impact	None Required	Less-than-Significant Impact
Impact 3.3-3: Would the Proposed Project have a substantial adverse effect on federally protected waters of the U.S. as defined by Section 404 of the federal Clean Water Act or protected waters of the state as defined by Section 1600 et seq. of the California Fish and Game Code (including, but not limited to, marshes, vernal pools, and coastal wetlands) through direct removal, filling, hydrological interruption, or other means?	Potential Significant Impact	Mitigation Measure 3.3-3a: Protect Jurisdictional Waters and Sensitive Habitat Areas	Less-than-Significant Impact
Impact 3.3-4: Would the Proposed Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.3-5: Would the Proposed Project conflict with any local policies or ordinances protecting biological resources?	Less-than-Significant Impact	None Required	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Impact 3.3-6: Would the Proposed Project conflict with an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	No Impact	None Required	Less-than-Significant Impact
3.4 Cultural, Paleontological, and Tribal Resources			
Impact 3.4-1: Would the Proposed Project cause a substantial adverse change in the significance of an historical resource as defined in State CEQA Guidelines §15064.5?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3-4.2: Would the Proposed Project cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5?	Potential Significant Impact	Mitigation Measure 3.4-2: Halt work if cultural resources are discovered	Less-than-Significant Impact
Impact 3.4-3: Would the proposed Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	Potential Significant Impact	Mitigation Measure 3.4-3: Stop Work if Paleontological Remains are Discovered	Less-than-Significant Impact
Impact 3.4-4: Would the Proposed Project disturb any human remains, including those interred outside of formal cemeteries?	Potential Significant Impact	Mitigation Measure 3.4-4: Halt Work if Human Remains are Found	Less-than-Significant Impact
Impact 3.4-5: Would implementation of the Proposed Project cause a substantial adverse change in the significance of a tribal cultural resource?	Potential Significant Impact	Mitigation Measure 3.4-5: Halt Work if Tribal Cultural Resources are Discovered	Less-than-Significant Impact
3.5 Geology Soils and Seismicity			
Impact 3.5-1: Would the Proposed Project expose people to injury or structures to damage from potential rupture of a known earthquake fault, strong ground shaking,	Less-than-Significant Impact	None Required	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
seismic-related ground failure, or landslides?			
Impact 3.5-2: Would construction grading and long-term closure conditions at the Landfill expose soils to erosion and result in the loss of topsoil?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.5-3: Would the Proposed Project be located on a unit or soils that are potentially unstable, or that could become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.5-4. Would the Proposed Project make a cumulatively considerable contribution to cumulative effects associated with increased seismic risk, landsliding, erosion, topsoil loss or increased exposure to seismic or other risks?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
3.6 Greenhouse Gases			
Impact 3.6-1: Would Implementation of the Proposed Project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.6-2: Would the Proposed Project conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
3.7 Hydrology and Water Quality			
Impact 3.7-1: Would the Proposed Project violate any	Less-than-Significant Impact	None Required	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?			
Impact 3.7-2: Would the Proposed Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.7-3: Would the Proposed Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would result in substantial erosion, siltation, polluted runoff or flooding on- or off-site?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.7-4: Would the Proposed Project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
3.8 Noise			
Impact 3.8-1: Would the Proposed Project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Proposed Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.8-2: Would the Proposed Project generate excessive groundborne vibration or groundborne noise levels?	Less-than-Significant Impact	None Required	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Impact 3.8-3: Would the Proposed Project be located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, and/or expose people residing or working in the project area to excessive noise levels.	No Impact	None Required	No Impact
Growth Inducement Effects			
Project implementation includes the final closure of the Ukiah landfill in accordance with local, regional, state and federal requirements. No residential or other development is proposed that would result in additional population growth. No infrastructure is required to be extended to the site that would induce population growth in the area. Therefore, the Proposed Project or the official and proper closing of the Ukiah Landfill will not indirectly or directly remove barriers to population growth and/or encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.	No Impact	None Required	No Impact
Cumulative Effects			
As described in Chapter 3 – Environmental Analysis, the construction and operation of the Proposed Project would have less-than-significant effects to the environment with the implementation of the identified mitigation measures. There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative	No Impact	None Required	No Impact

Table ES-1 Summary of Environmental Impacts and Mitigation Measures			
Potential Environmental Impact	**Level of Significance Before Mitigation**	**Mitigation Measure(s)**	**Level of Significance After Mitigation**
construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts.			

ES.8 Environmentally Superior Alternative

Section 15126.6(e)(2) of the CEQA Guidelines requires an EIR to identify an environmentally superior alternative. Of the two alternatives considered in this section (Proposed Project and the No Project Alternative), the Proposed Project would be the environmentally superior to the No Project Alternative. The No Project Alternative would not meet any of the goals and objectives of the Proposed Project. Under the No Project Alternative, the Ukiah Landfill would not be properly closed according to state and local regulations and would be susceptible to slope instability, potential water quality impacts to surface water and groundwater resources due to inadequate cover leading to drainage and erosion issues during inclement weather/stormwater, and the potential for inadequate LFG control and monitoring leading to air quality issues and impacts. Under the No Action Alternative, the City would be potentially susceptible for a variety of water quality and air quality violations and fines. As a result, the Proposed Project is considered to be the environmentally superior alternative.

Chapter 1 Introduction

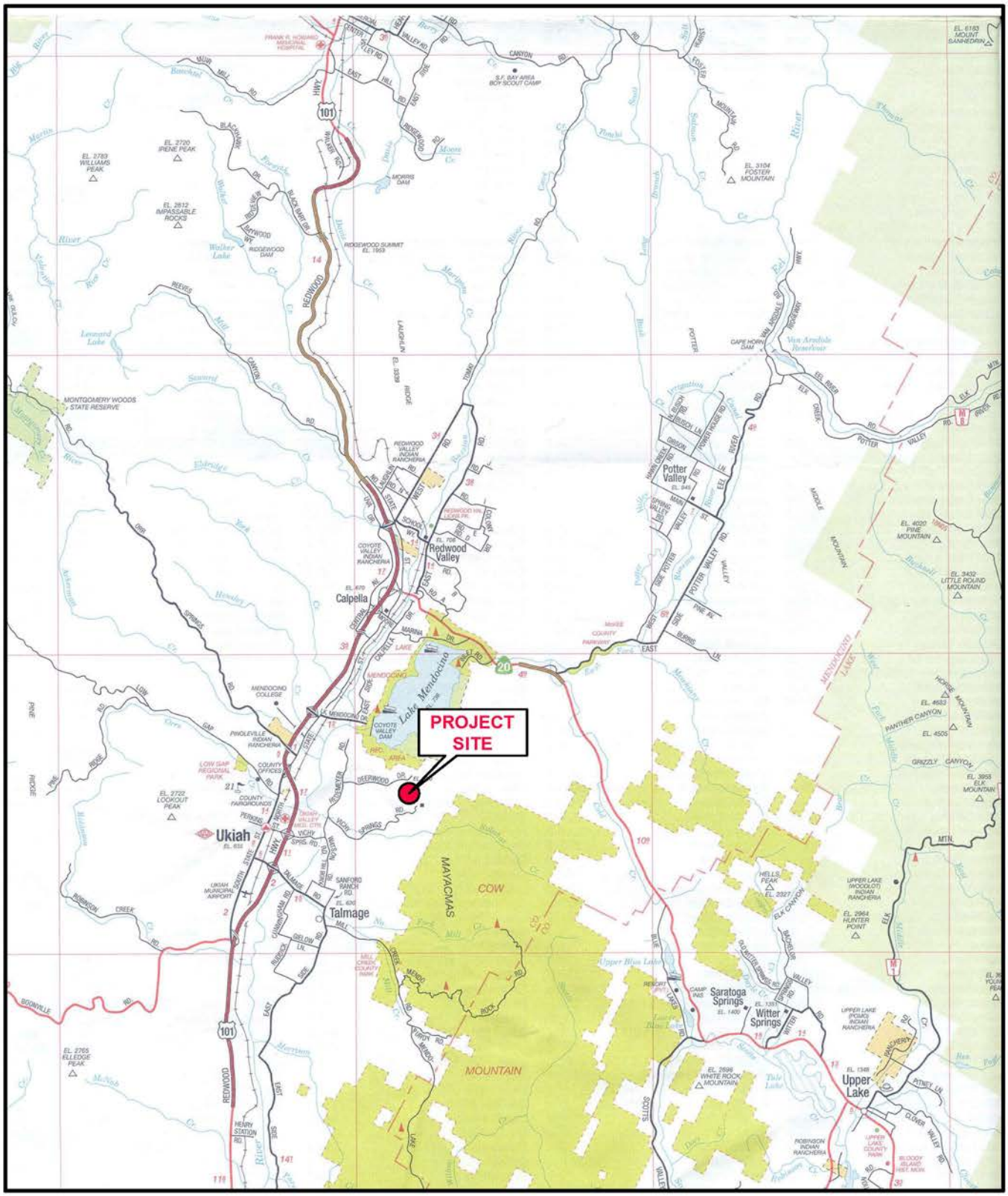
The City of Ukiah (City), Department of Public Works - Solid Waste Division, has prepared this Draft Environmental Impact Report (EIR, DEIR, or Public Draft EIR) in accordance with the California Environmental Quality Act (CEQA) to provide the public and responsible agencies with information about the potential environmental effects of the City's proposed Ukiah Landfill Closure Project (Proposed Project/Project). As shown in Appendix A, EBA Engineering of Santa Rosa, CA prepared the April 2019 Final Closure and Postclosure Maintenance Plan (Final CPMP) for the City's Ukiah Landfill Ukiah Landfill), in accordance with Title 27 of the California Code of Regulations, Division 2, Subdivision 1. The Ukiah Landfill is a Class III disposal site that occupies approximately 40-acres of a 283.5-acre site. The Final CPMP was developed to address closure and postclosure maintenance for the entire landfill. The Final CPMP is the basis for this Draft EIR and the City is the Lead Agency under CEQA.

1.1 Project Location and Background

The City of Ukiah, with a population of 16,075 people, is located approximately 115-miles north of San Francisco, CA on the US Highway 101 corridor. Ukiah is also the retail service hub to an area reaching a 50-mile perimeter and experiences a daytime service population exceeding 35,000 people. As shown on Figure 1-1, the Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah Landfill has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01.

As shown on Figure 1-2, the Ukiah Landfill occupies approximately 40-acres of a 283.5-acre parcel having a maximum width of approximately 1,000-feet in the north-south direction and a maximum length of about 3,500-feet in the east-west direction. Existing ground surface elevations at the landfill range from approximately 710-feet above mean sea level (MSL) near the western footprint, to about 970-feet MSL along the southeast footprint. The Ukiah Landfill has a very steep (2:1) slope and has been graded to form a series of flat terraces stepping down from south to north. The Landfill surface is covered with seasonal grasses. A City-owned shooting range is situated on the Ukiah Landfill property approximately 2,000-feet northeast of the waste management unit footprint. Zoning for the Project site is designated as Public Facilities by the Mendocino County General Plan.

Land adjacent to the Ukiah Landfill property is zoned primarily as rangeland and is used for grazing. Dwellings around the Ukiah Landfill property include a group of structures owned by the Vichy Springs Resort that are located within 500-feet of the City's south property line, but are well over 1,250 feet from the actual Ukiah Landfill area that is also separated visually by an elevation barrier/ridge. A rural residential development is located approximately one-quarter mile west of the Ukiah Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000-feet southward of the Ukiah Landfill property boundary and is also separated from the Landfill by an intervening ridge.


PROJECT SITE
Lake Mendocino
Ukiah
Talmage
Redwood Valley
Calpella
Potter Valley
Upper Lake
Saratoga Springs
Witter Springs
MAYACMAS MOUNTAIN
COW
MONTGOMERY WOODS STATE RESERVE
Van Arsdale Reservoir
Pillsbury Lake
Blue Lakes
Upper Blue Lake
Lower Blue Lake
Mendocino National Forest
Mendocino County Fairgrounds
Mendocino College
Low Gap Regional Park
Ukiah Municipal Airport
Coyote Valley Dam
Coyote Valley Indian Rancheria
Redwood Valley Indian Rancheria
Pinoleville Indian Rancheria
Upper Lake (Pomo) Indian Rancheria
Robinson Indian Rancheria
Ridgewood Summit El. 1663
Morris Dam
Ridgewood Dam
Cape Horn Dam
Scotts Valley
Potter Valley
Redwood Valley
Coyote Valley
Talmage
Upper Lake
Saratoga Springs
Witter Springs
Calpella
Ukiah
Lake Mendocino
Mayacmas Mountain
Cow Mountain
Montgomery Woods State Reserve
Van Arsdale Reservoir
Pillsbury Lake
Blue Lakes



Source: Google Earth 2018

SMB ENVIRONMENTAL

Figure 1-2
Aerial View of Ukiah Landfill

It should be noted that the City owns an approximate 97-acre parcel (Assessor's Parcel No. 178-210-01) that adjoins a portion of the landfill's southern property boundary. This property, which has been previously identified as the "Gun Club Parcel", was purchased as a buffer zone to limit future development adjacent to the Ukiah Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the Ukiah Landfill property.

Waste disposal operations at the Ukiah Landfill began in 1955 at the eastern end of the landfill footprint and progressed upslope and westward. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the landfill to separate the waste from the realigned creek channel. The method of operation during the Landfill's development was a fill and cover approach in a canyon/gully terrain. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing the City of Ukiah and the surrounding area. The types of waste received included garbage, rubbish, demolition and construction waste, brush, stumps, large appliances diverted as scrap metal and street refuse. The Landfill ceased operations in September 2001.

Environmental monitoring at the Landfill was originally regulated under Waste Discharge Requirements (WDR) Order No. 75-43 in conformance with Title 23 of the California Code of Regulations (23CCR). In September 1993, WDR Order No. 75-43 was amended by WDR Order No.93-83 as a mechanism to implement State Water Resources Control Board Resolution No. 93-62 and federal municipal solid waste regulations (i.e., "Subtitle D") per Title 40 of the Code of Federal Regulations (40 CFR), Parts 257 and 258. Concurrent with this amendment was the preparation of a Report of Waste Discharge (RoWD) (EBA, 1993) for the purpose of formally updating the Landfill's WDRs and to address groundwater impacts previously identified at the site. The combination of these two documents was subsequently used by the California Regional Water Quality Control Board, North Coast Region (RWQCB) to issue a new WDR (WDR Order No.94-123) for the site in October 1994. In August 1999, the initial Final CPMP (EBA, 1999) was submitted for the Landfill which resulted in the eventual issuance of interim closure WDRs (WDR Order No. R1-2002-0061) by the RWQCB in June 2002. WDR Order No. R1-2002-0061 represents the current WDR regulating environmental monitoring at the Landfill.

The purpose of the Final CPMP is to identify and describe the tasks necessary to close and maintain the Landfill in a manner which will protect the public health and safety and the environment. The Final CPMP describes the tasks that will be employed to comply with the requirements of 27CCR, Division 2, Subdivision 1 for a Class III landfill facility. Please note that this Final CPMP supersedes all previous closure/postclosure maintenance documents submitted to date. The original Final CPMP was submitted in August 1999 (EBA, 1999) that proposed a prescriptive standard final cover system (i.e., compacted clay liner [CCL] for the low-hydraulic conductivity layer [LHCL]). In March 2003, an engineered alternative analysis (EBA, 2003) was submitted to the RWQCB for approval that incorporated a geosynthetic clay liner (GCL) to replace the CCL as the LHCL due to the significantly higher cost associated with the CCL final cover system. This alternative was proposed again as part of a Joint Technical Document (JTD) dated January 2008 (EBA, 2008) and subsequent addendum dated June 2013 (EBA, 2013a).

In August 2015, a second addendum (Addendum No. 2) to the JTD (EBA, 2015) was submitted for approval that incorporated a new engineered alternative design ("ClosureTurf™") to replace the previously proposed GCL final cover system. The alternative design was pursued due to the significant increase in cover system stability as well as cost savings over the associated GCL final cover system

scenario. Whereas the California Department of Resources Recycling and Recovery (CalRecycle) and Mendocino County Health & Human Services Agency (i.e., Local Enforcement Agency [LEA]) conditionally approved the proposed alternative design (separate letters dated October 21 and November 9, 2015, respectively), both agencies requested that the design and associated provisions be summarized in a new stand-alone Final CPMP. A new standalone Final CPMP (EBA, 2016a) was subsequently submitted on March 8, 2016. Following its submittal, miscellaneous comments were issued by the respective regulatory agencies. The various issues were addressed in an updated Final CPMP dated May 2016 (EBA, 2016b).

In January 2016, EBA prepared an Initial Study/Mitigated Negative Declaration (2016 IS/MND) for the City on a Final CPMP (See Appendix B). Subsequently, the City determined that an EIR should be prepared due in part to concerns expressed by Vichy Springs Investment Group/Resort that is located within approximately 500-feet of the Ukiah Landfill's southern property line. These concerns included issues regarding aesthetic/visual resources, air quality and geology/hydrology concerns. Subsequently, the City prepared a Notice of Preparation (NOP) of the Draft EIR and published it on February 2, 2017 (SCH #2017022009). Please see Appendix C.

As part of the regulatory review of the May 2016 Final CPMP, several unresolved issues remained pertaining to the final cover design and maintenance provisions. The most prominent of these issues corresponded to the proposed thicknesses of the foundation layer (i.e., one-foot versus two-feet) and geomembrane thickness (50-millimeters versus 60-millimeters). After multiple deliberations, an agreement was reached to adhere to the 2-foot thick foundation layer standard, while the 50-millimeter geomembrane thickness was conditionally approved with provisions for increased postclosure maintenance funding. These items, along with the other previous regulatory comments, have been incorporated into this latest version (April 2019) of the Final CPMP and is the subject of this Draft EIR.

1.2 Project Goals and Objectives

The overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, groundwater/surface water monitoring systems, and site security.

1.3 Purpose and Scope of the Environmental Impact Report

The purpose of this Draft EIR is to provide the public and responsible and trustee agencies with information about the potential environmental effects of the Proposed Project. This Draft EIR was prepared in compliance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000et seq.) of 1970 (as amended), and the CEQA Guidelines (California Code of Regulations, Title 14). As described in CEQA guidelines Section 1512(a), an EIR is a public information document that assesses potential environmental effects of the Proposed Project, and identifies mitigation measures and alternatives to the Proposed Project that would reduce or avoid adverse environmental impacts. CEQA requires that state and local government agencies consider the environmental consequences of projects over which they have discretionary authority.

CEQA requires that a lead agency neither approve nor carry out a project as proposed unless the significant environmental effects of the project have been reduced to an acceptable level, or unless specific findings are made attesting to the infeasibility of altering the project to reduce or avoid environmental impacts (CEQA Guidelines Sections 15091 and 15092). An acceptable level is defined as eliminating, avoiding, or substantially lessening the significant effects. CEQA also requires that the decision makers balance the benefits of a proposed project against its unavoidable environmental risks. If environmental impacts are identified as significant and unavoidable, a project may still be approved if it is demonstrated that social, economic, and/or other benefits outweigh any significant and unavoidable environmental impacts. As the CEQA lead agency, the City would then be required to state in writing the specific reasons for approving the project based on information presented in the EIR, as well as other information in the record. This process is defined as a "Statement of Overriding Considerations" by Section 15093 of the CEQA guidelines.

As stated above, the City will be the lead agency for CEQA compliance and will use this document to evaluate the Proposed Project's potential environmental impacts and to aide in the City's decision - making process. The Proposed Project and analysis contained in this CEQA EIR document are the result of a multi-year planning effort that has entailed thorough consideration of many alternatives in the context of several different proposed projects and various related documents through the years.

For this analysis, we have reviewed prior and relevant existing technical and environmental documentation to assess the potential impacts of implementing the Proposed Project on endangered/threatened species, public health or safety, natural resources, regulated waters, and cultural resources, among others, to include and address specific issues associated with CEQA. This document focuses on the potential physical environmental issues associated with implementing the Proposed Project as it is currently defined and as presented in Section 2 – Project Description of this Draft EIR document. For any potentially significant impact(s) identified, we have identified proposed mitigation measures and strategies to attempt to avoid and/or reduce those impacts to less-than-significant levels. The information in this Draft EIR document is presented to assist the City and other decision makers of this concept to understand what the major potential physical environmental impacts are of constructing and operating the People's Project. Summarized below is an overview of the CEQA Process.

1.3.1 Notice of Preparation

In accordance with Sections 15063 and 15082 of the CEQA Guidelines, the City prepared a Notice of Preparation (NOP) of an EIR and published it on February 2, 2017 (SCH #2017022009) and is available for review in Appendix C.

The NOP was circulated to the public, local, state and federal agencies, and other interested parties to solicit comments on the Proposed Project during the 30-day comment period. During the scoping period, the City held a series of two (2) scoping meetings in the City of Ukiah to discuss the proposed project and to solicit public input as to the scope and content of this EIR. Scoping meetings were held:

2:00 pm Wednesday, February 15, 2017
City of Ukiah
300 Seminary Avenue.
Ukiah, CA 95482

6:00 pm Wednesday, February 15, 2017
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

1.3.2 Scope of this EIR

"Scope" is a term that describes the breadth and depth of an EIR (i.e. the content, as well as the level of analysis and discussion). The City identified the appropriate scope for this EIR by preparing an Initial Study and engaging appropriate state and local agencies and the public to provide input. As required by CEQA, this Draft EIR focuses on significant environmental effects expected to result from the Proposed Project (CEQA Guidelines, Section 15143).

Based on the results of the 2016 IS/MND (see Appendix B), responses to the NOP, and comments at the Public Scoping Meetings, substantial evidence exists to exclude the following identified environmental resources from further analysis in the EIR. Specifically, the following environmental resources were evaluated in the 2016 IS/MND and were found to not result in any significant impacts and impacts that would require mitigation: These, and a summary of the rationale for elimination from further discussion in this EIR are as follows.

- **Agriculture and Forestry Resources.** The Proposed Project site has designated zoning by the Mendocino County General Plan as Public Facilities. The Project site is not identified as Prime Farmland, Unique Farmland or Farmland of Statewide Importance. The Proposed Project is the final closure of the Ukiah Landfill and will not result in a conversion of any prime farmland or farmland of State-wide importance. In addition, the Proposed Project will not affect any forest resources. Therefore, no significant impacts to existing farmland and/or forest resources will occur and no mitigation measures are required.
- **Energy Resources.** Energy resource impacts include the depletion of nonrenewable resources (e.g., oil, natural gas, coal, etc.) and emission of pollutants during both the construction and/or operations of a proposed project. Energy usage is typically quantified using the British Thermal Unit (BTU). The BTU is the amount of energy that is required to raise the temperature of one pound of water by one-degree Fahrenheit. As points of reference, the approximate amount of energy contained in a gallon of gasoline, a cubic foot of natural gas, and a kilowatt hour (kWhr) of electricity are 123,000 BTUs, 1,000 BTUs, and 3,400 BTUs, respectively. Natural gas usage is expressed in therms. A therm is equal to 100,000 BTU. The Proposed Project or the final closure of the Ukiah Landfill will be constructed over a short 6-month period and will not use a considerable amount of energy resources. Once constructed, the Ukiah Landfill will not use any more energy resources than what is currently being used for routine operations, inspections, and maintenance – which is miniscule as Landfill operations have ceased. As a result, the Proposed Project or the final closure of the Ukiah Landfill will not significantly or adversely affect energy resources. In addition, the City and its contractors will use fuel efficient vehicles and equipment and implement standard energy conservation measures as is standard City practices. Therefore, the use of energy resources is not discussed further in this EIR.
- **Hazards and Hazardous Materials.** The Proposed Project or the final closure of the Ukiah Landfill will comply with all regulatory requirements in order to eliminate and/or minimize potential hazards associated with the landfill (e.g., air emissions, water quality, fire). In addition, potential health and safety impacts would also be avoided through the implementation of the environmental control systems proposed to close the Landfill. Finally, potential short- term construction impacts would be minimized and/or avoided through the use of construction best management practices as is consistent with local, state, and federal regulations.

No significant long-term impacts are anticipated upon completion of the final cover and associated environmental control systems.

- **Land Use and Planning.** The Proposed Project will not conflict with any adopted land use planning policies and/or programs of the City or Mendocino County. No development is proposed that would divide an established community and the Proposed Project does not conflict with an adopted Habitat Conservation Plan or Community Conservation Plan. As a result, project implementation would not contribute to potentially significant cumulative land use impacts.
- **Mineral Resources.** A variety of minerals resources are known to exist in Mendocino County. The most predominant minerals found in Mendocino County are aggregate resources, primarily sand and gravel. Three sources of aggregate materials are present in Mendocino County: quarries, in-stream gravel, and terrace gravel deposits. The project site does not contain any important deposits of aggregate/sand and gravel. Furthermore, neither the Mendocino County General Plan nor the State of California has identified the project area as a potential mineral resource of State-wide or regional significance. No mineral resources are known to exist and, therefore, project implementation will not result in the loss of availability of a known mineral resource that would be important to the state, region or local area. As a result, no significant impacts will occur as a result of project implementation and no mitigation measures are required.
- **Population and Housing.** The Proposed Project would not result in the addition of population growth, the loss of any existing housing, and/or the displacement of residents. As a result, implementation of the Proposed Project will not contribute to the cumulative impacts to population and housing. Therefore, no significant cumulative impacts to population and housing will occur as a result of project implementation.
- **Public Services.** The Proposed Project does not include a change in land use such as residential development that has a need for and would generate a demand for most public services (e.g., police, parks and recreation, schools, etc.), potential demands on those services are not expected to occur. In addition, several best management construction practices will be followed, consistent with local, state, and federal laws and regulations, to ensure that any potential impacts to fire protection service and facilities are adequately addressed and would not, therefore, result in potentially significant impacts. Furthermore, without residential development, no impacts would occur either to public schools or library facilities. Therefore, no significant cumulative impacts will occur.
- **Recreation.** Because no residential development that would create a demand for parks and recreational facilities in the County is proposed, the Proposed Project would not result in any impacts to those facilities. Therefore, no mitigation measures are required.
- **Transportation/Traffic.** The affected roadways, Vichy Springs Road in particular, have adequate capacity to accommodate the vehicular trips generated by the Proposed Project, which will be significantly fewer on a daily basis than the number of trips that occurred when the Ukiah Landfill was an operational landfill prior to 2001. It is important to note that the heavy truck trips will be short in duration depending on the source and location of the import material, which could increase the daily trip rate and reduce the duration. After that, the only Project-related trips will be associated with the movement of workers to and from the site and movement of equipment and materials. In addition, these vehicular trips will be temporary in nature and will cease upon completion of the construction of the final cover. The number of vehicular trips associated with the post closure maintenance activities will be significantly less than during

construction of the final cover. As a result, no significant impacts are anticipated. The addition of the Project-related trips will not significantly affect the traffic and operation of Vichy Springs Road and other existing roadways in the Project vicinity. As a result, no significant impacts are anticipated and no mitigation measures are required.

- **Utilities and Service Systems.** The Proposed Project creates only a short-term demand for water that will be used during the construction process to control fugitive dust and moisture condition materials for compaction. However, the demand for water would cease upon completion of the final closure plan and no long-term demands would occur. The Proposed Project will also reduce the amount of leachate and stormwater is captured and disposed of to the Ukiah wastewater treatment plant by reducing infiltration of stormwater and improving site stability. In addition, the Proposed Project would also not result in the generation of any solid waste and would not, therefore, contribute to cumulative solid waste generation in Mendocino County. Because the Proposed Project is consistent with the long-range plans and policies adopted for the subject site and would not create demands for water or generation sewage and/or refuse that exceed those anticipated by the County's General Plan, the potential cumulative impacts would be less than significant

Based on responses to the NOP, comments at the public Scoping Meetings, and results of the 2016 Initial Study/Mitigated Negative Declaration (IS/MND), the identified environmental resources that require further analysis in the EIR are as follows:

- Aesthetics/Visual
- Air Quality/Greenhouse Gases
- Biological Resources
- Cultural, Paleontological, and Tribal Resources
- Geology, Soils, and Seismicity
- Hydrology and Water Quality
- Noise

This Draft EIR characterizes the existing environmental resources within the vicinity of the Proposed Project, analyzes potential impacts to those resources, and identifies mitigation measures to reduce impacts. Other CEQA-related issues, such as cumulative and growth inducing effects that could result from the Proposed Project are also analyzed. All technically feasible and reasonable alternatives including a "No-Project" Alternative, are considered and/or analyzed in this Draft EIR.

1.3.3 Draft EIR

This document constitutes a CEQA Project-level EIR including site-specific impacts and mitigation analysis for the Proposed Project as it applies to successfully close the Ukiah Landfill. In addition, this Draft EIR contains a description of the environmental setting, identification of project impacts, mitigation measures for impacts found to be significant, and an analysis of project alternatives.

1.3.4 Public Review

This Draft EIR document is being circulated to relevant local, state, and federal agencies as well as to interested organizations and individuals who may wish to review and comment on the report and Proposed Project. Publication of this Draft EIR marks the beginning of a 45-day public review period,

beginning on November 13 and ending on December 31, 2019. During this review period, written comments will be received by the City at the following address:

Jarod Thiele, Management Analyst
The City of Ukiah
300 Seminary Avenue
Ukiah, California 95482-5400

The Draft EIR is also available on the City's website at https://cityofukiah.box.com/UkiahLandfillClosureProject.

1.3.5 Final EIR and EIR Certification

Written and oral comments received on the Draft EIR will be addressed in a Response to Comments document which, together with the Draft EIR and changes and corrections to the Draft EIR will comprise the Final EIR. After review of the project and the Final EIR, the City, at a public hearing, will decide whether to certify the Final EIR and whether to approve or deny the Proposed Project or any identified and evaluated alternative contained within this EIR.

If the City approves the Proposed Project (or alternative), even though significant impacts identified in the EIR cannot be mitigated to less-than significant levels, the City may still approve the Proposed Project (or Alternative), but first must state in writing the reasons for its actions/decision in a *Statement of Overriding Considerations* that also must be included in the record of the project approval and mentioned in the Notice of Determination (CEQA Guidelines Section 15093[c]).

1.3.6 Mitigation Monitoring and Reporting Program

CEQA Section 21081.6(a) requires lead agencies to "adopt a reporting and mitigation monitoring program for the changes to the project which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment". The specific "reporting or monitoring" program required by CEQA is not required to be included in the EIR. Throughout the EIR, however, mitigation measures must be clearly identified and presented in language that will facilitate establishment of a monitoring and reporting program for the Final EIR.

Chapter 2 Project Description

This chapter provides a detailed description of Proposed Project including a discussion of the Project goals and objectives, an overview of the Proposed Project and each of the major project components, construction considerations, operational plans, and potential approvals and permits that may be necessary.

2.1 Project Goals and Objectives

As described in Chapter 1 – Introduction, the overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water/leachate monitoring systems, and site security.

The Final CPMP for the Ukiah Landfill has been prepared with considerable input and conditional approval by the following agencies:

- California Department of Resources Recycling and Recovery (CalRecycle)
- Mendocino County Department of Public Health
- North Coast Regional Water Quality Control Board
- Mendocino County Air Quality Management District

The Final CPMP was prepared in accordance with Title 27 of the California Code of Regulations (27 CCR), Chapters 3 and 4 and the Code of Federal Regulations (CFR) 40, Subpart F. The objectives of the plan are identified below.

- To provide a basis for the establishment of an accurate detailed cost estimate for closure and post-closure maintenance.
- To provide a detailed plan and schedule for closure implementation.
- To provide a plan and schedule for the inspection, maintenance and monitoring procedures to be implemented during the post-closure maintenance period.
- To allow the applicable agencies to monitor closure and post-closure activities to determine that all landfill closure and post-closure maintenance and monitoring requirements are being followed in accordance with the approved plan.

2.2 Existing Environmental Control Systems

This section describes the existing environmental control systems at the Ukiah Landfill and includes the Landfill Gas Collection and Monitoring, Groundwater Monoitoring Network, and Stormwater Monitoring and Reporting. Figure 2-1 provides a site map of the existing conditions at the landfill.

2.2.1 Landfill Gas Collection and Monitoring

This section describes the existing landfill gas collection and monitoring systems and processes.

Landfill Gas Control

The Landfill currently includes a partial perimeter LFG collection system that was installed between the southwestern edge of the Landfill and the property line. In general, the system consists of 17 vertical extraction points installed in native geologic materials and completed at depths ranging from 35 to 133 feet below ground surface. The extraction points are connected to a buried 6-inch diameter, high-density polyethylene (HDPE) header pipe that leads to a vacuum blower located at the western end of the Landfill. The vacuum blower creates a vacuum in the header pipe that draws the LFG from the soil through the extraction points and header pipe, whereupon the collected LFG (diluted) is vented to the atmosphere via a 4-foot tall, 4-inch diameter stack. The system works on the premise that the extraction well field creates a barrier against migration while simultaneously mixing the collected LFG with "clean" soil pore gas that dilutes the LFG to concentrations that can be discharged directly to the atmosphere.

As part of final closure, an LFG extraction, collection, and control system will be installed in the refuse mass that will replace the partial perimeter collection system. The design for the system has been developed to meet the requirements of 17 CCR, §95464(b). The design flow rate for the system has been established at 53 to 210 SCFM (at 50 percent methane). This range covers the highest anticipated LFG recovery rate based on the most conservative generation model. In addition, the design range can accommodate lower flows to account for future operations as the generation rate continues to decreases over time. Overall, the LFG extraction, collection, and control system will consist of a series of perimeter and interior LFG extraction wells, associated above ground collection system piping, condensate collection provisions, and a flare station for destruction of the LFG.

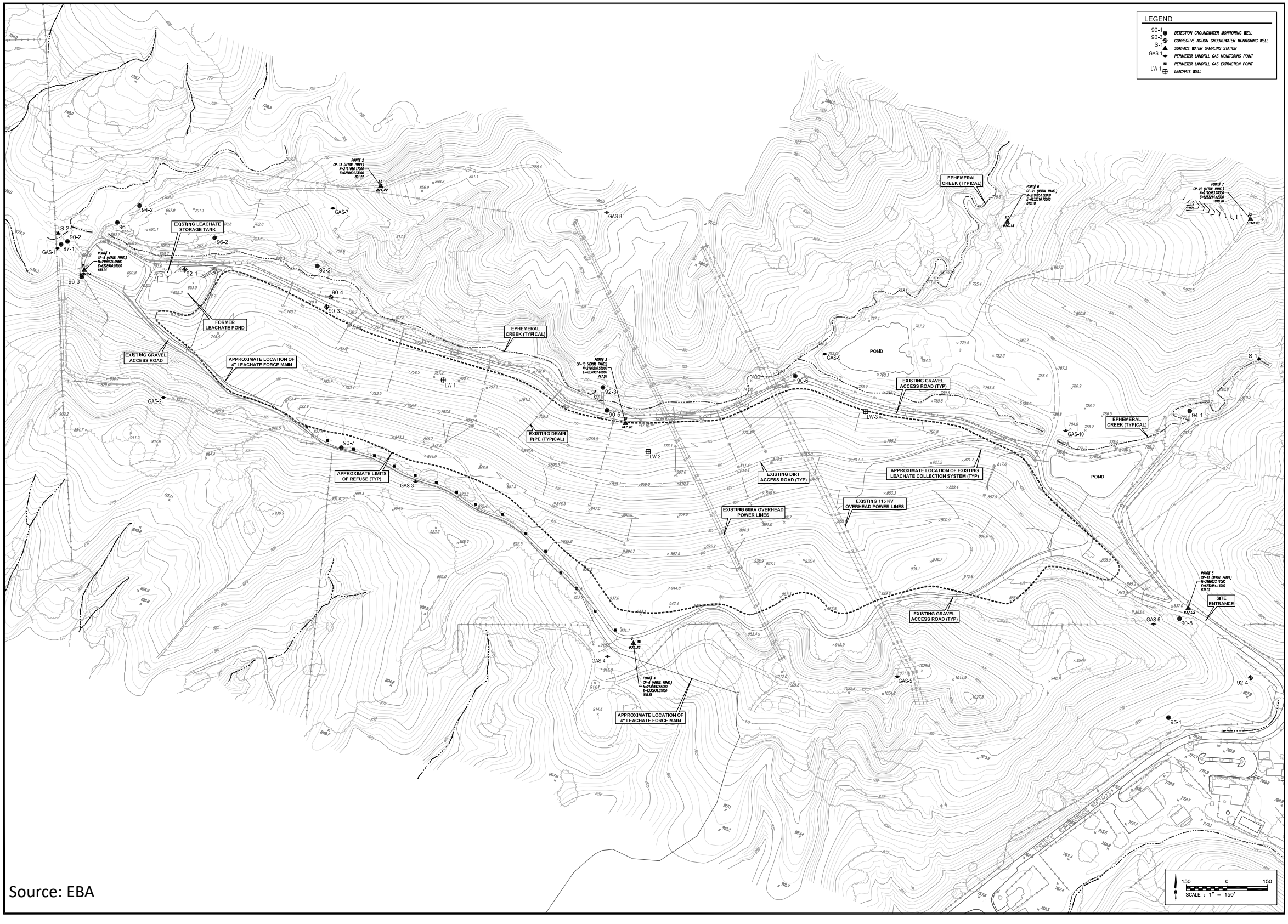
LFG Monitoring

There is currently ten (10) LFG monitoring points (GAS-1 through GAS-10) located at various locations along the landfill property boundary. These points are used to monitor methane concentrations at the property boundary as required by 27CCR, §20921. The regulatory compliance level for methane along the landfill property boundary is 5 percent by volume.

Each of the LFG monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter polyvinyl chloride (PVC) casing and capped with labcock valves. The monitoring probes range in depth from approximately 9 to 250 feet BGS. The number and depth of monitoring probes at each location are based on site lithology (i.e., permeable zones) and the maximum depth of refuse as measured within 1,000 feet of the monitoring point in question. The scope of monitoring at each probe included measuring static pressure and methane concentration.

Landfill Leachate Control

The Landfill is unlined and is not equipped with an engineered leachate collection and removal system (LCRS). Instead, leachate collection at the Landfill consists of a series of polyvinyl chloride (PVC) piping and French drain systems installed to collect leachate from seeps occurring along the completed slope faces. Leachate collected by these components is then conveyed by gravity flow to a primary buried pipeline located along the northern toe of the Landfill. The buried pipeline, in turn, drains the leachate westward and



Source: EBA

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Figure 2-1
Ukiah Landfill Site Map (Existing Conditions)

ultimately discharges to the leachate management facilities located at the western toe of the Landfill. A description of the leachate management facilities is as follows:

- Discharge from the primary buried pipeline is diverted to a subsurface concrete sedimentation chamber equipped with a valved sediment drain at its base. The clarified leachate within the chamber is then discharged (by gravity flow) to an adjacent pump station wet well (identified herein as the "leachate wet well") via a 10-inch diameter overflow line.

- Clarified leachate discharged to the leachate wet well is then pumped to a leachate storage tank for temporary storage. The leachate wet well is equipped with two (2) 25-gallon per minute (gpm), low- head, submersible pumps that are actuated by high/low water level controls. If the clarified leachate discharge rate exceeds the leachate wet well's pumping capacity (50 gpm), the excess leachate will be diverted to an underground storage tank to be installed as part of final closure.

- As noted above, leachate from the leachate wet well is diverted to the leachate storage tank for temporary storage. The leachate storage tank has a 63,500-gallon volumetric capacity and is constructed of AWWA factory epoxy lined and coated bolted steel. As was the case for the leachate wet well, the leachate storage tank is also equipped with a 10-inch diameter overflow line that will divert leachate to the underground storage in the case of an emergency.

- Leachate stored in the leachate storage tank is subsequently pumped to a sewer line connection located on Vichy Springs Road via a force main/gravity drain. The force main/gravity drain is constructed of 4-inch diameter PVC and is approximately 5,200 feet in length. The pump lift station for the leachate storage tank is equipped with two (2) 45-gpm pumps (one duty, one standby), thereby giving the system a total pumping capacity of 90 gpm.

2.2.2 Groundwater Monitoring Network

The existing groundwater monitoring network consists of 18 groundwater monitoring wells primarily concentrated along the northern and western margins of the Landfill. Groundwater monitoring well 87-1 was installed in 1987 and was subsequently used as part of the Water Quality Solid Waste Assessment Test (SWAT) conducted at the Landfill during the late 1980's. The remaining groundwater monitoring wells were installed over the period of 1990 through 1996 as a mechanism to characterize groundwater impacts at the site and to upgrade the Landfill's detection monitoring network. In accordance with the criteria specified in Section D(3)(b) of M&RP R1-2002-0061, the respective groundwater monitoring wells have the following use designation:

- *Detection Monitoring Wells*:

  87-1, 90-1, 90-2, 90-5, 90-6, 90-7, 90-8, 92-2, 92-3, 94-1, 94-2, 96-1, 96-2 and 96-3

- *Corrective Action Monitoring Wells*:

  90-3, 90-4, 92-1 and 92-4

- *Points of Compliance Wells*:

  87-1, 90-2, 90-3, 90-4, 90-5, 90-7 and 90-8

The two (2) primary water-bearing formation deposits underlying the site correspond to Quaternary alluvial deposits and Plio-Pleistocene upper/lower continental basin deposits. Groundwater monitoring wells completed within the Quaternary alluvial deposits include 87-1, 90-1, 90-3, 90-4, 92-1 and 94-1. These groundwater monitoring wells range in depth from approximately 12 to 35 feet BGS. The remaining groundwater monitoring wells are completed in the Plio-Pleistocene upper or lower continental basin deposits and range in depth from approximately 23 to 160 feet BGS.

2.2.3 Surface Water Monitoring System

The surface water monitoring system for the Landfill is comprised of two (2) surface water sampling stations (S-1 and S-2) located along the unnamed ephemeral creek that flows along the northern margin of the WMU from east to west. S-1 and S-2 are located upstream and downstream of the WMU, respectively.

It should be noted that a Notice of Termination (NOT) for the Landfill's former stormwater permit (WWID Number 1231001656) was approved by the RWQCB on July 30, 2015 on the basis that industrial activity no longer occurs at the site, nor will it occur in the future as the end use of the Landfill during the post closure maintenance period will be non-irrigated open space. Surface water monitoring and inspection at the Landfill will continue to be performed as part of the Landfill's post closure maintenance program, thereby providing long term provisions for monitoring surface water quality.

2.3 Proposed Project Description Overview

The Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The landfill is part of a 283.5-acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01.

Closure of the Ukiah Landfill will be performed in accordance with the applicable regulatory standards. The components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water/leachate monitoring systems, and site security. A description of each of these closure components proposed is presented below.

2.3.1 Final Cover Design

As outlined in 27 CCR, §20950, the primary performance goal for final closure is to minimize the infiltration of water into the waste, thereby minimizing the production of leachate and LFG. The proposed final cover design for the Landfill areas will consist of the following layers, from top to bottom:

- Minimum 5/8-inch thick sand infill layer;
- Specialized tufted geotextile;
- 50-millimeter linear low-density polyethylene (LLDPE) geomembrane liner; and
- A minimum two-foot thick foundation layer.

This final cover design for the Landfill areas is an engineered alternative final cover consistent with 27 CCR, §20080. A copy of the Final CPMP is included in Appendix A.

Several factors were taken into consideration is establishing the proposed final cover design for the Ukiah Landfill, including the geometry of the existing landfill, local climatic conditions, final cover material availability, slope stability, erosion protection, construction cost, and color. Artificial or synthetic specialized tufted geotextile covers generally come in three (3) natural colors – olive-green, tan, and a blend of olive-green and tan. For the Proposed Project the olive-green color was selected as the preferred color as it provides arguably the best color option to blend into the natural and surrounding environment. With the required minimum of a 5/8 thick sand infill layer on top, the cover will look like a blend of olive-green and tan. Figure 2-2 provides two recent examples of what the final cover would look like and how it blends in with the surrounding environment.

2.3.2 Final Grading, Drainage, and Erosion Control

The limits of refuse were established from record information and by a field investigation. The proposed final cover system will cover all areas within the limits of refuse. Due to clearance requirements under existing power lines that run through the Ukiah Landfill area, excavation and relocation of refuse will be required to maintain clearance between the finish surface and the power lines. The excavated refuse will be placed on other (flatter) sections of the Ukiah Landfill.

The Final Grading Plan as shown on Figure 2-3 illustrates the final landfill footprint and shows the Landfill configuration following foundation layer grading. Final refuse slopes will have a maximum gradient no steeper than 2:1 (horizontal to vertical). The synthetic final cover system will essentially eliminate the discharge of sediment from the Landfill surface as no soil component will be utilized in the final cover design.

Proposed drainage facilities consist of a network of benches, ditches and storm drain that drain to 18- and 24-inch diameter corrugated metal pipe (CMP) discharge culverts. To prevent soil erosion in the ephemeral tributary the culverts will be installed with energy dissipaters. These CMP culverts discharge to the unnamed ephemeral creek channel at various locations along the length of the Landfill's northern boundary. In general, the drainage system is designed to intercept run-off at intervals along the inside edge of berms, benches or access roads. A sedimentation pond is located at the western end of the Landfill to control sediment run-off from slope areas along the western and southern fill boundaries. Two (2) additional sedimentation ponds are also located at the northeastern end of the Landfill to contain sediment run-off from soil borrow areas and the eastern portion of the Landfill. Figure 2-3 also illustrates the locations of the respective sedimentation ponds.

Access improvements will include placing aggregate base over portion of the existing perimeter road and along benches to provide all-weather access.

The soil borrow area will be reclaimed by re-grading and re-vegetating (hydroseeding) with native grasses.

Construction Quality Assurance

The implementation of the Construction Quality Assurance (CQA) Plan will provide documentation that suitable materials and standard construction practices are used to place the final cover and to document that placement is consistent with the closure plan design specifications in 27 CCR, §20323 and §20324. Elements of the CQA Plan include a project description and definitions, qualifications and responsibilities, requirements for the final cover evaluation, inspection standards, testing frequencies, meetings, and

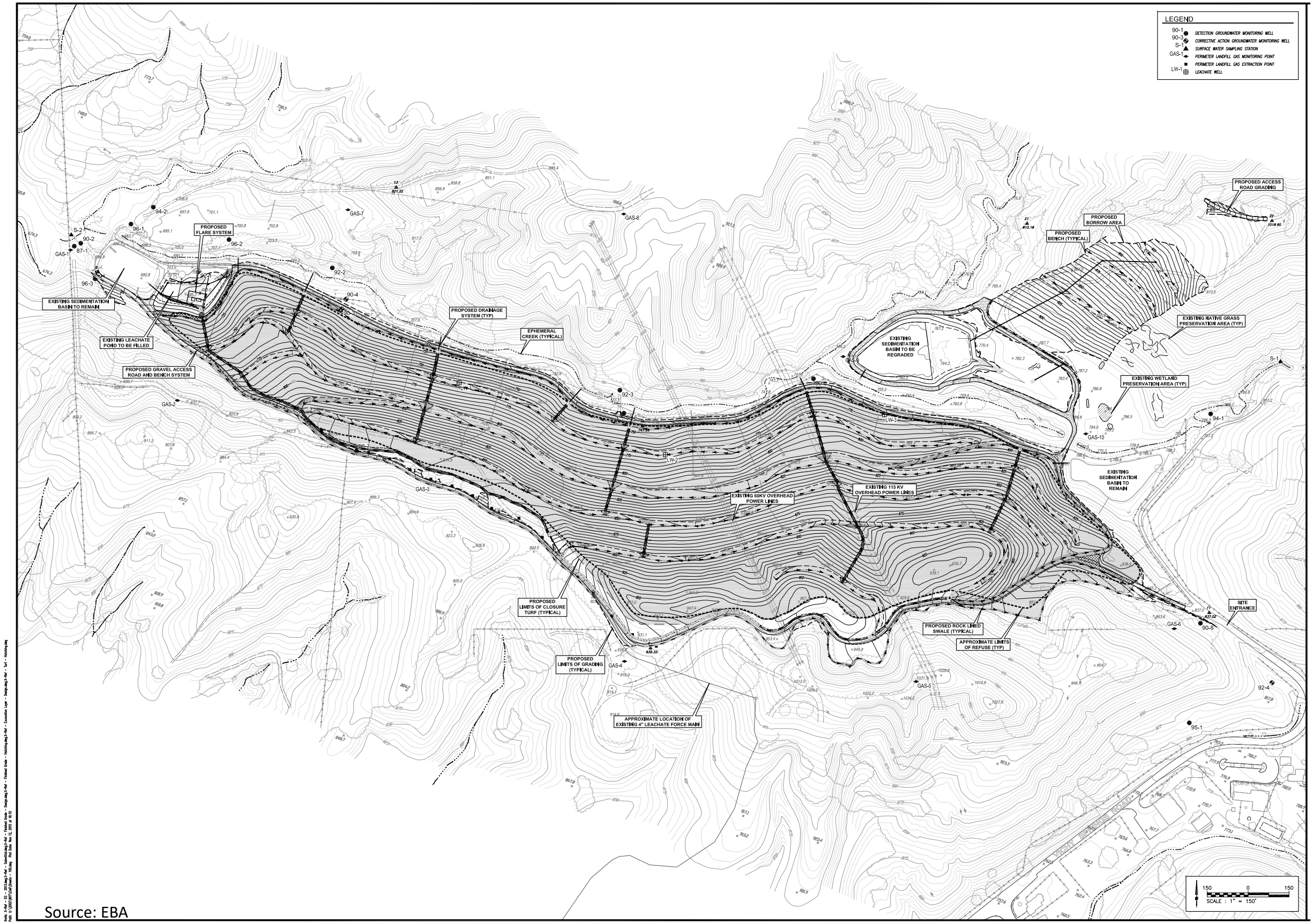


Berkeley County Landfill – Moncks Corner, South Carolina



Baldwin Landfill – Milledgeville, Georgia

Figure 2-2
Examples of Artificial/Synthetic Landfill Covers



Source: EBA

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Figure 2-3
Grading Plan

documentation. This information will be collected during construction of the final closure and incorporated into the project's final closure construction CQA Certification Report, which will be submitted to the appropriate agencies for recording and reporting purposes.

Post Closure Maintenance Plan

After closure activities are completed, the Final Post Closure Maintenance Plan (FPCMP) for the Landfill will be implemented by the City of Ukiah in accordance with 27 CCR, Chapters 3 and 4, and 40 CFR, §258.61. Post closure maintenance activities for the Landfill will consist of the following:

- Final cover inspection and maintenance;
- Landfill settlement monitoring and maintenance;
- LFG monitoring and maintenance;
- Leachate control system monitoring and maintenance
- Groundwater systems monitoring and maintenance;
- Surface water monitoring;
- Access road/bench maintenance;
- Drainage systems inspection and maintenance; and
- Site security inspection and maintenance.

Detection Monitoring Program

A Detection Monitoring Program (DMP) is currently implemented at the Ukiah Landfill in accordance with 27 CCR, §20420 and Waste Discharge Requirements Order No. R1-2002-0061 issued by the North Coast Regional Water Quality Control Board and a new WDR will be issued and the scope and frequency of testing may be revised as proposed in the Final CPMP. The scope of the existing DMP requirements includes the following monitoring and sampling activities:

- Monthly monitoring and recording of leachate discharge volumes.
- Quarterly sampling and analysis of leachate samples from the leachate wet well. The scope of analytical testing is in accordance with Table I of Monitoring and Reporting Program No. R1-2002- 0061 (M&RP).
- Quarterly monitoring and recording groundwater elevations and groundwater flow directions.
- Quarterly sampling and analysis of groundwater samples from detection monitoring wells and points of compliance monitoring wells. The scope of analytical testing is in accordance with Table II of the M&RP.
- Performance of quarterly statistical analyses of groundwater chemistry data to identify exceedances of applicable concentration limits.
- Quarterly sampling and analysis of surface water samples, including semi-quantitative comparisons between upstream and downstream water chemistry data to identify potential landfill-related surface water quality impacts. The scope of analytical testing is in accordance with Table III of the M&RP.
- Performance of monthly standard observations to monitor the conditions of the WMU, the landfill perimeter, and receiving waters.

Results and findings from the aforementioned activities are summarized in a Detection Monitoring Report and submitted to the North Coast Regional Water Quality Control Board on a quarterly basis. Standard quarterly report submittals include a presentation of the sampling and monitoring procedures (including Standard Operating Procedures), tabulated summaries of leachate, groundwater, and surface water field and laboratory data, statistical analysis results and supporting calculations, groundwater potentiometric surface map, results of standard observations, and copies of Certified Analytical Reports (CARs) and associated chain-of-custody documentation. Annual reports are also prepared that include (in addition to the above information) graphical summaries of monitoring data, an evaluation of the findings.

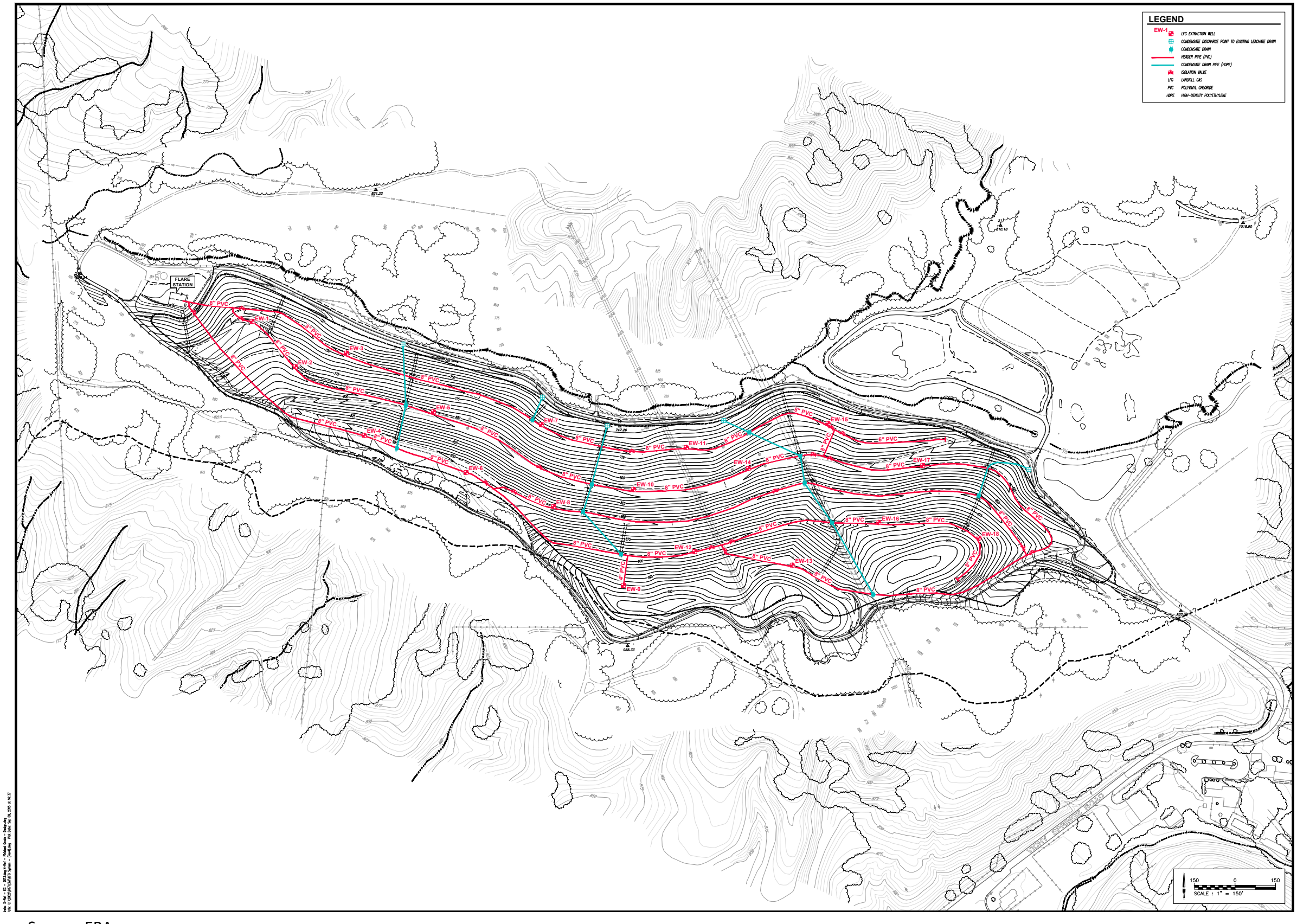
Landfill Gas Monitoring Program

A perimeter LFG monitoring program is currently implemented at the Landfill to fulfill monitoring requirements set forth in 27 CCR, §20921. This perimeter monitoring program will continue through the post closure maintenance period in accordance with the FPCMP. The system consists of ten LFG monitoring points (GAS- 1 through GAS-10). The locations of the LFG monitoring points are shown on Figure 2-4. Each of the LFG monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter polyvinyl chloride (PVC) casing and capped with labcock valves. The monitoring probes range in depth from approximately 9-to-250 feet below ground surface (BGS).

In addition to fulfilling the aforementioned regulatory requirements, the monitoring of perimeter probes will provide pertinent information regarding the overall performance of the LFG collection and control system. As the installation of the final cover system could increase lateral and vertical pressures within the Ukiah Landfill, thereby potentially inducing subsurface migration of LFG, the perimeter monitoring system will assist in determining whether the LFG collection and control system is providing adequate subsurface migration control, including whether ongoing operation of the existing partial perimeter LFG collection system is necessary if the historical LFG migration in that area can be abated by the new system. In accordance with 27 CCR, §20934, the results of the monitoring will be reported within 90-days from when the monitoring is performed and submitted to the Local Enforcement Agency (LEA), Mendocino County Air Quality Management District (MCAQMD) and the NCRWQCB.

The LFG collection and control system and landfill surface will also be monitored to comply with AB32 requirements in accordance with 17 CCR, §95469. The scope of monitoring will include the following:

- Instantaneous surface monitoring will be conducted on a quarterly basis to determine if surface emissions of 500 parts per million by volume (ppmv) or greater, other than non-repeatable, momentary readings, are present at any location on the WMU surface. The monitoring will be accomplished using a portable gas detector.
- Integrated surface monitoring will be conducted on a quarterly basis to determine if the average methane concentration within the individual grids exceeds 25 ppmv.
- Any components of the LFG control and collection system that are under positive pressure will be monitored on a quarterly basis to determine if any leaks are present at methane concentrations exceeding 500 ppmv.
- The wellhead for each extraction well will be monitored on a monthly basis to determine whether



Source: EBA

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Figure 2-4

LFG Collection and Control System Layout

the extraction well is being operated under vacuum conditions (i.e., negative pressure).

- The flare will be monitored for temperature and flow rate using dedicated instrumentation and the corresponding data documented using a continuous recorder. In addition, the flare will be source tested on an annual basis to verify compliance with emissions and destruction efficiency criteria.

The test methods and procedures employed to perform the respective monitoring provisions outlined above will be in accordance with the applicable subsections of 17 CCR, §95471. This includes portable gas meter instrumentation and calibration, emissions monitoring procedures, wind speed data collection, and precipitation documentation (i.e., no measurable precipitation 72 hours prior to emissions monitoring).

2.3.3 Project Construction Considerations and Schedule

As indicated above, landfill operations at the Ukiah Landfill ceased in 2001. The City of Ukiah has commenced the final closure process with preparation of submittal of the Final CPMP. The final closure date is contingent upon approval of the Final CPMP by applicable agencies. For purposes of this Draft EIR, construction is expected to begin in the spring/summer of 2020 and last for approximately 6 months. Each of the phases of the work is identified and described below.

Final Closure Schedule

The closure implementation schedule for the Ukiah landfill includes the estimated time frame to complete the closure tasks associated with each component of closure. The closure construction process will begin upon completion of final closure design and preparation and approval of the plan, selection of a qualified contractor and the subsequent issuance of a Notice to Proceed. This construction schedule may differ from the selected Contractor's schedule based on the Contractor's equipment and personnel resources. For purposes of evaluating different components of the project, the following estimate of equipment type and hours have been generated and is summarized in Table 2-1. These estimates of manpower and equipment needs have been used for purposes of evaluating several components of this study including greenhouse gas generation estimates, impacts from noise, traffic and other components. Please note that this information is used for estimating project requirements only and actual project needs will be based on contractor bid estimates. Using the following information, it is projected that the project duration will be approximately 6-8 months. Please also note that several of the project components will be conducted in parallel and coordinated with the overall project efforts.

The type of equipment and required personnel expected to be utilized during closure construction includes, but is not limited to, the following:

Types of Equipment

- Scrapers
- Dozers
- Loaders
- Compactors
- Dump Trucks (or End Dump Trailers)

- Water Pulls
- Soil Conditioning and Screening Equipment (Grizzlies)
- Forklift
- Welding Machine
- Pickup Trucks

Personnel

- Construction Manager
- Field Inspector(s)
- Field Engineer(s)
- Geotechnical Technician(s)
- Labor Crews (including qualified geosynthetics welders)
- Equipment Operators Surveyors
- Fabricators
- Mechanics

Once enough equipment is on-site, clearing and grubbing of the landfill surface can begin, as mobilization continues. Rough grading can then begin in those areas that have been cleared and grubbed. During preparation of the site for final cover placement, foundation layers for the final cover materials will be placed. In addition, there are several areas within the landfill that will require the grading, removal and final placement of refuse to provide clearance of electrical transmission lines that traverse over the landfill. The waste removal and reconsolidation activities will be conducted concurrent with clearing and grubbing and preliminary grading.

Placement of the final cover materials will begin after grading of the site. As placement of the final cover progresses, the LFG wells and collection system and drainage system required for closure can be integrated and constructed. The drainage facilities to be constructed during final cover placement will include the perimeter access road drainage systems, removal and relocation of the existing drainage components and outfalls and any ancillary drainage facilities including the sedimentation basin(s) structures. The drainage facilities and the LFG collection system components will be completed in conjunction with the final cover construction. Placement of erosion control best management practices can begin upon completion of the final cover installation.

The estimated time frame for completion of all closure construction activities for the site is estimated to be 6 months, which complies with the 180-day standard time frame required by 27 CCR, Section 21110 (e). Construction work will typically be done within normal working hours, weekdays between the hours of 7 a.m. and 7 p.m., and possibly on Saturdays between the hours of 7 a.m. and 4 p.m. The Proposed Project would be constructed entirely within the City's existing property. The City and its selected contractor(s) will employ appropriate construction best management practices (BMPs) to control erosion and fire prevention. As a final step of construction activities, construction trash and debris would be collected and disposed of properly. Once constructed, the City would provide routine operations and maintenance

Table 2-1
Estimate of Landfill Closure Project Manpower and Equipment

QTY	Description	HP	Load Factor	Hours /Day	Total Work Days	Average Hours Per Day	Annual Hours	Comments
Demolition								Demolition includes removal of above ground piping and drain inlets
1	Tractors/Loaders/Backhoes	97	0.3685	4	5	4	20	
1	Rubber-Tired Dozers	255	0.3953	4	5	4	20	
Site Preparation								Site preparation includes clearing, stripping, scarifying approximately 50 acres of landfill and borrow area surfaces
1	Rubber-Tired Dozers	225	0.3953	8	10	8	80	
1	Tractors/Loaders/Backhoes	97	0.3685	8	10	8	80	
Grading/Excavation								Grading/Excavation includes excavating and relocation of refuse, grading and placement of foundation layer material from onsite borrow area, placement of miscellaneous engineered fill
1	Excavators	162	0.3819	8	2	0.8	16	Excavation quantity = 13,500 CY
1	Graders	174	0.4087	8	10	4	80	Foundation Layer = 61,500
1	Rubber Tired Dozers	255	0.3953	8	20	8	160	Engineered fill quantity = 8,850 CY
2	Tractors/Loaders/Backhoes	97	0.3685	8	20	8	320	

Table 2-1
Estimate of Landfill Closure Project Manpower and Equipment

QTY	Description	HP	Load Factor	Hours /Day	Total Work Days	Average Hours Per Day	Annual Hours	Comments
2	Scrapers	361	0.48	8	10	4	160	
Well Drilling								Well drilling includes drilling for the LFG extraction wells. Vertical lineal feet = 940
1	Tractors/Loaders/Backhoes	97	0.3685	4	10	4	40	
1	Bore/Drill Rigs	205	0.5	8	10	8	80	
Final Cover								Final Cover includes placement of the synthetic turf material that includes a geomembrane, drainage layer, turf, and sand ballast
2	Tractors/Loaders/Backhoes	97	0.3685	4	40	4	320	
2	Welders	46	0.45	6	40	6	480	
2	Generator Sets	84	0.74	6	40	6	480	
Utilities (Storm Drain, LFG Pipe)								Utilities include storm drain culverts and inlets, and installation of above ground LFG piping that is solvent welded
1	Tractors/Loaders/Backhoes	97	0.3685	4	20	4	80	
1	Excavator	162	0.3819	6	10	3	60	
1	Welder	46	0.45	4	15	3	60	
1	Generator Sets	84	0.74	4	15	3	60	

Table 2-1
Estimate of Landfill Closure Project Manpower and Equipment

QTY	Description	HP	Load Factor	Hours /Day	Total Work Days	Average Hours Per Day	Annual Hours	Comments
LFG Flare Station								LFG flare station setting flare and blower skids, preparation of foundation and placement of concrete (8 CY), installation of underground storage tank, and placement of aggregate base – electric available
1	Cranes	226	0.2881	4	3	0.8	12	
2	Tractors/Loaders/Backhoes	97	0.3685	4	8	2.1	64	
1	Excavator	162	0.3819	8	2	1.1	16	
Roads								Roads include placement of aggregate base on perimeter access road and benches
1	Rollers	80	0.3752	8	15	8	120	
2	Tractors/Loaders/Backhoes	97	0.3685	8	15	8	240	

procedures as described in the postclosure maintenance plan as described above. No new permanent City employees are anticipated to be required for the Proposed Project.

2.4 Potential Responsible Agencies, Permits and Approvals

The Proposed Project, with its myriad distinct components and range of alternatives, is a complex project. Numerous federal, state, and local regulations and permit requirements would apply to the construction and operation of the Proposed Project. Table 2-2 lists the major federal, state, and local permits, approvals, and consultations identified likely to be required for the construction and operation of the Proposed Project. Table 2-2 is not intended to be exclusive and exhaustive. Other permits and approvals may be required. If so, the lead agency(s) would be bound by law to comply with such requirements.

Table 2-2
Potential Regulatory Requirements, Permits, and Authorizations for Proposed Project Facilities

Agency	Type of Approval
Federal Agencies	
U.S. Army Corps of Engineers (USACE)	Approval of a 404 permit for construction of storm drain outfalls in the adjacent stream.
State Agencies	
California Department of Resources Recycling and Recovery (CalRecycle)	Approval of the Final Construction Plans, Technical Specifications, and CQA Plan
North Coast Regional Water Quality Control Board	Approval of the Final Construction Plans, Technical Specifications, and CQA Plan
	Approval of a 401 permit for construction of storm drain outfalls in the adjacent stream
California Department of Fish and Wildlife (CDFW)	Approval of a 1602 Streambed Alteration Agreement for construction of storm drain outfalls in the adjacent stream
Local Agencies	
Mendocino County Air Quality Management District	Approval of the Authority to Construct and Permit to Operation for the LFG extraction and control system
Mendocino County Health & Human Services Agency	Approval of the Final Construction Plans, Technical Specifications, and CQA Plan

Chapter 3 Environmental Analysis

3.0 Introduction

This section presents potential environmental impacts of the proposed project. An overview of the environmental setting, the scope of the analysis, and the key attributes of the analytical approach are presented below to assist readers in understanding the manner in which the impact analyses have been conducted in this EIR.

3.0.1 Scope of the Environmental Impact Analysis

Based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines. This CEQA EIR addresses the following environmental resource topics in detail:

Subsection #	Subsection Title
3.1	Aesthetics/Visual Resources
3.2	Air Quality
3.3	Biological Resources
3.4	Cultural, Paleontological, and Tribal Resources
3.5	Geology, Soils, and Seismicity
3.6	Greenhouse Gases
3.7	Hydrology and Water Quality
3.8	Noise

For each resource topic, the CEQA EIR describes the existing environmental setting and regulatory framework, evaluates potential project impacts, and recommends mitigation measures that could reduce or avoid potentially significant impact(s).

3.0.2 Definition of Baseline or Existing Conditions

The Existing Conditions subsections present the existing environmental setting of the region and study area in relation to each of the resource topics. According to CEQA Guidelines Section 15125 (Environmental Setting), an EIR must include a description of the existing physical environmental conditions in the vicinity of the project, to provide the "baseline physical conditions" against which project-related changes can be compared. Based on the CEQA Guidelines, the baseline condition is normally the physical condition that exists when the Notice of Preparation is published. The Notice of Preparation for the proposed project was published on February 2, 2017, establishing the baseline for this Draft EIR as 2017. Throughout this Draft EIR, 2017 to current data is used for the description of the environmental setting to the extent available. Where such information is not available, data is used that is representative of baseline conditions.

3.0.3 Definition of Project Area and Study Area

The project area consists of areas within and around the City of Oxnard as were previously described in **Chapter 2, Project Description**, and are further described throughout this section. The extent of any

additional study area beyond the project area itself varies among resource topics, depending on the extent of the area in which impacts could be expected. A study area for each environmental topic is defined beyond the project area, as necessary and warranted, in the various subsections of this section.

3.0.4 Impact Determinations

As required by CEQA, an EIR must identify and evaluate the significance of impacts caused by a proposed project. Evaluation of the significance of an impact involves a variety of factors, such as the applicable standards of significance, the use of standard analytical methodologies and modeling approaches, an assessment of the extent and characteristics of the project effect, consistency with conclusions reached for similar projects, and principles derived from CEQA case law. The standards of significance, analytical methodologies, and other aspects of the analyses are described in detail in each section. The impact significance determinations listed below were used in this analysis.

- **Significant (SU) –** This category applies to those impacts that have been determined to be significant or potentially significant and cannot be mitigated to less than significant. This determination is made when there is no mitigation available, or the available feasible mitigation measures would not reduce the impact to less than significant. A *Statement of Overriding Considerations* must be made by the City of Ukiah for any project approval that will involve significant impacts that cannot be mitigated to less than significant.
- **Less than significant with mitigation (LTSM) –** This category applies to those impacts that may be significant or potentially significant, but can be reduced to less than significant through either project modifications or feasible mitigation measures.
- **Less than significant (LS) –** This category applies to effects of the project on the environment that could be adverse but are not significant or potentially significant, and therefore, do not require mitigation.
- **No impact (NI) –** This category refers to effects of the project on the environment that are not considered adverse.
- **Beneficial Impacts (B) –** CEQA does not require that beneficial impacts of a proposed project be identified and evaluated. However, this CEQA document identifies beneficial impacts if they are significant and address one or more of the identified project objectives, as identified in **Chapter 2, Project Description**.

3.0.5 Numbering Systems

Each of the environmental resource topics is evaluated in the numbered subsections shown above. The standards of significance and the impacts and mitigation measures in each subsection are also numbered. An example of the number system for each resource topic is provided below:
Numbering System for **Chapter 3.2, Air Quality**:

- Environmental Impacts – The impacts are numbered Impact 3.2-1, Impact 3.2-2, Impact 3.2-3, etc.
- Mitigation Measures – The mitigation measures are numbered based on which impact they address. For example, mitigation measures for Impact 3.2-1 are numbered Mitigation Measure 3.2-1a, Mitigation Measure 3.2-1b, Mitigation Measure 3.2-1c, etc.

3.0.6 Alternatives

In addition to the potential for direct and indirect impacts associated with the Proposed Project, alternatives to the Proposed Project are considered and evaluated. CEQA requires an EIR to describe and evaluate a reasonable range of alternatives to the Proposed Project that could feasibly attain most of the basic objectives of the Proposed project, while avoiding or substantially lessening any significant impacts (CEQA Guidelines Section 15126(a)). There is no iron clad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason. The discussion of alternatives must focus on those alternatives that are capable of avoiding or substantially lessening the significant environmental effects of the proposed project. **Chapter 4, Alternatives,** identifies, considers, and evaluates various Alternatives that would meet the goals and objectives of the Proposed Project.

3.0.7 Growth Inducing Effects

CEQA requires that an EIR evaluate the growth-inducing effects of a proposed project[1]. A growth-inducing impact is defined as follows:

> *[T]he ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects, which would remove obstacles to population growth.... It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.*

The environmental effects of induced growth are secondary or indirect impacts of the project. Growth can result in significant increased demand on community services and public service infrastructure; increased traffic, noise, degradation of air and water quality; and conversion of agricultural land to urban uses.

Based on the CEQA definition above, assessing the growth-inducement potential of a project such as the Proposed Project involves answering the question:

> *Will construction and/or operation of the proposed project and/or related infrastructure and facilities remove an obstacle to growth and thus directly or indirectly support more economic or population growth or residential construction in the surrounding environment?*

Chapter 5, Growth Inducement Potential, evaluates the growth inducement potential of the Proposed Project as well as any alternatives that may be carried forward for consideration of Project approval.

3.0.8 Cumulative Effects

In addition to the potential for direct and indirect impacts associated with the Proposed Project, the project may contribute to broader cumulative impacts, when considered together with other development that may cause related impacts. **Chapter 6, Cumulative Effects,** analyzes these potential effects.

[1] CEQA Guidelines Section 15126.2(d).

3.1 Aesthetic/Visual Resources

This chapter describes the existing visual character of the Proposed Project areas and evaluates how components of the Proposed Project would impact aesthetic or visual resources.

3.1.1 Introduction

Assessment of project impacts to aesthetic resources involves describing environmental baseline conditions in terms of visual quality, sensitivity, and visibility; identifying where project components could adversely impact aesthetic resources; and by choosing observation points from which these facilities will be evaluated. The severity of visual effects due to project components is evaluated against significance thresholds defined in CEQA to determine project impacts. If necessary, mitigation measures would be proposed to avoid or reduce impacts to acceptable levels. The following introduces the key terms and concepts used throughout this chapter.

- **Aesthetic Resource.** An aesthetic resource consists of the landforms, vegetation, water features, and cultural modifications that impart an overall visual impression of an area's landscape. Several factors important in describing the aesthetic resources of an area include visual quality, visual sensitivity and landscape visibility. These factors together not only describe the aesthetic appeal of an area, but also communicate how much value is placed upon a landscape or scene by the general public.
- **Dark Sky.** "Dark Sky" refers to a sky, which is free (or relatively free) of manmade lighting. Proponents of "dark sky" regulations point out the many benefits of reducing the upward spread of light, which include conserving energy, reducing glare, maintaining rural community character, safeguarding wildlife in their natural environment, and restoring the view of the starry night sky. By focusing and directing light, lighting fixtures designed to improve the dark sky can also result in cost savings.
- **Visual Quality.** Visual quality describes the intrinsic aesthetic appeal of a landscape or scene due to a combination of physiographic characteristics (such as landform, water and vegetation) and cultural modifications (physical change to a landscape caused by human activity). Visual character is influenced by many different landscape attributes including color contrasts, landform prominence, repetition of geometric forms, uniqueness of textures, and visual variety, among others. Cultural modifications are often considered to detract from visual quality, especially where they promote disharmony, reduce variety, or introduce chaotic assemblages of shapes and forms in a landscape (visual clutter). Occasionally, cultural modifications may add to the aesthetic appeal of a landscape. For example, vineyards often add pleasing patterns and colors to a landscape. Typically, the visual quality for a particular setting is determined using a reference point (see Key Observation Point definition below) and classified into low, moderate and high ratings based on the landscape attributes.
- **Visual Sensitivity.** Visual sensitivity refers to the level of interest or concern that the public has for a particular aesthetic resource. Areas such as tourist hot spots, parks, trails, or scenic highways - where expectations for aesthetically pleasing views are high – will have high visual sensitivity. Any change to existing views would more likely be noticed in these settings. These types of community expectations are often reflected in general plan documents, where scenic vistas or corridors are

established with the purpose of protecting or preserving an existing aesthetic resource. Designated scenic corridors, vistas, and sensitive viewsheds always have high visual sensitivity. Other areas have either low or moderate visual sensitivity, depending on public expectations and experience in the area.

- **Landscape Visibility.** Landscape visibility is a measure of the magnitude and frequency with which a particular landscape can be observed. In the most general terms, landscape visibility describes where people are, what part of the landscape they can see, and with what clarity. The magnitude of visibility refers to the duration a particular landscape is seen by an observer, and the frequency refers to the number of observers over certain time periods that typically view the landscape. A rural landscape may be seen by only several residents, but for very long durations, whereas an uninhabited landscaped crossed by an interstate might be seen by high numbers of travelers but for brief periods. Both the number of viewers and the duration of view are equally important in determining landscape visibility. An additional factor to consider is the distance of a landscape from an observer. If an area of interest is in the foreground of an observer's view, it would obviously be more visible than if it were in the background. Distance zones are typically divided into "foreground", "middleground", and "background" zones.
- **Key Observation Points**. A key observation point (KOP) is a representative location from which a scene is evaluated for its visual quality and for any potential effects of proposed changes. Typically, KOPs are from major travel corridors, vista points, public parks or beaches. Sometimes KOPs are used to show what is not visible or to portray a proposed project's specific effect on a particular scene.
- **Visual Impact Severity.** Visual impact severity rates how profoundly the existing visual setting is disturbed by a project. The severity of a project impact is typically evaluated from a KOP, with structures, architectural details, and landscaping (as best approximated) modeled into the photograph. Visual impact severity is given a rating, depending on an evaluation of the following three factors influencing impact severity. Factors that influence the severity of the project impact include:
  - Visual contrast with surrounding setting,
  - Dominance of the project relative to other features, and
  - Whether the project blocks or impairs views of valued aesthetic features such as trees, ridgelines, water, sky, or distinctive landforms.

3.1.2 Environmental Setting

This section describes the environmental baseline conditions with respect to aesthetic resources.

3.1.2.1 Visual Setting of the Region

The Proposed Project is located on a 235 acre- parcel that is owned by the City of Ukiah in Mendocino County and which is zoned as Public Facility. Most of the land in the county is in forest or in agricultural production. Both forest and agricultural lands are considered open spaces that add to the quality of life of county residents and attract tourists. The various state and county parks protect areas with scenic value, particularly redwood groves. The coast is considered a scenic resource, and policies in the County's Coastal

Element are designed to protect its scenic value. Some ecological communities in the county provide unique scenic value, most notably the pygmy forests.

Many open space and scenic areas in Mendocino County are protected under easements managed by land trusts. The number of land trusts with interests in Mendocino County has significantly increased in recent years. Those with a local focus or known to be active in the county include:

- Anderson Valley Land Trust: Preservation and restoration of the rural landscape with emphasis on the Navarro River watershed. Twenty conservation easements totaling more than 1,300 acres.
- California Institute of Man in Nature: Jug Handle Farm and Nature Center south of Fort Bragg.
- Caspar Community: Community planning to conserve resources and facilitate public access in the Caspar area; was involved in acquisition of Caspar Headlands.
- Comptche Land Conservancy: Preservation and protection of conservation values, i.e., healthy forest ecosystem, wildlife habitat, watershed, and viewshed in the Comptche environs. Two conservation easements, 50 and 120 acres, reserving commercial timber rights to owners.
- Coastal Land Trust: Manages two dedicated easements for trails to Pacific Ocean from Navarro Viewpoint, north of Albion; owns two parcels at Seaside Beach, north of Ten Mile River.
- Golden State Land Conservancy: Four conservation easements, 6,000+ acres, Mendocino County.
- Inland Mendocino County Land Trust: One conservation easement, 187 acres, Redwood Valley. Emphasis on farmlands.
- Mendocino Land Trust: Ten conservation easements totaling 3,501 acres in Willits, Hopland, Anderson Valley, the South Coast, and Albion. 7,334 acres protected by the Land Trust at Big River, 74 acres at Caspar Headlands, and 37 acres at Glass Beach were conveyed to California State Parks. Two acres, Heider Field in Mendocino Village, are managed under an operating agreement with State Parks. 55 acres are owned and managed at Navarro Point for botanical resources and coastal access. 75 acres are owned and managed at Caspar Beach and the Caspar South uplands. Seven acres of coastal access easements are managed at Cantus Cove, Belinda Point, the Mendocino Bay Viewpoint, and Navarro Harbor. The Land Trust holds 21 offer-to-dedicate coastal access easements.
- Moat Creek Managing Agency: Accepted two offers to dedicate land at a bluff south of Point Arena.
- Pacific Forest Trust: Conservation easements on 10,765 acres in Mendocino County, including Sinkyone Wilderness Park and Leonard Lake Reserve.
- Redwood Coast Land Conservancy: Coastal areas, Navarro River to Russian River, Sonoma County.
- Westport Village Society: Westport community and Headlands, assisted in Headlands acquisition. Interest in area from Ten Mile River to Rockport.

There are no highways within Mendocino County that have been officially designated within the California Scenic Highway System. The nearest eligible state scenic highway is 30.8-mile section of State Route 20 near Calpella to State Route 20 near Willits. The County's Scenic Highways Element, adopted in 1977, recommended the designation of SR 1 through the County and SR 162 from Longvale to Inspiration Point as official state scenic highways, upon completion of corridor studies to characterize scenic qualities and corridor boundaries. Several communities also recommended local protection of the natural character of their scenic corridors. The Laytonville community proposed local scenic highway designation on several roads in the area, while Anderson Valley citizens desired local ordinances to ensure scenic protection of the valley.

3.1.2.2 Existing Visual Setting of Project Site

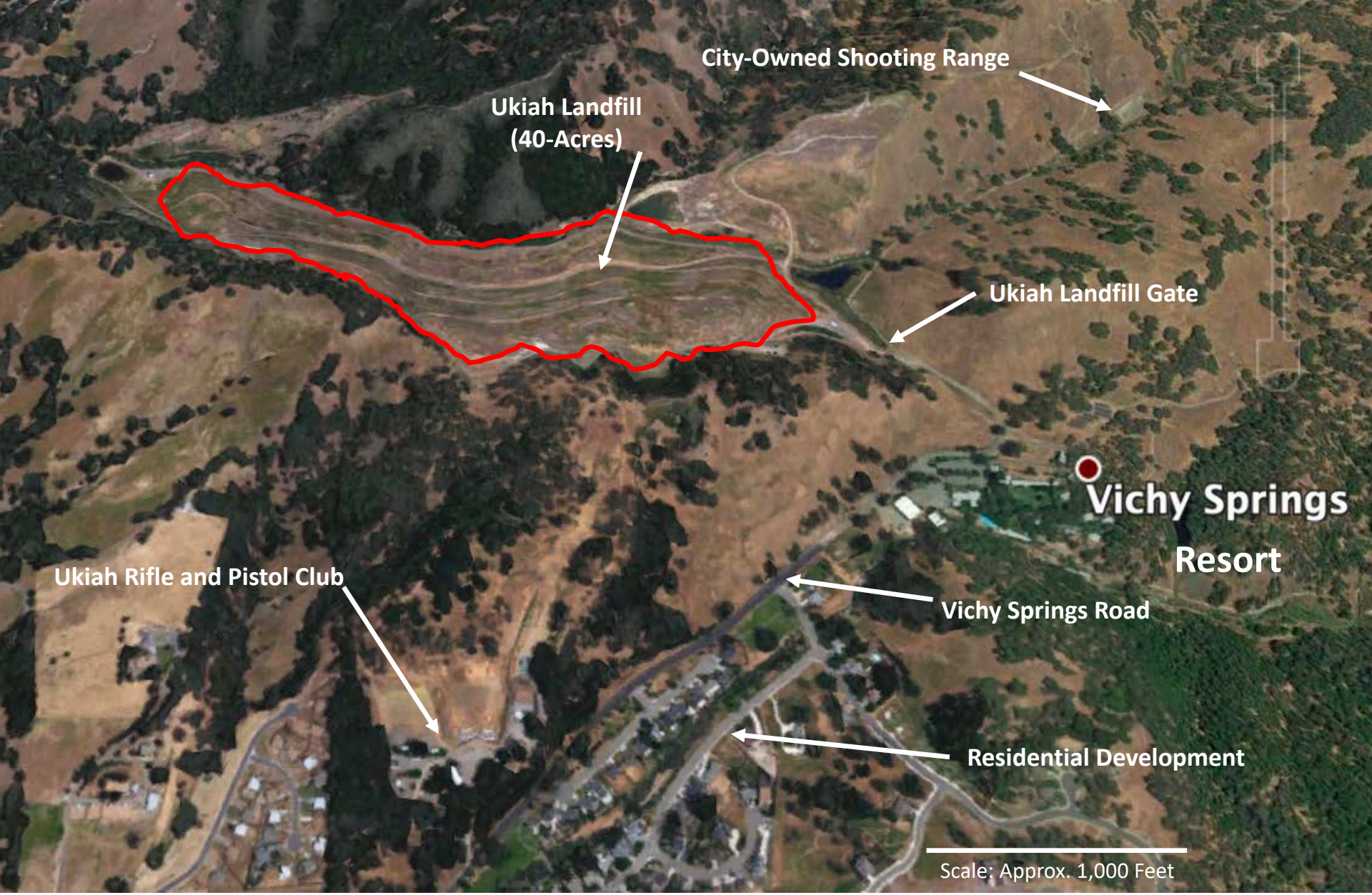
In this section, the visual setting of the Proposed Project site is described by locating it within a particular landscape unit and then describes its visual quality, visual sensitivity and landscape visibility based on key observation points (KOPs). A qualitative rating for aesthetic resource value (low moderate, or high) is then assigned based on these factors. In addition, an evaluation of existing lighting conditions is provided for the site by describing existing light sources visible from the site. Site setting for project components which already exist, or would not be visible, are typically not required to be addressed in this section because baseline conditions would not be affected by the Proposed Project if it cannot be seen.

Proposed Project Site

The Proposed Project is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. As shown on Figure 3.1-1, the Ukiah Landfill occupies approximately 40-acres of permitted landfill area on a 283.5-acre parcel and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01.

The existing Ukiah Landfill has a maximum width of approximately 1,000-feet wide in the north-south direction and a maximum length of about 3,500-feet in the east-west direction. Existing ground surface elevations at the landfill range from approximately 710-feet above mean sea level (MSL) near the western footprint, to about 970-feet MSL along the southeast footprint. The landfill has been graded to form a series of flat terraces stepping down from south to north. The landfill surface is currently covered with seasonal grasses. A City-owned shooting range is situated on the landfill property approximately 2,000-feet northeast of the waste management unit footprint. Zoning for the Ukiah Landfill site is designated as Public Facilities by the Mendocino County General Plan.

Land adjacent to the landfill property is zoned primarily as rangeland and is used for grazing. Vichy Springs Resort is a California Registered Historical Location (No. 980) that is located approximately 625-feet from the Ukiah Landfill's south property line. A single-family residence located approximately 1,000-feet west of the landfill's western property boundary. A rural residential development is located approximately one-quarter-mile west of the landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire residential development is approximately 1,000 feet southward of the landfill property boundary and is separated from the Ukiah Landfill by an intervening ridge. It should be noted that the City owns an approximate 97-acre parcel (Assessor's Parcel No. 178-210-01) that adjoins a portion of the Ukiah Landfill's southern



Source: Google Earth 2018

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Figure 3.1-1
Aerial View of Ukiah Landfill

property boundary. This property, which is now known as the Ukiah Rifle and Pistol Club, was purchased as a buffer zone to limit future development adjacent to the Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the landfill property or part of this Proposed Project.

3.1.3 Regulatory Context

The Proposed Project is subject to specific state and local laws, ordinances, regulations, and standards for visual resources. There are no specific federal regulations that apply to the visual resources associated with the Project.

3.1.3.1 State Regulations

Summarized below are the relevant state regulations related to aesthetics/visual resources that are applicable to the Proposed Project.

California Scenic Highway Program. California's Scenic Highway Program was created in 1963 to preserve and protect scenic highway corridors from change, which would diminish the aesthetic value of lands adjacent to highways. The state laws governing the Scenic Highway Program are found in the Streets and Highways Code, Section 260 et seq. The State Scenic Highway System includes a list of highways that are either eligible for designation as scenic highways or have been so designated. These highways are identified in section 263 of the Streets and Highways Code.

There are no highways within Mendocino County that have been officially designated within the California Scenic Highway System. The nearest eligible state scenic highway is 30.8-mile section of State Route 20 near Calpella to State Route 20 near Willits. The County's Scenic Highways Element, adopted in 1977, recommended the designation of SR 1 through the county and SR 162 from Longvale to Inspiration Point as official state scenic highways, upon completion of corridor studies to characterize scenic qualities and corridor boundaries. Several communities also recommended local protection of the natural character of their scenic corridors. The Laytonville community proposed local scenic highway designation on several roads in the area, while Anderson Valley citizens desired local ordinances to ensure scenic protection of the valley. The Project area is not visible from any of these designated highways.

3.1.3.2 Local Regulations

The Proposed Project would be located on City property within the jurisdictional boundaries of Mendocino County. The relevant policies that may apply to the project components within each jurisdiction are described below.

County of Mendocino General Plan – Resource Management Element. The following is a list of the County of Mendocino Development goals, policies, and action items related to visual resources.

Goals

Goal RM-14 (Visual Character) Protection of the visual quality of the county's natural and rural landscapes, scenic resources, and areas of significant natural beauty.

City of Ukiah General Plan and Growth Management Plan. The following goals and policies from the Ukiah General Plan relate to the aesthetics of a Proposed Project:

Goals

Goal OC-28: Visually enhance the Highway 101 corridor through the Planning Area.

Goal CD-3: Provide an aesthetically pleasing urbanscape.

Goal CD-4: Seek uniform, attractive landscaping standards for non-single-family residential development throughout the Valley.

Goal CD-5: Preserve and enhance the scenic setting of the Ukiah Valley.

Goal CD-6: Ensure community separation and identification.

Goal CD-7: Improve the appearance of area gateways.

Goal CD-8: Recognize that general area appearance - especially of orchards and vistas - is a cultural and visual resource.

Goal CD-17: Require commercial and industrial parking lots to be designed and sited so as to increase the attractiveness of the areas in which they are located.

3.1.4 Impact Analysis

This section includes a discussion of the relevant significance criteria, the approach and methodology to the analyses, and any identified impacts and mitigation measures.

3.1.4.1 Significance Criteria

Significance thresholds below are based on Appendix G (Environmental Checklist Form) of the *CEQA Guidelines*, which indicates that a potentially significant impact on aesthetics would occur if the project would:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; and/or
- Create a substantial new source of light or glare that would adversely affect day or nighttime views in the area.

3.1.4.2 Approach to Analysis

The approach for this analysis is fairly simple and straight forward. First, an assessment is made as to what the visual impact severity of the Proposed Project is - or is not. And then, a determination is made as to whether the Proposed Project's visual change can actually be seen from sensitive receptor(s) or would adversely affect the visual quality, visual sensitivity, and/ or adversely affect a visual resource or view. Based on the feedback from the 30-day public review of the 2016 IS/MND, the primary visual concern that has been expressed to the City is that the artificial/synthetic specialized tufted geotextile cover has the potential to provide a negative altered change of view of the viewshed by the Vichy Springs Resort and their guests. As such, this is the primary focus for this analysis.

As discussed above, the visual impact severity rates how profoundly the existing visual setting is disturbed by a project. Visual severity of visual impacts of a proposed project is determined by evaluating the degree to which the project contrasts with site setting, the dominance of project in the view-shed and whether views of appealing features (such as trees, water, skyline, or distinctive landforms) are blocked or obscured.

Specifically, and depending on the nature of the resource and the complexity of the project, the analysis can range from simple informal evaluations to complex analyses. The visual resource analysis often involves describing three essential items or components, including:

- **The nature and quality of the visual resource.** Any of the significant visual resources, as identified above in the environmental setting that may be affected by the Proposed Project is noted and described. This would include local waterways, agricultural greenbelts, beaches and coastlines, scenic roadways, and well-preserved urban landscapes associated with historic neighborhoods and parks and open plazas.
- **The viewpoint and the identity of the viewers and their sensitivity to changes in the view.** Viewers who would be the most sensitive to alterations in the landscape or existing views would be residents or visitors enjoying the recreational uses in open spaces, beaches, coastal areas, or scenic roadways viewing these areas. For example, people using smaller parks, open spaces, or plazas within urban areas would also be sensitive to the views of urban landscapes in the area.
- **The effect of the project in altering the nature of the view.** A project that introduces a manmade feature that contrasts strongly with the existing natural or cultural landscape affecting sensitive viewers would normally have a significant impact. The impact may be significant if the project is inharmonious or discordant with the existing landscape and provides a long-term negative view to a sensitive receptor, and/or if it would introduce a feature that blocks views of important resources, even if the view is already partially blocked. The effect may also be part of a cumulative impact if it occurs in combination with similar projects or man-made features that adversely affect the same visual resource.

For this analysis, it is also important to understand what can actually be seen by the naked eye and how far away that is. Certainly, time of day, light sources, elevation, curvature of the earth, obstructions like hills and trees, and many other factors all affect one's ability to see and notice visual resources- even with perfect 20/20 vision[1]. However, the key question for this analysis is "**What can reasonably be seen from within 1,000-feet of the Proposed Project?** As shown in Figure 3.1-2, objects 1,000-feet away are much farther and harder to see than you think. Specifically, even with unobstructed views, most things from farther than 1,000-feet away are not seen or noticeable by the naked eye[2].

In short for this analysis, impacts will be assessed by determining the nature and quality of the visual resource, the viewpoint, the identity of the viewers and their sensitivity to changes in the view, the effect of the Proposed Project in altering the nature of the view, and most importantly the ability to see the changed view or viewshed.

3.1.4.3 Impacts and Mitigation Measures

As discussed above, evaluation of potential impacts to aesthetic/visual resources of the Proposed Project included reviewing relevant City and County standards and policies, characterizing the existing visual and

[1] 20/20 vision is a term used to express normal visual acuity (the clarity or sharpness of vision) measured at a distance of 20 feet. ... If you have 20/100 vision, it means that you must be as close as 20 feet to see what a person with normal vision can see at 100 feet.

[2] Unassisted vision, without a telescope, microscope, or other device.









Source: Peter Wagner and Aleks Kajstura

Note: Notice that after 100-feet, the red stop sign, mail box, and telephone pole in each close-up are not visible.

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Figure 3.1-2
1,000-Feet is Farther Than You Might Think

aesthetic environment throughout the study area, and simulating the visual effects of proposed Project facilities. Impacts were assessed by determining the nature and quality of the visual resource, the viewpoint, the identity of the viewers and their sensitivity to changes in the view, and the effect of the Proposed Project in altering the nature of the view. significance criteria for aesthetics/visual resources in accordance with CEQA guidelines.

Impact 3.1-1: Would the Proposed Project have a substantial adverse effect on a scenic vista?

As indicated in the Mendocino County Resources Management Element, Mendocino County is a predominantly rural county. Most of the land in the county is in forest or in agricultural production. Both forest and agricultural lands are considered open spaces that add to the quality of life of county residents and attract tourists. The various state and county parks protect areas with scenic value, particularly redwood groves. The coast is considered a scenic resource, and policies in the County's Coastal Element are designed to protect its scenic value. Areas such as the forest lands and other open space areas have been identified as scenic resources in the County's Resource Management Element.

The Project Site property consists of a 283.5-acre rural parcel of land of which only approximately 40-acres of the property is occupied by the landfill unit (See Figure 3.1-1 above). The Ukiah Landfill began refuse disposal operations in 1955 and ceased operations in 2001. As discussed herein the Landfill property is surrounded by rural agricultural and undeveloped lands that are typically large in size with very limited to no public access. The Project Site property has been significantly altered by past landfilling activities and is not considered to be a scenic or aesthetic resource in its altered condition. The Proposed Project includes the closure of the landfill that consists of the placement of a final cover synthetic material with the sequential installation of grading and drainage improvements and landfill gas collection and control equipment. The final cover element of the Proposed Project includes no structures on the surface of the final closure project, with the exception of the landfill gas flare station located on the northwest portion of the site, which would create a visual element that would not adversely affect the visual/aesthetic character of the Project Area, including the adjacent forestland.

Other features of the landfill include a landfill gas monitoring and control system, surface water control system, a groundwater and stormwater monitoring and reporting system/program, and a leachate collection and removal system. These environmental control systems are composed of minor surface and subsurface features, including monitoring wells, pipes, a landfill gas flare and related features. As indicated above, no significant vertical elements that would be visually obtrusive are proposed on the site, with the exception of the landfill gas flare, as part of the final closure process. Therefore, no significant visual impacts will occur as a result of project implementation and no associated mitigation measures are required.

The Project Site is located at the end of Vichy Springs Road, which is not identified in the Mendocino County General Plan as a Scenic Resource. Further, the Proposed Project would not be visible from Vichy Springs Resort or any other sensitive receptor and would be designed to blend into the existing landscape. As a result, Project implementation will not affect existing views from scenic corridors/roads.

Significance: No Impact.

Impact 3.1-2: Would the Proposed Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.

The Project site property is located in an area of Mendocino County that is removed from any scenic highways and is not identified as a scenic amenity or resources. The site has been substantially altered by past landfilling activities and is not characterized by any important or significant aesthetic resources. Furthermore, the Project Site is not located adjacent to or within the view shed of any designated highways/roadways as designated by the Mendocino County General Plan.

Current closure and post-closure requirements significantly limit future land uses over the refuse footprint in order to maintain the integrity of the final cover surface. The proposed post-closure end use for the Ukiah Landfill refuse footprint will be non-irrigated vegetated open space. However, the Ukiah Landfill surface will consist of an artificial/synthetic specialized tufted geotextile turf cover that will be olive-green in color and is designed to look like an irrigated agricultural field. In addition, implementation of the proposed final closure plan and subsequent post-closure maintenance activities includes environmental control systems and related features that are intended to meet current closure requirements so that the Proposed Site does not pose a health hazard or other adverse effects to the environment. No significant above-ground structures or other features, other than the landfill gas flare station, are proposed that would either affect the existing site characteristics or the visual/aesthetic character of the site and/or area. As a result, no significant impacts are anticipated and no mitigation is required.

Significance: Less-than-Significant.

Impact 3.1-3: Would the Proposed Project substantially degrade the existing visual character or quality of the site and its surroundings.

The Ukiah Landfill began refuse disposal operations in 1955 and ceased operations in 2001. As discussed herein, the Ukiah Landfill property provides no public access and is surrounded by rural agricultural and undeveloped lands that are typically large in size with no public access as well. As indicated above, no development (i.e., structures or vertical features) are proposed for the Project, other than the landfill gas flare station, which would affect the aesthetic character either of the project site or the surrounding area. Furthermore, the Proposed Project is consistent with Policy RM-128 of the County of Mendocino's Resources Management Element (i.e., protect the scenic values of the county's natural and rural landscapes, scenic resources, and areas of significant natural beauty). Therefore, no significant impacts will occur either to the aesthetic character of the site or to that of the surrounding area and no mitigation measures are required.

As shown in Chapter 2 – Project Description, the Proposed Project includes the construction of a permanent olive-green artificial/synthetic specialized tufted geotextile turf cover instead of a clay layer with a natural grass cover. Figure 2-2, in Chapter 2 – Project Description, provides two recent examples of where olive-green artificial/synthetic specialized tufted geotextile turf has been and is being successfully used. Figure 3.1-1, above, provides an aerial view of the existing Ukiah Landfill and pinpoints key features and potential sensitive receptors within and/or throughout the viewshed. Figure 3.1-3 provides an aerial view simulation of the proposed olive-green cover for the Ukiah Landfill. Olive-green was chosen as the best color of the three options (olive-green, tan, or blend) in order to blend into the natural surrounding environment. It was designed to blend in with the olive-green grass in the winter or wet season and look like an irrigated field



Source: Google Earth 2018

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Figure 3.1-3

Simulated Aerial View of Post-Constructed Ukiah Landfill

in the summer or dry months, especially at distances over 500-feet. Figure 3.1-4 provides an aerial view comparison of a simulation of the Proposed Ukiah Landfill cover with an actual aerial view of the City of Ukiah's Municipal Golf Course – indicating that it would blend in with other existing irrigated features in the surrounding area. Figure 3.1-5 provides an up-close view of the existing Ukiah Landfill and a simulated view of it with an olive-green artificial/synthetic specialized tufted geotextile turf cover. Based on this analysis, the Proposed olive-green artificial/synthetic specialized tufted geotextile turf cover would have less-than-significant impacts on the existing visual character or quality of the site and its surroundings.

As for the ability to be seen from sensitive receptor(s), Figure 3.1-6 provides a visual analysis of the Proposed Project to surrounding sensitive receptors. Figure 3.1-7 provides a further visual simulation of the pre-and post-constructed Project. Specifically, the 40-acre-Ukiah Landfill is not visible from the Ukiah Landfill Gate. And more importantly, Vichy Springs Resort is also not visible from the Ukiah Landfill Gate, due primarily due to elevation changes. Figure 3.1-8 provides another visual simulation analysis proving that due to an elevation barrier, Vichy Springs Resort and other sensitive receptors cannot see the existing Ukiah Landfill from their property and/or any public access point. Additionally, the author of this section visited Vichy Springs Resort as a paid guest and hiked the all-around the Vichy Springs Resort Property, looking for any point where the Ukiah Landfill was visible. No visual sighting of the 40-acres portion of the Ukiah Landfill was seen or was possible, due to a variety of factors including, but not limited to, elevation differences, distance, and natural barriers like trees. Figure 3.1-9 provides photo views of KOPs D and C on Figure 3.1-6 showing that the Ukiah Landfill cannot be seen from even elevated portions of the Vichy Springs Resort property and along their hiking trails. KOPs A, B, E, F, and G have no and even worse views towards the Ukiah Landfill and thus these non-descript pictures have been left out. However, Table 3.1-1 provides a summary of the ability to see the Ukiah Landfill from KOPs within approximately 2,000-feet. As demonstrated in Figure 3.1-2 above, anything over 1,000-feet is not considered to be a KOP with a significant view. As a result, the Proposed Project would not have any visual impacts to and/or from the Vichy Springs Resort, the Ukiah Rifle and Pistol Club, the residential developments to the south and the west, and/or any other sensitive receptor(s).

Table 3.1-1
Key Observation Points (KOPs) with 2,000-feet of the Ukiah Landfill

KOP Location	Elevation	Coordinates	Distance (feet)	Is Ukiah Landfill Visible?	Comments
L1	856	39.10.09.66 N 123.09.38.64 W	N/A	N/A	Closest Viewpoint of the Landfill to/from Vichy Springs Resort
L2	728	39.10.17.33 N 123.09.21.61 W	N/A	N/A	Closest Viewpoint of the Landfill to/from Residential Development to the West
A	800.	39.10.01.60 N 129.09.30.30 W	1,061	No	60-foot +/- Elevation Barrier/Ridge Blocks View
B	815	39.10.04.31 N 129.09.29.02 W	963	No	45-foot +/- Elevation Barrier/Ridge Blocks View
C	812	39.10.01.79 N 129.09.26.63 W	1,270	No	45-foot +/- Elevation Barrier/Ridge Blocks View
D	873	39.10.04.07 N 129.09.22.03 W	1,459	No	Distance and Trees Obstruct View
E	792	39.10.08.79 N 129.09.32.60 W	1,064	No	60-foot (+/-) Elevation Barrier/Ridge Blocks View
F	791	39.10.56.35 N 129.09.42.09 W	1,702	No	300-foot (+/-) Elevation Barrier/Ridge Blocks View

Table 3.1-1 Key Observation Points (KOPs) with 2,000-feet of the Ukiah Landfill					
KOP Location	**Elevation**	**Coordinates**	**Distance (feet)**	**Is Ukiah Landfill Visible?**	**Comments**
G	803	39.10.23.33 N 123.10.44.08 W	1,892	No	Distance and Trees Obstruct View
Note: Due to map scale issues, KOPs L2, F, and G are not practical or useful to put on a map.					

Further, construction activities would be temporary (i.e. 6 months) and located on-site with limited to no visual views and are thus considered to be a less-than-significant impact. Similarly, routine operations and maintenance activities would not affect aesthetic or visual resources and are thus considered to be a less-than-significant impact. With that said, the City offers the following precautionary mitigation measure to ensure that no sensitive receptor is adversely affected by the Proposed Project on a long-term basis.

> **Mitigation Measure 3.1-1: Provide Proper Fencing and/or Shielding from Sensitive Receptors.** If sensitive receptor(s) can prove to the City that they have an actual view of part or all of the 40-acre Ukiah Landfill and do not like the construction activities or the color/visual aspects of the permanent cover, the City will work with the sensitive receptor(s) and provide proper on-site fencing (in neutral colors) and/or natural shields such as trees, brushes, and/or shrubs to block any unwanted view(s) of the new landfill cover or appurtenant structures as necessary.

With Mitigation Measure 3.1-1above, any unlikely impacts would be further reduced and would be considered to not be an impact.

Significance: No Impact with Mitigation.

Impact 3.1-4: Would the Proposed Project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?

The Proposed project is located in a remote area of Mendocino County and is removed from urban areas. Project implementation does not include any new lighting sources and/or features that would result in the creation of new lighting either on the site or in the Project Area. All construction activities will occur during the daylight hours, which would not require lighting. Upon completion of the final closure construction activities, site activities would then be limited to routine maintenance, monitoring, and repair of site features/facilities; however, no new lighting would be required and, therefore, is not incorporated into the project. As a result, no lighting impacts will occur and no mitigation measures are required.

Significance: No Impact.



Source: Google Earth 2018

Aerial Simulation of Ukiah Landfill with Artificial Cover



Source: Google Earth 2018

City of Ukiah Valley Golf Course

SMB ENVIRONMENTAL

Figure 3.1-4
Comparison of Proposed Project and Local Irrigated Areas



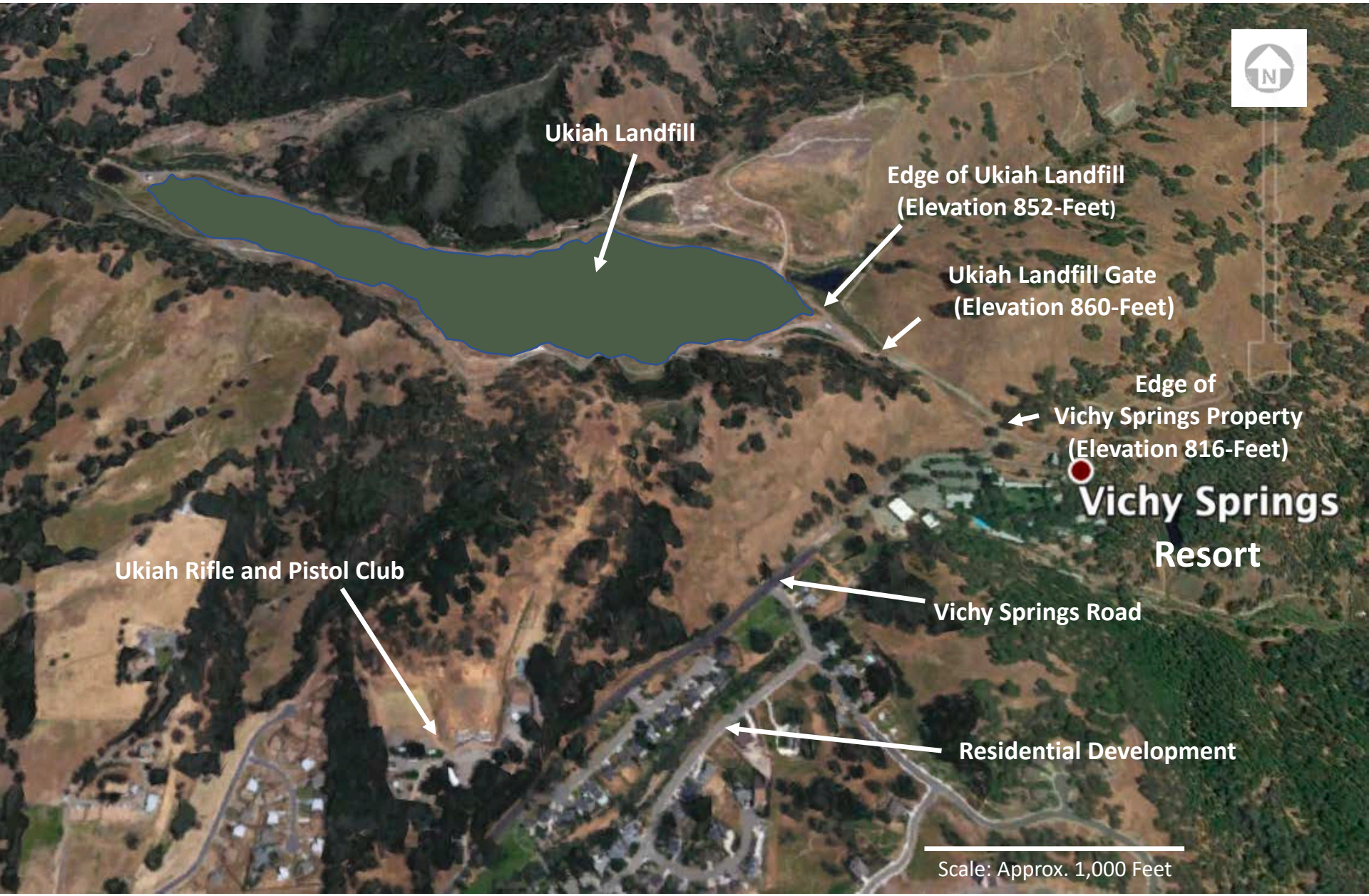
Existing Ukiah Landfill – March 2018



Simulated Post-Constructed Ukiah Landfill

SMB ENVIRONMENTAL

Figure 3.1-5
Visual Simulation of Pre- and Post-Project Ukiah Landfill



Source: Google Earth 2018

SMB ENVIRONMENTAL

Figure 3.1-6

Visual Analysis of Ukiah Landfill to Surrounding Receptors



View of Ukiah Landfill at Gate – March 2019



View of Vichy Springs Resort from Ukiah Landfill Gate – March 2019



Source: Google Earth 2018

SMB ENVIRONMENTAL

Figure 3.1-8
Key Observation Points from Vichy Springs Resort



View from KOP C at Vichy Springs Resort – March 2019



View from KOP D at Vichy Springs Resort – March 2019

SMB ENVIRONMENTAL

Figure 3.1-9
Views from Vichy Springs Resort Towards Ukiah Landfill

3.1.5 Cumulative Effects

There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts to aesthetics and/or visual resources.

Significance: Less-than-Significant.

3.1.6 References

City of Ukiah General Plan and Growth Management Plan, 1995.
http://www.cityofukiah.com/documents-and-maps/?cx=017902004270358824394%3A5v_kawavgdw&cof=FORID%3A11&q=general+plan

County of Mendocino General Plan – Resource Management Element, August 2009.
https://www.mendocinocounty.org/government/planning-building-services/plans/mendocino-county-general-plan

3.2 Air Quality

This section provides an overview of the existing air quality conditions at the project site, the air quality regulatory framework and an analysis of potential air quality impacts that would result from implementation of the Proposed Project. Issues related to climate change and greenhouse gas emissions are contained within Section 3.6. The supporting methodology and assumptions used in the air quality analysis are provided in Appendix D.

3.2.1 Introduction

The air quality analysis addresses air emissions from temporary construction activities (i.e. construction equipment, haul trucks and worker trips) and long-term operation of the proposed flare station. The air quality analysis includes a review of criteria pollutant emissions such as carbon monoxide (CO), nitrogen oxides (NO_x), volatile organic compounds (VOC) as reactive organic gases (ROG), particulate matter less than 10 micrometers (coarse particulate or PM10), and particulate matter less than 2.5 micrometers (fine particulate or PM2.5).

3.2.2 Environmental Setting

3.2.2.1 Regional Overview and Climate

The Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah landfill is part of a 284-acre parcel of land. The project area is located on the southeastern portion of Mendocino County and designated Inland South. The inland urban section of Mendocino County consists of the cities of Ukiah and Willits as well as a large number of unincorporated communities. Highway 101 is the main (in some areas exclusive) north/south roadway and Highway 20 is the main east/west connector. The Northwestern Pacific Railroad runs roughly parallel to Highway 101 and connects Willits and Ukiah. Highway 101 varies between a divided highway, freeway and two lane street in this area.

The Proposed Project is in Mendocino County within the North Coast Air Basin (NCAB), as established by the California Air Resources Board (CARB). The NCAB includes Mendocino, Humboldt, Trinity, Del Norte Counties, and Northern Sonoma County. The NCAB extends south from the coast of Oregon between 30 and 100 miles wide. The Coastal Range and Pacific Ocean border to the west, the Sacramento Valley to the east and the Klamath Mountains to the north.

The Mendocino County Air Quality Management District (MCAQMD) has air quality regulatory jurisdiction within Mendocino County. The MCAQMD is the permitting and oversight agency for the installation and operation of the proposed flare station. The short-term construction-related emissions as a result of the Proposed Project are required to be reviewed in comparison to significance thresholds established by the MCAQMD. The Proposed Project would be required to implement airborne dust control measures to comply with MCAQMD regulatory requirements to reduce and control particulate emissions to ensure that project implementation would not conflict with adopted plans and programs.

Air quality is affected by the rate, amount, and location of pollutant emissions and the associated meteorological and geographical conditions that influence pollutant movement and dispersal. Atmospheric conditions, including wind speed, wind direction, stability, and air temperature, in combination with local

surface topography (i.e., geographic features such as mountains, valleys), determine the effect of air pollutant emissions on local air quality.

The surrounding climate is characterized by warm, dry summers and cool, damp winters. Summer highs reach 90 to 100 degrees Fahrenheit, while nighttime temperatures range in the 50s and 60s. Highs in the 50s and 60s are common during wintertime. Freezing temperatures are common on clear winter and fall nights. Most of the rainfall occurs during the winter, averaging 38 inches per year. December and January are the wettest months which average 7 to 8 inches of precipitation. Winds are generally from the northwest, especially during the summer. Winds rarely flow from the south when low pressure systems over the Pacific affect Northern California and during warm weather where low-level marine air penetrates into the valley through the Russian River Valley. Wind speeds are usually light up to 50 percent of the time. Temperature inversions occur frequently where higher elevation warm air traps cold air near the surface.

Two temperature inversions affect the region: elevated inversions and ground based inversions. Elevated inversions are caused by marine air penetration and/or subsidence (sinking air caused by strong high pressure systems). Ground-based inversions occur when cold night air sinks into the valley from ridge tops. Inversions create a very stable layer of air because vertical mixing is prevented near the surface. During late fall and winter, ground-based inversions (the most restrictive of vertical mixing) often occur during clear, cold nights and are weakened or "burned off" by the sun. Extreme inversions may last days to weeks and allow stagnant air to become dense with air emissions, sometimes to unhealthy levels.

3.2.2.2 Criteria Air Pollutants and Other Air Pollutants

As required by the Federal Clean Air Act passed in 1970, the United States Environmental Protection Agency (USEPA) has identified six criteria air pollutants that are pervasive in urban environments and for which state and national health-based ambient air quality standards have been established. The USEPA calls these pollutants "criteria air pollutants" because the agency has regulated them by developing specific public health- and welfare-based criteria as the basis for setting permissible levels. Ozone, CO, nitrogen dioxide (NO_2), SO_2, particulate matter, and lead are the six criteria air pollutants. Notably, particulate matter is measured in two size ranges: PM10 for particles less than 10 microns in diameter (or coarse particulates), and PM2.5 for particles less than 2.5 microns in diameter (or fine particulates).

Ozone (O_3)

Ozone (O_3) is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and that can cause substantial damage to vegetation and other materials. O_3 is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving ROG and NO_x. ROG and NO_x are known as precursor compounds for O_3. Substantial ozone production generally requires O_3 precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. O_3 is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NO_x under the influence of wind and sunlight. O_3 concentrations tend to be higher in the late spring, summer, and fall, when long sunny days combine with regional air subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds.

Carbon Monoxide (CO)

Carbon monoxide (CO) is a non–reactive pollutant that is a product of incomplete combustion of organic material, and is mostly associated with motor vehicle traffic, and in wintertime, with wood–burning stoves

and fireplaces. High CO concentrations develop primarily during winter when periods of light winds combine with the formation of ground–level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces its oxygen–carrying capacity, resulting in reduced levels of oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia. CO measurements and modeling were important in the early 1980s when CO levels were regularly exceeded throughout California, but in more recent years, CO measurements and modeling are not a priority in most California air districts due to the retirement of older vehicles, reduced CO emissions in newer vehicles, and improvements to fuels.

Nitrogen Oxides (NOx)

When combustion temperatures are extremely high, as in aircraft, truck and automobile engines, atmospheric nitrogen combines with oxygen to form various oxides of nitrogen. Nitric oxide (NO) and NO_2 are the most significant air pollutants generally referred to as NO_x. Nitric oxide is a colorless and odorless gas that is relatively harmless to humans, quickly converts to NO_2 and can be measured. NO_2 has been found to be a lung irritant capable of producing pulmonary edema. Inhaling NO_2 can lead to respiratory illnesses such as bronchitis and pneumonia.

Volatile Organic Compounds (VOC)/Reactive Organic Gases (ROG)

Volatile organic compounds (VOC) means any compound of carbon, excluding carbon monoxide, carbon dioxide (CO_2), carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions and thus, a precursor of ozone formation. ROG are any reactive compounds of carbon, excluding methane, CO, CO_2 carbonic acid, metallic carbides or carbonates, ammonium carbonate, and other exempt compounds. The terms VOC and ROG are often used interchangeably and the terminology varies from air district to air district.

VOC include a variety of chemicals, some of which may have short- and long-term adverse health effects. VOC are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, building materials and furnishings as well as fuel storage and use.

VOC can cause eye, nose, and throat irritation; headaches, loss of coordination, nausea; and damage to liver, kidney, and central nervous system. Some organics can cause cancer in animals; some are suspected or known to cause cancer in humans. The ability of organic chemicals to cause health effects varies greatly from those that are highly toxic, to those with no known health effect. As with other pollutants, the extent and nature of the health effect depends on many factors including level of exposure and length of time exposed. Eye and respiratory tract irritation, headaches, dizziness, visual disorders, and memory impairment are among the immediate symptoms that some people have experienced soon after exposure to some organics.

Particulate Matter (PM10 and PM2.5)

Particulate matter consists of airborne particles that measure 10 microns or less in diameter and 2.5 microns

or less in diameter, respectively. PM10 and PM2.5 represent fractions of particulate matter that can be inhaled into the air passages and the lungs, causing adverse health effects. Particulate matter in the atmosphere results from many kinds of dust– and fume–producing industrial and agricultural operations, fuel combustion, wood burning stoves and fireplaces, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition, construction activities and mining, are more local in nature, while others, such as vehicular traffic and wood burning stoves and fireplaces, have a more regional effect.

Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates can also damage materials and reduce visibility. Dust comprised of large particles (diameter greater than 10 micrometers) settles out rapidly and is easily filtered by human breathing passages. This dust is of concern more as a soiling nuisance rather than a health hazard. The remaining fractions, PM10 and PM2.5, are a health concern particularly at levels above the Federal and State ambient air quality standards. PM2.5 (including diesel exhaust particles) is thought to have greater effects on health, because these particles are so small and thus are able to penetrate to the deepest parts of the lungs.

Acute and chronic health effects associated with high particulate levels include the aggravation of chronic respiratory diseases, heart and lung disease, and coughing, bronchitis, and respiratory illnesses in children. Mortality studies since the 1990s have shown a statistically significant direct association between mortality (premature deaths) and daily concentrations of particulate matter in the air. Despite important gaps in scientific knowledge, a comprehensive evaluation of the research findings provides persuasive evidence that exposure to fine particulate air pollution has adverse effects on cardiopulmonary health. The CARB has estimated that achieving the ambient air quality standards for PM10 could reduce premature mortality rates by 6,500 cases per year.

Sulfur Dioxide (SO_2)

SO_2 is a combustion product of sulfur or sulfur–containing fuels such as coal and diesel. SO_2 is also a precursor to the formation of atmospheric sulfate and particulate matter, and contributes to potential atmospheric sulfuric acid formation that could precipitate downwind as acid rain. The maximum SO_2 concentrations recorded in the project area are well below federal and State standards; as a result, the area is in attainment status with both federal and State SO_2 standards.

Lead (Pb)

Lead has a range of adverse neurotoxin health effects, and was released into the atmosphere via leaded gasoline products. The phase–out of leaded gasoline in California has resulted in dramatically decreased levels of atmospheric lead. Metal processing is currently the primary source of lead emissions in the NCAB. The highest concentrations of lead in air are generally found near lead smelters and general aviation airports; where piston aircraft use leaded fuel. Other stationary sources that generate lead emissions include waste incinerators, utilities, and lead-acid battery manufacturers.

Toxic Air Contaminants (TAC)

Non-criteria air pollutants or toxic air contaminants (TAC) are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer causing) adverse human health effects (i.e., injury or illness). TAC include both organic and inorganic chemical substances. They

may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TAC includes approximately 240 compounds, including particulate emissions from diesel-fueled engines and asbestos.

In August of 1998, CARB identified particulate emissions from diesel-fueled engines as TAC. CARB developed the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*.[1] The document represents a proposal to reduce diesel particulate emissions, with the goal to reduce emissions and the associated health risk by 75 percent in 2010 and by 85 percent in 2020. The program aims to require the use of state-of-the-art catalyzed diesel particulate filters and ultra-low sulfur diesel fuel on diesel-fueled engines.

Diesel particulate matter (DPM) is the most complex of diesel emissions. Diesel particulates, as defined by most emission standards, are sampled from diluted and cooled exhaust gases. This definition includes both solid and liquid material that condenses during the dilution process. The basic fractions of DPM are elemental carbon; heavy hydrocarbons derived from the fuel and lubricating oil and hydrated sulfuric acid derived from the fuel sulfur. DPM contains a large portion of the polycyclic aromatic hydrocarbons (PAH) found in diesel exhaust. Diesel particulates include small nuclei particles of diameters below 0.04 micrometer (μm) and their agglomerates of diameters up to 1 μm. DPM is a major factor in total TAC exposure in California.

California State law defines TAC as air pollutants having carcinogenic effects. A total of 243 substances have been designated as TAC under California law; they include the 187 (federal) Hazardous Air Pollutants (HAP) adopted in accordance with AB 2728. The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources but AB 2588 does not regulate air toxics emissions. Toxic air contaminant emissions from individual facilities are quantified and prioritized. Depending on the risk levels, emitting facilities are required to implement varying levels of risk reduction measures.

Landfill gas is primarily methane (CH_4) and carbon dioxide (CO_2), both in concentration about 50 percent. Landfill gas also contains about 1 percent of many constituents, including trace amounts of TACs.

In 2005, CARB published the *Air Quality and Land Use Handbook: A Community Health Perspective*. The primary goal in developing the *Handbook* was to provide information that would help keep California's children and other vulnerable populations out of harm's way with respect to nearby sources of air pollution. The *Handbook* highlights recent studies that have shown that public exposure to air pollution can be substantially elevated near freeways and certain other facilities. However, the health risk is greatly reduced with distance from these air pollution sources. For that reason, CARB provided some general recommendations aimed at keeping appropriate distances between sources of air pollution, such as landfills, and sensitive land uses, such as residences.

Silica Crystalline Dust

In 2005, the California Office of Environmental Health Hazard Assessment (OEHHA) added a chronic reference exposure level (REL) for crystalline silica. Silica is a hazardous substance when it is inhaled, and

[1] California Air Resources Board. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.* October 2000. http://www.arb.ca.gov/diesel/documents/rrpfinal.pdf

the airborne dust particles that are formed when the material containing the silica is broken, crushed, or sawn pose potential risks.

Naturally Occurring Asbestos (NOA)

Asbestos is the name given to a number of naturally occurring fibrous silicate minerals that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The three most common types of asbestos are chrysotile, amosite, and crocidolite. Chrysotile, also known as white asbestos, is the most common type of asbestos found in buildings. Chrysotile makes up approximately 90 to 95 percent of all asbestos contained in buildings in the United States.

Buildings often include materials containing asbestos. However, the Proposed Project will not include the demolition of existing buildings. Asbestos is also found in a natural state, known as naturally occurring asbestos. Exposure and disturbance of rock and soil that naturally contain asbestos can result in the release of fibers to the air and consequent exposure to the public. Asbestos most commonly occurs in ultramafic rock that has undergone partial or complete alteration to serpentine rock (serpentinite) and often contains chrysotile asbestos. In addition, another form of asbestos, tremolite, can be found associated with ultramafic rock, particularly near faults. Sources of asbestos emissions include unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present.

Naturally occurring asbestos (NOA) is found in ultramafic rocks, including serpentine. When this material is disturbed in connection with grading, quarrying or surface mining operations, asbestos containing dust can be generated. Exposure to asbestos can result in health impacts such as lung cancer, mesothelioma (cancer of the linings of the lungs and abdomen), and asbestosis (scarring of lung tissue that results in constricted breathing).

In July 2001, the CARB approved an Air Toxic Control Measure for construction, grading, quarrying and surface mining operations to minimize emissions of naturally occurring asbestos.[2] The regulation requires application of best management practices to control fugitive dust in areas known to have NOA and requires notification to the local air district prior to commencement of ground-disturbing activities. The measure establishes specific testing, notification and engineering controls prior to grading, quarrying or surface mining in construction zones where naturally occurring asbestos is located on projects of any size. There are additional notification and engineering controls at work sites larger than one acre in size. These projects require the submittal of a "Dust Mitigation Plan" and approval by the air district prior to the start of a project.

The regional geological map generated by the Department of Conservation, Division of Mines and Geology does indicate that the project site is located in a geographic area designated as an ultramafic or ultrabasic rock unit.[3] [4]The MCAQMD has produced a series of maps of areas likely to contain NOA in Mendocino

[2] California Code of Regulations, §93105. Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying and Surface Mining Operations. https://govt.westlaw.com/calregs/Document/I2E3DFB70D60811DE88AEDDE29ED1DC0A?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=%28sc.Default%29

[3] U.S. Geological Survey and California Geological Survey, Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California, 2011, https://pubs.er.usgs.gov/publication/ofr20111188

[4] Department of Conservation, *A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos*, August 2000, ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ofr_2000-019.pdf

County. These maps show areas where NOA is more likely and displays the area of concern for NOA in the Ukiah Valley, which includes the project site.[5] Therefore, the Proposed Project could be subject to requirements related to NOA during construction.

Odorous Emissions

Odors are generally regarded as an annoyance rather than a health hazard. Manifestations of a person's reaction to odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting and headache). The ability to detect odors varies considerably among the population and overall is quite subjective. People may have different reactions to the same odor. An odor that is offensive to one person may be perfectly acceptable to another (e.g., coffee roaster). An unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. Known as odor fatigue, a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity. The occurrence and severity of odor impacts depend on the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of receptors. Odor impacts should be considered for any proposed new odor sources located near existing receptors, as well as any new sensitive receptors located near existing odor sources. Generally, increasing the distance between the receptor and the odor source will mitigate odor impacts.

3.2.2.3 Ambient Air Quality Standards

The Federal Clean Air Act (FCAA) requires the U.S. Environmental Protection Agency (USEPA) to identify National Ambient Air Quality Standards (NAAQS or national standards) to protect public health and welfare. National standards have been established for ozone, CO, NO_2, SO_2, PM10, PM2.5, and lead. Table 3.2-1 shows current national and state ambient air quality standards and provides a brief discussion of the related health effects and principal sources for each pollutant.

Pursuant to the 1990 Federal Clean Air Act Amendments (FCAAA), the USEPA classifies air basins (or portions thereof) as "attainment" or "nonattainment" for each criteria air pollutant, based on whether or not the NAAQS had been achieved. The area is nonattainment for the California PM10 standards and attainment or unclassified for all the other California standards. The area is attainment for all federal standards.

The FCAAA requires each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). The FCAAA added requirements for states containing areas that violate the NAAQS to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is a living document that is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of air basins as reported by the agencies with jurisdiction over them. The USEPA has responsibility to review all state SIPs to determine if they conform to the mandates of the FCAAA and will achieve air quality goals when implemented. If the USEPA determines a SIP to be inadequate, it may prepare a Federal Implementation Plan (FIP) for the nonattainment area and may impose additional control measures. Failure to submit an approvable SIP or to implement the plan within mandated timeframes can result in sanctions applied to transportation funding and stationary air pollution sources in the air basin.

[5] Mendocino County Air Quality Management District Areas that may Contain Naturally Occurring Asbestos in the Ukiah Valley, May 24, 2005, http://www.co.mendocino.ca.us/aqmd/pdf_files/Ukiah_NOA.pdf

Table 3.2-1
State and National Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Ozone	1 Hour 8 Hour	0.09 ppm 0.07 ppm	– 0.070 ppm	High concentrations can directly affect lungs, causing irritation. Long–term exposure may cause damage to lung tissue.	Formed when reactive organic gases and nitrogen oxides react in the presence of sunlight. Major sources include on–road motor vehicles, solvent evaporation, and commercial / industrial mobile equipment.
Carbon Monoxide (CO)	1 Hour 8 Hour	20 ppm 9.0 ppm	35 ppm 9.0 ppm	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline–powered motor vehicles.
Nitrogen Dioxide (NO_2)	1 Hour Annual	0.18 ppm 0.03 ppm	0.10 ppm 0.053 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish–brown.	Motor vehicles, petroleum–refining operations, industrial sources, aircraft, ships, and railroads.
Sulfur Dioxide (SO_2)	1 Hour 3 Hour 24 Hour Annual	0.25 ppm – 0.04 ppm –	– 0.5 ppm 0.14 ppm 0.03 ppm	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
Respirable Particulate Matter (PM10)	24 Hour Annual	50 µg/m3 20 µg/m3	150 µg/m3 –	May irritate eyes and respiratory tract, decreases in lung capacity, cancer, and increased mortality. Produces haze and limits visibility.	Dust and fume–producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind–raised dust and ocean sprays).
Fine Particulate Matter (PM2.5)	24 Hour Annual	– 12 µg/m3	35 µg/m3 15 µg/m3	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; Also, formed from photochemical reactions of other pollutants, including nitrogen oxides, sulfur oxides, and organics.
Lead (Pb)	Month Rolling 3 Month	1.5 µg/m3 –	– 0.15 µg/m3	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present sources: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.

1) ppm = parts per million; µg/m3 = micrograms per cubic meter
SOURCE: California Air Resource Board, https://www.arb.ca.gov/research/aaqs/aaqs2.pdf, May 4, 2016.

3.2.2.4 Local Air Quality Monitoring Data

The MCAQMD maintains several monitoring stations in the Proposed Project vicinity that monitor air quality and compliance with associated ambient standards. The closest station to the project site is the East Gobbi

Street Monitoring Station at 306 East Gobbi Street, which measures ozone and is approximately 2.5 miles to the southwest of the project site. The Fort Bragg Monitoring Station at 300 Dana Street measures PM10 and is the only monitoring station in Mendocino County that measures PM10. The Ukiah County Library Monitoring Station at 105 North Main Street, located approximately 2.5 miles to the southwest of the project site and collects PM2.5 measurements. The most recent available monitoring data for ozone and particulates are presented in Table 3.2-2.

In 1988, California passed the California Clean Air Act (CCAA) (California Health and Safety Code Sections 39600 et seq.), which, like its federal counterpart, called for the designation of areas as attainment or nonattainment, but based on state ambient air quality standards rather than the federal standards. Mendocino County and the NCAB is non-attainment for the state PM10 standard. The primary sources of PM10 are wood combustion emissions, fugitive dust from construction projects, automobile emissions and industry. Some of the automobile emissions are the result of "pass-though" traffic on Highway 101 because of its nature as a major transportation corridor in the state. The NCAB is designated "attainment" or "unclassifiable" with respect to the other ambient air quality standards.

Table 3.2-2
Air Quality Data Summary (2015 - 2017)

Pollutant	Standard	2015	2016	2017
Ozone				
Highest 1 Hour Average (ppm)	0.09	0.076	0.065	0.085
Days over State Standard		0	0	0
Highest 8 Hour Average (ppm)	0.070	0.061	0.051	0.064
Days over National Standard		0	0	0
Particulate Matter (PM10)				
Highest 24 Hour Average (µg/m^3)	50	**53.5**	43.4	**81.5**
Days over State Standard		**1**	0	**5**
State Annual Average (µg/m^3)	20	**	**	**
Particulate Matter (PM2.5)				
Highest 24 Hour Average (µg/m^3)	35	**64.9**	17.9	**127.3**
Days over National Standard		**3**	0	**6**
State Annual Average (µg/m^3)	12	**	6.4	9.4

1) Values in **bold** are in excess of at least one applicable standard.
2) Generally, state standards and national standards are not to be exceeded more than once per year.
3) ppm = parts per million; µg/m^3 = micrograms per cubic meter.
4) PM10 is not measured every day of the year. Number of estimated days over the standard is based on 365 days per year.
5) ** means there was insufficient data available to determine the value.
Source: California Air Resources Board, Air Quality Data Statistics, https://www.arb.ca.gov/adam/index.html, 2015–2017.

3.2.2.5 Sensitive Receptors

Land uses such as residences, schools, children's daycare centers, hospitals, and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress. Persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality. The CARB has identified the following people as most likely to be affected by air pollution: children less than 14 years of age, the elderly over 65 years of age, athletes, and those with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive population groups.

Residential areas (i.e., apartments, house, and condominiums) are considered more sensitive to air quality conditions than commercial and industrial areas, because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions. Recreational uses are also considered sensitive, due to the greater exposure to ambient air quality conditions and because the presence of pollution detracts from the recreational experience.

Land adjacent to the landfill property is zoned primarily as rangeland and is used for grazing. The nearest sensitive receptor is the Vichy Springs Resort and Spa, located approximately 600 feet south of the landfill's entrance. A rural residential development is located approximately one-quarter mile west of the landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort and Spa. The entire development is approximately 1,000 feet southward of the landfill property boundary and is separated from the landfill by an intervening ridge.

3.2.3 Regulatory Setting

This section provides a summary of the Federal, state and local regulations and regulatory setting for air quality.

3.2.3.1 Federal

The federal CAA enacted in 1970 and amended twice thereafter (including the 1990 amendments), establishes the framework for modern air pollution control. The CAA directs the USEPA to establish ambient air standards for six pollutants: ozone, CO, lead, NO_2, particulate matter, and SO_2. The standards are divided into primary and secondary standards—the former to protect human health within an adequate margin of safety, and the latter to protect environmental values, such as plant and animal life.

The primary legislation that governs federal air quality regulations is the Clean Air Act Amendments of 1990, which delegates primary responsibility for clean air to the USEPA. The USEPA develops rules and regulations to preserve and improve air quality, as well as delegating specific responsibilities to state and local agencies.

The CAA requires states to submit a SIP for areas in nonattainment for federal standards. The SIP, which is reviewed and approved by the USEPA, must demonstrate how the federal standards will be achieved. Failing to submit a plan or secure approval could lead to denial of federal funding and permits. In cases where the SIP is submitted by the state but fails to demonstrate achievement of the standards, the USEPA is directed to prepare a federal implementation plan.

3.2.3.2 State

Responsibility for achieving California's air quality standards, which are more stringent than federal standards, is placed on the CARB and local air districts and is to be achieved through district-level air quality management plans that will be incorporated into the SIP. In California, the USEPA has delegated authority to prepare SIP to the CARB, which in turn has delegated that authority to individual air districts.

The CARB has traditionally established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving SIP. Responsibilities of air districts include overseeing stationary source emissions, approving permits, maintaining emissions

inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents required by CEQA.

3.2.3.3 Local

Mendocino County General Plan

The following policies of the *Mendocino County General Plan* (Adopted 2009)[6] relate to the Proposed Project:

- Policy RM-35: The County shall work to maintain 'attainment status' for state and federal air quality standards which are currently met, and toward attainment for currently exceeded standards.
    - Action Item RM-35.2: Continue to refer complaints about fumes, smoke, dust and other potential stationary or non-point airborne pollutants to MCAQMD for investigation.
- Policy RM-37: Public and private development shall not exceed MCAQMD emissions standards.
- Policy RM-38: The County shall work to reduce or mitigate particulate matter emissions resulting from development, including emissions from wood-burning devices.
- Policy RM-41: Reduce dust generation for unpaved roads.
- Policy RM-43: Reduce the effects of earth-moving, grading, clearing and construction activities on air quality.
    - Action Item RM-43-1: Continue to inform applicants about MCAQMD dust control and grading requirements.
- Policy RM-46: Reduce or eliminate exposure of persons, especially sensitive populations, to air toxics.
- Policy RM-47: Minimize the exposure of sensitive uses, such as residences, schools, day care, group homes or medical facilities to industrial uses, transportation facilities, or other sources of air toxics.
- Policy RM-48: Reduce potential health hazards from disturbance in areas classified as likely to contain Naturally Occurring Asbestos (NOA).
    - Action Item RM-48: Work with the MCAQMD to enforce standards for development within areas likely to contain Naturally Occurring Asbestos, including road construction, surface mining and grading operations.
- Policy RM-49: Prohibit new road construction through areas with known Naturally Occurring Asbestos when feasible alternative transportation modes or routes are available.

Ukiah General Plan

The following policies of the *Ukiah Valley General Plan and Growth Management Program* (Adopted 1995)[7] relate to the Proposed Project:

- Policy OC-32.1: The City and County shall require all air quality mitigation measures to be reasonable, effective, feasible, measurable, and implementable concurrent with Project development.

[6] Ukiah Valley General Plan and Growth Management Program, December 6, 1995, http://www.cityofukiah.com/documents-and-maps/
[7] Ukiah Valley General Plan and Growth Management Program, December 6, 1995, http://www.cityofukiah.com/documents-and-maps/

- Policy OC-34.1: Submit all discretionary applications to the MCAQMD for review and comment.
- Policy OC-37.2: Work to reduce particulate emissions from construction activities.

Mendocino County Air Quality Management District

Regulation 1 of the MCAQMD contains two rules relating to the control of fugitive dust: Rule 1-400 (Public Nuisance) and Rule 1-430 (Fugitive Dust Emissions).[8]

RULE 1-400- GENERAL LIMITATIONS

(a)Public Nuisance

A person shall not discharge from any source whatsoever such quantities of air contaminants or other material that cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or that endanger the comfort, repose, health or safety of any such persons or the public or that cause or have a natural tendency to cause injury or damage to business or property, (Health and Safety Code, Section 41700).

RULE 1-430- FUGITIVE DUST EMISSIONS

This Rule prohibits the handling, transportation, or open storage of materials, or the conduct of other activities in such a manner that allows or may allow unnecessary amounts of particulate matter to become airborne except under the following circumstances:

(a) Reasonable precautions shall be taken to prevent particulate matter from becoming airborne, including, but not limited to, the following provisions:

(1) Covering open bodied trucks when used for transporting materials likely to give rise to airborne dust.
(2) Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials.
(3) The screening of all open-outdoor sandblasting and similar operations.
(4) The use of water or chemicals for the control of dust during the demolition of existing buildings or structures.

(b) The following airborne dust control measures shall be required during all construction operations, the grading of roads, or the clearing of land:

(1) All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions.
(2) All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 miles per hour.
(3) Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed.
(4) Asphalt, oil, water or suitable chemicals shall be applied on materials stockpiles, and other surfaces that can give rise to airborne dusts.
(5) All earthmoving activities shall cease when sustained winds exceed 15 miles per hour.
(6) The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours.
(7) The operator shall keep a daily log of activities to control fugitive dust.

[8] Mendocino County Air Quality Management District. *Regulation 4 Particulate Emissions Reduction Measures*. http://www.co.mendocino.ca.us/aqmd/district-regulation-4.html

Other prohibitions include Rule 1-410 (Visible Emissions), Rule 1-420 (Particulate Matter) and Rule 1-440 (Sulfur Dioxide Emissions).

3.2.4 Impact Analysis

This section includes a discussion of the relevant significance criteria, the approach and methodology to the analyses, and any identified impacts and mitigation measures.

3.2.4.1 Significance Criteria

Significance thresholds are used to determine whether impacts associated with a project are significant. Appendix G (2019 Revisions) of the State CEQA Guidelines (14 CCR 15000) lists the following criteria for determining significance of air quality impacts from a project:

- Conflict with or obstructs implementation of the applicable air quality plan;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project is nonattainment under applicable federal or state ambient air quality standards;
- Exposes sensitive receptors to substantial pollutant concentrations; or
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

In June 2010, the MCAQMD adopted the Bay Area Air Quality Management District (BAAQMD) thresholds of significance in the MCAQMD's *Adopted Air Quality CEQA Thresholds of Significance – June 2, 2010*.[9] Specifically, average daily project construction emissions would be considered potentially significant if they exceed the following:

- NOx or ROG – 54 pounds per day;
- PM10 (exhaust emissions only)– 82 pounds per day;
- PM2.5 (exhaust emissions only)– 54 pounds per day;
- Fugitive Dust (PM10/PM2.5) – Best Management Practices.

The Proposed Project would only generate new operational air quality emissions from the proposed flare station (a stationary source). The MCAQMD considers stationary source operational impacts to be significant if they exceed the stationary maximum annual emissions in the MCAQMD's *Adopted Air Quality CEQA Thresholds of Significance – June 2, 2010*.[10] Specifically, the emissions would be considered potentially significant if they exceed the following:

- NOx or ROG – 40 tons per year;
- CO – 125 tons per year;
- PM10 – 15 tons per year;
- PM2.5 – 10 tons per year.

3.2.4.2 Approach to Analysis

Proposed Project-related air quality impacts fall into two categories: short-term impacts due to construction,

[9] Mendocino County Air Quality Management District, Adopted Air Quality CEQA Thresholds of Significance – June 2, 2010. http://www.co.mendocino.ca.us/aqmd/pdf_files/MCAQMDCEQARecomendations.pdf
[10] Ibid.

and long-term impacts due to project operation. First, during project construction (short-term), the Proposed Project would temporarily increase emissions due to construction equipment, haul trucks and worker vehicles. Under Proposed Project operations (long-term), the Proposed Project would result in a change in emissions due to the proposed flare station (LFG is currently being vented to the atmosphere, with the proposed flare station LFG would be destroyed in the flare). The analysis presented within this section is based on both qualitative and quantitative approaches for determining air quality impacts associated with construction and operation of the Proposed Project. Regulatory models used to estimate air quality impacts include:

- California Emissions Estimator Model (CalEEMod) Version 2016.3.2[11]. CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions. The model was developed for the California Air Pollution Officers Association (CAPCOA) in collaboration with the California Air Districts. Default data (e.g., emission factors, trip lengths, meteorology, source inventory, etc.) have been provided by the various California Air Districts to account for local requirements and conditions.
- California Air Resources Board (CARB) EMFAC2014[12] emissions inventory model. EMFAC2014 is the latest emission inventory model that calculates emission inventories and emission rates for motor vehicles operating on roads in California. This model reflects CARB's current understanding of how vehicles travel and how much they emit. EMFAC2014 can be used to show how California motor vehicle emissions have changed over time and are projected to change in the future.
- CARB OFFROAD[13] emissions inventory model. OFFROAD is the latest emission inventory model that calculates emission inventories and emission rates for off-road equipment such as loaders, excavators, and off-road haul trucks operating in California. This model reflects CARB's current understanding of how equipment operates and how much they emit. OFFROAD can be used to show how California off-road equipment emissions have changed over time and are projected to change in the future.
- AP-42, Compilation of Air Pollutant Emission Factors, has been published since 1972 as the primary compilation of USEPA's emission factor information. It contains emission factors and process information for more than 200 air pollution source categories. A source category is a specific industry sector or group of similar emitting sources. The emission factors have been developed and compiled from source test data, material balance studies, and engineering estimates. AP-42 contains emission factors flare activities within Section 13.5[14]

3.2.4.3 Impacts and Mitigation Measures

Impact 3.2-1: Would the Proposed Project Conflict with or Obstruct Implementation of the Applicable Air Quality Management Plan?

[11] California Air Pollution Control Officers Association, *California Emissions Estimator Model User's Guide*, November 2017, http://www.caleemod.com/
[12] California Air Resources Board, *EMFAC2014 User's Guide*, April 30, 2014, http://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol1-users-guide-052015.pdf
[13] California Air Resources Board, *OFFROAD Instructions*, http://www.arb.ca.gov/msprog/ordiesel/info_1085/oei_write_up.pdf
[14] United States Environmental Protection Agency, *AP-42 Compilation of Air Emission Factors Section 13.5 Industrial Flares*, December 2016, https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_12-13-16.pdf

A significant air quality impact may occur if a project is not consistent with the applicable air quality management plan or would in some way obstruct the implementation of the policies or attainment of the goals of that plan. The MCAQMD is required to comply and implement the State Implementation Plan (SIP) to demonstrate how and when the region can attain the ambient air quality standards. Accordingly, the MCAQMD prepared the *Particulate Matter Attainment Plan* (dated January 2005).[15] The *Particulate Matter Attainment Plan* (*2005 Plan)* contains control measures related to six topics: woodstoves, campgrounds, unpaved roads, construction and grading activities, new residential development, and open burning. The *2005 Plan* is the applicable air quality plan for the Proposed Project.

A conflict with, or obstruction of, implementation of the *2005 Plan* could occur if a project generates greater emissions than what has been projected for the site in the emissions inventory of the *2005 Plan*. Emissions inventories are developed based on projected increases in population, employment, regional vehicle miles traveled, and associated area sources within the region, which are based on regional projections and zoning designations for the region.

The Proposed Project would not increase population, employment or regional vehicle miles traveled in the region. The Proposed Project would result in temporary construction emissions, which would not exceed MCAQMD significance thresholds (See Impact 3.2-2). Operational emissions generated by the proposed flare station would not exceed MCAQMD significance thresholds and would be subject to permitting requirements of the MCAQMD (See Impact 3.2-3). The Proposed Project with implementation of airborne dust control measures required by the MCAQMD would support the primary goals of the *2005 Plan*, it would be consistent with all applicable *2005 Plan* control measures, and would not disrupt or hinder implementation of any *2005 Plan* control measures. Therefore, the Proposed Project would have a less-than-significant impact associated with, conflicting with, or obstructing implementation of the applicable air quality plan and no mitigation measures are required.

Significance Determination: Less-Than-Significant.

Impact 3.2-2: Would Construction of the Proposed Project Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard?

Construction-related emissions arise from a variety of activities including (1) grading, excavation, and other earth moving activities; (2) travel by construction equipment and worker vehicles, especially on unpaved surfaces; and (3) exhaust from construction equipment. Construction of the proposed project would temporarily generate ROG, NO_X, PM10 and PM2.5 emissions. The Proposed Project would require the importation of materials for the final cover and related infrastructure, which would result in approximately 723 haul truck round trips (1,446 haul truck one way trips). Soil material required for construction of the foundation layer of the final cover would be obtained from the borrow area on the project site, the same borrow area used during prior landfill operations. Construction of the Proposed Project is anticipated to begin in 2020 and would consist of eight construction phases: demolition, site preparation, grading/excavation, well drilling, final cover, utilities, LFG flare station, and roads. Proposed Project construction would be completed over approximately six months.

[15] Mendocino County Air Quality Management District, Particulate Matter Attainment Plan, January 2005, http://www.co.mendocino.ca.us/aqmd/pdf_files/Attainment%20Plan_DRAFT.pdf

Table 3.2-3 shows the average daily construction emissions from Proposed Project construction and compares them to the applicable MCAQMD significance thresholds. As shown in Table 3.2-3, construction emissions would be below the applicable significance thresholds. Appendix D provides details on the emission calculations.

Table 3.2-3
Estimated Average Daily Construction Emissions (pounds)

Condition	ROG	NOx	PM10	PM2.5
2020 Construction	3.14	32.92	1.46	1.37
Significance Threshold	54	54	82	54
Significant (Yes or No)?	No	No	No	No

1) PM10 and PM2.5 emissions are from combustion sources (exhaust) only. The MCAQMD considers fugitive dust (PM10 and PM2.5) to be less than significant with implementation of required fugitive dust control measures.
Source: CalEEMod Version 2016.3.2

Fugitive dust from the grading and vehicle travel on unpaved surfaces would also occur during the construction period. The MCAQMD considers fugitive dust (PM10 and PM2.5) to be less than significant with the implementation of the following MCAQMD required fugitive dust control measure.

> **Mitigation Measure 3.2-1: Fugitive Dust Control Measures***:* The following airborne dust control measures shall be required during all construction operations, grading of roads, or the clearing of land (MCAQMD Rule 1-430- Fugitive Dust Emissions):
>
> - All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions.
> - All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 miles per hour.
> - Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed.
> - Asphalt, oil, water or suitable chemicals shall be applied on materials stockpiles, and other surfaces that can give rise to airborne dusts.
> - All earthmoving activities shall cease when sustained winds exceed 15 miles per hour.
> - The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours.
> - The operator shall keep a daily log of activities to control fugitive dust

With the implementation of the above mitigation, any impacts would have a less-than-significant impact associated with a cumulatively considerable net increase of any criteria pollutant under an applicable federal or state ambient air quality standard.

Significance Determination: Less-Than-Significant with Mitigation.

Impact 3.2-3: Would Operation of the Proposed Project Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard?

Operation of the Proposed Project would consist of a totally-enclosed vertical ground flare (flare station) utilized for the thermal destruction of collected LFG. The landfill is currently equipped with a partial perimeter gas collection system consisting of 17 vertical extraction wells connected to a header pipe that

leads to a vacuum blower. The vacuum blower creates a vacuum in the header pipe that draws the LFG from the soil through the extraction wells and subsequently to the blower. Discharge from the current system is vented directly to the atmosphere via a 4-foot tall, 4-inch diameter stack. It should be noted that once the flare station is installed and operational, the need to operate the existing partial perimeter gas collection system may no longer be necessary and would either be abandoned or maintained for emergency use only.

Table 3.2-4 shows estimated annual operational emissions from the proposed flare station and compares them to the applicable MCAQMD significance thresholds. As shown in Table 3.2-4, operational emissions would be below the applicable MCAQMD significance thresholds. Appendix D provides details on the emission calculations.

Table 3.2-4
Estimated Annual Operational Emissions (tons)

Condition	ROG	NOx	PM10	PM2.5	CO
Flare Station	**0.18**	**1.62**	**0.03**	**0.03**	**5.26**
Significance Threshold	40	40	15	10	125
Significant (Yes or No)?	No	No	No	No	No

1) Flare emissions assume the maximum LFG flow rate of 210 scfm, a flare operating temperature of 1600 degrees Fahrenheit, and a destruction efficiency of 98%. See Appendix D for detailed flare emissions calculations.
Source: Authority to Construct Permit Emission Calculations (May 2016) and USEPA AP-42.

Operational emissions would be below the applicable MCAQMD significance thresholds and the Proposed Project would require the acquisition of an Authority to Construct (ATC)/ Permit to Operate (PTO) from the MCAQMD. Therefore, the Proposed Project would have a less-than-significant impact associated with a cumulatively considerable net increase of any criteria pollutant under an applicable federal or state ambient air quality standard. No significant impacts would occur and no mitigation measures are required.

Significance Determination: Less-Than-Significant.

Impact 3.2-4: Would Construction and/or Operation of the Proposed Project Expose Sensitive Receptors to Substantial Pollutant Concentrations?

BAAQMD's *CEQA Air Quality Guidelines* indicates a minimum buffer zone of 300 meters (1,000 feet) between construction activities and sensitive receptors in order to reduce pollutant exposure.[16] Studies of health risk have found the highest impacts on sensitive receptors within 1,000 feet.[17]

The California Air Toxics Program establishes the process for the identification and control of toxic air contaminants (TAC) and includes provisions to make the public aware of significant toxic exposures and for reducing risk. The Office of Environmental Health Hazard Assessment (OEHHA) is responsible for the Air Toxics Hot Spots Program. OEHHA has adopted the Guidance Manual for Preparation of Health Risk

[16] Bay Area Air Quality Management District, *CEQA Air Quality Guidelines*, May 2017, http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en
[17] California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective*, April 2005, https://ww3.arb.ca.gov/ch/handbook.pdf

Assessments. OEHHA recommends assessing cancer risk for projects where the maximally-exposed individual resident or sensitive receptor is exposed for two months or longer.[18]

Diesel-powered equipment and vehicles such as haul trucks, excavators, backhoes, and loaders would be used during construction of the Proposed Project. Grading and ground-disturbing activities would occur during construction activities. The operation of diesel-powered equipment would generate diesel exhaust emissions. The Proposed Project grading would be performed with equipment operating within the site and haul trucks on nearby roadways throughout the duration of construction. Diesel-powered grading equipment and haul trucks would emit TAC and PM2.5 in the form of diesel exhaust emissions. Construction-related emissions would be short term in duration (approximately 6 months).

Due to the nature of the Proposed Project described previously, sensitive receptors at any one location would not be exposed to TAC and PM2.5 emissions from construction activities for greater than two continuous months, falling outside the time period for which OEHHA recommends a health risk assessment. Most sensitive receptors are well beyond 1,000 feet from construction areas. The closest construction activities (minor grading and road construction) would occur as close as approximately 600 feet from the nearest sensitive receptor, but work would not be expected to occur for greater than two continuous months at that location. The majority of construction would occur approximately 1,500 feet or greater from the nearest sensitive receptor. Lastly, the intensity of the construction activities and thus, the amount of TAC and PM2.5 emissions would be expected to be minimal. Therefore, the impact of construction TAC and PM2.5 emissions on sensitive receptors would be less than significant.

The proposed flare station would be greater than 1,000 feet from the nearest sensitive receptor. Operations of the proposed flare could emit some TAC, however, as noted previously, the landfill is currently equipped with a partial perimeter gas collection system that vents LFG to the atmosphere. LFG contains non-methane organic compounds (NMOC) such as TACs and ROG/VOCs, and other non-organic compounds such as hydrogen sulfide. The proposed flare would destroy NMOC and other non-organic compounds sent to the flare (which are currently vented to the atmosphere) at a 98 percent destruction efficiency. Thus, operation of the proposed flare station would be expected to result in a reduction in TAC exposure. The Proposed Project would require the acquisition of an ATC/PTO from the MCAQMD prior to constructing the proposed flare station. Air toxics and impacts to sensitive receptors would be analyzed during air quality permitting for the proposed flare station by the MCAQMD. Therefore, the impact of operational TAC emissions on sensitive receptors would be less than significant.

Construction and operation of the Proposed Project would generate ROG and NOx, which are precursor compounds to ozone formation. Ozone is produced in the atmosphere through a complex series of photochemical reactions involving ROG and NOx (See 3.2.2 Environmental Setting for more information on ROG, NOx and Ozone including potential impacts to human health). Due to the complex photochemistry of ozone production, it is not feasible to estimate ozone emissions attributable to the construction or operation of the Proposed Project. As indicated in Impact 3.2-2 and 3.2-3, construction and operational emissions would be well below significance thresholds for all pollutants including ROG and NOx.

The NCAB including Mendocino County is in attainment for state and federal standards for ozone. Local air quality monitoring data shows no exceedances of the state or federal ozone standard in Mendocino

[18] Office of Environmental Health Hazard Assessment, *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, February 2015, http://oehha.ca.gov/air/hot_spots/hotspots2015.html

County (See Table 3.2-2). State and federal ambient air quality standards are set by CARB and EPA to protect human health. No single project is sufficient in size to, itself, result in nonattainment of ambient air quality standards.[19] Construction emissions of ROG and NOx would well below MCAQMD significance thresholds and are a one-time release. After construction is complete, operations would emit very low levels of ROG and NOx from the proposed flare. As indicated previously LFG contains ROG/VOC and the ROG/VOC in the LFG sent to the flare (which is currently vented to the atmosphere) would be destroyed at a 98 percent destruction efficiency. Thus, operation of the Proposed Project could reduce ROG/VOC emissions at the landfill and subsequent ozone formation in the region. Therefore, impacts to public health from ozone formation would be less than significant and no mitigation measures are required.

Significance Determination: Less-Than-Significant.

Impact 3.2-5: Would Construction and/or Operation of the Proposed Project Result in Other Emissions (Such as Those Leading to Odors) Adversely Affecting a Substantial Number of People?

Though offensive odors from stationary and mobile sources rarely cause any physical harm, they still remain unpleasant and can lead to public distress, generating citizen complaints to local governments. The occurrence and severity of odor impacts depend on the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of receptors.

The Proposed Project is designed to minimize local odor risk by insuring long-term landfill cover integrity. No substantial quantities of buried refuse would be disturbed by construction of the Proposed Project and any refuse that is required to be excavated and relocated would be subject to procedures in the Proposed Project*'s Construction Quality Assurance Plan*[20]*,* such as removing refuse from the site within 48 hours of being excavated and covering relocated refuse lifts with a minimum 6 inches of soil at the end of each working day. Furthermore, the nearest sensitive receptors are approximately 600 feet from the landfill site entrance and are approximately 1,000 feet from buried refuse, and any required refuse excavation would likely occur much farther than 1,000 feet from a sensitive receptor. Any odors generated by excavation and relocation of buried refuse would be minimally perceptible and would cease after the grading/excavation phase of construction is complete (approximately one month). Operation of the Proposed Project would reduce odors at the project site by insuring long-term landfill cover integrity and through the proposed flare station. Flaring destroys the odor-causing gases in LFG, which would otherwise be vented to the atmosphere without the Proposed Project.[21]

Therefore, a substantial number of people would not be affected due to Proposed Project construction and operation. Therefore, odor impacts associated with the Proposed Project would be less than significant and no mitigation measures are required.

Significance Determination: Less-Than-Significant.

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[19] Bay Area Air Quality Management District, *CEQA Air Quality Guidelines*, May 2017, http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en
[20] EBA Engineering, *Construction Quality Assurance Plan for the City of Ukiah Department of Public Works City of Ukiah Landfill Final Closure Construction*, April 2019.
[21] Agency for Toxic Substances and Disease Registry, *Landfill Gas Primer, Chapter 5: Landfill Gas Control Measures, November 2001*. https://www.atsdr.cdc.gov/HAC/landfill/html/intro.html

Impact 3.2-6: Would Construction of the Proposed Project Result in Other Emissions (Such as Naturally Occurring Asbestos) Adversely Affecting a Substantial Number of People?

As discussed in the Environmental and Regulatory Setting sections, NOA is a health hazard when airborne. Construction in areas of rock formations that contain NOA could release asbestos into the air and pose a health hazard.

The Governor's Office of Planning and Research published a memorandum on August 1, 2007 entitled Addressing Naturally Occurring Asbestos in CEQA Documents. The memorandum indicates that the CEQA process provides an opportunity for Lead Agencies to identify whether serpentinite or ultramafic rocks will be disturbed by the Proposed Project and to investigate ways to avoid, control, or otherwise mitigate the impacts of NOA.

The screening criterion for determining if a project has the potential to disturb naturally occurring asbestos is to identify if the project location is in an area likely to contain such a substance. The regional geological map generated by the Department of Conservation, Division of Mines and Geology does indicate that the project site is located in a geographic area designated as an ultramafic or ultrabasic rock unit.[22] [23]The MCAQMD has produced a series of maps of areas likely to contain NOA in Mendocino County. These maps show areas where NOA is more likely and displays the area of concern for NOA in the Ukiah Valley, which includes the project site.[24]

The aforementioned maps are not parcel specific and only show areas where NOA is more likely, the actual presence of NOA can only be determined by an expert. For projects in areas identified as potentially containing NOA, the MCAQMD requires an evaluation and report by a State registered geologist to determine that any observed NOA is below levels or regulatory concern in the areas being disturbed. The MCAQMD Air Pollution Control Officer may, upon being provided a report detailing the geologic evaluation, grant an exemption from other requirements in Title 17 California Code of Regulations §93105 (Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying and Surface Mining Operations).[25] With the implementation of the following mitigation measure, any impacts would be considered less-than-significant.

> **Mitigation Measure 3.2-6: Develop and Submit NOA Dust Mitigation Plan.** Prior to construction of the Proposed Project (if an exemption is not granted because it is determined that NOA is not found on the project site), the City shall submit a NOA Dust Mitigation Plan to the MCAQMD and comply with NOA requirements of the MCAQMD and Title 17 California Code of Regulations §93105. Specifically, the MCAQMD requires that the following control measures are implemented at the start and maintained throughout the duration of the construction or grading activity (one acre or greater), in accordance with Title 17 California Code of Regulations §93105:
>
> - Submittal of an Asbestos Dust Mitigation Plan in accordance with Section 93105(e)(4)

[22] U.S. Geological Survey and California Geological Survey, Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California, 2011, https://pubs.er.usgs.gov/publication/ofr20111188
[23] Department of Conservation, *A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos*, August 2000, ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ofr_2000-019.pdf
[24] Mendocino County Air Quality Management District, Areas that may Contain Naturally Occurring Asbestos in the Ukiah Valley, May 24, 2005, http://www.co.mendocino.ca.us/aqmd/pdf_files/Ukiah_NOA.pdf
[25] Mendocino County Air Quality Management District, Advisory: Policies for Areas Containing Naturally Occurring Asbestos (NOA), December 2013. http://www.co.mendocino.ca.us/aqmd/pdf_files/NOA_Policy_ADVISORY.pdf

- All Asbestos Dust Mitigation Plan requirements must be implemented and maintained throughout project.
- Stabilize disturbed areas after construction.
- Report and record all geologic survey and sampling analysis results
- All fill removed from areas containing NOA must be disposed of in accordance with all applicable laws and regulations.
- Approved dust suppressants are to be used on all unpaved surfaces annually.
- Construction within ¼ mile of a school, hospital, or other sensitive receptors can occur only with a District permit.
- Discovery of NOA after start of a project requires stoppage of work, notification to the District and implementation of NOA requirements for the project size prior to restarting of work.
- All on-site workers must be notified of the presence or possible presence of NOA per OSHA requirements.

With implementation of the above mitigation, any NOA impacts associated with the Proposed Project would be less-than-significant.

Significance Determination: Less-Than-Significant with Mitigation.

3.2.5 Cumulative Effects

There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts to air quality.

Significance: Less-than-Significant.

3.2.6 References

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United States Geological Survey and California Geological Survey, Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California, 2011, https://pubs.er.usgs.gov/publication/ofr20111188

3.3 Biological Resources

This section describes the existing environmental and regulatory setting, the biological resources in the Project Area, and evaluates how construction and operation of the Proposed Project would impact biological resources.

3.3.1 Introduction

This evaluation of biological resources includes a review of vegetation and wildlife habitat, special-status species, and jurisdictional "waters of the United States" that occur or potentially occur at or in the vicinity of the Planning Area. The results of this assessment are based upon field reconnaissance of the Planning Area, literature searches, and database queries. The sources of reference data reviewed include the following:

- U.S. Fish and Wildlife Service (USFWS) Information on Planning and Conservation (IPaC 2019)
- USFWS list of special status animals for Sonoma County (USFWS 2019)
- California Natural Diversity Database records (CNDDB) (CNDDB 2019)
- California Department of Fish and Wildlife's (CDFW) Special Animals List (CDFW 2019),
- State and Federally Listed Endangered and Threatened Animals of California (CDFW 2019)
- California Native Plant Society (CNPS) Electronic Inventory records (CNPS 2019)
- CDFG publication "California's Wildlife, Volumes I-III" (Zeiner et al., 1990)

The literature search also included a review of the CalFish IMAPS Viewer (www.calfish.org), developed by CDFW Biogeographic Branch for analysis of steelhead Critical Habitat along tributaries to the Russian River (CNDDB 2019). Additionally, *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988) was reviewed for characterizing wildlife habitats.

Other sources of information regarding reported occurrences included locations previously reported to the U.C. Berkeley Museum of Vertebrate Zoology and the California Academy of Sciences that were not included in the CNDDB.

3.3.2 Environmental Setting

The Ukiah Landfill occupies approximately 40-acres of a 283.5-acre parcel having a maximum width of approximately 1,000-feet in the north-south direction and a maximum length of about 3,500-feet in the east-west direction. Existing ground surface elevations at the landfill range from approximately 710-feet above mean sea level (MSL) near the western footprint, to about 970-feet MSL along the southeast footprint. The Ukiah Landfill has a very steep (2:1) slope and has been graded to form a series of flat terraces stepping down from south to north. The Landfill surface is covered with seasonal grasses. The Project Area is located within the headwaters of an ephemeral tributary to the Russian River. It is located north of Sulphur Creek, a perennial creek, which supports steelhead (*Onchorhynchus mykiss*) and foothill yellow legged frog (*Rana boylii*). There is no hydrologic connection between Sulphur Creek and the

ephemeral tributary located on the northern boundary of the site. Although the ephemeral tributary is hydrologically connected to the Russian River, an 8-foot tall cement fish barrier occurs at the Redeemer Road crossing, located approximately 1.25 miles west of the project area. Zoning for the Project site is designated as Public Facilities by the Mendocino County General Plan. The rest of this section provides a summary of the vegetation communities, wildlife habitats, wildlife corridors, and waters of the U.S. that occur within and immediately round the vicinity of the Project Study Area.

3.3.2.1 Vegetation Communities

Nomenclature for vegetation types follows *The Manual of California Vegetation* Second Edition (Sawyer, et. al. 2009) where applicable. Nine vegetation communities occur within the project study area. Each of these are discussed below.

***Avena (barbata, fatua)* Semi-natural Herbaceous Stands or Wild Oats Grassland.** This is the dominant vegetation type within the project study area as this type covers most of the landfill area, borrow area and roadsides. The wild oats grassland is mixed in with the ruderal forbs type. The revegetated portions of the landfill have a mixture of non-native grasses and in some areas non-native forbs (ruderal forbs) are dominant. Plant species commonly found in the wild oats grasslands include wild oats (*Avena barbata, A. fatua*), rip-gut brome (*Bromus diandrus*), soft chess (*Bromus hordaceus*), hare barley (*Hordeum murinum* ssp. *leporinum*), Harding grass (*Phalaris aquatica*), orchard grass (*Dactylis glomerata*), ryegrass (*Festuca perennis*), tall fescue (*Festuca arundinacea*) and rattail fescue (*Festuca myuros*). A few native grass species were also noted in this type including purple needle grass (*Nasella pulchra*), California oatgass (*Danthonia californica*) and six weeks fescue (*Festuca microstachys*). A variety of non-native forb species also occur in this type including hairy vetch (*Vicia villosa*), cut-leaf plantain (*Plantago coronopus*), yellow star thistle (*Centaurea solsititalis*), European umbrella milkwort (*Tolpis barbata*), yellow glandweed (*Parentucellia viscosa*), Mediterranean linseed (*Bellardia trixago*), rose clover (*Trifolium hirtum),* filarees (*Erodium cicutarium, E. botrys*), and rough cat's-ear (*Hypochaeris radicata*). Native forb species included blow wives (*Achyrachaena mollis*), erect plantain (*Plantago erecta*), suncups (*Taraxia ovata*), blue-eyed grass (*Sisrynchium bellum*), soaproot (*Chloragalum pomeridianum*), Pacific sanicle (*Sanicula crassicaulis*), and California buttercup (*Ranunculus californicus*).

Ruderal Community. Ruderal forbs dominate the area on northeastern portion of the project study area in the flat area of the former borrow pit. This area is dominated primarily by non-native forb species such as European umbrella milkwort, lesser hawbit (*Leontodon taraxacoides* ssp. *taraxacoides*), cut-leaf plantain, hairy vetch, yellow star thistle, and rough cat's-ear.

***Nasella pulchra* herbaceous alliance or Purple Needle Grass Grassland**. This community was mapped in several locations near the borrow pit area. Small areas of purple needle grass occur in other locations on the site but are not large enough to map separately as a stand along grassland community. The areas adjacent to the borrow site were large enough to map and identify as a separate plant community.

***Quercus douglasii* woodland alliance or Blue Oak Woodland.** This woodland occurs along the southern portion of the project study area and also occurs along the northern bank of the unnamed creek that forms the northern boundary of the study area. Blue oak (*Quercus douglasii*) are the dominant species. Other trees and shrubs noted include interior live oak (*Quercus wislenzi* var. *wislizeni*), coast live oak (*Quercus*

agrifolia), black oak (*Quercus kelloggii*), Shreve oak (*Quercus parvula* var. *shrevei*), buckeye (*Aesculus californica*), madrone (*Arbutus menziesii*), coyote brush (*Baccharis pilularis*), manzanita (*Arctostaphylos manzanita* ssp. *glaucescens*), toyon (*Heteromeles arbutifolia*), buckbrush (*Ceanothus cuneatus*), mountain mahogany (*Cercocarpus betuloides)* and poison oak (*Toxicodendron diversilobum*). A diversity of native grasses is found in this type include onion grass (*Melica geyeri, M. torreyana*), blue wildrye (*Elymus glaucus*), Nevada bluegrass (*Poa secunda*) and native fescues (*Festuca rubra, F. idahoensis*). Native forbs include blue dicks (*Dichelostemma capitatum*), fork-toothed ookow (*Dichelstemma congestum*), Ithuriel's spear (*Triteleia laxa*), phacelia (*Phacelia* sp.), Pacific sanicle, soaproot, Diogene's lantern (*Calochortus amabilis*), farewell to spring (*Clarkia gracilis*) and fringed checkerbloom (*Sidalcea diploscypha*).

***Arctostaphylos manzanita* provisional shrubland alliance or Manzanita Chaparral.** This shrubland occurs primarily on the northern portion of the study area along the north bank of the unnamed creek. Whiteleaf manzanita (*Arctostaphylos manzanita* ssp. *glaucescens*) is dominant and includes other chaparral shrub species such as toyon, buckbrush, coyote brush, mountain mahogany, chamise (*Adenostoma fasciculatum*), sticky monkeyflower (*Diplacus aurantiacus*), and snowberry (*Symphoricarpos albus* var. *laevigatus)*. A variety of native and non-native grasses and forbs occur as understory species including blue-eyed grass, Douglas iris (*Iris douglasiana*), phacelia, hound's tongue (*Cynoglossum grande*), blue dicks, farewell to spring, and Ithuriel's spear.

***Salix exigua* shrubland alliance or Sandbar Willow Thickets.** This community occurs along unnamed creek that forms the northern boundary of the study area. Sandbar willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*) are dominant. Other tree and shrub species include valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), madrone, manzanita, coyote brush, Himalayan blackberry (*Rubus armeniacus*) and poison oak. Herbaceous wetland plants noted within the creek bed include scouring rush (*Equisetum hymale*), rushes (*Juncus patens, J mexicanus, J. balticus* ssp. *ater*), foothill sedge (*Carex tumulicola)*, pale spike rush (*Eleocharis macrostachya*) and cattails (*Typha angustifolia*).

***Eleocharis macrostachya* herbaceous alliance or Pale Spike Rush Marshes.** This community occurs along the pond margins along with the cattail marsh types and also within vegetated sections of the unnamed creek channel in the eastern portion of the study area. The dominant species is pale spike rush. Other wetland plants noted include penneyroyal (*Mentha pulegium*), curly dock (*Rumex crispus*), umbrella sedge (*Cyperus eragrostis*), rushes and water plantain (*Alisma sp.*).

***Typha angustifolia* herbaceous alliance or Cattail Marshes.** This community occurs in conjunction with the pale spike rush vegetation type and include the same species. Narrowleaf cattail (*Typha angustifolia*) is dominant and can be a monotypic community type.

Seasonal wetlands. In 2015, this community was mapped in four areas in the eastern portion of the Project Study Area. In 2019, two small wetlands were added along the access road in the northern portion of the site. Three seasonal wetlands were mapped in the borrow area and one occurs along the entrance road on the southeastern side of the Project Study Area. Seasonal wetlands occur as relatively small depressions in the flatter areas of the borrow area. The one along the road appears to have developed as a result of water flowing along the inside portion of the roadway. Plant species noted in these areas include penneyroyal, cocklebur (*Xanthium strumarium*), rabbitsfoot grass (*Polypogon monspeliensis*), small quaking grass (*Briza*

minor), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), hyssop loosestrife (*Lythrum hyssopifolium*) and cut-leaf plantain.

3.3.2.2 Wildlife Habitat

The following is a discussion of existing wildlife habitats found on and around the Project Site and the wildlife species they support.

Non-native Grassland. Grassland habitat, including native and non-native grasslands, provides both primary habitat, such as nesting and foraging, and secondary habitat, such as a movement corridor. Small species using this habitat as primary habitat include reptiles and amphibians, such as southern alligator lizard (*Gerrhonotus multicarinatus*), western fence lizard (*Sceloporus occidentalis*), and Pacific slender salamander (*Batrachoseps attenuatus*), which feed on invertebrates found within and beneath vegetation and boulders within the vegetation community. This habitat also attracts seed-eating and insect-eating species of birds and mammals. California quail (*Lophortyx californicus*), mourning dove (*Zenaidura macroura*), and grasshopper sparrow (*Ammodramus savannarum),* are a few seed-eaters that nest and forage in grasslands. Insect-eaters such as scrub jays (*Aphelocoma coerulescens*) use the habitat for foraging only. Grasslands are important foraging grounds for aerial and ground foraging insect-eating bat species such as myotis (*Myotis* spp.) and pallid bat (*Antrozous pallidus*). A large number of other mammal species such as California vole (*Microtus californicus*), deer mouse (*Peromyscus maniculatus*), Botta's pocket gopher (*Thomomys bottae*), and brush rabbit (*Sylvilagus bachmani*) also forage and nest within grasslands. Small rodents attract raptors (birds of prey) such as owls, as well as red-tailed hawks (*Buteo jamaicensis*) and red-shouldered hawks (*Buteo lineatus*), among others. Black-tailed deer (*Odoicoileus hemionus californicus*) use grassland for grazing and, if the grass is tall enough, for nesting at night. Coyotes (*Canis latrans*) and striped skunk (*Mephitis mephitis*) also inhabit the grassland.

Valley-Foothill Riparian. This habitat occurs along the ephemeral tributary on the northern boundary. The tributary supports insect diversity attractive to a variety of migratory birds and provides nesting habitat. Typically, diverse foraging substrates, such as foliage, bark and ground substrates, increase feeding availability. Birds that forage for insects in the leaves of plants include Bewick's wren (*Thryomanes bewickii*), and bushtit (*Psaltriparus minimus*). Bark-insect foraging species, such as oak titmouse (*Baeolophus inornatus*) and white-breasted nuthatch (*Sitta carolinensis*) forage for insects in the bark. There are a few species that are adapted to foraging for insects in flight, such as black phoebe (*Sayornis nigricans*), and western wood pewee (*Contopus sordidulus*). Generalist omnivores are species such as the scrub jay (*Aphelocoma caerulescens*) that eat a variety of different foods, from insects to seeds to fruits. Although insects are the primary food source for most species in the riparian habitat, ground dwelling species, such as California quail (*Callipepla californica*) and California towhee (*Melozone crissalis*), are also present in the riparian habitat feeding on seeds. The reduced vegetation along the north bank within the project area reduces the occupancy of the project area by these species but habitat still exists on the south bank to support many of these species.

The aquatic habitat of the tributary to the Russian River is comprised of pools up to 2-feet deep on either end of the proposed project area with varying degrees of canopy cover. Along the project area, the majority of the streambed structure is riffles with shallow flows, between 2- to 6- inches of water, at the time of the survey.

The ephemeral drainage located on the north side of the project area does no support steelhead habitat. There is no perennial water and the pools are not deep enough for the water to last for the entire summer period. In addition, there is an eight-foot high cement fish barrier at the creek crossing of Redeemer Road. This barrier is part of the culvert system that runs under the roadway.

Mixed Chaparral. Chaparral habitat, often interspersed with other habitats, provides foraging and nesting habitat for species that are attracted to edges of communities. These edge community species include California quail, California thrasher (*Toxostoma redivivum*), mourning dove (*Zenaidura macroura*), and spotted towhee (*Pipilo crissalis*), that forage among the leaf litter for invertebrates. Avian species that use the canopy of the chaparral for catching insects include blue-gray gnatcatcher (*Polioptila caerulea*), and wrentit (*Chamaea fasciata*). Besides insects, flowers of the manzanita and ceonothus attract nectar drinkers such as Anna's hummingbird (*Calypte anna*). If nesting cliffs are nearby prairie flacons (*Falco mexicanus*) will use chaparral for foraging grounds, as well as sharp-shinned hawks, if water is nearby. Mammals use this habitat for protection and foraging grounds, feeding off new shoots of plants. Black-tailed deer (*Odoicoileus hemionius*) often feed in chaparral but this habitat supports a lower density than in oak savannah. Other species include brush rabbits (*Sylvilagus audubonii*), gophers, and deer mice (*Peromyscus maniculatus*). Small mammals attract predators such as long-tailed weasel (*Mustela frenata*), gray fox, and bobcat (*Felis rufous*). Western rattlesnakes (*Crotalus viridis*) inhabit the warm, dry chaparral community, as well as western fence lizards (*Sceloporus occidentalis*).

Montane Hardwood. The woodlands provide habitat for a variety of species, including refugia for reptiles, such as ring-necked snake (*Diadophis punctatus*), amphibians, such as the Pacific slender salamander (*Batrachoseps attenuatus*) and arboreal salamander (*Aneides lugubris*), foraging and nesting habitat for passerines, and roosting habitat for bats. Smaller passerines, such as black-capped chickadee (*Poecile atricapillus*), lazuli bunting (*Passerina amoena),* bushtit (*Psaltriparus minimus*), oak titmouse (*Baeolophus inornatus*) and acorn woodpecker (*Melanerpes formicivorus*) observed on the site may nest and forage in the woodlands, feeding on insects on the bark. No large cavities that may support the larger raptors, such as great horned owl (*Bubo virginianus*), were observed in any of the trees in the mixed oak woodland. Other species observed foraging on the site include red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), spotted towhee (*Pipilo maculatus*), dark eyed junco (*Junco hyemalis*) and California towhee (*Pipilo crissalis*). Oak trees on the lower west-facing slopes provide potential nesting habitat for tree swallows (*Tachycineta bicolor*) and Coopers hawk (*Accipiter cooperii*). Mammals such as mule deer utilize the understory of this community, i.e. poison oak, and black berry bushes, in the form of shelter and food from the berries. The gray fox also utilizes the poison oak and black berry bushes for food and shelter, foraging on small birds and mammals, insects, fungi and berries. Several of the trees were of a diameter large enough to support roosting bats species, such as long-eared myotis (*Myotis evotis*), long-legged myotis (*Myotis volans*), Yuma myotis (*Myotis yumanensis*), California myotis (*Myotis californicus*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*) and pallid bat (*Antrozous pallidus*), a California Species of Special Concern (SSC) species.

Lacustrine. Lacustrine habitat (pond or lake habitat) contains standing water, from either a dammed river channel or an inland depression. Sizes may vary from pond size, less than one hectare, to reservoir size, comprising several square miles. Most permanent lacustrine systems support fish, while intermittent forms do not. Lacustrine habitats provide a source of water, and cover within riparian areas. The diversity of

habitats typically found around lacustrine habitats provide a higher ratio of edge communities and therefore higher wildlife diversity. Wildlife species typically found in this habitat include amphibians and reptiles, such as Pacific tree frog (*Pseudacris regilla*), aquatic garter snake (*Thamnophis couchii*) and western pond turtle (*Emys marmorata*), among others. American bullfrog (*Lithobates catesbeianus*) was observed and heard in the ponds. High diversity of invertebrate species provides foraging opportunities for a variety of avian species, including red-winged blackbird (*Agelaius phoeniceus*) and American coot (*Fulica americana*). Snowy egret (*Leocophoyx thula*), black crowned night heron (*Nycticorax nycticorax*) and mallard (*Anas platyrhynchos*) may also forage and nest in this habitat. Mammals common in this habitat are meadow vole (*Microtus californicus*) along the edges of the pond area, raccoon (*Procyon lotor*) that may forage on eggs and invertebrates, with striped skunk (*Mephitis mephitis*) and gray fox (*Urocyon cinereoargenteus*) using the pond as a source of water. This habitat provides important foraging and drinking areas for aerial and ground feeding insectivorous bats, such as *Myotis* species and pallid bat (*Antrozous pallidus*).

3.3.2.3 Wildlife Movement Corridors

Wildlife movement includes migration (*i.e*., usually one way per season), inter-population movement (*i.e*., long-term genetic flow) and small travel pathways (*i.e.,* daily movement corridors within an animal's territory). While small travel pathways usually facilitate movement for daily home range activities such as foraging or escape from predators, they also provide connection between outlying populations and the main corridor, permitting an increase in gene flow between populations.

These linkages between habitat types can extend for miles between primary habitat areas and occur on a large scale throughout California. Habitat linkages facilitate movement between populations located in discrete areas and populations located within larger habitat areas. The mosaic of habitats found within a large-scale landscape results in wildlife populations that consist of discrete sub-populations comprising a large single population, often referred to as a meta-population. Even where patches of pristine habitat are fragmented, such as occurs with coastal scrub, the movement between wildlife populations is facilitated through habitat linkages, migration corridors and movement corridors. Depending on the condition of the corridor, genetic flow between populations may be high in frequency, thus allowing high genetic diversity within the population, or may be low in frequency. Low frequency genetic flow can potentially lead to complete isolation, and if pressures are strong, potential extinction (McCullough 1996; Whittaker 1998).

As described in the *California Essential Connectivity Project* (Spencer, et al. 2010), the study area is located in North Coast Ecoregion (Fig. 3.2, Spencer, et al. 2010). The natural drainages in the immediate area (e.g., Sulphur Creek) flow west into the Russian River which then flows south and west into Pacific Ocean. The Study Area is considered to be within the #615 Natural Landscape Block (defined as relatively natural habitat blocks that support native biodiversity) that occurs within the Cache Creek and Russian River watersheds. The study area is located in the #36 Essential Connectivity Area (defined as areas that are essential for ecological connectivity between blocks) (Fig. 3.4, Spencer, et al. 2010).

The ephemeral tributary to the Russian River is not considered a movement corridor for fish, such as steelhead, due to the road barrier at Redeemer Road. See under special status species for a specific description of the barrier. Amphibians, such as foothill yellow-legged frog, and mammals, such as striped skunk may use the creek as a movement corridor. Movements by these wildlife species occur between

habitats in the Russian River, located downstream, and the ponds located upstream at the headwaters of the creek. The creek provides cover from predators while these movements are being made.

3.3.2.4 Waters of the U.S., Including Wetlands

A formal delineation of waters of the U.S. and state, including wetlands, was conducted for the project study area on April 29 and May 22, 2015, which was updated on August 8, 2019. There are two unnamed creek drainages within the Project Study Area. These creek drainages are mapped as blue-line drainages on the Ukiah USGS 7.5-minute quadrangle and eventually flow into the Russian River west of the landfill. The eastern tributary drainage is an ephemeral drainage that has areas of wetland vegetation and areas that are dry with no wetland vegetation. The upper portion of the main drainage that forms the northern boundary of the study area is dry with mostly no wetland vegetation in the creek channel, although this creek has a well-developed riparian canopy cover of mostly willows and does include some valley oak and cottonwood. The eastern tributary lacks any tree or shrub cover with the exception of a few isolated valley oaks. The lower portion of the northern creek channel from the bridge to the western end of the study area has wetland vegetation within the creek bed and within the ordinary high-water mark. The northern creek channel varies in width but has an average width of between 15- to 20-feet within the ordinary high-water mark. The eastern tributary channel is narrower and more incised and varies from 5- to 10-feet in width, with an average of about 8-feet wide at the ordinary high-water mark.

Areas mapped as jurisdictional wetlands include the three former sediment ponds that occur within the study area. A fourth pond, identified as the leachate pond, has not been identified as jurisdictional because this pond is part of the treatment system for the Landfill, even though it supports wetland vegetation. Seven small seasonal wetlands were also mapped in 2015 and two were added in 2019. Six of these are in the borrow pit area in the northeastern portion of the study area, and one occurs along the entrance road (W1) at the southeastern portion of the study area. The two new added wetlands occur along the access road in the north near the main creek channel. Table 3.3-1 provides a summary of the calculations for potential wetlands and other waters within the Project Area. Figure 3.3.-1 provides a visual location for these potential wetlands and other waters.

Table 3.3-1
Area Calculations for Potential Wetlands and Other Waters

Type	Area in Square Feet	Acres
Seasonal Wetlands		
W1	1,117	0.026
W2	340	0.008
W3	1,417	0.033
W4	466	0.011
W5	226	0.005
W6	2,279	0.052
W7	285	0.006
W8 (added in 2019)	90	0.002
W9 (added in 2019)	90	0.002
Subtotal for Seasonal Wetlands	***6,310***	***0.145***
Ponds		
Pond A	37,154	0.85
Pond B	60,966	1.40

Table 3.3-1 Area Calculations for Potential Wetlands and Other Waters		
Type	**Area in Square Feet**	**Acres**
Pond C	20,890	0.48
Subtotal for Ponds	***119,010***	***2.73***
Vegetated Other Waters		
15' wide	34,881	0.80
10' wide	11,004	0.25
8' wide	5,805	0.13
Subtotal for Vegetated Other Waters	***44,383***	***1.02***
Other Waters – Not Vegetated		
20' wide	30,665	0.70
8' wide	1,958	0.04
Subtotal for Other Waters –Not Vegetated	***32,623***	***0.75***
TOTAL FOR ALL AREAS	**202,146**	**4.645**

3.3.3 Regulatory Setting

Relevant federal, state, and local guidelines specific to biological resource issues are discussed in this section.

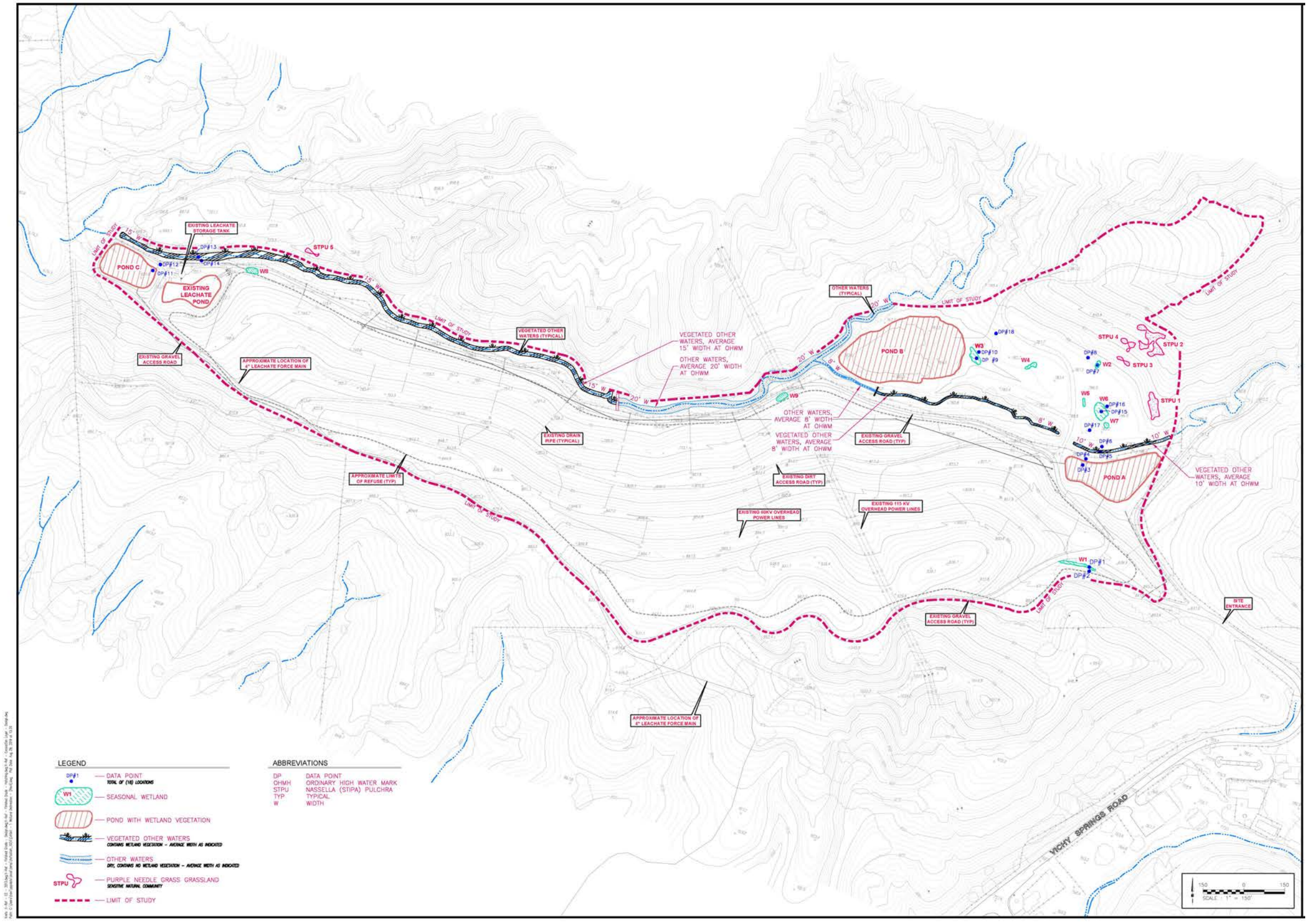
3.3.3.1 Federal Regulations

The relevant federal regulations are discussed below.

Clean Water Act – Section 404. Wetlands and other waters of the U.S. (as defined above) are subject to jurisdiction by the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA) under Section 404 of the Clean Water Act. Wet areas that are not regulated by this act would include stock watering ponds, agricultural ditches created in upland areas, and isolated wetlands that do not have a hydrologic link to other waters of the U.S., either through surface or subsurface flow. The discharge of fill into a jurisdictional feature requires a permit from the Corps.

The Corps has the option to issue a permit on a case-by-case basis (individual permit) or at a program level (general permit). Nationwide permits (NWPs) are an example of general permits; they cover specific activities that generally have minimal environmental effects. Activities covered under a particular NWP must fulfill several general and specific conditions, as defined by the NWP. If a proposed project cannot meet these conditions, an individual permit may be required.

Federal Endangered Species Act. The USFWS administers the Federal Endangered Species Act (16 USC Section 153 et seq.) and thereby has jurisdiction over federally listed threatened, endangered, and proposed species. Projects that may result in "take" of a listed species must consult with the U.S. Fish and Wildlife Service (USFWS). Federal agencies that propose a project that may affect a listed species are required to consult with the USFWS under Section 7 of the Federal Endangered Species Act. If it is determined that a federally listed species may be adversely affected by the Federal action, the USFWS will issue a Biological Opinion to the Federal agency that describes minimization and avoidance measures that must be implemented as part of the Federal action. Projects that do not have a Federal nexus must apply for a take permit under Section 10 of the Act. Section 10 of the Act requires that the project



Source: EBA

SMB ENVIRONMENTAL

Figure 3.3-1
Wetlands Delineation Map

applicant prepare a habitat conservation plan as part of the permit application.

Under the Federal Endangered Species Act the USFWS designates critical habitat, areas that are essential for the conservation of a threatened or endangered species and which may require special management considerations. A designation only applies to projects with a Federal nexus; it has no specific regulatory impact on landowners who take actions on their land that do not involve Federal funding. However, Federal agencies must consult with the USFWS before taking actions that could harm or kill protected species or destroy their habitat.

Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act. The Migratory Bird Treaty Act (MBTA, 16 USC Section 703-711) and the Bald and Golden Eagle Protection Act (16 USC Section 668) protect certain species of birds from direct take. The MBTA protects migrant bird species from take through the establishment of hunting limits and seasons and protecting occupied nests and eggs. The Bald and Golden Eagle Protection Act prohibits the take or commerce of any part of these species. The USFWS administers both acts, and reviews Federal agency actions that may affect species protected by the acts.

3.3.3.2 State Regulations

The relevant state regulations are discussed below.

California Fish and Wildlife Code Sections 1600 – 1616. The CDFW regulates the modification of streams, rivers, and lakes under Sections 1600-1616 of the California Fish and Wildlife Code. Modification includes diverting, obstructing, or changing the natural flow or bed, channel, or bank of a regulated feature. While most of the features regulated by the Fish and Wildlife Code meet the definition of other waters of the U.S., the Code may regulate some ephemeral features that do not have all the criteria to qualify as other waters of the U.S. A project proponent, including both private parties and public agencies, proposing an activity that may modify a feature regulated by the Fish and Wildlife Code must notify the CDFW before project construction. The CDFW will then decide whether to enter into a Streambed Alteration Agreement with the project proponent.

California Endangered Species Act. The CDFW administers the California Endangered Species Act of 1984 (Fish and Game Code Section 2080), which regulates the listing and "take" of endangered and threatened species. A "take" may be permitted by CDFW through implementing a management agreement. Under the State laws, the CDFW is empowered to review projects for their potential impacts to listed species and their habitats. CDFW maintains lists for Candidate-Endangered Species (SCE) and Candidate-Threatened Species (SCT). California candidate species are afforded the same level of protection as listed species. California also designates Species of Special Concern (CSC), which are species of limited distribution, declining populations, diminishing habitat, or unusual scientific, recreational, or educational value. These species do not have the same legal protection as listed species, but may be added to official lists in the future. The CSC list is intended by CDFW as a management tool for consideration in future land use decisions.

3.3.3.3 Local Regulations

The relevant local regulations are discussed below.

City of Ukiah General Plan. The combined Open Space and Conservation Element of the City's existing General Plan contains several Natural Resources policies pertinent to biological resources.

Mendocino County 2009 General Plan. Currently, there are no ordinances or codes that provide mitigation or measures for the protection of special status species.

3.3.4 Impact Analysis

This section includes a discussion of the relevant significance criteria, the approach and methodology to the analyses, and any identified impacts and mitigation measures.

3.3.4.1 Significance Criteria

Significance thresholds below are based on Appendix G (Environmental Checklist Form) of the *CEQA Guidelines*, which indicates that a potentially significant impact on biological resources would occur if the Proposed Project would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations adopted by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on federally protected waters of the U.S. as defined by Section 404 of the federal Clean Water Act or protected waters of the state as defined by Section 1600 et seq. of the California Fish and Game Code (including, but not limited to, marshes, vernal pools, and coastal wetlands) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or
- wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources; and/or
- Conflict with an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

3.3.4.2 Approach to Analysis

This EIR used the best available scientific and commercial data to evaluate the potential effects to biological resources from the proposed project. Literature review, aerial imagery and field surveys informed the descriptions of the vegetation communities, identification of present and past occurrences of special status species in the vicinity of the proposed project, the assessment of habitats for special status animal species. Each are discussed below.

Literature Review

Information on special status plant species was compiled through a review of the literature and database search (See Appendix E). Database searches for known occurrences of special status species focused on the Ukiah, Cow Mountain, Purdys Gardens and Elledge Peak U.S. Geologic Service 7.5-minute topographic quadrangle, which provided a 4.8 km (3 mi) radius around the proposed project area. The following sources were reviewed to determine which special status plant and wildlife species have been documented in the vicinity of the project site:

- U.S. Fish and Wildlife Service (USFWS) Information on Planning and Conservation (IPaC 2019)
- USFWS list of special status animals for Sonoma County (USFWS 2019)
- California Natural Diversity Database records (CNDDB) (CNDDB 2019)
- California Department of Fish and Wildlife's (CDFW) Special Animals List (CDFW 2019),
- State and Federally Listed Endangered and Threatened Animals of California (CDFW 2019)
- California Native Plant Society (CNPS) Electronic Inventory records (CNPS 2019)
- CDFG publication "California's Wildlife, Volumes I-III" (Zeiner et al., 1990)

The literature search also included a review of the CalFish IMAPS Viewer (www.calfish.org), developed by CDFW Biogeographic Branch for analysis of steelhead Critical Habitat along tributaries to the Russian River (CNDDB 2019). Additionally, *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988) was reviewed for characterizing wildlife habitats.

Other sources of information regarding reported occurrences included locations previously reported to the U.C. Berkeley Museum of Vertebrate Zoology and the California Academy of Sciences that were not included in the CNDDB.

Site Surveys

Wildlife biologists, botanists, and wetland specialists conducted surveys of the Project Study Area on April 15, 21 and 29, May 19 and 22, and June 30, 2015 and on August 8, 2019. Specifically, an evaluation of the on-site vegetation communities was conducted for their potential to support special status plants and/or wetland communities.

The potential for special status plants and animals to occur on the site or use the site for migratory purposes was assessed. All trees were evaluated for suitable bird nesting and bat roosting habitat, noting presence of cavities, and old bird nests. The reconnaissance-level site visit was intended only as an evaluation of on-site and adjacent habitat types, and no special status species wildlife surveys were conducted as part of this

survey. Species opportunistically observed in the field were recorded.

Analysis of aerial photographs was also conducted of adjacent habitat that could provide terrestrial habitat for California red-legged frog, and ponds and water bodies that could provide potential breeding habitat for California red-legged frog but from which have not been reported in the CNDDB. Habitats within 1.6 km were evaluated for their potential to provide connectivity between sites for California red-legged frog. These methods were also used for foothill yellow-legged frog and western pond turtle. Jane evaluated the on-site vegetation communities for their potential to support special status plants and/or wetland communities.

A delineation of waters of the U.S. was conducted on April 29, 2015 and updated in August 2019, This report will be submitted to the U.S. Army Corps of Engineers (Corps) for their verification as part of the permit application for work to be conducted in wetlands associated with the Ukiah Landfill and in the tributary to the Russian River.

3.3.4.4 Impacts and Mitigation Measures

What follows is an impact analysis for the specific significance criteria for biological resources in accordance with CEQA guidelines.

Impact 3.3-1: Would the Proposed Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

As shown in Appendix E, a record search of CDFW's California Natural Diversity Database (CNDDB) and USFWS' Species List was conducted for the area within a five-mile radius of the Project area to identify previously reported occurrences of state and federal special-status plants and animals. In addition, field visits for the Proposed Project/Action were conducted on April 15, 21, and 29, May 19 and 20, and June 30, 2015 and again on August 8, 2019 to determine the potential for special-status plant species to occur within the general vicinity of the Proposed Project Study Area (i.e. Construction Area) as described in Chapter 2 – Project Description. These field visits were conducted to determine the potential for special-status species to occur within the Proposed Project Area. During the field visits, no specific special status species were observed in the Project Study Area. The Project Area does not support state or federally listed or proposed plant and/or wildlife species. No designated critical habitat is found in or adjacent to the Project Area. However, Table 3.3-2 provides a summary of the potential for state and federal special status species to occur within the Proposed Project Study Area.

Construction of the Proposed Project could have a temporary, but substantial adverse effect, either directly or through habitat modifications, on several species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW and USFWS. Table 3.3-2 provides a summary of the potential for state and federal special status species to occur within the Proposed Project Study Area. As a result, the following mitigation measures and procedures are proposed to reduce any impacts to less-than-significant levels:

Mitigation Measure 3.3-1a: Conduct A Preconstruction Survey for Special Status Wildlife Species. A qualified biologist shall conduct a pre-construction survey for state and federal special

status wildlife species no more than 10-days prior to construction. A combination of visual and trapping surveys may be performed with authorization from CDFW and/or USFWS. If a wildlife special species such as the western pond turtle, and/or the yellow-legged frog is found near any proposed construction areas, impacts on individuals and their habitat shall be avoided to the extent feasible. If occupied habitat can be avoided, an exclusion zone shall be established around the habitat and temporary suitable/authorized fencing shall be installed around the buffer area with "Sensitive Habitat Area" signs posted and clearly visible on the outside of the fence. If avoidance is not possible and the species is determined to be present in work areas, the biologist with approval and permits from CDFW may capture the wildlife special status species prior to construction activities and relocate them to nearby, suitable habitat a minimum of 300-feet from the work area. Exclusion fencing shall then be installed if feasible to prevent them from reentering the work area. For the duration of work in these areas, the biologist shall conduct regular follow-up visits during and throughout construction activities to monitor effectiveness.

Mitigation Measure 3.3-1b: Conduct Bird Breeding and Nesting Surveys. For construction activities that occur between February 1 and August 31, preconstruction breeding and nesting bird surveys shall be conducted by a qualified biologist prior to and within 3-days of any initial ground-disturbance activities to prevent birds from nesting between the survey and the start of construction. Typically, nesting birds can build a nest in approximately 4 days. Surveys shall be conducted within all suitable nesting habitat within 250-feet of the activity. All active, non-status passerine nests identified at that time shall be protected by a 75-100-foot radius minimum exclusion zone. Active raptor or special-status species nests shall be protected by a buffer with a minimum radius of 200-feet. CDFW and USFWS recommend that a minimum 500-foot exclusion buffer be established around active special-status species nests. The following considerations apply to this mitigation measure:

- Survey results are valid for 7-days from the survey date. Should ground disturbance commence later than 7-days from the survey date, surveys should be repeated. If no breeding birds are encountered, then work may proceed as planned.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
Plants				
Arctostaphylos stanfordiana ssp. raichei Raiche's manzanita	-/-/1B	Chaparral, lower montane coniferous forest (openings)/rocky, often serpentinite. Blooms February to April. Elevation: 450-1000m.	Unlikely. Potential chaparral habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Carex comosa Bristly sedge	-/-/2B	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland. Blooms May to September. Elevation: 0-625m.	Unlikely. Potential wetland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
Ceanothus confusus Rincon Ridge ceanothus	-/-/1B	Closed-cone coniferous forest, chaparral, cismontane woodland/volcanic or serpentinite. Blooms February to June. Elevation: 75-1065m.	Unlikely. Potential chaparral and oak woodland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Cypripedium californicum California lady's slipper	-/-/4	Bogs and fens, lower montane coniferous forest in seeps and streambanks, usually serpentinite. Blooms April to September. Elevation: 30-2750m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Cypripedium montanum Mountain lady's-slipper	-/-/4	Broadleafed upland forest, cismontane woodland, lower montane coniferous forest, North Coast coniferous forest. Blooms March to August. Elevation: 185-225m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Entosthodon kochii Koch's cord moss	-/-/1B	Cismontane woodland (soil). Elevation: 180-1000m.	Unlikely. Potential woodland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Gratiola heterosepala Boggs Lake hedge-hyssop	-/CE/1B	Marshes and swamps (lake margins), vernal pools in clay soils. Blooms April to August. Elevation: 10-2375m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Grimmia torenii Toren's grimmia	-/-/1B	Chaparral, cismontane woodland, lower montane coniferous forest/openings, rocky, boulder and rock walls, carbonate, volcanic. Elevation: 320-1160m.	Unlikely. Potential chaparral and woodland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Hesperolinon adenophyllum glandular western flax	-/-/1B	Chaparral, cismontane woodland, valley and foothill grassland/usually serpentinite. Blooms May-Aug. Elevation:	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
		150-1315 m.		
Horkelia bolanderi Bolander's horkelia	-/-/1B	Chaparral, lower montane coniferous forest, meadows and seeps, valley and foothill grassland/edges, vernally mesic areas. Blooms June-Aug. Elevation: 450-1100 m.	Unlikely. Potential grassland and mesic area habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Kopsiopsis hookeri Small groundcone	-/-/2B	North Coast coniferous forest. April-Aug. Elevation: 90-885 m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Lasthenia burkei Burke's goldfields	FE/CE/1B	Meadows and seeps (mesic), vernal pools. Blooms April to June. Elevation: 15-600m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Lasthenia conjugens Contra Costa goldfields	FE/-/1B	Cismontane woodland, playas (alkaline), valley and foothill grassland, vernal pools/ mesic. Blooms March-June. Elevation: 0-470m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Layia septentrionalis Colusa layia	-/-/1B	Chaparral, cismontane woodland, valley and foothill grassland/sandy, serpentinite. Blooms April to May. Elevation: 100-1098m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Lilium rubescens Redwood lily	-/-/4	Broadleafed upland forest, chaparral, lower montane coniferous forest, North Coast coniferous forest, upper montane coniferous forest, sometimes serpentinite, sometimes roadsides. Blooms April to September. Elevation: 30-1910m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Limnanthes bakeri Baker's meadowfoam	-/CR/1B	Meadows and seeps, freshwater marshes and swamps, vernally	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
		mesic valley and foothill grassland, vernal pools. Blooms April to May. Elevation: 175-910m.		
Malacothamnus mendocinensis Mendocino bush-mallow	-/-/1A	Cismontane woodland. Blooms May to June. Elevation: 425-575m.	Unlikely. Potential woodland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Monardella viridis Green monardella	-/-4	Broadleafed upland forest, chaparral, cismontane woodland. June-September. Elevation: 100-1010m.	Unlikely. Potential chaparral and woodland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Navarretia leucocephala ssp. *bakeri* Baker's navarretia	-/-/1B	Cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools/mesic. Blooms April to June. Elevation: 5-1740m.	Unlikely. Potential wetland and grassland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Perideridia gairdneri ssp. *gairdneri* *Gairdner's yampah*	-/-/4	Broadleafed upland forest, chaparral, coastal prairie, valley and foothill grassland, vernal pools/vernally mesic. Blooms June to October. Elevation: 0-610m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Pleuropogon hooverianus North Coast semaphore grass	-/CT/1B	Broadleafed upland forest, meadows and seeps, North Coast coniferous forest/ open areas, mesic. Blooms April-June. Elevation: 10-671m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Ranunculus lobbii Lobb's aquatic buttercup	-/-/4	Cismontane woodland, North Coast coniferous forest, valley and foothill grassland, vernal pools/mesic. Blooms February to May. Elevation: 15-470m.	Unlikely. Potential wetland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
Sanguisorba officinalis Great burnet	-/-/2B	Bogs and fens, broadleafed upland forest, meadows and seeps, marshes and swamps, North Coast coniferous forest, riparian forest/often serpentinite. Blooms July-October. Elevation: 60-1400m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Strepthanthus glandulosus ssp. *hoffmanii* Hoffman's bristly jewelflower	-/-/1B	Chaparral, cismontane woodland, valley and foothill grassland (often serpentinite). Prefers rocky soils. Blooms March to July. Elevation: 120-476m.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Traycina rostrata Beaked tracyina	-/-/1B	Cismontane woodland, valley and foothill grassland. Blooms May to June. Elevation: 90-790m.	Unlikely. Potential woodland and grassland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Trifolium amoenum Two-fork clover	FE/-/1B	Coastal bluff scrub, valley and foothill grassland, sometimes on serpentinite. Blooms April to June. Elevation: 5-415m.	Unlikely. Potential grassland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Viburnum ellipticum Oval-leaved viburnum	-/-/2B	Chaparral, cismontane woodland, lower montane coniferous forest. Blooms May to June. Elevation: 215-1400m.	Unlikely. Potential chaparral and woodland habitat for this species is present but this species was not found in the Study Area.	No further actions are recommended for this species.
Fish				
Onchorhynchus kisutch Coho salmon - Central California Coast ESU	FT/SE	Occurs from Punta Gorda, in northern California, to the San Lorenzo River, in Santa Cruz County, and includes coho salmon populations from several tributaries of San Francisco Bay. Project located outside species range (CNDDB 2019).	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
Onchorhynchus mykiss Steelhead - Central California Coast ESU	FT/SSC	Requires beds of loose, silt-free, coarse gravel for spawning. Also needs cover, cool water and sufficient dissolved oxygen. Russian River is occupied habitat (CNDDB 2019).	Unlikely. Suitable habitat for this species does not occur in the Stu dy Area.	No further actions are recommended for this species.
Oncorhynchus tshawytscha Chinook salmon	FT	Requires gravel diameter of 2 to 3 inches, with depths generally less than 36 inches but more than 20 inches and a velocity of more than 3 ft/sec. Requires water temperatures from 42°F to 51°F. Russian River is occupied habitat (CNDDB 2019).	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Amphibians				
Rana boylii Foothill yellow-legged frog	-/SCT	Prefers permanent stream pools, and creeks with emergent and/or riparian vegetation.	Moderate: Suitable habitat within Project Study Area.	If water present, conduct Pre-construction Survey. If FYF present consult with CDFW. If no water present, no further action is required.
Rana draytonii California red-legged frog	FT/ SSC	Prefers semi-permanent and permanent stream pools, ponds and creeks with emergent and/or riparian vegetation. Occupies upland habitat especially during the wet winter months. Outside species range (USFWS 2009).	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Red-bellied newt *Taricha rivularis*	-/SSC	Spends dry season underground within root channels. Requires rapid streams	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
		with temps between 15°C and 26° C and rocky substrate for breeding and egg-laying.		
Birds				
Accipiter cooperii Cooper's hawk	MB/ SSC	Nests primarily in deciduous riparian forests. May also occupy dense canopied forests from gray pine-oak woodland to ponderosa pine. Forages in open woodlands.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.s
Accipiter striatus Sharp-shined hawk	MB/ SSC	Dense canopy pine or mixed conifer forest and riparian habitats. Water within one mile required.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Aechmophorus clarkii Clark's grebe	BCC	Breeds in colonies on large bodied freshwater lakes and marshes with emergent vegetation. Nest is built on floating plants or submerged snag, among emergent vegetation.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Agelaius tricolor tricolored blackbird	BCC/ ST, SSC	Nests primarily in dense freshwater marshes with cattail or tules, but also known to nest in upland thistles. Forages in grasslands.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.s
Ammodramus savannarum Gasshopper sparrow	MB/SSC	Typically found in tall, dense grass, nesting on the ground at the base of grass tuft.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.s
Baeolophus inornatus Oak titmouse	MB/ SSC	Breeds in cavities in oak woodlands, gleaning insects from the bark. Occurs from southern Oregon to	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
		northern Mexico along the Central Valley and xeric coastal foothills.		February 1st and August 31.s
Buteo lineatus Red-shouldered hawk	MB	Nests in trees along riparian corridors and open fields.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.s
Calypte anna Anna's hummingbird	MB/-	Nests in individual trees or shrubs or in copses. Nest placement height varies between 4 feet and 40 feet.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.s
Calypte costae Costa's hummingbird	BCC/-	Resident of the Sonoran and Mojave Deserts	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Carduelis lawrencei Lawrence's goldfinch	BCC/	Nests in open woodlands, chaparral and weedy fields in trees	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Chamaea fasciata Wrentit	BCC	Nests in coastal scrub and chaparral.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Charadrius alexandrinus nivosus Western snowy plover	FT/-	Nests on sandy, gravelly or friable soils on beaches, salt pond levees and shores of large alkaline lakes.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Coccyzus americanus occidentalis Yellow-billed cuckoo	FT/SE	Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles or wild grape.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Geothylpis trichas sinuosa Common yellowthroat	BCC/SSC	Nests in fresh and salt marshes in tall grasses, tule patches and willows and forages in thick, continuous cover down to the water surface.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.s.
Haliaeetus leucocephalus Bald eagle	BCC/	Nests in tall snags near water and forages on	Unlikely. Suitable habitat for this species does not	No further actions are recommended

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
		fish. This species winters near large bodies of waters with fish.	occur in the Study Area.	for this species.
Melospiza melodia Song sparrow	BCC/-	Primarily breeds in riparian habitat or wetlands, or coastal scrub along the fog belt where the lack of standing or running water is compensated by moisture from fog.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.[s]
Melanerpes lewis Lewis's woodpecker	BCC/SSC	Found in open forest and woodland, often logged or burned, including oak, coniferous forest, riparian woodland, orchards, less often pinyon-juniper. Closely associated with open ponderosa pine forest in western North America. Most commonly uses pre-made or natural cavities. Wintering areas must provide storage sites for grain or mast.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Pandion haliaetus Osprey	-/SSC	Nests in large trees within 15 miles of good fish-producing water body.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Picoides nuttallii Nuttall's woodpecker	BCC/-	Found primarily in oak woodlands and riparian woods. Cavity nester.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.[s]
Pipilo maculatus clementae Spotted towhee	BCC	Nests in shrubs and trees.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.[s]

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
Selasphorus rufus Rufous hummingbird	BCC/-	Nests in chaparral, coniferous forest, scrub habitats and riparian habitats in Canada and winters in Mexico. Nests are placed on a downward drooping structure.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Selasphorus sasin Allen's hummingbird	BCC/-	Nests in wooded areas, meadows, or thickets along shaded streams, on a branch low down on stem, although placement height varies between 10 inches and 90 feet.	**Moderate:** Suitable nesting habitat within Project Study Area.	Conduct pre-construction breeding surveys for any activities occurring between February 1st and August 31.s.
Strix occidentalis caurina Northern spotted owl	FT, MB/-	Dense coniferous and hardwood forest, shaded, steep sided canyons.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Toxostoma redivivum California thrasher	BCC	Nests in Lowland and coastal chaparral, and riparian woodland thickets.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Mammals				
Antrozous pallidus Pallid bat	-/SSC	Day roosts include rock outcrops, mines, caves, buildings, bridges, and hollows and cavities in a wide variety of tree species	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Corynorhinus townsendii Townsend's big-eared bat	-/SSC	Day roosts in cave analogs; mines, buildings, bridges, sometimes large tree hollows. Females form maternity colonies, males roost singly, and all disperse widely after maternity season. During winter, roosts in cold, but non-freezing roosts, which may include man-made structures.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Erethizon dorsatum North American porcupine	-/-	Occurs in forests, mountains, chaparral, and sagebrush. During	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
		the winter porcupines eat evergreen needles and the inner bark of trees. During the spring and summer they eat flowers, berries, tender twigs, and leaves from deciduous plants.		
Myotis thysanodes Fringed myotis	-/SSC	Roosts in colonies in caves, cliffs and attics of old buildings. Will also use trees as day roosts.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Western red bat *Lasiurus blossevillii*	-/SSC, WBWG:H	Solitary roosting, except when females are with young (from 2 to 6 are born). Roosts almost exclusively in foliage, under overhanging leaves, in woodland borders, rivers, agricultural areas including orchards, and urban areas with mature trees. Typically found in large cottonwoods, sycamores, walnuts and willows associated with riparian habitats.	**Moderate**: Suitable habitat present in unnamed tributary.	Conduct a bat habitat assessment of trees to be removed and within 250 feet of disturbance area. If suitable potential habitat present and being removed, conduct two-step tree removal during seasonal periods of bat activity.
Hoary bat *Lasiurus cinereus*	-/-, WBWG:M	Roosts singly except when females are with young (from 2 to 4 are born) in dense foliage of medium to large coniferous and deciduous trees. Highly migratory, occurs from sea level to tree line in Sierra Nevada. Forages along stream and river corridors, open water bodies, meadows, and open forest above canopy.	**Moderate:** Suitable habitat present in unnamed tributary.	Conduct a bat habitat assessment of trees to be removed and within 250 feet of disturbance area. If suitable potential habitat present and being removed, conduct two-step tree removal during seasonal periods of bat activity.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
Pekania pennanti Pacific fisher	FPT/SCT	Intermediate to large-tree stages of coniferous forests & deciduous riparian areas with high percentage of canopy closure. This species uses cavities, snags, logs & rocky area for cover and denning. Needs large areas of mature, dense forest.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Invertebrates				
Bombus calignosus Obscure bumble bee	-/-	Food plants include *Baccharis, Circium, Lupinus, Lotus, Grindelia* and *Phacelia*. Occurs in Coastal areas from northern Washington to southern California.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Bombus occidentalis Western bumble bee	-/SSC	Generalist foragers. They do not depend on any one flower type but they favor *Melilotus, Cirsium, Trifolium, Centaurea, Chrysothamnus, Eriogonum*. Historically from the Pacific coast to the Colorado Rocky Mountains; severe population decline west of the Sierra-Cascade Crest.	Unlikely. Suitable habitat for this species does not occur in the Study Area.	No further actions are recommended for this species.
Reptiles				
Emys marmorata Western pond turtle	-/SSC	Prefers permanent, slow-moving creeks, streams, ponds, rivers, marshes and irrigation ditches with basking sites and a vegetated shoreline. Requires upland sites for egg-laying. Species reported in Russian River in Ukiah	**Moderate:** Suitable nesting habitat within Project Study Area.	If water is present, conduct Pre-Construction Surveys. If WPT is present, consult with CDFW. If no water is present, no further action is required.

Table 3.3-2
Potential for Special-Status Species to Occur in the Proposed Project Study Area

Species	Status	Habitat	Potential for Occurrence/Disturbance	Recommendations
		(CNDDB 2019).		

Key to status codes:
FE Federal Endangered
FT Federal Threatened
FC Federal Candidate
FD Federal De-listed
FPD Federal Proposed for De-listing
FPT Federal Proposed Threatened
NMFS Species under the Jurisdiction of the National Marine Fisheries Service
BCC USFWS Birds of Conservation Concern
MB Migratory Bird treaty Act Protected
RP Sensitive species included in a USFWS Recovery Plan or Draft Recovery Plan
SE State Endangered
ST State Threatened
SR State Rare
SSC CDFW Species of Special Concern
Draft CSC 4 April 2000 Draft CDFG Species of Special Concern
CFP CDFW Fully Protected Animal
WBWG Western Bat Working Group High Priority species
SLC Species of Local Concern
List 1A CNPS List 1A: Plants presumed extinct in California
List 1B CNPS List 1B: Plants rare, threatened or endangered in California and elsewhere
List 2 CNPS List 2: Plants rare, threatened, or endangered in California, but more common elsewhere
List 3 CNPS List 3: Plants about which CNPS needs more information (a review list)

- Exclusion zone sizes may vary, depending on habitat characteristics and species, and are generally larger for raptors and colonial nesting birds. Each exclusion zone would remain in place until the nest is abandoned or all young have fledged.
- The non-breeding season is defined as September 1 to January 31. During this period, breeding is not occurring and surveys are not required. However, if nesting birds are encountered during work activities in the non-breeding season, disturbance activities within a minimum of 50-feet of the nest should be postponed until the nest is abandoned or young birds have fledged.

Mitigation Measure 3.3-1c: Conduct a Bat Habitat Assessment of Trees: Removal of trees containing suitable bat roosting habitat comprised of cavities, crevices, and/or exfoliating bark, may cause direct mortality of roosting bats if removed during maternity season (April 15 to August 31) prior to self-sufficient volancy of pups, or in winter during torpor or hibernation (October 16 to February 28). Removal of larger mature trees has the potential of causing direct mortality of solitary tree-roosting species such as western red bat or hoary bat. Minimization Measures identified in Sections 1.3.7, and 1.3.8 will reduce these impacts to less than significant. However, if the construction timing is changed and construction must occur between April 15 and August 31 or October 15 and February 29, a bat habitat assessment will be conducted.

For those trees with suitable potential habitat, presume presence of roosting bats, then conduct two-step tree removal during seasonal periods of bat activity, so that bats can safely abandon the tree prior to removal. These dates are:

A) between March 1 (or after evening temperatures rise above 45F and 72 hours after rains fall to less than 0.5-inches in 24 hours) and April 15 (maternity season), after which time non-

volant pups are present in maternity roosts, and;

B) between September 1, after young are self-sufficiently volant, and October 15 (winter hibernation), or before evening temperatures fall below 45F, and 72 hours prior to onset of rains greater than 0.5-inches in 24 hours.

A qualified bat biologist experienced with two-step removal procedures is required to instruct and provide initial supervision of tree cutting crews on Day 1 so that they do not accidentally remove potential habitat features, which could result in direct mortality of bats. On Day 2, the day following trimming and removal of non-habitat roost features on habitat trees, the tree is removed. Any new tree cutting crew members added to the crew will require instruction and initial supervision by a qualified bat biologist.

Mitigation Measure 3.3-1d: Environmental Awareness Training. All construction personnel shall be given environmental awareness training by the Proposed Project's environmental inspector or biological monitor before the start of construction. The training will familiarize all construction personnel with the federally listed species that may occur in the Action Area, their habitats, general provisions and protections afforded by the Endangered Species Act, measures to be implemented to protect these species, and the project boundaries. This training will be provided to any new worker before they are authorized to perform project work. As part of the environmental awareness training, construction personnel will be notified that no dogs or any other pets under control of construction personnel will be allowed in the Project Area, and that no firearms will be permitted in the Project Area, unless carried by authorized security personnel or law enforcement.

Mitigation Measure 3.3-1e: Biological Monitor. A CDFW -approved Biological Monitor will be present on site for all construction activities that occur within 100-feet of suitable habitats for state and/or federally listed species that may be present during the Proposed Project. The City will submit the Biological Monitor's qualifications to the CDFW for approval 30-days prior to project construction. The Biological Monitor will ensure that all applicable avoidance and minimization measures are implemented during project construction. Specifically, the Biological Monitor will also ensure that:

- All vehicles entering the site are free of debris that may harbor organisms that could be introduced to the site, such as vegetation or mud from other areas.
- Turbidity, sedimentation, and the release of materials such as dust or construction runoff are controlled, and that spill control measures are enacted properly.
- No state or federally listed species and/or their habitats experience unintended effects.

The Biological Monitor will have the authority to stop any work activities that could result in unintended adverse effects to covered species and/or their habitats.

Mitigation Measure 3.3-1f: Staging Areas and Access Routes. Placement of all staging areas, access roads, and other facilities will avoid and limit disturbance-sensitive habitats (e.g., riparian habitat, suitable habitats) as much as possible. All staging and material storage areas, including the locations where equipment and vehicles are parked overnight, will be placed outside of the flood zone of a watercourse, away from riparian habitat or wetland habitat, and away from any other sensitive habitats. When possible, staging and access areas will be situated in areas that are previously disturbed, such as developed areas, paved areas, parking lots, areas with bare ground or gravel, and areas clear of vegetation.

The implementation of the above mitigation measures would reduce impacts associated with the Proposed

Project/Action to a level of less-than-significant.

Significance: Less than Significant with Mitigation.

Impact 3.3-2 Would the Proposed Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations adopted by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

As discussed, the Project includes the removal and replacement of six storm drain outlets, installation of six new outlets and abandonment of six outfalls that discharge to the unnamed tributary to Sulfur Creek located directly adjacent to the landfill footprint. The work associated with these structures is subject to permitting by the California Department of Fish & Wildlife, the North Coast Regional Water Quality Control Board and the US Army Corps of Engineers. Due to the fact that no federally listed species present at the Project Site, it is not expected that a Section 7 consultation will be required with the US Fish & Wildlife Service.

The work related to the storm drain outfalls is to occur within the bed and bank of the on-site unnamed ephemeral creek. While this work is relatively minor with a total of approximately 30 cubic yards of fill materials within the bed of the waterway, there will be disturbance to the bed and bank of the waterway during construction activities. Construction work within the bed and bank of the waterway could render soils and sediments more susceptible to erosion and result in increased sediment and turbidity, resulting in the degradation of aquatic habitat on-site and downstream.

As described in detail in Section 3.7, *Hydrology and Water Quality* (see Impact 3.7-1), all construction activities would be required to comply with NPDES regulations and obtain coverage under the State Construction General Permit (CGP). Under the CGP, the City of Ukiah or their contractor(s) would be required to implement construction BMPs as set forth in a detailed SWPPP. The BMPs are designed to prevent pollutants from coming into contact with stormwater and to keep all products of erosion, such as sediment, and stormwater pollutants from moving offsite into receiving waters. Typical BMPs to be implemented at construction sites include placement of fiber rolls or gravel barriers to detain sediment from disturbed areas, and temporary or permanent covering of stockpiles to prevent rainfall from contacting the stockpiled material. In addition to erosion control BMPs required under the CGP, as described under Section 3.3.3.2, work within the bed and bank of the waterway would require adherence to the conditions of a Lake and Streambed Alteration Agreement (LSAA) under Section 1601 of the California Fish and Wildlife Code. BMPS required under the LSAA typically include avoidance of construction activities during inclement weather; limitation of construction access routes and stabilization of access points; stabilization of cleared, excavated areas by providing vegetative buffer strips, providing plastic coverings, and applying ground base on areas to be paved; protection of adjacent properties by installing sediment barriers or filters, or vegetative buffer strips; stabilization and prevention of sediments from surface runoff from discharging into storm drain outlets; use of sediment controls and filtration to remove sediment from water generated by dewatering; and returning all drainage patterns to pre-construction conditions.

Compliance with the requirements of the CGP and Section 1601 of the California Fish and Wildlife Code,

including the implementation of associated BMPs as part of the SWPPP and LSAA, would ensure that adverse effects on riparian habitat or other sensitive natural communities from construction work related to storm drain outfalls within the bed and bank of the ephemeral creek would be less than significant.

Significance: Less-than-Significant

Impact 3.3-3: Would the Proposed Project have a substantial adverse effect on federally protected waters of the U.S. as defined by Section 404 of the federal Clean Water Act or protected waters of the state as defined by Section 1600 et seq. of the California Fish and Game Code (including, but not limited to, marshes, vernal pools, and coastal wetlands) through direct removal, filling, hydrological interruption, or other means?

In 2015, a Wetlands Delineation Report was prepared for the Proposed Project. However, the Corps has not verified the information as of this date. The eastern tributary drainage is an ephemeral drainage and is mapped as vegetated other waters. The upper portion of the main drainage that forms the northern boundary of the study area is dry with no wetland vegetation in the creek channel. The lower portion of the northern creek channel from the bridge to the western end of the study area has wetland vegetation within the creek bed and within the ordinary high-water mark. The northern creek channel varies in width but has an average width of between 15- to 20-feet within the ordinary high-water mark. The eastern tributary channel is narrower and more incised and varies from 8- to 10-feet in width. Areas mapped as potential jurisdictional wetlands also include the three former sediment ponds that occur within the study area. A fourth pond, identified as the leachate pond, has not been identified as jurisdictional because this pond is part of the treatment system for the landfill, even though it supports wetland vegetation. Seven small seasonal wetlands were also mapped.

Existing drainage facilities consist of a network of benches, ditches and eight (8) storm drains that drain to 18- and 24-inch diameter corrugated metal pipe (CMP) discharge culverts into the top of bank of the ephemeral tributary. Under the proposed project, six (6) of these eight (8) will be removed, and a total of six (6) new drainages will be discharging into the ephemeral creek. To prevent soil erosion in the ephemeral tributary the culverts will be installed with energy dissipaters that measure four (4) feet wide by six (6) feet in length around the pipe outlet. These CMP culverts discharge to the unnamed ephemeral creek channel at various locations along the length of the Ukiah Landfill's northern boundary. In general, the drainage system is designed to intercept run-off at intervals along the inside edge of berms, benches or access roads. Riparian vegetation clearing will be required at each of these seven locations. It is expected that the clearing will be approximately 10-feet in width for the machinery to access all areas of the storm drain area. Approximately 3,006-square feet (sf) of disturbance will occur from installation of the drainage pipes. Proposed access improvements that include placing aggregate base over portion of the existing perimeter road and along benches to provide all-weather access will also impact seasonal wetland areas W1, W3 and W5. During the 2019 site visit two small +/- 90 sf wetlands for a total of 180 sf were added along the access road adjacent to the northern main creek channel.

Approximately 2,950 sf or 0.07 acres of ruderal, seasonal wetlands will be impacted by the project. This includes impacts to W1 (1,117 sf) along the access road near the gate entrance, potential impacts to W5

(226 sf), two small wetlands (W8 and W9) that were added in 2019 that occur along the north access road totaling approximately 180 sf, plus W3 which is 1,417 sf. The unnamed creek is identified as vegetated other waters and other waters which lack wetland vegetation. Isolated seasonal wetlands are also present in several areas located off the landfill footprint. The work related to the replacement of old storm drains and installation of new drains will work within limited areas of the bed and bank of the channel of the seasonal creek. This work will require permitting and mitigation from applicable agencies. The following avoidance and mitigation measures will be implemented to protect jurisdictional waters and sensitive habitat areas.

Mitigation Measure 3.3-3a: Protect Jurisdictional Waters and Sensitive Habitat Areas. The City shall implement the following measures to protect jurisdictional waters and sensitive habitats.

- Request a verification of the pre-construction delineated boundaries from the Corps. Following verification of the delineation boundaries from the Corps, the City shall develop measures to avoid impacts to jurisdictional wetlands.
- After final design, quantify impacts to wetlands and other waters. Submit to the Corps a permit application for discharge of fill material into waters of her United States, pursuant to Section 404 of the Clean Water Act.
- Install and maintain appropriate erosion and sedimentation controls during and following construction.
- Obtain a streambed alteration agreement with the California Department of Fish and Wildlife, pursuant to Section 1601 of the Fish and Game Code, before initiating construction within the 100-year floodplain of any stream crossing.
- Develop and implement mitigation plans for impacts to wetlands. Replace eliminated wetlands at a 1:1 ratio so there is no net loss of wetlands. Temporarily impacted wetlands should be restored onsite. Stockpile topsoil removed from wetlands and store in upland landscape positions. Following construction disturbance, restore the land surface contours and backfill the top 6- to 12-inches with stockpiled topsoil.
- Following Project completion, monitor the site to assess mitigation success. Success criteria should be clearly defined for all measures implemented to mitigate for project impacts to wetlands. Yearly reports should be submitted to the Corps until implementation has been determined to be successful.

Implementation of the above mitigation measures would reduce impacts to jurisdictional waters to a less than significant level.

Significance: Less-than-Significant with Mitigation.

Impact 3.3-4: Would the Proposed Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The project site footprint for the landfill is approximately 40-acres. With the exception of temporary, construction-related activities that would occur during the closure construction activities, the project implementation would not result in any significant changes to the landfill or physical environment beyond the limits of the landfill footprint. The area surrounding the project site encompasses open space and rangelands on all sides with some residential development to the south. The project as proposed would not result in any direct long-term impacts to wildlife movement in the area. With the final cover of the landfill surface being a geosynthetic material that is ballasted with sand is not expected to produce sediment that would impact the creek and associated aquatic processes. In addition, the proposed drainage system would be expected to reduce the amount of sedimentation that may enter the creek. No significant impacts are anticipated either to wildlife movement and project implementation would not adversely affect any native wildlife nursery sites. Measures to prevent take of nesting birds and roosting bats have been addressed above. No mitigation measures are required.

Significance: Less-than-Significant.

Impact 3.3-5: Would the Proposed Project conflict with any local policies or ordinances protecting biological resources?

The Proposed Project is located in an area that is comprised generally of grasslands and oak woodlands with some chaparral. There are no trees that exist within the refuse footprint of the active portion of he Ukiah Landfill. The Proposed Project will include earthwork and grading that will occur almost exclusively within the limits of the existing landfill footprint. Project implementation will include the replacement and abandonment of several storm drain outlets located on the bed of the unnamed tributary stream that does include limited riparian vegetation. The wetland delineation and biological survey indicated no presence of listed and protected plant and animal species within the area of the proposed project. Potential impacts to trees located along the periphery of the landfill footprint that may be affected by the Project activities within the Ukiah Landfill or any of the environmental control systems such as the Landfill gas flare compound would not be significant because they do not support sensitive species and are not otherwise protected. Therefore, potential impacts are less-than-significant; no mitigation measures are required.

Significance: Less-than-Significant.

Impact 3.3-6: Would the Proposed Project conflict with an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

There are no known Habitat Conservation Plans in effect for the Project Site property or surrounding area. As a result, there would be no impacts and no mitigation measures are necessary.

Significance: No Impact.

3.3.5 Cumulative Impacts

There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts to biological resources.

Significance: Less-than-Significant.

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3.4 Cultural, Paleontological, and Tribal Resources

This chapter describes the existing visual character of the Proposed Project areas and evaluates how components of the Proposed Project would impact cultural, paleontological, and tribal resources.

3.4.1 Introduction

This section describes the existing environmental and regulatory setting, cultural resources, and tribal cultural resources in Project Area, and evaluates how construction and operation of the Proposed Project would impact identified and unanticipated cultural and tribal resources. A cultural resource is any physical evidence or specific location of past human activity, occupation, or use, identifiable through archaeological investigation, historical research, or oral history.

Cultural resources can be separated into four categories: archaeological resources (the physical traces of human activity), built environment resources (buildings and structures), traditional cultural resources (places associated with cultural practices of a community), and tribal cultural resources.

- **Archaeological Resources.** Archeological resources are material remains of human life or activities that can provide information about past human behavior. Prehistoric archaeological resources include a variety of artifactual and non-artifactual remains of human activity. Typical prehistoric artifacts include flaked stone tools (arrowheads, scrapers), ground stone tools (mortars, pestles, milling slabs, net weights), bone tools (fishhooks, awls), and decorative or social items (bone flutes, bone gaming sticks, shell beads, shell or stone pendants, obsidian tinklers). Non-artifactual remains may include human remains; architectural remnants such as house pits; evidence of cooking such as fire-affected rock, ash, animal bone or shell; midden soil, which is dark brown to black with a high organic content and typically contains charcoal, animal bone; or shell middens, which are deposits of shell or shell mixed with midden soil and artifacts. Historic-era archaeological resources may include filled hollow features such as privies, trash pits, or wells; architectural features such as foundations, concrete pads, adobe brick, or fence posts; diffuse or concentrated trash scatters containing glass bottles, domestic ceramics, or metal; and trash dumps containing food debris such as animal bone, shellfish, seeds, or pits.
- **Built Environment Resources.** This term includes architectural evidence from the past, including buildings, building complexes (such as homesteads or farms), roads and trails, bridges, cemeteries, infrastructure (such as canals, dams, pipelines, power lines, or electrical stations), and other structures.
- **Traditional Cultural Resources.** Traditional cultural resources include sites of special importance to a living community. These may include gathering places, sacred sites, landscape features, or other locations that help to maintain the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community.
- **Tribal Cultural Resources.** A Tribal Cultural Resource is a geographically-defined site, feature, place, object or cultural landscape that with cultural value to a California Native American tribe. It may include any of the above categories of cultural resource.

3.4.2 Key Concepts and Terminology

The term "cultural resources" encompasses historic, archaeological, and paleontological resources, and burial sites. Below is a brief summary of each component:

- **Archaeology.** The study of human activity in history or prehistory through study of artifacts, architecture, and other physical remains.
- **Archaeological Resources:** Archaeology is the study of prehistoric human activities and cultures. Archaeological resources are generally associated with indigenous cultures.
- **Burial Sites:** Burial sites are formal or informal locations where human remains, usually associated with indigenous cultures, are interred.
- **Ethnography.** The scientific study of contemporary human cultures.
- **Complex.** A patterned grouping of similar artifact assemblages from two or more sites, presumed to represent an archaeological culture.
- **Historic Preservation District.** An area of the City having historic, architectural, cultural or aesthetic significance and designated as a Historic Preservation District under the provisions of the City's Planning and Zoning Code.
- **Historic Resource.** A property, site, or district listed in, or determined to be eligible for listing in, the National Register of Historic Places, California Register of Historical Resources (CRHR), Ventura County Historical Landmarks, or City of Oxnard Points of Interest.
- **Isolate.** Archaeological artifacts or features found apart from recognized archaeological sites. Generally, isolates cannot provide enough information to make them eligible to be historic resources.
- **Landmark.** Any structure or natural feature designated as a Cultural or Historic Monument under the provisions of the City's Planning and Zoning Code or as listed in California Historical Landmarks.
- **Midden.** Soils produced by dumping of human domestic waste, which may contain artifacts, bone, shell fragments, charcoal, ash, rock, human remains, structural remnants, or other traces of human activity.
- **Paleontological Resources.** Paleontological resources are the fossilized evidence of past life found in the geologic record. Despite the tremendous volume of sedimentary rock deposits preserved worldwide, and the enormous number of organisms that have lived through time, preservation of plant or animal remains as fossils is an extremely rare occurrence. Because of the infrequency of fossil preservation, fossils – particularly vertebrate fossils – are considered to be nonrenewable resources. Because of their rarity, and the scientific information they can provide, fossils are highly significant records of ancient life.
- **State Historical Landmark.** Historic structure or site of local or statewide interest.
- **State Point of Historical Interest.** Historic structure or site of local or countywide interest.

3.4.3 Environmental Setting

What follows is a discussion of the regional environmental setting for cultural resources in Ukiah, Ukiah Valley and portions of Mendocino County.

3.4.3.1 Archeology and Prehistory

Generally, the prehistory of the Ukiah Valley within Mendocino County is not well known. No peer-reviewed documents have been published since the seminal study presented by Fredrickson in 1984. The Northwest Information Center at California State University, Sonoma indicated that approximately 4,320 archaeological sites from both prehistoric and historic eras have been catalogued or listed. The most frequent form of cultural resource study is the surface inspection and these vary widely with respect to project methodology.

The coastal region of Mendocino County exhibits two, perhaps three, different forms of cultural adaptations. The *Coast Yuki* north of Fort Bragg lived on the coast year-round, with their major villages set back from the coast within sheltered areas. The *Northern Pomo* were a riverine-adapted people who made seasonal treks to the coast, set up seasonal camps, harvested their seafood, and returned home. Large, complex village sites have not been found often on the coast between Fort Bragg and the Navarro River, unless they pre-date Northern Pomo habitation. The *Central Pomo* south of the Navarro lived in permanent villages and seasonal camps on the coast.

The redwood belt in central Mendocino County was used for short-term purposes by individuals or groups passing through the region; however, no prehistorical Mendocino County groups lived permanently or even seasonally in this zone. The *Central* and *Northern Pomo* maintained large villages along the Russian River and its larger tributaries. These peoples made seasonal encampments in upland areas but were primarily a riverine adapted people. The *Yuki* were also a riverine group, but with a substantial mountain adaptation living along the Middle and South Forks of the Eel and Black Butte Rivers. They made extensive use of the mountainous lands surrounding them. Their linguistic relatives, the *Huchnom*, lived along the South Eel. The Huchnom's territory was limited. It appears that all of their major villages were located along the South Eel, with the mountainous regions used for short trips to gather specific resources. Of all the Yuki groups, they were most similar to the Pomo, and interacted with the Potter and Redwood Valley Pomo group extensively.

Much the same can be said for *Cahto* groups living along Ten Mile Creek. Separate from the *Yuki*, the*Cahto* integrated well with their Pomo neighbors, living along those major watercourses within their territory with a highly variable food base. The *North Fork Wailaki* were a riverine people with an adaptation different from their more southerly neighbors. Theirs was a largely salmon oriented economy, supplemented by local resources such as acorn harvesting, gathering, and hunting. Large villages were established along the major watercourses, with seasonal camps and special use sites located in the upland regions of their territory. Remaining *Athapaskan*-speaking groups along the northern boundary of the County are more aptly discussed within the context of Humboldt County. Their material culture and economic adaptations are similar to the North Fork Wailaki.

The time depth of human occupation of Mendocino County is uncertain. Human occupation is reported in the Clear Lake Basin and in Sonoma County around 10,000 to 12,000 years ago.5 In Humboldt County, the time depth of human occupation along the coast is not more than a few thousand years; however, prehistoric occupation on the interior ridges separating Shasta County may have occurred perhaps 8,000 years ago. Similar time depth is reported for the Eel River region. The oldest occupation in Round Valley is about 3,000 years ago, but occupation in the surrounding hills and drainages extends back to approximately 8,000 years ago. Although the Russian River was very heavily used, occupation has not been reported before 5,000 years ago.

Human occupation along the coast, in both Northern and Central Pomo controlled territory, appears roughly contemporaneous with that of the Russian River. It has been suggested that the lack of antiquity for human occupation along the coast may be in part a result of rising sea levels that inundated older archaeological sites. While there is no evidence for this, it does offer a plausible explanation for why the coast of northern California lacks significant time depth of human occupation.

3.4.3.2 European History of Mendocino County

The European history of Mendocino County began many decades before the Bear Flag Revolt of 1848. The earliest known incursions into the County by Europeans were in the 1820s. Several pre-Eighteenth Century Spanish coastal explorations were undertaken, including one by Cabrillo, but there is no evidence that any of these landed on the coast of Mendocino County to establish permanent settlements. In the early decades of the Nineteenth Century, the Russian Empire established a number of settlements in northwestern Sonoma County centered on Fort Ross. The Russians were not satisfied to merely exploit their immediate surroundings and they conducted extensive explorations of the interior. A qualified scientist accompanied each exploration and, as a result, the National Academy of Sciences in Leningrad has near unparalleled collections of Coastal California ethnographic and botanical materials. One of these explorations, circa 1828, traveled up the Russian River into Mendocino County and then east to Clear Lake, describing either Mt. Lassen or Mt. Shasta to the north. Very little of this information has been translated. Working with new translated information, Werner (1977) prepared a short summary and bibliography of these explorations.

In the 1820s and 1830s, the County was visited, perhaps annually, by bands of English, French Canadian, and American fur trappers. Never staying long in one place, these men were hunters and trappers and only incidentally explorers. Spain, and subsequently Mexico, had many settlements in what was known as Alta California—an area roughly corresponding to the coastal strip of modern California as far north as central Sonoma County, where a mission and small presidio were established. By the 1840s, Sonoma and Napa counties were carved into large land grants and, late in that decade, two ranchos were established in southern Mendocino County: *Rancho de Sanel* at Hopland and *Yokaya* in the Ukiah Valley (Marschner 2000:195).

Neither Spanish nor Mexican influence extended into Mendocino County beyond establishing the two land grants. Neither grant was developed or confirmed by the U.S. government (Marschner 2000:196). However, Fernando Feliz did receive a patent for some 17,000 acres in Sanel Valley after receiving the *Rancho de Sanel* land grant from the Mexican government (Hoover, et al. 1966:196). There were no established cities or towns until 1859, and, owing to an extremely sparse population, the County was administered by Sonoma County. In the 1840s, Rafael Garcia was using Point Arena for cattle grazing and claimed to have a rancho but it was never named or confirmed.

The first region in Mendocino County to develop was the coast. In the 1850s, the County's fishing and lumber industries were established. Harbors were established at the mouths of the Noyo, Navarro, and Albion Rivers, with the Noyo an early center for fishing. The ports on the Navarro and Albion Rivers were developed to serve a burgeoning lumber industry (Gille 1980:331). Other coastal areas were also subject to intensive activities associated with this industry; Point Arena was reputedly the busiest town between San Francisco and Eureka.

By the 1880s, the California Lumber Company had established 20 mills along the coast connected by narrow gauge railroads to each other and the numerous small towns (Usal, Rockport, Hardy Creek,Westport, Cleone, Fort Bragg, Noyo, Caspar, Mendocino City, Little River, Albion, Navarro,

Greenwood, Elk River, and Gualala). Some of these towns have completely disappeared, while others have managed to survive as small rural communities. The Town of Mendocino has been designated by the State of California as a "special community" pursuant to the Coastal Act in recognition of an existing balance of residential, commercial and visitor serving facilities. The Town of Mendocino remains a visitor destination for its historic significance and natural beauty.

The U. S. government originally established Fort Bragg, named after General Braxton Bragg of Mexican War fame, as an Army fort on what was to be the Mendocino Indian Reservation. The fort was established within the City limits of a thriving community. In the 1850s, the Union Lumber Company had established lumber mills within in the City of Fort Bragg and in 1922 established the first private nursery in California, the first private venture of its type in the State (Hoover, et al 1966:199). In the 1850s, the California Western Railroad connected the City to Willits; this railroad survives to this day as the popular "Skunk Train."

Inland towns were established at Ukiah, Hopland (called Sanel as late as 1859), and the town of Willits, established circa 1865. Kirk Brier first settled Willits in Little Lake Valley in 1865, but the town was named after Hiram Willits who bought Brier out and then helped with incorporation in 1888. The first settler in the Ukiah area was S. Lowry, who established himself there by 1856. He sold his land to A. T. Perkins, and in 1859 the tiny hamlet of some 100 people was selected as the County seat. In 1894, the State Fish and Game Commission took over a fish hatchery begun in 1894 by the Northwestern Pacific Railway. In 1898, the International Geodetic Association established one of four International Latitude Observatories in the Ukiah area. In 1900, C. A. Purdy established a preserve for native western wildflowers, bulbs, shrubs, and trees. This area east of Ukiah is known as Purdy's Garden; the internationally known facility was gone by the 1960s (Hoover, et al. 1966:196-197).

The Ukiah area is also the location of *Vichy Springs*, one of the oldest continuously operating hot springs resorts in the country (Hoover, et al. 1999), beginning as a resort circa 1888 as Doolan Ukiah Vichy. Vichy Springs is recognized as a State historical landmark (Number 980). Other mineral spring resorts in the County include Orr's Springs west of Ukiah and Duncan Springs south of Hopland. The Sun House in Ukiah is also a State listed historical landmark (Number 926).

These inland interior areas were very remote; in the Boonville locality a unique dialect of English was begun called Boontling, one of the very few recognized dialects of English. The rugged interior of the County within the Redwood belt remains a sparsely settled region to this day. Population centers in the region are small, with Boonville, Navarro, and Comptche in the south, and Branscomb in the north. Boonville was founded in 1864 as Kendall City. Navarro or 'Navarra' appears on a *Rancho Diseno* map of 1844, but after statehood the post office in this location was called Wendling, until 1914 when it was changed to Navarro. Branscomb was settled relatively late, in 1895 when the post office was established.

The major industry of the interior was logging and supporting facilities with light retailing in the small towns. The industry led to the establishment of Philo, Yorkville, and other towns in this portion of the County. Agricultural activities were undertaken in the larger valleys, for example Anderson Valley around Boonville and Yorkville. More recently, in the southern end of the County vineyards in some areas have replaced fruit trees. The first major crop in the Hopland area, planted by Stephen Warren Knowles in 1858, was hops and by the early 1900s, hops were replaced by pears and later vineyards. The Potter, Redwood, and Coyote Valleys north, northeast, and east of Ukiah were heavily agricultural with some logging in the first two. Coyote Valley, flooded in 1958 by Lake Mendocino behind Coyote Dam, was also heavily agricultural and the first vineyard in Mendocino County was begun here in the 1880s (Patterson, et al.

1977). The Ukiah Valley remains primarily an agricultural area although light industry and commercial development has increased since the Second World War. Round Valley, about 30 miles northeast of Willits, is also heavily agricultural with some logging in the northern end. Local tradition has the last fast draw duel in California occurring in the streets of Covelo circa 1908.

3.4.3.3 Ethnography

The entire southern third of Mendocino County was the home of groups of *Central Pomo*. To the north of the Central groups lie the *Northern Pomo*, who controlled a strip of land extending from the coast to Clear Lake in Lake County. The northern groups controlled the coast from the Navarro River north to Cleone and from just north of Anderson Valley to Sherwood Valley. Coyote, Yokayo, Redwood, and Potter Valleys were within their territory. The Northern Pomo were the most populous native linguistic groups in the County. The Pomo were a Hokan language group, judged one of the oldest linguistic families in the State (McLendon and Oswalt 1977).

The *Coast Yuki* claimed a portion of the coast from Ft. Bragg north to an area slightly north of Rockport. The Coast Yuki was one of the few native groups in California with a true coastal adaptation; they had little access to interior resources. The Coast Yuki were linguistically related to a small group living along the South Eel River north of Potter Valley called the *Huchnom*. Both of these smaller groups were related to the *Yuki* who were centered in Round Valley. The Round Valley Indian Reservation at the northern end of the valley is the largest contiguous enclave of Indian land in the County and one of the largest in California. These three groups represent a linguistic isolate language known as Yuki, which has no known linguistic relatives (Miller 1977).

At the far northern end of the County, above the Coast Yuki, Northern Pomo, and Yuki, several groups extend south from Humboldt County. These groups are interesting in that they represent the southern extension of a different cultural area than their southerly neighbors. Pomoan-Yukian groups are representative of the California Culture as defined by Kroeber (1925). These groups had a mixed economy based primarily on harvesting acorns and hunting, fishing, and other gathering. The northerly groups represent an extension of the Northwest Culture Area; the most well-known groups in this Culture Area lie far to the north in Washington and British Columbia and include groups such as the *Klingat* and *Tillamook*, to name two.

Only one of the northerly groups lies entirely within Mendocino County, the *Cahto*; their territory was bounded by Branscomb, Laytonville, and Cummings (Miller 1977). Three other groups, all Athapaskans peaking like the Cahto, extended just south of the County boundary. These are the *Shelter Cove Sinkyone*, the *Eel River*, and *Pitch Wailaki*. The *North Fork Wailaki* were almost entirely in Mendocino County along the North Fork of the Eel River. Of the five southern Athapaskan groups, the Cahto were the most closely related from a cultural perspective to the Pomo and are judged primarily a California Culture Area group; the remaining four are included among the Northwestern California groups, which were culturally part of the Northwest Culture Area. In truth, Northwestern California is more of an agglomeration of California and Northwestern cultural characteristics, but their material culture is sufficiently distinct from the Pomo that they are included in a distinct culture area.

Nearly all of these native groups have living representatives in the County today. The Central Pomo are represented by Rancherias in Hopland, Manchester, and Point Arena. Northern Pomo groups have Rancherias in Potter, Redwood, Pinoleville (Ukiah), Guideville (Coyote Valley), and Sherwood. The Yuki,

Huchnom, Coast Yuki, and North Fork Wailaki were placed on the Round Valley Reservation. The Cahto have a Rancheria at Laytonville. The remaining Athapaskan groups have land set aside for them in Humboldt County.

3.4.3.4 Status of Reservations and Rancherias

Many Rancherias represent the composite remnants of once populous native villages when the U. S. Government restricted movement and confiscated their lands in the 1850s. For example, nine separate tribes at Round Valley including Pomo and Wintu groups were forced to settle there in the Nineteenth Century; Central Pomo and Northern Pomo live on each other's Rancherias, often through intermarriage. Thus, in land use planning it is often necessary to consult tribal members at several Rancherias and those living at the Rancheria closest to a proposed project may not be the most appropriate group(s) to consult. Established in 1856, Round Valley Reservation is the largest in Mendocino County. The Reservation is a discontinuous assemblage of at least 15 parcels, some of which extend into Humboldt County. Before the establishment of Round Valley, the Department of Indian Affairs had established a farm called Nome Cult.

The total acreage of Native American land is subject to change. Since the advent of Indian Gaming, investment groups may form partnerships with tribal units for the purpose of acquiring property in locations advantageous for resort-casino operations. Rancheria acreages may also increase as the result of local action to place lands that were historically in a Rancheria back under trust status. Land sales within a Rancheria require Bureau of Indian Affairs approval. Not all land within the boundaries of reservations, are Federal trust lands. Today, Reservations and Rancherias in the County strive to restore, maintain, and protect their histories. Cultural history is stressed through preservation of tribal language and ceremonies. Cultural and sacred aspects of the land are also important. Round Valley Indian Tribes, for example, may consider peaks and high places within the area to be spiritually significant. Likewise, the acts of hunting, fishing, and gathering are not merely a means of gathering food or materials; they represent cultural traditions.

Tribes are also striving to ensure that necessary social services are available. Employment opportunities at or near their places of residence continue to be a priority for many tribes in Mendocino County. Employment rates of 43 percent on the Redwood Valley Rancheria and 84 percent on the Round Valley Reservation were identified in 2000. Many of those who are employed work off their Rancheria or Reservation lands. Further, local tribes remain concerned about educational opportunities for Rancheria and Reservation residents along with health and safety issues.

3.4.3.5 Status of Reservations and Rancherias

The process of identifying and mitigating impacts to cultural resources incrementally increases man's understanding of human and natural environments through time. The largest blocks of land studied in the County are within Mendocino National Forest. The Bureau of Land Management has conducted extensive cultural resources surveys in the Cow Mountain Planning Unit and the Geysers Known Geothermal Resources Area. The Round Valley Reservation was inspected for prehistoric cultural resources in the 1970s. Several other Reservations or Rancherias have been studied recently as the result of housing or economic development projects. The California Department of Parks and Recreation has conducted cultural resources surveys on most if not all of their properties in the County. Many sections of State highway rights-of-way have been inspected.

Large tracts of land under private ownership in the redwood belt have been inspected in association with

timber harvest plans administered by the California Department of Forestry and Fire Protection. Some State agencies routinely require cultural resources investigations, such as the State Water Resources Control Board, Division of Water Rights and the State Land Commission.

Prehistoric archaeological sites subject to intensive study are spread throughout the County. Many archaeological sites along the Russian River in Coyote Valley were examined in the 1970s (Stoddard, *et al*. 1978). A few prehistoric sites in Round Valley and vicinity have been studied. The California Department of Transportation has excavated prehistoric sites along the State Route 101 right-of-way. A few prehistoric sites along the coast in MacKerricher State Park presumed associated with the Coast Yuki were studied in the early 1990s. Isolated prehistoric sites have been examined within the limits of lands under the jurisdiction of the California Coastal Act; most of these are to define site boundaries. Unless exempted, cultural resources investigations are required on lands subject to disturbance by public and private 'projects' under the California Environmental Quality Act (CEQA). However, agricultural cultivation and many other uses are "permitted" and not subject to CEQA requirements. Very few prehistoric or historic archaeological sites under the County's CEQA jurisdiction have been subject to systematic scientific study. With so few cultural resources carefully studied, the prehistory of the County generally remains not well understood.

3.4.3.6 Project Site Setting

The Proposed Project Site encompasses approximately 40-acres of the 283.5-acre City-owned property which was utilized as a Class III municipal landfill between 1955 and 2001. The landfill activities that occurred at the property extensively altered the property as a result of the landfilling and related activities necessary to maintain the project site property.

On July 5, 2019 the Northwest Information Center at Sonoma State University (NWIC) returned record search NWIC No.: 19-0004. We requested information about known cultural resources and previous studies within the project parcel and surrounding area. No cultural resources are known within this search radius. Two previous studies have examined the project area in part. In 1975, the Bureau of Land Management prepared a high-level overview of archaeological sites in its Cow Mountain Planning Unit (Keesling and French 1975). A small portion of the project area was also surveyed on foot in 1994 (Roybal 1994). Neither study identified cultural resources in the project area. Just outside of the Project Area is Vichy Springs Resort, established in 1857. Vichy Springs Resort (P-23-001793) is listed on the National Register of Historic Places (National Park Service 1985). The Proposed Project is not located on Vichy Springs Resort property and would not involve any activities that would affect this historic place and/or buildings. Given this information it appears that the project area is not sensitive for prehistoric or historic-era cultural resources.

3.4.3.7 AB 52 Native American Consultation

As documented in Appendix F, on February 3, 2017, a letter was sent to the Native American Heritage Commission (NAHC), requesting a listing of local Native American tribes in the area and any information regarding sacred lands within the area in order to be compliant with Assembly Bill 52 (AB52). On February 7, 2019 NAHC sent the City a list of the Native American Tribes to request a government-to-government consultation to determine the potential of the Proposed Project to affect Tribal Cultural Resources. On Feb, 2019 the City then sent a government-to-government letter to each Native American Tribe requesting consultation regarding how the Proposed Project could potentially affect any known tribal cultural resources. To date, none of the tribes have provided any information regarding tribal cultural resources or

issues with the Proposed Project. Further none of the tribes have not requested government-to-government consultation and the 30-day AB-52 consultation period and requirements have been completed.

3.4.4 Regulatory Context

The project is subject to specific state and local laws, ordinances, regulations, and standards for visual resources. There are no specific federal regulations that apply to the visual resources associated with the Project.

3.4.4.1 Federal Regulations

Summarized below are the relevant federal regulations related to cultural resources that are applicable to the Proposed Project.

National Historic Preservation Act. The National Historic Preservation Act of 1966 (NHPA), as amended, established the National Register of Historic Places (NRHP), which contains an inventory of the nation's significant prehistoric and historic properties. Under 36 Code of Federal Regulations 60, a property is recommended for possible inclusion on the NRHP if it is at least 50 years old, has integrity, and meets one of the following criteria: It is associated with significant events in history, or broad patterns of events.

- It is associated with significant people in the past.
- It embodies the distinctive characteristics of an architectural type, period, or method of construction; or it is the work of a master or possesses high artistic value; or it represents a significant and distinguishable entity whose components may lack individual distinction.
- It has yielded, or may yield, information important in history or prehistory.
- Certain types of properties are usually excluded from consideration for listing in the NRHP, but they can be considered if they meet special requirements in addition to meeting the criteria listed above. Such properties include religious sites, relocated properties, graves and cemeteries, reconstructed properties, commemorative properties, and properties that have achieved significance within the past 50 years.

National Environmental Policy Act. NEPA's concern is with the "human environment," defined as including the natural and physical (e.g. built) environment and the relationships of people to that environment. A thorough environmental analysis under NEPA should systematically address the "human" -- social and cultural -- aspects of the environment as well as those that are more "natural," and should address the relationships between natural and cultural. Culturally valued aspects of the environment generally include historic properties, other culturally valued pieces of real property, cultural use of the biophysical environment, and such "intangible" sociocultural attributes as social cohesion, social institutions, lifeways, religious practices, and other cultural institutions.

3.4.4.2 State Regulations

Summarized below are the relevant state regulations related to cultural resources that are applicable to the Proposed Project.

California Environmental Quality Act (CEQA). CEQA requires that lead agencies determine whether their projects may cause a substantial adverse change to a historical resource or unique archaeological

resource, which is considered to be a significant effect on the environment (Public Resources Code §21084.1). CEQA defines "historical resource" as a property determined eligible for the National Register of Historic Places (NRHP), the California Register of Historic Resources (CRHR), or local registers by a lead agency (14 Code of California Regulations §15064.5). The CRHR eligibility criteria are modeled on those for the NRHP and include:

1. Association with events that have made a significant contribution to the broad patterns of our history;
2. Association with the lives of persons significant in our past;
3. Embodiment of the distinctive characteristics of a type, period, or method of construction, represents the work of a master, possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
4. Has yielded, or is likely to yield, information important to prehistory or history.

Resources determined eligible for the NRHP are automatically listed on the CRHR. In addition, historic landmark designations by cities and counties are also presumptively eligible for the CRHR. A property that has been determined eligible to the CRHR or NRHP is considered a historical resource for the purposes of CEQA, whether or not it has been formally listed on the CRHR.

A "unique archaeological resource" is defined in CEQA statute §15064.5(g) as an archaeological artifact, object, or site that "without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.
3) Is directly associated with a scientifically recognized important prehistoric or historic event or person."

These eligibility criteria mirror that of the CRHR, so that practically speaking any resource meeting the definition of a unique archaeological resource will also meet the eligibility criteria of the CRHR.

A "substantial adverse change" under CEQA can include physical demolition, destruction, relocation, or alteration of a historical resource or its immediate surroundings in a way that "materially impairs" its significance in such a way as to make it ineligible for the CRHR.

CEQA emphasizes avoidance of archaeological and historical resources as the preferred means of reducing potential significant environmental effects resulting from projects. If avoidance is not feasible, an excavation program or some other form of mitigation must be developed to mitigate the impacts. In most cases, whenever a project adversely impacts historic resources, a mitigated Negative Declaration or EIR is required under CEQA. The following are steps typically taken to assess and mitigate potential impacts to cultural resources for the purposes of CEQA:

- Identify cultural resources,
- Evaluate the significance of the cultural resources found,
- Evaluate the effects of the project on cultural resources, and
- Develop and implement measures to mitigate the effects of the project on cultural resources that would be significantly affected.

California PRC Section 5097.5. California PRC Section 5097.5 prohibits excavation or removal of any "vertebrate paleontological site…or any other archaeological, paleontological or historical feature, situated on public lands, except with express permission of the public agency having jurisdiction over such lands." Public lands are defined to include lands owned by or under the jurisdiction of the state or any city, county, district, authority or public corporation, or any agency thereof. Section 5097.5 states that any unauthorized disturbance or removal of archaeological, historical, or paleontological materials or sites located on public lands is a misdemeanor.

State Laws Pertaining to Human Remains. Section 7050.5 of the California Health and Safety Code requires that construction or excavation be stopped in the vicinity of discovered human remains until the county coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the California Native American Heritage Commission. CEQA Guidelines (Section 15064.5) specify the procedures to be followed in case of the discovery of human remains on non-Federal land. The disposition of Native American burials falls within the jurisdiction of the Native American Heritage Commission.

Native American Consultation. Prior to the adoption or amendment of a general plan, Government Code Sections 65352.3 and 65352.4 require a city or county to consult with local Native American tribes that are on the contact list maintained by the Native American Heritage Commission. The purpose is to preserve or mitigate impacts to places, features, and objects described in PRC Sections 5097.9 and 5097.993 (Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property) that are located within a city or county's jurisdiction.

In addition, Assembly Bill 52 (e.g. 2014) (AB 52), as codified in PRC Sections 5097, 21073, 21074, 21080, 21082, 21083, and 21084, will:

- Establish a new classification of resources called Tribal Cultural Resources (TCRs) which considers the value of a resource to tribal cultural traditions, heritages, and identifies;
- Establish potential mitigation options for TCRs; and
- Recognize that California Native American tribes have expertise concerning their tribal history and practices.

AB 52 is intended to help identify impacts to TCRs as early as possible during the CEQA process so that appropriate mitigation measures may be developed. Under this legislation, when a project is initiated, the lead agency must formally notify interested tribes that have requested to be on the agency's consultation list. AB 52 consultation should inform the need for a ND, MND, or EIR and must be initiated prior to the release of an ND, MND, or EIR, so it is important to build AB 52 consultation into project schedules.

Tribes must be given written notification by the lead agency within 14 days of the decision by the lead agency themselves to undertake a project or the lead agency's determination that a project application is complete for a private project. If a tribe does not respond to a request within a 30-day timeframe, the agency may move forward with the project having made a good faith effort to open consultation.

However, if the tribe(s) responds after 30 days, the lead agency may elect to begin consultation with the tribe(s), despite the passing of the legal deadline. The lead agency can and should make follow-up calls after the consultation letters are sent to try to get responses as soon as possible. Note, however, that if the tribes do not respond to follow-up telephone calls, they must still be afforded the 30-day window to respond.

3.4.4.3 Local

Summarized below are the relevant established goals and polices related to cultural resources in the City of Ukiah and the County of Mendocino that are applicable to the Proposed Project/Action.

City of Ukiah General Plan. The City of Ukiah has adopted policies and ordinances for the protection and preservation of cultural resources. The City's preservation of cultural resources is accomplished through education, cooperation, and commitment to a program that make sense to the community. The City's commitment is to maintain cultural resources as a link to past populations – those whose ancestors called the Ukiah Valley home from time immemorial and those who adopted the Ukiah Valley as part of the growth of the United States. Over the years, the importance of preserving cultural resources has been viewed as critical to maintaining history and the quality of life as well as hindering development. However, the City has adopted measures to protect cultural resources and preserving the past as well as accommodating the future. The City's approach is to consider cultural resources as part of the permitting process. With early planning, the protection of cultural resources can usually be integrated into project designs in such a way as to avoid or minimize impacts. The City has developed a cultural resources inventory of known and likely known areas where cultural resources are or likely to be found. A review of this map, the Proposed Project/Action area would not conflict with, impact or be near any known cultural resources identified by the City. Prior to any proposed development, project proponents are required to identify areas of potential conflicts with known cultural resources.

County of Mendocino General Plan. The Mendocino County Archeological Ordinance adopted in 1976 (Mendocino County Code, Title 21) recognized Native American sites as "unique, irreplaceable phenomena of significance in the history of the County and in the understanding of the cultural heritage of our land…". The County Archeological Commission conducts CEQA review and recommends mitigation regarding archaeological resources, taking into account the records search performed by the Northwest Information Center. The Archaeological Ordinance also implements the Public Resources Code with regard to discovery of archaeological resources or human remains.

3.4.5 Impact Analysis

This section includes a discussion of the relevant significance criteria, the approach and methodology to the analyses, and any identified impacts and mitigation measures.

3.4.5.1 Significance Criteria

Significance thresholds below are based on Appendix G (Environmental Checklist Form) of the *CEQA Guidelines* which indicates that a potentially significant impact on cultural or tribal cultural resources would occur if the Proposed Project should:

- Cause a substantial adverse change in the significance of an historical resource as defined in State CEQA Guidelines §15064.5;
- Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to State CEQA Guidelines §15064.5;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;
- Disturb any human remains, including those interred outside of formal cemeteries; and/or

- Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code §21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American Tribe.

As noted above, a "historical resource" under CEQA is a property, site, or district listed in, or determined to be eligible for listing in, the National Register of Historic Places, California Register of Historical Resources (CRHR), Mendocino County Historical Landmarks, or City of Ukiah Points of Interest. A "unique archaeological resource" is one that meets the criteria in CEQA Guidelines §15064.5(g), which are substantively similar to those of the CRHR. CEQA Guidelines section 15064.5 defines "substantial adverse change" as:

- Physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired.
- Demolition or material alteration in an adverse manner of those physical characteristics of an historical resource which convey its historical significance and justify its inclusion in or eligibility for inclusion in the CRHR inclusion in a local register, or identification in a historical resources survey.

3.4.5.2 Approach to Analysis

This section provides an overview of the approach and methodology used in evaluations of historic properties, identifies potential impacts, and proposes mitigation measures to mitigate potential impacts to a less-than-significant level. The analysis in the following sections has been developed based on record search information and archaeological sensitivity analysis to determine if any known cultural and/or tribal resources would be affected by the Proposed Project.

Specifically, On July 5, 2019, a records search was conducted by staff at the Northwest Information Center (NWIC), Sonoma State University, Rohnert Park, California (NWIC File # 19-0004). The record search included the project Area of Potential Effect (APE) and a 0.25-mile radius outside the project boundaries. The record search included reviewing pertinent NWIC base maps that reference cultural resources records and reports, historic period maps, and literature for Mendocino County including current inventories of the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHP), the California Inventory of Historical Resources, California State Historic Landmarks, and the California Points of Historical Interest. No cultural resources are known within this search radius. Two previous studies have examined the project area in part. In 1975, the Bureau of Land Management prepared a high-level overview of archaeological sites in its Cow Mountain Planning Unit (Keesling and French 1975). A small portion of the project area was also surveyed on foot in 1994 (Roybal 1994). Neither study identified cultural resources in the project area. Just outside of the 1/8-mile search radius is Vichy Springs Resort, established in 1857. Vichy Springs Resort (P-23-001793) is listed on the National Register of Historic Places (National Park Service 1985). Given this information it appears that the project area is not sensitive for prehistoric or historical cultural resources

In addition, and as documented in Appendix F, on February 3, 2019, a letter was sent to the Native American Heritage Commission (NAHC), requesting a listing of local Native American tribes in the area and any information regarding sacred lands within the area in order to be compliant with Assembly Bill 52 (AB52). On February 7, 2019, NAHC sent the City a list of the Native American Tribes to request a government-

to-government consultation to determine the potential of the Proposed Project to affect Tribal Cultural Resources. On June 7, 2019 the City then sent a government-to-government letter to each Native American Tribe requesting consultation regarding how the Proposed Project could potentially affect any known tribal cultural resources. To date, none of the Tribes have come forward requesting government-to-government consultation and/or provided any documentation regarding any known tribal resources that could be affected by the Proposed Project.

3.4.5.3 Impacts and Mitigation Measures

Based on the review of the cultural and tribal record search information noted above, there are no known cultural and/or tribal resources in the Project Area. However, all projects (including the Proposed Project) that require ground disturbance (such as grading, trenching, and filling) have the potential to inadvertently discover previously unknown cultural and/or tribal resources during construction. What follows is further analysis for the specific significance criteria for cultural and/or tribal resources in accordance with CEQA guidelines.

Impact 3.4-1: Would the Proposed Project cause a substantial adverse change in the significance of an historical resource as defined in State CEQA Guidelines §15064.5?

The Project Site is a closed landfill that has been significantly altered as a result of grading and excavation and the deposition of refuse into the Class III landfill. There are no identified historical structures and/or other historical resources currently known to exist either on the site or within the project area, which is characterized by grassland and devoid of any development. Project implementation will include grading and site alteration in order to implement the proposed final closure plan, including environmental control systems. No historical resources, including Vichy Springs Resort will be affected, either directly or indirectly as a result of the implementation of the Proposed Project. Therefore, no impacts to historical resources will occur as a result of project implementation and no mitigation measures are required.

Significance: Less-than-Significant.

Impact 3-4.2: Would the Proposed Project cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5?

The subject property was utilized as a Class III municipal landfill between 1955 and 2001. Approximately 40-acres of the 283.5-acre City-owned property encompasses the Project Area. The landfill activities that occurred at the property extensively altered the property as a result of the landfilling and related activities necessary to maintain the project site property. The Proposed Project includes the construction of the final cover for the landfill as well as associated activities such as groundwater quality monitoring and site maintenance. Cover materials for the final cover will consist of a geosynthetic membrane that is ballasted with sand. Some excavation of the existing borrow site located within the limits of the site will occur as necessary which would result in additional site disturbance. However, it is important to note that these areas have been previously altered by past grading activities conducting at the project site. As a result, it is not likely that significant archaeological resources would be encountered during the proposed final closure and post closure activities. Therefore, potential impacts are anticipated to be less than significant. Nevertheless, and as with all construction activities, there is a slight chance

that construction activities of the Proposed Project could result in accidentally discovering unknown unique archaeological resources during construction. However, to further reduce this less-than-significant impact, the following mitigation measures are recommended:

> **Mitigation Measure 3.4-2: Halt work if cultural resources are discovered.** In the event that any prehistoric or historic subsurface cultural resources are discovered during ground disturbing activities, all work within 100-feet of the resources shall be halted and after notification, the City shall consult with a qualified archaeologist to assess the significance of the find. If any find is determined to be significant (CEQA Guidelines 15064.5[a][3] or as unique archaeological resources per Section 21083.2 of the California Public Resources Code), representatives of the City and a qualified archaeologist shall meet to determine the appropriate course of action. In considering any suggested mitigation proposed by the consulting archaeologist in order to mitigate impacts to historical resources or unique archaeological resources, the lead agency shall determine whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If avoidance is infeasible, other appropriate measures (e.g., data recovery) shall be instituted. Work may proceed on other parts of the project site while mitigation for historical resources or unique archaeological resources is carried out.

Significance: Less-than-Significant with Mitigation.

Impact 3.4-3: Would the proposed Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

As previously indicated, the subject property has been significantly altered as a result of prior grading and landfill activities that have occurred on the site between 1955 and 2001. Implementation of the final closure plan, which includes some additional excavation within the project site property and placement of final cover over the landfill as well as installation/modification of the environmental control systems will not result in any potentially significant impacts to paleontological resources because the areas that will be altered by the proposed project have already been altered; no paleontological resources are known to exist within the affected areas. Also, because the Proposed Project/ would result in minimal excavation in bedrock conditions, significant paleontological discovery would be unlikely. However, fossil discoveries can be made even in areas of supposed low sensitivity. In the event a paleontological resource is encountered during project activities, implementation of the following mitigation measure would reduce potential impacts to less-than-significant.

> **Mitigation Measure 3.4-3: Stop Work if Paleontological Remains are Discovered.** If paleontological resources, such as fossilized bone, teeth, shell, tracks, trails, casts, molds, or impressions are discovered during ground-disturbing activities, work will stop in that area and within 100-feet of the find until a qualified paleontologist can assess the significance of the find and, if necessary, develop appropriate treatment measures in consultation with the District.

With the implementation of the above mitigation measure, the Proposed Project would not result in impacts to unique paleontological or geological resources.

Significance: Less-than-Significant with Mitigation.

Impact 3.4-4: Would the Proposed Project disturb any human remains, including those interred outside of formal cemeteries?

The Proposed Project will not encompass any sites or properties that possess known cultural values. Specifically, no formal cemeteries are located either on the project site in the vicinity of the project area, and no human remains are known to exist within the project site area. Although project implementation will require grading and limited excavation to implement the proposed project, the discovery of human remains is not anticipated. Nonetheless, the possibility exists that subsurface construction activities may encounter undiscovered human remains. Accordingly, this is a potentially significant impact. Mitigation is proposed to reduce this potentially significant impact to a level of less-than-significant.

> **Mitigation Measure 3.4-4: Halt Work if Human Remains are Found.** If human remains are encountered during excavation activities conducted for the Proposed Project, all work in the adjacent area shall stop immediately and the Mendocino County Coroner's office shall be notified. If the Coroner determines that the remains are Native American in origin, the Native American Heritage Commission shall be notified and will identify the Most Likely Descendent, who will be consulted for recommendations for treatment of the discovered human remains and any associated burial goods.

Significance: Less-than-Significant Impact with Mitigation.

Impact 3.4-5: Would implementation of the Proposed Project cause a substantial adverse change in the significance of a tribal cultural resource?

Tribal cultural resources are defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is either; (1) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k); and/or (2) is a resource determined by the City or its archeological consultant, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1.

As noted above, consultation with the NAHC and with local tribes under AB52 did not identify any Tribal Cultural Resources within the Project area. Therefore, the Proposed Project/Action is not likely to cause a substantial adverse change in the significance of tribal cultural resources. Nevertheless, there is a slight chance that construction activities of the Proposed Project could result in accidentally discovering unique tribal cultural resources. To further reduce this less-than-significant impact, the following mitigation measures shall be implemented.

> **Mitigation Measure 3.4-5: Halt Work if Tribal Cultural Resources are Discovered.** In the event that any tribal cultural resources are discovered during ground disturbing activities, all work within 100-feet of the resources shall be halted and after notification, the City shall consult with a qualified archaeologist and local tribes to assess the significance of the find. If any find is determined to be significant as a unique tribal cultural resource, the City shall treat the resource with culturally appropriate dignity, taking into account the tribal cultural values

and meaning of the resource, including to, but not limited to, the following:

- Protecting the cultural character and integrity of the resource;
- Protecting the traditional use of the resource; and
- Protecting the confidentiality of the resource.

In considering any suggested mitigation proposed by the consulting archaeologist and/or the appropriate tribe in order to mitigate impacts to any tribal cultural resources find, the City shall determine whether avoidance is feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If avoidance is infeasible, other appropriate measures (e.g., data recovery) shall be instituted and coordinated with the appropriate tribe(s). Work may proceed on other parts of the project site while mitigation measures for tribal cultural resources or other unique archaeological resources are carried out.

With the implementation of the above mitigation measure, any remaining impacts would be considered less-than-significant.

Significance: Less-than-Significant with Mitigation.

3.4.6 Cumulative Effects

There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts to cultural, paleontological, and/or tribal resources.

Significance: Less-than-Significant.

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3.5 Geology, Soils, and Seismicity

3.5.1 Introduction

This section identifies and evaluates the changes in conditions related to geology, soils, and seismic conditions associated with implementation of the Proposed Project. The analysis addresses potentially significant effects relating to geological and soil resources and seismic hazards.

3.5.2 Environmental Setting

Regional Geology

The Project site lies within the geologic region of California referred to as the Coast Ranges geomorphic province.[1] The Coast Ranges province lies between the Pacific Ocean and the Great Valley (Sacramento and San Joaquin valleys) provinces and stretches from the Oregon border to the Santa Ynez Mountains near Santa Barbara. Much of the Coast Range province is composed of marine sedimentary deposits and volcanic rocks that form northwest trending mountain ridges and valleys, running subparallel to the San Andreas Fault Zone. The Coast Ranges can be further divided into the northern and southern ranges, which are separated by the San Francisco Bay. The Northern Coast Ranges are comprised largely of the Franciscan Complex basement bedrock, which consists primarily of graywacke, shale, greenstone (altered volcanic rocks), basalt, chert (ancient silica-rich ocean deposits), and sandstone that originated as ancient sea floor sediments. In some locations, especially to the east of Ukiah, Franciscan rocks are overlain by volcanic cones and flows of the Quien Sabe, Sonoma and Clear Lake volcanic fields (CGS, 2002). The inner Northern Coast Ranges include the Mayacamas Mountains east of the Ukiah Valley. The Mayacamas Mountains extend in a northwesterly-southeasterly direction and are about 50 miles in length.

Ukiah and the Proposed Project site are located near the boundary of the Coastal and Central belts of the Franciscan Complex. The Central belt is largely composed of a tectonic mélange composed of numerous large, discontinuous bodies of graywacke sandstone, metagraywacke, greenstone, chert, and serpentinite in a highly sheared and deformed shale matrix. During Miocene time (approximately 23 million years before present; m.y.b.p) a relatively large elongate basin began subsiding in the vicinity of Ukiah in response to extensional stresses associated with displacement along the north-northwest trending Maacama Fault and less obvious sub-parallel strike-slip faults to the west. Erosion of the surrounding Franciscan Complex bedrock, and continued basin subsidence throughout Pliocene-Pleistocene time (from ~5 m.y.b.p. to 10,000 years ago), resulted in the accumulation of a thick section of alluvial deposits (sediments deposited by rivers and streams) and lacustrine deposits (sediments formed at the bottom of ancient lakes) referred to as Continental Basin Deposits. The maximum thickness of the Continental Basin Deposits is estimated to be more than 2,000 feet (Cardwell *in* EBA, 1994). Younger Holocene alluvial deposits overlie the Continental Basin Deposits that were deposited along active stream channels and flood plains during the last 10,000 years. The alluvial deposits are present in all major valleys and many of the minor stream courses.

[1] A geomorphic province is an area that possesses similar bedrock, structure, history, and age. California has 11 geomorphic provinces (CGS, 2002).

Project Site Geology

The Ukiah Landfill is situated in the lower rolling foothills of the Mayacamas Mountains, east of downtown Ukiah, at ground surface elevations ranging from approximately 710 feet above mean sea level (MSL) near the western edge to about 970 feet MSL along the southeast edge of the landfill property. The landfill occupies the southern slope of an unnamed ephemeral stream valley, which is tributary to the Russian River. While the topography of the landfill's waste management unit (WMU) is a consistent slope of about 25 percent, the surrounding topography is hilly with slopes ranging from 30-50 percent.

Soils on the hillslopes south of the landfill consist primarily of Yorktree-Yorkville loams and Yorkville loams on 30 to 50 percent slopes. Slopes (30 to 75 percent) immediately north of the landfill are composed of bedrock overlain by up to 12-inches of sandy loams belonging to the Maymen-Etsel-Snook complex and gravelly loams of the Xerochrepts-Haploxeralfs-Argixerolls on 9 to 30 percent slopes (NRCS, 2019). Yorktree-Yorkville loams also occupy slopes northeast of the landfill. The WMU is composed of reworked soil cover underlain by refuse and other soil and debris mixtures, which are classified as "Pits and Dumps" under the Natural Resource Conservation Service (NRCS) soils survey. The western half of the WMU is classified as Yorkville-Hopland loams and clays. No soils on the project site are considered by the NRCS as Prime Farmland soils.

Three major geologic units are represented in the vicinity of the landfill site (EBA, 1994). These include rocks from the coastal belt of the Franciscan Complex, Continental Basin Deposits, and recent Holocene alluvial deposits. The Franciscan Complex outcrops in the Sulphur Creek drainage to the south of the landfill site, near Vichy Springs Resort and predominantly consists of the tectonic mélange. The Continental Basin Deposits are represented by lenticular bodies of orange-brown to brown clayey and silty sands and gravels and thick blue-gray claystone and siltstone units that contain occasional sand and gravel lenses. The Holocene alluvial deposits consist of unconsolidated sand, gravel, silt, and clay units

Regional Seismicity

The Project site is located in a seismically active area with the Maacama fault located less than a mile away (Hart, 1997). The Maacama Fault Zone (MFZ) extends 114 miles northward from east of Healdsburg to north central Mendocino County. The MFZ is identified by the California Geological Survey as active under the Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo)[2] on the basis of historic and on-going tectonic creep along the fault and geomorphologic evidence of fault rupture. Recent evidence of moderate earthquakes on the MFZ includes moment magnitude (mw) 4.3 and 4.4 events in December 2001.[3] The east boundary of the MFZ is located approximately 0.6 miles south-southwest of the Project site at its closest distance and the closest "approximately located" fault trace is 0.65 miles south-southwest. The closest "accurately located" fault trace to the landfill is 0.88 miles southeast. The Maacama fault has not generated a known historic earthquake capable of triggering surface fault rupture. However, on the basis of the length of the fault, creep rates, and evidence of displacement in the last 11,000 years, the fault is

2 The Alquist-Priolo Earthquake Fault Zoning Act, signed into law in December of 1972, requires the delineation of zones along active faults. The purpose of the Alquist-Priolo Act is to regulate development on or near active fault traces to reduce the hazard of fault rupture.
3 Moment magnitude is a measure of the size of an earthquake calculated by the seismic moment. Moment is a physical quantity proportional to the slip on the fault multiplied by the area of the fault surface that slips; it is related to the total energy released in the earthquake.

considered active and capable of generating a up to a moment magnitude 7.1 earthquake. This is referred to as its Maximum Credible Earthquake or MCE.[4]

Seismic Hazards

Surface Fault Rupture

Seismically-induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude and nature of fault rupture can vary for different faults, or even along different strands of the same fault. Ground rupture is considered more likely along active faults, which are referenced in **Table 3.5-1**, and development near these faults is regulated under Alquist-Priolo. The Project site is not located on a known active fault and is not within an Earthquake Fault Hazard Rupture Zone as defined by Alqust-Priolo (Hart, 1997). While surface fault rupture is not necessarily bound to occur within the rupture zone, the likelihood of it occurring outside of the zone established by Alquist-Priolo is considered far less probable. Other active faults that could be capable of generating surface fault rupture within their respective earthquake fault zones are the Bartlett Springs fault, located about 20 miles northeast of the Project site, and the San Andreas Fault, located 30 miles to the southwest. These two faults would not generate surface fault rupture at the Project site but could cause ground shaking.

Table 3.5-1
Regional Faults in the Vicinity of the Proposed Project

Fault	Approximate Distance[a]	Fault Classification[b]	Historical Seismicity[c]	Maximum Magnitude[d]
Maacama	0.65 miles northeast	Active	M_w 4.4 2001	M_w 7.1
San Andreas	30 miles southwest	Historic-Active	M 7.1, 1989 M 8.25, 1906 M 7.0, 1838 Many <M 6	M 7.9
Bartlett Springs	22 miles northwest	Active	Evidence of displacement between 300 and 1,000 years ago.	M 7.1

a Distance from approximate center point of the Project site.
b Recency of faulting from Jennings (1994). Historic: displacement during historic time (within last 200 years), including areas of known fault creep; Holocene: evidence of displacement during the last 10,000 years.
c Richter magnitude (M) and year for recent and/or large events.
d This is the maximum earthquake magnitude which could occur within the specified fault zone.

NA = Not applicable and/or not available.

SOURCES: Jennings (1994), Hart (1997), Peterson et al. (1996)

Ground Shaking

Strong ground motion is described as motion of sufficient strength to affect people and their environment or ground movement recorded on a strong-motion instrument or seismograph. Ground shaking intensity is partly related to the size of an earthquake, the distance to the site, and the response of the geologic materials that underlie a site. As a rule, the greater the earthquake magnitude and the closer the fault rupture to a site, the greater the intensity of ground shaking. Violent ground shaking is generally expected at and near the epicenter of a large earthquake; however, different types of geologic materials respond differently to earthquake

[4] The MCE is defined in the California Code of Regulations (CCR) Title 27 as the maximum earthquake that appears capable of occurring under the presently known geologic framework and is considered the upper bound earthquake for a given seismic source.

waves. For instance, deep unconsolidated materials can amplify earthquake waves and cause longer periods of ground shaking.

While the magnitude is a measure of the energy released in an earthquake, intensity is a measure of the observed ground shaking effects at a particular location. The Modified Mercalli (MM) scale is commonly used to measure earthquake intensity due to ground shaking. **Table 3.5-2** presents a description of the Modified Mercalli scale. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total). MM intensities ranging from IV to X can cause moderate to significant structural damage, although the damage will not be uniform. Some structures experience substantially more damage than others. The age, material, type, method of construction, size, and shape of a structure affect its performance in an earthquake.

Ground motion during an earthquake is described with the parameters of acceleration, velocity and the duration of the shaking. A common measure of ground motion is the peak ground acceleration (PGA), which is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the acceleration due to gravity (g), which is approximately 980 centimeters per second squared. In terms of automobile accelerations, one "g" of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds. For comparison purposes, the maximum peak acceleration value recorded during the 1989 Loma Prieta earthquake was close to the epicenter, near Santa Cruz, at 0.64 g. A Probabilistic Seismic Hazard Assessment (PSHA) for California was completed by the California Geological Survey to describe the statewide distribution of estimated ground motion throughout the state. This assessment provides a conservative estimate, through probabilistic analysis, of the peak ground acceleration for all regions of California. Based on estimates of the PSHA, PGA in the region of the Project site could range between 0.6g and 0.7g (CGS, 2019). A PGA value of this magnitude roughly relates to a MMI values of VIII to IX, which could cause moderate damage in specially designed structures and considerable damage in ordinary structures.

Liquefaction and Lateral Spreading

Liquefaction is the sudden temporary loss of shear strength in saturated, loose to medium dense, granular sediments subjected to ground shaking. Liquefaction generally occurs when seismically-induced ground shaking causes pore water pressure to increase to a point equal to the overburden pressure. Liquefaction can cause foundation failure of buildings and other facilities due to the reduction of foundation bearing strength. The potential for liquefaction depends on the duration and intensity of earthquake shaking, particle size distribution of the soil, density of the soil, and elevation of the groundwater. Areas at risk due to the effects of liquefaction are typified by a high groundwater table and underlying loose to medium-dense, granular sediments, particularly younger alluvium and artificial fill. Lateral spreading is the horizontal, downslope movement of materials in a slope that have undergone liquefaction. Groundwater at the Project site is not shallow, and the soils are reworked, fine-grained alluvial soils with refuse mixtures without extensive areas of poorly graded, granular materials. These subsurface conditions are not typically conducive to liquefaction or lateral spreading.

Table 3.5-2
Modified Mercalli Intensity Scale

Intensity Value	Intensity Description	Average Peak Acceleration (% g[a])
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.0017 g[a]
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	< 0.014 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck.	< 0.014 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	0.014–0.04 g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	0.04–0.09 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	0.09–0.18 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving.	0.18–0.34 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	0.34–0.65 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked. Underground pipes broken.	0.65–1.24 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed over banks.	> 1.24 g
XI	Few, if any, masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24

a g (gravity) = 980 centimeters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.
SOURCE: ABAG, 2003; CGS, 2003.

Earthquake-Induced Landslides

Earthquake motions can induce significant horizontal and vertical stresses in slopes that produce dynamic normal and shear stresses along potential failure surfaces within a slope. The susceptibility for native and engineered slopes to fail depends on the gradient and localized geology, as well as the amount of rainfall, excavation, or seismic activities. During a slope failure, a mass of rock, soil, and debris is displaced down slope by sliding, flowing, or falling. Steep slopes and down-slope creep of surface materials characterize

areas most susceptible to failure. Engineered slopes have a tendency to fail during an earthquake if not properly designed, constructed, or compacted. A primary element of the Proposed Project is the stabilization of the landfill slope, and thus, post closure slope failure is considered in the impact analysis.

Earthquake-Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of subsurface materials (particularly loose, non-compacted, and variable sandy sediments) due to the rearrangement of soil particles during prolonged ground shaking. Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates). Typically, areas underlain by artificial fills, unconsolidated alluvial sediments, slope wash, and areas with improperly engineered construction fills are susceptible to this type of settlement. Settlement of soils could occur at the project site could occur during an earthquake.

Other Non-Seismic Geologic Hazards

Soil Erosion

Soil erosion is the process whereby soil materials are worn away and transported to another area either by wind or water. Rates of erosion can vary depending on the soil material and structure, placement, and human activity. Soil containing high amounts of sand or silt can be easily eroded while clayey soils are less susceptible. The soils on the Project site have a moderate to high susceptibility to erosion (NRCS, 2019).

Subsidence and Settlement

Subsidence is the gradual lowering of the land surface due to loss or compaction of underlying materials. Subsidence can occur as the result of hydro-compaction, groundwater, gas and oil extraction, or the decomposition of highly organic soils. Hydro-compaction is the process where volume decreases and density increases upon saturation of a soil or alluvial deposit.

Settlement is the depression of the bearing soil when a load, such as that of a building or new fill material, is placed upon it. Soils tend to settle at different rates and by varying amounts depending on the load weight. Differential settlement can be a greater hazard than total settlement if there are variations in the thickness of previous and new fills or natural variations in the thickness and compressibility of soils across an area. Settlement commonly occurs as a result of building construction or other large projects that require soil stockpiles.

Slope Instability and Landslides

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) forces. Rock slopes exposed to either air or water can undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience shallow soil slides, rapid debris flows, and deep-seated rotational slides.

3.5.3 Regulatory Context

FEDERAL

Resource Conservation and Recovery Act (RCRA) Subtitle D (258)

RCRA Subtitle D regulations (40 CPR Part 258) went into effect October 9, 1993 and are applicable to landfills receiving municipal solid waste (MSW) and establish minimum Federal criteria for the siting, design, operation, and closure of MSW landfills. These regulations apply to the entire waste containment system, including liners, leachate collection systems, and surface water control systems. Section 258.13 of the regulations requires that new or lateral expansions of existing landfills cannot be sited within 200-feet of a fault that has been active during the Holocene Epoch (past 11,000 years) unless it can be demonstrated that a lesser setback is safe.

STATE

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act), signed into law December 1972, requires the delineation of zones along active faults in California. The purpose of the Alquist-Priolo Act is to regulate development on or near fault traces to reduce the hazard of fault rupture and to prohibit the location of most structures for human occupancy across these traces. Cities and counties must regulate certain development projects within the zones, which includes withholding permits until geologic investigations demonstrate that development sites are not threatened by future surface displacement (Hart, 1997). Surface fault rupture is not necessarily restricted to the area within an Alquist-Priolo Zone.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted, and appropriate mitigation measures incorporated into the project design. The area surrounding the Project site has not yet been evaluated under this Act.

California Code of Regulations Title 27

Title 27 of the California Code of Regulations (27 CCR), Division 2, Subdivision 1, contains the regulations of the California Integrated Waste Management Board (CIWMB) – now the California Department of Resources Recycling and Recovery (CalRecycle) – and the State Water Resources Control Board (SWRCB) pertaining to closure and post-closure maintenance standards for landfills. The requirements listed here pertain to geology, grading, slope stability and seismic design.

- 27 CCR, § 20370 requires that Class III waste management units be designed to withstand the Maximum Probable Earthquake (MPE) without damage to the foundation or to the structures which

control leachate, surface drainage, erosion, or landfill gas. The MPE is defined in 27 CCR 20164 as the maximum earthquake that is likely to occur during a 100-year interval.

- 27CCR, §21090 - Closure and Post-Closure Maintenance Requirements for Solid Waste Landfills. sets forth requirements for: 1) Final Cover Requirements, which includes the foundation layer, low-hydraulic-conductivity layer, and erosion-resistant layer, 2) Cover Maintenance Plan & Annual Cost Estimate, 3) Periodic Leak Search, and 4) Stability Analysis, 5) Grading requirements, 6) General post-closure duties, and final cover surveys.
    - 27CCR§21090(a)(6), requires that a stability analysis be performed for the proposed final cover system to demonstrate conformance with 27CCR, §21750(f)(5). 27CCR 21750 outlines requirements for the preparation of a slope stability report for a Class III landfill, which includes the use of the MPE to determine the maximum expected horizontal acceleration in rock at the site.
- 27 CCR § 21145 - Slope Stability. (a) The operator shall ensure the integrity of final slopes under both static and dynamic conditions to protect public health and safety and prevent damage to post-closure land uses, roads, structures, utilities, gas monitoring and control systems, leachate collection and control systems to prevent public contact with leachate, and prevent exposure of waste. Slope stability analyses shall be conducted and reported pursuant to the requirements of Division 2, Subdivision 1, Chapter 4, Subchapter 3, Article 4 Section 21750(f)(5). The operator shall notify the EA, CIWMB, and RWQCB in the event of any slope failure.
- 27 CCR § 21150 - Drainage and Erosion Control. (a) The drainage and erosion control system shall be designed and maintained to ensure integrity of post-closure land uses, roads, and structures; to prevent public contact with waste and leachate; to ensure integrity of gas monitoring and control systems; to prevent safety hazards; and to prevent exposure of waste. Slopes not underlain by waste shall be stabilized to prevent soil erosion. Methods used to protect slopes and control erosion shall include, but are not limited to, terracing, contour furrows, and trenches.

LOCAL

Mendocino County Environmental Health

The Mendocino County Environmental Health Department (MCEHD) acts as the Local Enforcement Agency (LEA) for the California Department of Resources Recycling and Recovery (CalRecycle) and, in adherence to Title 27, conducts regular monthly inspections of the Ukiah Landfill and will continue inspections until the landfill is officially closed. Inspections are documented in monthly progress reports submitted by the MCEHD.

3.5.4 Impact Analysis

This section discusses the significance criteria used to evaluate potential impacts, the approach to analyzing impacts on geological resources, seismic response, and related seismic hazards, and the potential impacts related to the construction and operation of the Proposed Project.

3.5.4.1 Significance Criteria

According to CEQA Guidelines Appendix G, the Project would result in a significant impact to air quality

if it would:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

  i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

  ii) Strong seismic ground shaking?

  iii) Seismic-related ground failure, including liquefaction?

  iv) Landslides?

- Result in substantial soil erosion or the loss of topsoil?
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Criteria Items Considered, But Not Analyzed Further

Significance criteria regarding expansive soils, capability of soils for septic tanks and paleontological resources were considered but were found not to be impacts of the Proposed Project and are therefore focused-out of this impact analysis. A brief discussion of each criterion is provided below.

The Project would not be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.

The Project site, namely the WMU, is underlain by various mixtures of fill and cover soils containing silts, sand, and clay. Considering the heterogeneity and distribution of the existing cover soils, there is a possibility that some of these soils are expansive (tending to swell in volume when wet and shrink when desiccated) and could exhibit expansive behavior in localized areas. However, under the proposed alternative cover system, existing cover soils would be graded and covered with a minimum two-foot thick foundation layer of engineered, non-expansive fill compacted to 90 percent overlain by a tufted geotextile and covered with a 50-millimeter linear low-density polyethylene (LLDPE) geomembrane liner. These components would significantly reduce or eliminate infiltration of water into the WMU and diminish the potential to activate shrink-swell behavior in expansive soils, if they are present.

Septic tanks or alternative wastewater systems are not components of the Proposed Project and thus, determining the capability of onsite soils to support these systems is not necessary.

The scope of the Proposed Project involves grading, applying a cover to the WMU, and the eventual closure of the Landfill. Alternative wastewater systems, septic tanks, or leachfields are not proposed. Surface water would be collected and routed to discharge points at the ephemeral drainage along the northern boundary of the site or into sedimentation ponds. Leachate would be collected and eventually routed to the municipal sewer. No component of the Proposed Project requires discharge of wastewater to the ground or subsurface.

The Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

The Proposed Project involves covering and closing a municipal landfill that had received household and construction refuse between 1955 and 2001. The WMU and surrounding areas, including the borrow areas, have been disturbed by excavation and grading for many years. The Proposed Project would involve grading on the WMU and installation a final cover system. These activities would take place on previously disturbed portions of the property and would not require grading or excavation on native, undisturbed areas. As these areas are previously disturbed, activities associated with the Proposed Project would not disturb a paleontological resource or site or unique geologic feature.

3.5.4.2 Impacts and Mitigation Measures

Impact 3.5-1: Would the Proposed Project expose people to injury or structures to damage from potential rupture of a known earthquake fault, strong ground shaking, seismic-related ground failure, or landslides?

The Project site is located in a seismically active region of California with the Maacama Fault Zone located about 0.6 miles to the south-southeast. In the event of an earthquake on the Maacama fault or on other regional faults such as the San Andreas fault (30 miles to the southeast) or Bartlett Creek fault (20 miles to the northwest), the site would experience some degree of ground shaking. Considering its proximity to the Maacama Fault, the PSHA projected that that the Project site could experience peak ground accelerations ranging between 0.6g and 0.7g. However, as the landfill site is not directly overlying a known, active fault trace, the potential for surface fault rupture is remote.

Ground shaking at the project site could cause slope failure, liquefaction, and/or densification of the site soils. California Code of Regulations Title 27 [§21090(a)(6)] requires that a slope stability analysis be completed for the proposed landfill closure. In accordance with 27CCR, §21090(a)(6), a stability analysis was performed for the proposed final cover system to demonstrate conformance with 27CCR, §21750(f)(5). The Seismic Hazard Assessment and Stability Analysis (Stability Analysis) prepared by EBA Engineering is provided as Appendix E of the Final Closure and Post Closure Maintenance Plan.

Seismic Assessment

Title 27 of the California Code of Regulations (27 CCR), Section 20370 requires that Class III waste management units be designed to withstand the Maximum Probable Earthquake (MPE) without damage to the foundation or to the structures which control leachate, surface drainage, erosion, or landfill gas. The MPE is defined in 27 CCR Section 20164 as the maximum earthquake that is likely to occur during a 100-year interval. Using a 70% chance of non-exceedance as the definition of "likely", the recurrence interval for the MPE is approximately 280 years (City of Ukiah, 2019). Federal Regulations contained in 40 CFR Part 258.14 (Subtitle D) require landfill operators located within seismic hazard zones to design the unit to

resist the maximum horizontal acceleration in lithified (i.e. consolidated sediments) material for the site. The Project site is located less than a mile from the active Maacama Fault and is within a seismic hazard zone, which, as defined by Subtitle D, is a 10 percent or greater probability of maximum horizontal acceleration of 0.10 g in 250 years.

The MCE is defined by Title 27 as the maximum earthquake that appears capable of occurring under the geologic framework and is referred to as the upper bound earthquake for a given seismic source. Although Class III landfills must be designed to withstand strong ground motions associated with the MPE, the final closure configuration for the Project site has been designed using the higher bedrock acceleration (0.66g) associated with the larger MCE determined for the Maacama Fault. The use of the MCE could be considered more conservative because the estimated recurrence interval for the Maacama fault and other potential seismic sources in the region is approximately 220 years while the recurrence interval for the MPE is 280 years. Since earthquakes comparable in size to the MCE are absent from the historic seismic record for the region, the use of the more stringent MCE as the design earthquake provides a more realistic and conservative estimate of the maximum expected horizontal bedrock acceleration at the site (City of Ukiah, 2019).

Final Cover Stability Analysis

The factor of safety (FOS) can be defined as the forces that resist movement divided by the forces that trigger it. Therefore, when the resisting forces are greater than the those that may trigger failure, the FOS is 1.0 or greater and the slope is considered stable. Slope stability analyses determine the FOS for slopes to evaluate whether they will withstand both static forces, such as gravity (no earthquake ground motion) or pseudo-static forces, which are those generated during an earthquake.

The slope stability analysis evaluated the strength of the various interfaces comprising the proposed landfill cover system and analyzed the resulting static and pseudo-static slope stability. The design characteristics of the current proposed alternative final cover system includes the following components (in descending order):

- Minimum 5/8-inch thick sand infill layer;
- 50-millimeter linear low-density polyethylene (LLDPE) geomembrane liner;
- Specialized tufted geotextile; and
- A minimum two-foot thick foundation layer.

The interfaces between the geosynthetic layers making up the landfill cover system, such as the interface between two geosynthetic materials or between a geosynthetic and native or compacted soil material, are typically the weakest interfaces in a final cover system. These represent the weakest areas and are susceptible to block-type or wedge failures.

Slope stability of the proposed final cover system was modeled using the conservative "infinite slope method", which evaluates the stability of shallow failures of constant thickness along a defined interface. This method assumes the failure block is infinitely long and neglects forces that would resist failure present along the toe of the slope or along the sides. The slope stability analysis considered a LLDPE geomembrane/artificial turf with sand infill ballast cover system using a critical slope angle of 26.5 degrees (2H: 1V). Results of the infinite slope stability analysis indicate a minimum static FOS of 2.8 for failure at

the LLDPE/subgrade interface and a minimum static FOS of 3.3 for failure above the LLDPE geomembrane.

A pseudo-static slope analysis, or an analysis of the slope stability under earthquake ground shaking conditions, was performed to determine the yield acceleration for the cover. The yield acceleration is the average horizontal ground acceleration at the point slope movement occurs. The yield acceleration was determined using a trial and error procedure in which the seismic coefficient was varied until a FOS of 1.0 was obtained. The lowest yield acceleration calculated for the LLDPE geomembrane/artificial turf cover system was 0.70 g. This is greater than the maximum horizontal acceleration determined for an earthquake with an MCE of 0.66 g on the Maacama fault, the highest acceleration predicted for the site. Because the maximum horizontal acceleration of 0.66g predicted by the site response analysis does not exceed the calculated yield acceleration, it can be concluded that permanent seismic displacements of the LLDPE geomembrane/artificial turf cover system are highly unlikely (City of Ukiah, 2019).

Further analysis using the Newmark Method (1965) evaluated the stability of slopes subject to seismic loading conditions in terms of permanent displacements (deformations) that are expected to occur. This method is commonly used for slopes under seismic loading conditions and evaluates the stability of slopes in terms of permanent deformations that result when the acceleration of seismically-induced ground motion exceed the yield acceleration of the slope mass. The total amount of slope deformation is estimated by down-slope displacements that occur during each brief period of time when the yield acceleration of the slope mass is exceeded. As stated above, a pseudo-static analysis of the Project site determined that the yield acceleration is not exceeded by seismically-induced strong ground motions, therefore no permanent displacements of the final cover system are predicted by the Newmark Method (City of Ukiah, 2019)

Conclusions of the Seismic Hazard and Slope Stability Analyses

- The seismic analysis considered the potential ground motion generated by nearby Maacama fault and the other regional faults (i.e. the San Andreas, Bartlett Springs and Rodgers Creek) and determined that the Maacama fault represented the most significant seismic source to impact the Project site.
- For purposes of the pseudo-static slope stability calculations, using the MCE with a recurrence interval of 220 years was a more conservative design earthquake than the MPE with the recurrence interval of 280 years.
- The minimum static conditions FOS of 2.8 for the proposed geomembrane/artificial turf engineered alternative cover system constructed on maximum 2H:1V slopes. These results suggest that the final landfill configuration would be stable throughout the post-closure maintenance period following closure (City of Ukiah, 2019).
- Under pseudo-static (earthquake conditions), even if the maximum horizontal ground accelerations were generated from the Maacama fault, permanent seismic displacements of the proposed geomembrane/artificial turf cap would not likely occur.

Based on these conclusions, the potential for failure of slopes at the landfill after completion of the proposed final cover is low. If subjected to earthquake ground shaking, it is unlikely that the landfill slopes would permanently fail. These findings, in addition to the absence of active known active fault traces underlying

the Project site, the potential is low that the Proposed Project would expose people to injury or structures to damage from potential rupture of a known earthquake fault, strong ground shaking, seismic-related ground failure, or landslides. This impact would be less-than-significant, and no mitigation is required.

Significance: Less-than-Significant.

Impact 3.5-2: Would construction grading and long-term closure conditions at the Landfill expose soils to erosion and result in the loss of topsoil?

Construction activities associated with the Proposed Project would require demolition, backfilling, earthmoving, grading, and compaction, and could expose areas of bare soil susceptible to temporary erosion by wind or water. Given that the construction is a short-term operation, substantial and permanent downslope soil erosion and gullying on the surfaces of WMU would not be expected. As described in the Section 3.6 *Hydrology and Water Quality*, the construction contractor and the City of Ukiah would be required, as the discharger, to obtain coverage under California's Construction General Permit (Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ and 2012-0006-DWQ) (General Construction NPDES Permit or CGP). The Proposed Project would be required to comply with the permit requirements set forth to control stormwater discharges from the construction sites. Construction activity subject to this permit includes clearing, grading, and disturbances to the ground, such as stockpiling or excavation, Monitoring and corrective action under the CGP is described in the required Stormwater Pollution Prevention Plan (SWPPP) that is prepared by a California Certified Qualified SWPPP Developer (QSD) and is implemented in the field by a State-certified Qualified SWPPP Practitioner (QSP). The SWPPP identifies BMPs that must be implemented to reduce construction effects on receiving water quality based on potential pollutants. The BMPs identified are directed at implementing both sediment and erosion control measures and other measures to control potential chemical contaminants. In addition, the SWPPP is required to contain a visual monitoring program and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction.

The Proposed Project would integrate several erosion controls into the overall design of the final cover. These features and provisions are intended to minimize the potential for erosion and are required by required by 27CCR, §21150. Erosion control features are summarized below:

- The geosynthetic final cover system (ClosureTurf™) would greatly reduce or eliminate the discharge of sediment from the WMU surface as no soil component will be utilized in the final cover design.
- The final surface of the soil borrow area, as well as other areas disturbed by the construction operations, would be repaired/graded as necessary and then hydroseeded. The aforementioned areas with surface slopes steeper than 10 percent would also be covered with 1.5 inches of straw and secured with erosion control netting.

- Drainage channels outside the WMU footprint that could be subjected to high flow velocities would be lined with rock rip-rap to protect against erosion.
- Drainage outfalls will be lined with rock rip-rap.
- Aggregate base placed on perimeter access roads to allow for all-weather access would also serve to reduce the potential for sediment-laden run-off from these areas.

The proposed post-closure Inspection/Maintenance and Monitoring Programs, as required by 27CCR §21830 (b)(5), would be implemented and would provide a mechanism to identify and correct excessive erosion following the placement of the final cover. The final cover areas would be visually inspected on a monthly or quarterly basis and evaluated for breaches in the liner system, exposed refuse, slope failure, leachate seeps and sand migration.

Considering the requirement to comply with the CGP over the short-term construction period and the stormwater/erosion management features proposed following placement of the final cover, the potential for excessive, damaging erosion or loss of topsoil attributable to the Proposed Project is low. The post-closure inspection requirements and schedules reduces the potential for undetected erosional features to worsen. Construction grading and long-term closure conditions at the landfill would not expose soils to substantial erosion or result in the loss of topsoil. This impact is less-than-significant and no mitigation is required

Significance: Less-than-Significant.

Impact 3.5-3: Would the Proposed Project be located on a unit or soils that are potentially unstable, or that could become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Under existing conditions, the landfill WMU consists of a mass of refuse overlying Holocene and Plio-Pleistocene-aged sediments. Slopes at the WMU range from approximately 2:1 to 3:1 (horizontal to vertical). A slope stability analysis of the waste mass was completed in 2008 and presented in the Joint Technical Document – Final Closure Plan. The results indicated that the slope stability of the waste mass had a FOS greater than 1.7 for a failure through the base of the landfill (City of Ukiah, 2019). Additionally, a pseudo-static (earthquake ground motion) analysis determined that the yield acceleration for the waste mass was 0.13 g.

As discussed in **Impact 3.5-1**, a seismic hazard assessment was conducted to evaluate of the final cover system for the Proposed Project and determined that the minimum FOS was 2.8 and the yield acceleration was greater than the projected peak horizontal ground acceleration generated from the MCE on the Maacama fault. The proposed final cover system would strengthen the existing WMU by developing a more stable/consistent 2:1 slope, adding an engineered foundation fill layer that is compacted to 90-percent, and installing a geomembrane cover that would reduce surface water infiltration and increase overall slope stability. This evidence, therefore, supports a conclusion that the Proposed Project would increase both the static and pseudo-static stability of the landfill thereby greatly reducing the potential for slope failure, earthquake-induced landslides, liquefaction-related failures, and/or soil subsidence or collapse. This impact is less-than-significant, and no mitigation is required

Significance: Less-than-Significant.

Impact 3.5-4. Would the Proposed Project make a cumulatively considerable contribution to cumulative effects associated with increased seismic risk, landsliding, erosion, topsoil loss or increased exposure to seismic or other risks?

The Ukiah Landfill is located in the foothills of the Mayacamas Mountains, east of the city of Ukiah within a sparsely populated rural setting. The geographic scope for assessing cumulative impact to geologic resources, seismic risk and erosion or loss of topsoil consists of the area within the permitted property boundary. The Proposed Project would grade and cover the existing WMU with engineered cover system that would increase static and pseudo-static slope stability within the landfill property, reduce surface water infiltration, improve drainage, reduce erosion (at the WMU and borrow areas), and eventually add acreage to available open within the region. For these reasons, when viewed in context with the effects of past, current, and probable future projects, the incremental effects of the Proposed Project are beneficial, and thus, the Proposed Project does not contribute to a cumulative adverse impact and is not cumulatively considerable. This impact is less-than-significant and no mitigation is required

Significance: Less-than-Significant.

3.5.5 Cumulative Effects

There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts to geology, soils, and/or seismicity.

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3.6 Greenhouse Gases

3.6.1 Introduction

This section characterizes and discusses the potential effects of the Proposed Project on greenhouse gas (GHG) emissions. This section also includes a review of the current regulatory framework relevant to greenhouse gases (GHGs). The supporting methodology and assumptions used in the GHG emissions analysis are provided in Appendix D.

3.6.2 Environmental Setting

"Global warming" and "global climate change" are the terms used to describe the increase in the average temperature of the earth's near-surface air and oceans since the mid-20th century and its projected continuation. Warming of the climate system is now considered to be unequivocal, with global surface temperature increasing approximately 1.33 degrees Fahrenheit (°F) over the last 100 years. Continued warming is projected to increase global average temperature between 2 and 11°F over the next 100 years.

Natural processes and human actions have been identified as the causes of this warming. The International Panel on Climate Change concludes that variations in natural phenomena such as solar radiation and volcanoes produced most of the warming from pre-industrial times to 1950 and had a small cooling effect afterward. After 1950, however, increasing GHG concentrations resulting from human activity such as fossil fuel burning and deforestation have been responsible for most of the observed temperature increase. These basic conclusions have been endorsed by more than 45 scientific societies and academies of science, including all of the national academies of science of the major industrialized countries. Since 2007, no scientific body of national or international standing has maintained a dissenting opinion.

Increases in GHG concentrations in the earth's atmosphere are thought to be the main cause of human-induced climate change. GHGs naturally trap heat by impeding the exit of solar radiation that has hit the earth and is reflected back into space. Some GHGs occur naturally and are necessary for keeping the earth's surface inhabitable. However, increases in the concentrations of these gases in the atmosphere during the last 100 years have decreased the amount of solar radiation that is reflected back into space, intensifying the natural greenhouse effect and resulting in the increase of global average temperature.

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. The accumulation of GHGs has been implicated as the driving force for global climate change. The primary GHGs are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), ozone, and water vapor.

While the presence of the primary GHGs in the atmosphere are naturally occurring, CO_2, CH_4, and N_2O are also emitted from human activities, accelerating the rate at which these compounds occur within earth's atmosphere. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas methane results from off-gassing associated with agricultural practices and landfills. Other GHGs include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, and are generated in certain industrial processes. GHGs are typically reported in "carbon dioxide-equivalent" measures (CO_2e).[1]

There is international scientific consensus that human-caused increases in GHGs have and will continue to

[1] Because of the differential heat absorption potential of various GHG, GHG emissions are frequently measured in "carbon dioxide-equivalents," which present a weighted average based on each gas's heat absorption (or "global warming") potential.

contribute to global warming. Potential global warming impacts may include, but are not limited to, loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years. Secondary effects are likely to include a global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity.[2]

The California Global Warming Solutions Act of 2006 defined GHGs to include CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

CO_2 is an odorless and colorless GHG. Outdoor levels of carbon dioxide are not high enough to result in negative health effects. CO_2 is emitted from natural and manmade sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include: the burning of coal, oil, natural gas, and wood. CO_2 is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks.

Since the industrial revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution. Data from the past 50 years suggests a corollary increase in levels and concentrations. As an example, prior to the industrial revolution, CO_2 concentrations were fairly stable at 280 ppm. Today, they are around 370 ppm (or higher), an increase of more than 30 percent. Left unchecked, the concentration of CO_2 in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources.

CH_4 is an extremely effective absorber of radiation, though its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10 to 12 years), compared to other GHGs. No health effects are known to occur from exposure to CH_4. CH_4 has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropogenic sources include fossil-fuel combustion and biomass burning. CH_4 is a major constituent of landfill gas, typically about 50 percent. The additional 50 percent of landfill gas is primarily CO_2, also a GHG.

N2O, also known as laughing gas, is a colorless GHG. N2O can cause dizziness, euphoria, and sometimes slight hallucinations. In small doses, it is considered harmless. However, in some cases, heavy and extended use can cause Olney's Lesions (brain damage).

Concentrations of N_2O also began to rise at the beginning of the industrial revolution. In 1998, the global concentration was 314 parts per billion (ppb). N_2O is produced by microbial processes in soil and water, including those reactions which occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, i.e., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines

[2] Intergovernmental Panel on Climate Change, Climate Change 2014 Synthesis Report Summary for Policymakers, 2014. https://www.epa.gov/climatechange/frequently-asked-questions-about-climate-change

and in race cars. N_2O can be transported into the stratosphere, be deposited on the earth's surface, and be converted to other compounds by chemical reaction.

3.6.3 Regulatory Setting

Climate change and GHG emissions are governed by an increasingly evolving body of treaties, laws, regulations, and case law. The following are some of the key climate change regulations.

Federal Regulation and the Clean Air Act

Previously the USEPA had not regulated GHGs under the Clean Air Act because it asserted that the Act did not authorize it to issue mandatory regulations to address global climate change and that such regulation would be unwise without an unequivocally established causal link between GHGs and the increase in global surface air temperatures. In Massachusetts v. Environmental Protection Agency et al. (127 S. Ct. 1438 (2007)), however, the U.S. Supreme Court held that GHGs are pollutants under the Clean Air Act and directed the USEPA to decide whether the gases endangered public health or welfare. On December 7, 2009, the USEPA issued an Endangerment Finding under Section 202(a) of the Clean Air Act, opening the door to federal regulation of GHGs. The Endangerment Finding notes that GHGs threaten public health and welfare and are subject to regulation under the Clean Air Act. To date, the USEPA has not promulgated major regulations on GHG emissions, but it has begun to develop them.

The USEPA had also not moved aggressively to regulate GHGs because it expected Congress to make progress on GHG legislation, primarily from the standpoint of a cap-and-trade system. However, proposals circulated in both the House of Representative and Senate have been controversial and it may be some time before Congress adopts major climate change legislation. The USEPA's Endangerment Finding paves the way for federal regulation of GHGs with or without Congress. To date, Congress, under the Consolidated Appropriations Act of 2008 (HR 2764), has established mandatory GHG reporting requirements for some emitters of GHG. On September 22, 2009, the USEPA issued the Final Mandatory Reporting of Greenhouse Gases Rule. The rule requires annual reporting to the USEPA of GHG emissions from large sources and suppliers of GHGs, including facilities that emit 25,000 metric tons or more a year of CO_2e.

Executive Order S-3-05

Governor Schwarzenegger established Executive Order S-3-05 in 2005, in recognition of California's vulnerability to the effects of climate change. Executive Order S-3-05 set forth a series of target dates by which statewide GHG emissions would be progressively reduced, as follows:

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels; and
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

The executive order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. The Secretary will also submit biannual reports to the governor and California Legislature describing the progress made toward the emissions targets, the impacts of global climate change on California's resources, and mitigation and adaptation plans to combat these impacts. To comply with the executive order, the secretary of CalEPA created the California Climate Action Team, made up of members from various state agencies and

commissions. The team released its first report in March 2006. The report proposed to achieve the targets by building on the voluntary actions of California businesses, local governments, and communities and through state incentive and regulatory programs.

AB 32 (California Global Warming Solutions Act of 2006)

California passed the California Global Warming Solutions Act of 2006 (AB 32; California Health and Safety Code Division 25.5, Sections 38500 - 38599). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished by enforcing a statewide cap on GHG emissions that was phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires CARB to adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrived at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state reduces GHG emissions enough to meet the cap. AB 32 also includes guidance on instituting emissions reductions in an economically efficient manner, along with conditions to ensure that businesses and consumers are not unfairly affected by the reductions. Using these criteria to reduce statewide GHG emissions to 1990 levels by 2020 would represent an approximate 25 to 30 percent reduction in current emissions levels. However, CARB has discretionary authority to seek greater reductions in more significant and growing GHG sectors, such as transportation, as compared to other sectors that are not anticipated to significantly increase emissions. Under AB 32, CARB must adopt regulations to achieve reductions in GHG to meet the 1990 emissions cap by 2020.

The Landfill Methane Control Measure (Landfill Methane Rule or LMR) is one of the early action measures adopted by CARB to reduce GHG emissions. The rule became effective June 17, 2010 and required increased monitoring and earlier installation of LFG collection and destruction systems at landfills with the goal of reducing methane emissions.

In September of 2016, the AB 32 was extended to achieve reductions in GHG of 40 percent below 1990 levels by 2030. The new plan, outlined in SB 32, involves increasing renewable energy use, putting more electric cars on the road, improving energy efficiency, and curbing emissions from key industries.

Climate Change Scoping Plan

In October of 2013, the CARB submitted the First Update to the Climate Change Scoping Plan for public review and comment. The First Update to the Scoping Plan was approved by the CARB on May 22, 2014, and builds upon the initial Scoping Plan with new strategies and recommendations. The First Update identifies opportunities to leverage existing and new funds to further drive GHG emission reductions through strategic planning and targeted low carbon investments. The First Update defines CARB's climate change priorities for the next five years, and also sets the groundwork to reach long-term goals set forth in Executive Orders S-3-05 and B-16-2012. The Update highlights California's progress toward meeting the "near-term" 2020 GHG emission reduction goals defined in the initial Scoping Plan. It also evaluates how

to align the State's "longer-term" GHG reduction strategies with other State policy priorities for water, waste, natural resources, clean energy, transportation, and land use.

In the First Update to the Climate Change Scoping Plan, nine key focus areas were identified (energy, transportation, agriculture, water, waste management, and natural and working lands), along with short-lived climate pollutants, green buildings, and the cap-and-trade program. These key focus areas have overlapping and complementary interests that will require careful coordination in California's future climate and energy policies. These focus areas were selected to address issues that underlie multiple sectors of the economy. As such, each focus area is not contained to a single economic sector, but has far-reaching impacts within many economic sectors.

Executive Order No. B-30-15

On April 29, 2015, Executive Order No. B-30-15 was issued to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. Executive Order No. B-30-15 sets a new, interim, 2030 reduction goal intended to provide a smooth transition to the existing ultimate 2050 reduction goal set by Executive Order No. S-3-05 (signed by Governor Schwarzenegger in June 2005). It is designed so State agencies do not fall behind the pace of reductions necessary to reach the existing 2050 reduction goal. Executive Order No. B-30-15 orders "All State agencies with jurisdiction over sources of GHG emissions shall implement measures, pursuant to statutory authority, to achieve reductions of GHG emissions to meet the 2030 and 2050 targets." The Executive Order also states that "CARB shall update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of carbon dioxide equivalent." The CARB is currently moving forward with a second update to the Climate Change Scoping Plan to reflect the 2030 reduction target. The updated Scoping Plan will provide a framework for achieving the 2030 target.

Greenhouse Gas Regional Emission Estimates

Worldwide emissions of GHG in 2014 were 45.7 billion tons of CO_2e per year.[3] This value includes ongoing emissions from industrial and agricultural sources, but excludes emissions from land use changes. In 2016, the United States emitted about 6,511 million metric tons of CO_2e. Total U.S. emissions have increased by 2.4 percent from 1990 to 2016, and emissions decreased from 2015 to 2016 by 1.9 percent (126.8 million metric tons of CO_2e). The decrease in total GHG emissions between 2015 and 2016 was driven in large part by a decrease in CO_2 emissions from fossil fuel combustion. The decrease in CO_2 emissions from fossil fuel combustion was a result of multiple factors, including substitution from coal to natural gas and other non-fossil energy sources in the electric power sector; and warmer winter conditions in 2016 resulting in a decreased demand for heating fuel in the residential and commercial sectors. Of the five major sectors nationwide — residential and commercial, industrial, agriculture, transportation, and electricity— electricity accounts for the highest fraction of GHG emissions (approximately 28 percent), closely followed by transportation (approximately 28 percent) and by industry (approximately 22 percent).[4]

In 2016, California emitted approximately 429.4 million tons of CO_2e. This represents approximately 6.6 percent of total U.S. emissions. This large number is due primarily to the sheer size of California compared to other states. California's gross emissions of GHGs decreased by 9.26 percent from 466.3 million metric

[3] Climate Analysis Indicator Tool, https://www.wri.org/our-work/project/cait-climate-data-explorer
[4] United States Environmental Protections Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016*, April 2018, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016

tons of CO_2e in 2000, with a maximum of 492.7 million metric tons in 2004.[5]

In 2016, the composition of GHG emissions in California (expressed as CO_2e) were as follows:

- CO_2 accounted for 83 percent;
- CH_4 accounted for 9 percent;
- N_2O accounted for 3 percent; and
- Fluorinated gases (hydrofluorocarbons (HFCs), perfluorinated compounds (PFCs), and sulfur hexafluoride (SF_6)) accounted for 5 percent.

Of these gases, the transportation sector is the source of approximately 41 percent of the State's GHG emissions, followed by industrial sources at 23 percent and electricity generation (both in-State and out-of-State) at 16 percent. Agriculture is the source of approximately 8 percent, and residential activity is the source of about 7 percent, followed by commercial activities at 5 percent. The recycling and waste sector accounted for approximately 2 percent of the State's emissions.[6]

The baseline 2005 GHG inventory for the community of Ukiah totals 155,480 metric tons of CO_2e. In 2005, On-road Transportation accounted for of the largest portion of overall community-wide emissions, constituting 47.9 percent of total emissions. Contributions from other sectors, in order of magnitude, include: Ukiah Landfill (23.8 percent), Residential Energy (electricity and natural gas, 10.4 percent), Commercial/Industrial Energy (electricity and natural gas, 9.0 percent), Solid Waste Generation (3.0 percent), Agriculture (2.8 percent), Off-road Transportation (2.7 percent), Wastewater Treatment (0.2 percent), Water Conveyance Electricity (0.1 percent), and Stationary Sources (<0.1 percent).[7]

Between 2005 and 2010 the community-wide emissions decreased by approximately 7 percent to 144,625 metric tons of CO_2e. The 44 percent reduction in emissions from Solid Waste Generation is due to a large increase in waste diversion between 2005 and 2010 (i.e., increased recycling). The decrease at the Ukiah Landfill is due to the natural attenuation of CH_4 emissions as the waste in place decomposes and releases less LFG over time. Electricity-related reductions (Residential, Commercial, and Water Conveyance) can be attributed to lower power consumption resulting from the economic downturn, and an increase in the amount of low-carbon renewable energy sources in the City's electricity portfolio from 2005 to 2010. Overall, the percent that each sector contributed to total emissions did not change significantly between 2005 and 2010, with On-road Transportation continuing to comprise the largest sector (51.1 percent), followed by the Ukiah Landfill (21.1 percent), and Residential Energy (electricity and natural gas, 11.2 percent).[8]

City of Ukiah Climate Action Plan

The following goals and strategies of the *City of Ukiah Climate Action Plan* (March 12, 2014 Final Draft)[9] relate to the Proposed Project (although as of June 2019, the Climate Action Plan has not been adopted by

[5] California Air Resources Board, *Emissions Trends Report 2000-2016*, July 11, 2018, https://www.arb.ca.gov/cc/inventory/pubs/reports/2000_2016/ghg_inventory_trends_00-16.pdf
[6] Ibid.
[7] City of Ukiah Climate Action Plan, March 12, 2014, http://www.cityofukiah.com/NewWeb/wp-content/uploads/2013/05/Final-Draft-Climate-Action-Plan.pdf
[8] Ibid.
[9] Ibid.

the City):

- Goal SW.2: Reduce Release of Landfill Methane
- Strategy SW.2.1: Explore Potential of Flaring Landfill Gas

Mendocino County General Plan

The following policies of the *Mendocino County General Plan* (Adopted 2009)[10] relate to the Proposed Project:

- Policy RM-50: Mendocino County acknowledges the real challenge of climate change and will implement existing strategies to reduce greenhouse gas emissions and incorporate future measures that the State adopts in the coming years.
    - Action Item RM-50.1: Inventory existing and historical sources of greenhouse gas emissions in Mendocino County. Coordinate those efforts with other jurisdictions to ensure completeness and avoid unnecessary duplication.
    - Action Item RM-50.2: Create a greenhouse gas reduction plan for the unincorporated areas of the county that sets specific reduction strategies and targets to meet.
    - Action Item RM-50.3: Reduce Mendocino County's greenhouse gas emissions by adopting measures that reduce the consumption of fossil fuel energy resources.

3.6.4 Impact Analysis

3.6.4.1 Significance Criteria

Significance thresholds are used to determine whether impacts associated with a project are significant. Appendix G of the State CEQA Guidelines (14 CCR 15000) lists the following criteria for determining significance of air quality impacts from a project:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

In June 2010, the MCAQMD adopted the BAAQMD thresholds of significance in the MCAQMD's *Adopted Air Quality CEQA Thresholds of Significance – June 2, 2010.*[11] Specifically, Proposed Project GHG emissions would be considered potentially significant if they exceed the following:

Construction GHG Emissions – 1,100 metric tons of CO_2e per year (The MCAQMD nor the BAAQMD have an adopted threshold of significance for construction-related emissions, therefore, this analysis uses the adopted operational-related significance threshold).

- Operational GHG Emissions – 10,000 metric tons of CO_2e per year (stationary sources).

[10] Mendocino County General Plan, 2009. https://www.mendocinocounty.org/government/planning-building-services/plans/mendocino-county-general-plan
[11] Mendocino County Air Quality Management District, Adopted Air Quality CEQA Thresholds of Significance – June 2, 2010. http://www.co.mendocino.ca.us/aqmd/pdf_files/MCAQMDCEQARecomendations.pdf

3.6.4.2 Approach to Analysis

The Proposed Project's construction-related (temporary, short-term) and operation-related (long-term) GHG emissions and whether they would result in a cumulatively considerable contribution to global climate change are described below.

Pursuant to CEQA Guidelines Section 15064.7(c), this EIR employs both quantitative and qualitative thresholds of significance. The quantitative threshold is used to answer the first question of the OPR revisions to the CEQA Guidelines identified above (i.e., will the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment). For purposes of this EIR, the threshold is based upon BAAQMD's CEQA Air Quality Guidelines (adopted by the MCAQMD).

With respect to construction-related GHG impacts, BAAQMD does not have an adopted threshold of significance for construction-related GHG emissions. However, as recommended in BAAQMD's CEQA Air Quality Guidelines, this EIR has quantified and disclosed GHG emissions that would occur during construction. This EIR makes a determination on the significance of these construction-generated GHG emission impacts by comparing them to the BAAQMD adopted operational-related significance threshold of 1,100 metric tons of CO_2e per year.

With respect to operational-related GHG impacts, in accordance with the BAAQMD CEQA Air Quality Guidelines, this Proposed Project would be considered to have a significant impact if the project would emit GHG greater than 10,000 metric tons per year CO_2e from its permitted stationary sources (flare). The Proposed Project is closing the landfill to control methane emissions (LFG is currently being vented to the atmosphere) and the Proposed Project would be expected to be beneficial in reducing GHG emissions.

The qualitative threshold is used to answer the second of the OPR revisions to the CEQA Guidelines identified above (i.e., will the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG). Ukiah has not adopted its own GHG reduction plan. However, if a project implements reduction strategies identified in AB 32, the Governor's Executive Order S-3-05, or other strategies to help reduce GHG to the level proposed by the governor, it could reasonably follow that the project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG. That said, BAAQMD's approach to developing a threshold of significance for GHG emissions is to identify the emissions level for which a project would not be expected to substantially conflict with existing California legislation adopted to reduce statewide GHG emissions needed to move us towards climate stabilization. Consequently, the quantifiable threshold (in this case, 10,000 metric tons CO_2e per year for operations) was formulated based on AB 32 reduction strategies. For this reason, if a project exceeds the quantifiable threshold after mitigation, then for purposes of this EIR, the project is assumed to conflict with the second criteria of the OPR revisions; that is, the project is considered to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

In summary, two criteria are used in this analysis to determine significance: the significance thresholds recommended by BAAQMD (adopted by MCAQMD) requiring construction to generate less than 1,100 metric tons of CO_2e per year and operation of permitted stationary sources to generate less than 10,000 metric tons of CO_2e per year, and a determination of whether the project promotes attainment of California's goals of reducing GHG emissions as stated in applicable plans, policies or regulations, including AB 32.

The analysis presented within this section is based on both qualitative and quantitative approaches for determining GHG emissions impacts associated with construction and operation of the Proposed Project. Regulatory models used to estimate GHG emissions impacts include:

- California Emissions Estimator Model (CalEEMod) Version 2016.3.2[12]. CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions. The model was developed for the California Air Pollution Officers Association (CAPCOA) in collaboration with the California Air Districts. Default data (e.g., emission factors, trip lengths, meteorology, source inventory, etc.) have been provided by the various California Air Districts to account for local requirements and conditions.
- California Air Resources Board (CARB) EMFAC2014[13] emissions inventory model. EMFAC2014 is the latest emission inventory model that calculates emission inventories and emission rates for motor vehicles operating on roads in California. This model reflects CARB's current understanding of how vehicles travel and how much they emit. EMFAC2014 can be used to show how California motor vehicle emissions have changed over time and are projected to change in the future.
- CARB OFFROAD[14] emissions inventory model. OFFROAD is the latest emission inventory model that calculates emission inventories and emission rates for off-road equipment such as loaders, excavators, and off-road haul trucks operating in California. This model reflects CARB's current understanding of how equipment operates and how much they emit. OFFROAD can be used to show how California off-road equipment emissions have changed over time and are projected to change in the future.
- AP-42, Compilation of Air Pollutant Emission Factors, has been published since 1972 as the primary compilation of USEPA's emission factor information. It contains emission factors and process information for more than 200 air pollution source categories. A source category is a specific industry sector or group of similar emitting sources. The emission factors have been developed and compiled from source test data, material balance studies, and engineering estimates. AP-42 contains emission factors flare activities within Section 13.5[15]

3.6.4.3 Impacts and Mitigation measures

Impact 3.6-1: Would Implementation of the Proposed Project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

Construction-related emissions arise from a variety of activities including (1) grading, excavation, and other earth moving activities; (2) travel by construction equipment and worker vehicles, especially on unpaved surfaces; and (3) exhaust from construction equipment. Construction of the Proposed Project would temporarily generate ROG, NO_X, PM10 and PM2.5 emissions. The Proposed Project would require the importation of materials for the final cover and related infrastructure, which would result in approximately

[12] California Air Pollution Control Officers Association, *California Emissions Estimator Model User's Guide*, November 2017, http://www.caleemod.com/
[13] California Air Resources Board, *EMFAC2014 User's Guide*, April 30, 2014, http://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol1-users-guide-052015.pdf
[14] California Air Resources Board, *OFFROAD Instructions*, http://www.arb.ca.gov/msprog/ordiesel/info_1085/oei_write_up.pdf
[15] United States Environmental Protection Agency, *AP-42 Compilation of Air Emission Factors Section 13.5 Industrial Flares*, December 2016, https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_12-13-16.pdf

723 haul truck round trips (1,446 haul truck one way trips). Soil material required for construction of the foundation layer of the final cover would be obtained from the borrow area on the project site, the same borrow area used during prior landfill operations. Construction of the Proposed Project is anticipated to begin in 2020 and would consist of eight construction phases: demolition, site preparation, grading/excavation, well drilling, final cover, utilities, LFG flare station, and roads. The construction would be completed over approximately six months.

Table 3.6-1 shows the GHG emissions generated from Proposed Project construction and compares them to the applicable significance threshold. As shown in Table 3.6-1, construction emissions would be below the applicable significance threshold. Appendix D provides details on the GHG emissions calculations.

Table 3.6-1
Estimated Greenhouse Gas Emissions From Construction

Condition	Metric Tons of CO_2e
2020 Construction	221
Significance Threshold	1,100
Significant (Yes or No)?	No
Source: CalEEMod Version 2016.3.2	

Operation of the Proposed Project would consist of a totally-enclosed vertical ground flare (flare station) utilized for the thermal destruction of collected LFG. The landfill is currently equipped with a partial perimeter gas collection system consisting of 17 vertical extraction wells connected to a header pipe that leads to a vacuum blower. The vacuum blower creates a vacuum in the header pipe that draws the LFG from the soil through the extraction wells and subsequently to the blower. Discharge from the current system is vented directly to the atmosphere via a 4-foot tall, 4-inch diameter stack. It should be noted that once the flare station is installed and operational, the need to operate the existing partial perimeter gas collection system may no longer be necessary and would either be abandoned or maintained for emergency use only.

Table 3.6-2 shows estimated annual operational GHG emissions from the proposed flare station and compares them to the applicable MCAQMD significance threshold. As shown in Table 3.6-2, the proposed flare station would emit approximately 3,435 metric tons of CO_2e, well below the stationary source significance threshold of 10,000 metric tons of CO_2e per year. Appendix D provides details on the GHG emission calculations.

Table 3.6-2
Estimated Greenhouse Gas Emissions From Operations

Condition	Metric Tons of CO_2e
Flare Station	3,435
Significance Threshold	10,000
Significant (Yes or No)?	No
Source: CalEEMod Version 2016.3.2	

Furthermore, while the proposed flare would emit GHG emissions, it is important to note that the Proposed Project would result in an overall reduction in GHG emissions emitted by the landfill. As noted previously, the landfill is currently equipped with a partial perimeter gas collection system that vents LFG (primarily methane) to the atmosphere. The proposed flare would destroy methane sent to the flare at a 99 percent

destruction efficiency, producing CO_2 and water vapor.[16] Methane has a global warming potential 21 to 28 times that of CO_2 (Releasing one metric ton of methane is equivalent to releasing 21 to 28 metric tons of CO_2).[17] Thus, destroying methane in the proposed flare would create a significant GHG emissions reduction. Therefore, the Proposed Project would have a less-than-significant impact and no mitigation measures are required.

Significance Determination: Less-Than-Significant.

Impact 3.6-2: Would the Proposed Project conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG?

The City of Ukiah developed a Draft Climate Action Plan regarding the reduction of GHG emissions, but the Climate Action Plan was never adopted.[18] The Proposed Project would help the City achieve their proposed Goal SW.2: Reduce Release of Landfill Methane and implement their proposed Strategy SW.2.1: Explore Potential of Flaring Landfill Gas in the Draft Climate Action Plan. Although the Draft Climate Action Plan was never adopted, the aforementioned goal and strategy was included because they would lead to a significant reduction in the City of Ukiah's GHG emissions.

The principal State plan and policy adopted for the purpose of reducing GHG emissions is AB 32. The quantitative goal of AB 32 is to reduce GHG emissions to 1990 levels by 2020. Statewide plans and regulations such as GHG emissions standards for vehicles and the low carbon fuel standard are being implemented at the statewide level, and compliance at the specific plan or project level is not addressed. The assumption is that AB 32 and other statewide regulations will be successful in reducing the cumulative GHG emissions statewide by 2020 and beyond. The State has taken these measures, because no project individually could have a major impact (either positively or negatively) on the global concentration of GHGs. Therefore, the Proposed Project would result in a significant impact if it would be in conflict with AB 32 State goals.

The Proposed Project has been reviewed relative to the AB 32 measures and it has been determined that the proposed project would not conflict with the goals of AB 32. The Proposed Project would put the landfill in compliance with the Landfill Methane Control Measure (Landfill Methane Rule), which is one of the early actions measures adopted by CARB to reduce GHG emissions. The Landfill Methane Rule requires LFG collection and destruction systems at landfills with the goal of reducing methane emissions. Furthermore, as noted earlier, the Proposed Project would result in an overall reduction in GHG emissions emitted by the landfill by flaring methane emissions that are currently vented to the atmosphere. Therefore, the Proposed Project would result in a less-than-significant impact and no mitigation measures are required.

Significance Determination: Less-Than-Significant.

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[16] In California, flares are required to have minimum methane destruction efficiencies of 99% (CCR, Article 4, Subarticle 6, Section 95464(b)(2)(A)(1)).
[17] IPCC, Global Warming Potential Values, https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf
[18] City of Ukiah Climate Action Plan, March 12, 2014, http://www.cityofukiah.com/NewWeb/wp-content/uploads/2013/05/Final-Draft-Climate-Action-Plan.pdf

3.6.5 Cumulative Effects

There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative greenhouse gas impacts.

3.6.6 References

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California Air Resources Board, *OFFROAD Instructions*, http://www.arb.ca.gov/msprog/ordiesel/info_1085/oei_write_up.pdf

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United States Environmental Protections Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016*, April 2018, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016

United States Environmental Protection Agency, *AP-42 Compilation of Air Emission Factors Section 13.5 Industrial Flares*, December 2016, https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_12-13-16.pdf

3.7 Hydrology and Water Quality

This section describes the existing conditions relating to surface and groundwater hydrology and water quality in the Project area, presents laws and regulatory requirements relating to hydrology and water quality applicable to the Proposed Project, and presents an assessment of the potential water resources related impacts from Project implementation.

3.7.1 Introduction

The physical setting and existing conditions relevant to the Project provide the basis for the impact analyses, which include assessment of whether the Project would violate water quality standards or waste discharge requirements, alter the existing drainage pattern of the site or area, contribute to or create runoff that would result in erosion or hydromodification, degrade water quality, or expose people or structures to significant risk due to flooding or inundation.

3.7.2 Environmental Setting

A discussion of the environmental setting is discussed below.

3.7.2.1 Regional Hydrology

The Project area is located in the Russian River watershed which encompasses 1,485 square miles in Mendocino and Sonoma counties (RWQCB, 2019). The mainstem of the Russian River is approximately 110 miles long and flows southward from Redwood and Potter valleys (north of Ukiah) to its confluence with Mark West Creek, where it turns west to cut through the coast range and meet the Pacific Ocean at Jenner. The principal tributaries from the headwaters downstream are the East Fork Russian River, Feliz, Pieta, Big Sulfur, Dry, Mark West, Green Valley, and Austin creeks. The summer climate is moist and cool near the coast with temperatures increasing in the upper valley areas that are more isolated from the coastal influence. The majority of flow in the Russian River and its tributaries occurs during the winter season, when average rainfall ranges from 30-80 inches, depending on locale (RWQCB, 2019).

The Russian River is a major source of water for regional supply and distribution (City of Ukiah, 2004). The Russian River is also a major flood control channel. Two reservoirs provide flood protection and water supply storage within the watershed: 1) Coyote Dam and Lake Mendocino on the East Fork Russian River near Ukiah, and 2) Warm Springs Dam and Lake Sonoma on Dry Creek west of Healdsburg. The river traverses the entire length of the Ukiah Valley groundwater basin (discussed below) and is a major source of recharge for the underlying aquifer (City of Ukiah, 2004).

3.7.2.2 Project Site Hydrology

The Project Site (landfill) is approximately three miles east of Ukiah in Mendocino County, California. The landfill occupies approximately 40 acres of permitted landfill area on a 284-acre parcel. The landfill area has a maximum width of approximately 1,000-feet in the north-south

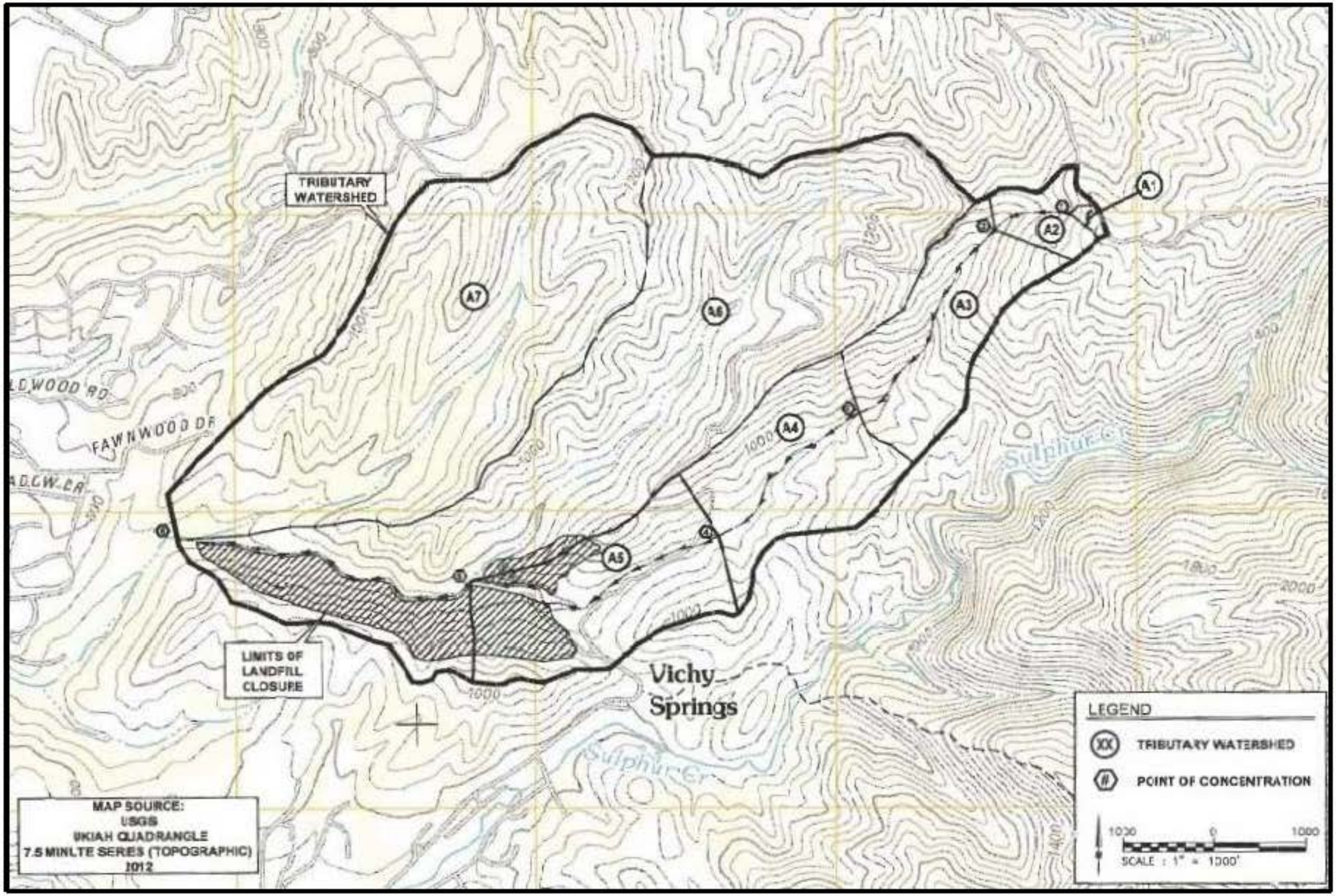
direction and a maximum length of about 3,500-feet in the east-west direction. The site is located on a topographic saddle[1], with Sulphur Creek located off-site to the south, and an unnamed ephemeral creek, tributary to the Russian River, located on-site along the northern boundary of the landfill (**See Figure 3.7-1**) and approximately 1.4-miles east of the Russian River main stem. Existing ground surface elevations at the landfill range from approximately 710-feet above mean sea level (MSL) near the western edge, to about 970-feet MSL along the southeast edge of the property. Land adjacent to the landfill is zoned primarily as rangeland and is used for grazing. The site receives approximately 35-inches of precipitation per year (RWQCB, 2002a).

The Ukiah Landfill ceased operations in September 2001 (RWQCB, 2002a). Waste disposal operations at the landfill began in 1955 at the eastern end of the landfill footprint and progressed upslope and westward. The landfill operated as a nonhazardous Class III solid waste disposal site servicing Ukiah and the surrounding area and employed a fill and cover approach in a canyon/gully terrain. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, thus the northern edge of the landfill overlies portions of the original streambed. As part of the realignment, a soil berm was constructed along the toe of the slope to separate the waste from the realigned creek channel (City of Ukiah, 2019). The landfill surface is covered with a combination of native and non-native grasses (Wildlife Research Associates, 2015) and slopes range from approximately 2:1 to 3:1 (horizontal to vertical) (City of Ukiah, 2019).

The landfill site drains to the unnamed ephemeral creek along the northern property boundary, which leaves the site below the landfill toe at the north-eastern edge of the site adjacent to the former leachate pond and sediment pond (**See Figure 3.7-1**). The existing landfill cover has been graded to form a series of terraces stepping down from south to north. Storm water run-on and run-off from the site is controlled in a series of perimeter drainage ditches, stormdrain pipes, down chutes and sedimentation ponds located throughout the facility. The stormwater conveyance system routes off-site stormwater around the site and collects surface runoff from on-site (i.e. the landfill cover and additional slopes) for discharge to the unnamed ephemeral creek (RWQCB, 2002a). A perimeter ditch exists along the head of the landfill to divert water from running onto the site that is then directed around the existing landfill site. Existing drainage ditches have been in place for many years and have been constructed as the landfill filling operation proceeded. Benches and culverts direct stormwater runoff from slopes and drainage ditches to interior drains and then finally to outfalls located at the toe of the landfill slope that drain to the unnamed tributary.

There are 11 existing stormwater outfalls that discharge stormwater runoff from the landfill stormwater system to the unnamed ephemeral creek. The outfalls are generally located above and outside of the bed of the ephemeral creek, are of poor design (EBA, 2015), and have no energy dissipation devices or other features to control or dissipate the energy of stormwater discharges. Due to the location of the existing stormwater outlets, stormwater discharges "shotgun" into the ephemeral creek channel from 5- to 6-feet above the channel bottom (EBA, 2015). As a result,

[1] A low point on a ridge between two peaks.



Source: EBA

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Figure 3.7-1
Overall Hydrology Map

the existing discharges are causing erosion and sedimentation within the ephemeral creek and downstream, and localized channel incision has occurred.

Three sedimentation ponds are located on the landfill site (**Figure 3.7-1**). The purpose of the sedimentation basins is to retain runoff, allowing for settling of sediments, evaporation, the retention of stormwater and management of peak stormwater discharges into the ephemeral creek. The central northernmost pond has been at the landfill for several decades and was constructed to capture sediment from the borrow pit located on the upland area on the eastern side of the basin (City of Ukiah, 2012). The sediment pond at the western edge of the landfill (adjacent to the leachate management facility) has a riser outlet structure for managing detention volumes and discharges and is coupled with an additional overflow pipe in the embankment which ensures overfilling (and thus overtopping the pond) does not occur. The riser outlet structure is currently not functioning, and the pond fills up to maximum retention capacity, then spills unmanaged through the overflow pipe in the embankment to the ephemeral creek (EBA, 2016).

Leachate is formed when rainwater infiltrates the existing vegetated soil cover and percolates through the degrading waste. Landfill leachate, especially from mature and stabilized landfills, contains high concentrations of organic and inorganic pollutants that would cause severe water quality impacts (such as toxicity and eutrophication) to receiving waters if discharged (Science Direct, 2019). As described in detail in Section 2.2.1, leachate from the landfill is collected and treated via a leachate control system that captures leachate and conveys it to leachate management facilities located at the western toe of the landfill for storage and conveyance to the municipal sewer system. Additionally, runoff from any surface seep occurring along the landfill slope faces is collected and managed as leachate (City of Ukiah, 2019).

3.7.2.3 Surface Water Quality

The quality of surface water is primarily a function of land uses in the project area. Local land uses influence the quality of the surface water through point source discharges (i.e., discrete discharges from discharge pipes) and nonpoint source discharges (e.g., direct storm runoff from slopes). Surface water runoff is generated by precipitation that cannot be absorbed into the ground in the period following a storm. Pollutants and sediments are transported in watersheds by stormwater runoff that reaches streams, rivers, and storm drains. As described above, stormwater runoff from the landfill slopes and drainage ditches is conveyed into the landfill stormwater system and is subsequently discharged into the ephemeral creek, and ultimately flows to the Russian River. The amount of surface water runoff is a factor of precipitation, ground saturation, and available permeable or pervious ground surfaces. Permeability is a measure of how quickly water can penetrate a surface area.

In accordance with Section 303(d), the North Coast Regional Water Quality Control Board (RWQCB) has identified impaired water bodies within its jurisdiction, including the Project area, and the pollutant or stressor responsible for impairing the water quality and defined beneficial uses (discussed further in Section 3.7.3). The Russian River and its tributaries in the Project area

are listed as impaired for sedimentation/siltation and temperature. As described above, the existing landfill cover and stormwater outfall structures discharging to the ephemeral creek are a potential source of sediment as a result of erosion on the landfill slopes and within the ephemeral creek channel. Sources listed for the impairment are as follows (RWQCB, 2019):

- **Sedimentation/ Siltation:** Agriculture, Silviculture, Construction/Land Development, Resource Extraction, Habitat Modification, Removal of Riparian Vegetation, Streambank Modification/ Destabilization, Drainage/Filling of Wetlands, Channel Erosion, Erosion/Siltation, Highway Maintenance and Runoff, and Natural Resources
- **Temperature:** Hydromodification, Upstream Impoundment, Flow Regulation/Modification, Habitat Modification, Removal of Riparian Vegetation, Streambank Modification/Destabilization, and Nonpoint Source.

Consistent with the landfill's Waste Discharge Requirements (WDRs; see Section 7.3.3), a Monitoring and Reporting Program (MRP) was implemented in 2002 (RWQCB, 2002b) and is ongoing. Under the MRP, leachate, groundwater, and surface water monitoring activities are conducted quarterly to monitor potential landfill impacts on surface water and groundwater quality and to inform the implementation of additional monitoring or corrective actions, as necessary. The following provides a summary of the leachate and surface water monitoring and reporting program, parameters and constituents monitored, and historic water quality trends (see below for discussion of groundwater monitoring and existing groundwater quality).

Leachate is sampled via the leachate wet well associated with the Leachate Collection and Removal System (LCRS). Additionally, under the MRP, if leachate is observed to surface and be discharged to surface waters, immediate sampling is conducted. As discussed above, runoff from surface seeps occurring along the landfill slopes is collected and managed as leachate to maximize protection to local water quality. The following provides a summary of the constituents and parameters monitored as part of leachate monitoring as well as the associated monitoring and reporting frequencies:

- **Field Parameters (Quarterly):** Specific Conductance, pH, Turbidity and Temperature.
- **Quarterly Monitoring Parameters (Quarterly):** Total Dissolved Solids (TDS), Chloride, Nitrate-Nitrogen, Total Ammonia, Sulfate, Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Magnesium, Sodium, Calcium, Potassium, Manganese, Boron, Carbonate, Bicarbonate, Total Alkalinity, Volatile Organic Compounds (EPA Method 8260B with Methyl tert-Butyl Ether [MtBE]) and Total Purgeable/Extractable Petroleum Hydrocarbons.
- **Constituents of Concern (Annual):** Appendix II Metals (Dissolved) and Extractable Oil and Grease.
- **Constituents of Concern (Every Five Years):** Semi-Volatile Organic Compounds, Organochlorine Pesticides, Polychlorinated Biphenyls (PCBs), Organophosphorus Compounds, Chlorophenoxy Herbicides.

Surface water monitoring is conducted within the ephemeral creek with sample stations established upstream and downstream of the landfill site. Surface water samples are collected after the first storm event of the rainy season that produces significant flow and quarterly thereafter when water is present in the ephemeral creek. The following provides a summary of the constituents and parameters monitored as part of surface water monitoring as well as the associated monitoring and reporting frequencies:

- **Field Parameters (Quarterly):** Specific Conductance, pH, Turbidity, Dissolved Oxygen, and Temperature.
- **Quarterly Monitoring Parameters (Quarterly):** Total Suspended Solids (TSS), Total Settleable Solids, Total Dissolved Solids (TDS), Turbidity, Chloride, Total Nitrogen, Total Ammonia, Unionized Ammonia, Sulfate, Chemical Oxygen Demand (COD).
- **Constituents of Concern (Annual):** Appendix II Metals (Dissolved) and Extractable Oil and Grease.
- **Constituents of Concern (Every Five Years):** Semi-Volatile Organic Compounds, Organochlorine Pesticides, Polychlorinated Biphenyls (PCBs), Organophosphorus Compounds, Chlorophenoxy Herbicides.

The Landfill MRP (RWQCB, 2002b) specifies Water Quality Protection Standards (WQPS) for all monitored parameters and constituents outlined above. If a WQPS is exceeded (i.e., a release is discovered), the impacted monitoring point becomes subject to a Corrective Action Monitoring Program (CAMP) and the landfill begins a Compliance Period determined by the RWQCB. If corrective actions do not achieve compliance with the WQPS by the scheduled end of the Compliance Period, the Compliance Period is automatically extended until the landfill has been in continuous compliance for at least three consecutive years. Upon confirmation that levels in a previously impacted monitoring point have been reduced below concentration limits specified in the WQPS, and following RWQCB approval, standard monitoring under the MRP is resumed.

Based on analysis of the MRP monitoring results and comparison to historical conditions and trends, no appreciable changes in surface water quality has occurred in the ephemeral creek over time as a result of landfill operations (EBA, 2019a). Although concentration spikes have occurred on occasion over the course of the monitoring program for various parameters (such as turbidity), such spikes have been limited to one or several parameters during individual events and concentrations have typically declined to within the historical ranges the following quarter. To date, based on quarterly and annual reporting under the MRP, no exceedances of the WQPS associated with surface water quality have occurred, and no CAMP or other evaluation monitoring has been required by the RWQCB (EBA, 2019b).

3.7.2.4 Groundwater

Within the Russian River hydrologic unit, the Project site is underlain by the Ukiah Valley Groundwater Basin, which is the northernmost basin in the Russian River water system. The 22-mile long, 3-mile wide groundwater basin underlies an area of approximately 60 square miles. Groundwater-bearing units of primary importance within the Ukiah Valley Groundwater Basin include recent

(Holocene) alluvium, as well as the older (Plio-Pleistocene) Continental Basin Deposits. Underlying these deposits is fractured basement rock of the Franciscan Complex. Even when highly fractured, these formations have limited permeability and are considered to yield only small quantities of water locally. Alluvium within the basin is considered a principal source of groundwater and consists of unconsolidated gravel, sand, silt, and minor amounts of clay deposited in channels and on floodplains of the Russian River watershed and as colluvium on alluvial fan slopes. Based on hydrographs from wells monitored by the California Department of Water Resources (DWR), groundwater levels in the past 30 years have remained relatively stable. The groundwater basin surface elevation varies from approximately 1,000-feet in the upper portions of the Redwood Valley, to approximately 500-feet in the lower, southern areas of the Ukiah Valley. In the Holocene alluvium, groundwater depths vary from 15-feet to over 600-feet below ground surface (bgs)[2] (DWR, 2004).

Bedrock of the Franciscan Complex underlies the majority of the Mayacamas Mountains east of the Maacama fault. The Franciscan bedrock outcrops in the Sulphur Creek drainage to the south-southeast of the landfill site, near the Vichy Springs Resort. The tectonic mélange that makes up the Franciscan Complex in this area contains a mixture of sandstone and altered volcanic rocks within a fractured shale matrix and has undergone intensive, complex structural deformation for millions of years. Water often percolates into large upland areas underlain by the Franciscan Complex bedrock and later discharges from springs and/or provides base flow for tributaries to the Russian River (EBA, 1994). Discharge of thermal water, such as Vichy Springs, is also quite common throughout the area. Historical records indicate that groundwater yield to wells within Franciscan bedrock is generally unpredictable and typically volumetrically insignificant (Cardwell, 1965; Farrar 1986, *in* EBE, 1994). Vichy Springs flows from fractured Franciscan Complex bedrock along the southern edge of the Sulphur Creek drainage basin.

The Landfill site is situated on younger Holocene alluvial deposits that overlie the Continental Basin Deposits. Lithologic logs show that the Holocene deposits consist of medium dense mixtures of clayey silt, sand, and gravel that extend to the maximum depth explored of 35-feet bgs. The Continental Basin Deposits consist of poorly sorted conglomerates, sands and clays, which unconformably overlie an irregular surface of Franciscan bedrock. The maximum thickness of these deposits are estimated to be more than 2,000-feet (Cardwell *in* EBE, 1994). The lowermost contact of the Continental Basin Deposits overlying the Franciscan bedrock has not been encountered in any of the test borings or monitoring wells drilled at the site to date including the abandoned well, TB-90-4, which reached the depth of 265-feet below the surface (EBA, 1994).

Lithologic boring logs of monitoring wells 90-8 and 92-4 indicate they are drilled through a continuous section of Continental Basin Deposits consisting of low permeability silty clays and clayey silts (City of Ukiah, 2019). If encountered, groundwater was typically present in the silty and sandy gravels lenses of the Continental Basin Deposits and in the Holocene alluvial layers. No perched groundwater, aquitards or Franciscan Complex bedrock were encountered while drilling the wells at the Landfill (EBA, 1994). This suggests that the monitoring wells are

[2] Groundwater levels in domestic wells (15- 600-feet) and municipal/ irrigation wells (36-115-feet).

completed in a distinctive and separate geologic formation, consisting of significantly different hydrogeologic properties from the Franciscan Complex bedrock.

Groundwater Elevation and Flow

Groundwater elevation data collected on October 22, 2018 was used to determine the groundwater depth, flow direction and the gradient within the respective water-bearing zones. Groundwater elevations within the Holocene alluvial deposits ranged from approximately 665 to 699-feet MSL and 674 to 758-feet MSL in the Continental Basin Deposits. Since the Holocene alluvial deposits are confined to the unnamed ephemeral creek's depositional channel, the direction of groundwater flow within these deposits generally coincides with the axis of the creek. This translates to an overall westerly groundwater flow component with a hydraulic gradient of approximately 0.03 feet/foot. Groundwater flow conditions within the Continental Basin Deposits exhibit a northwesterly groundwater flow south of the creek (i.e., beneath the Landfill), and a south-southwesterly groundwater flow component north of the creek. These two components join near the creek, and result in a westerly flow direction down the axis of the canyon. These potentiometric surface conditions generally mimic the topography, which is common in mountainous terrain. The hydraulic gradients along the flanks of the creek range from approximately 0.08-feet/foot on the north flank to approximately 0.04 to 0.07-feet/foot on the south flank, whereas the gradient along the axis of the creek is approximately 0.02-feet/foot (City of Ukiah, 2016).

Groundwater Quality

Over a 9-year period from 1987 through 1996, several detection and corrective action monitoring wells were installed in the Continental Basin Deposits and Holocene alluvial deposits.[3] The groundwater monitoring wells were installed to characterize groundwater impacts at the site and to upgrade the Landfill's detection monitoring network (EBA, 2019a). A release of waste constituents from the landfill to groundwater was discovered in 1989 and since then, volatile organic compounds (VOCs) and petroleum hydrocarbons have continually been detected in groundwater at the northern toe of the landfill footprint.

As discussed above, consistent with the Landfill's WDR's a Monitoring and Reporting Program (MRP), also referred to the Detection Monitoring Program (DMP), is currently implemented at the Landfill in accordance with 27 CCR, §20420 and Waste Discharge Requirements Order No. R1-2002-0061, issued by the North Coast Regional Water Quality Control Board. This program is in effect currently and is anticipated to continue, with certain adjustments (discussed below) through the post closure maintenance period. Regarding groundwater, the scope of the DMP includes the following monitoring and sampling activities:

- Quarterly monitoring and recording groundwater elevations and groundwater flow directions.

[3] Groundwater monitoring well 87-1 was installed in 1987 and was subsequently used as part of the Water Quality Solid Waste Assessment Test (SWAT) conducted at the Landfill during the late 1980's.

- Quarterly sampling and analysis of groundwater samples from detection monitoring wells and points of compliance monitoring wells.

- Performance of quarterly statistical analyses of groundwater chemistry data to identify exceedances of applicable concentration limits.

Results and findings from the MRP are presented in the Annual Detection Monitoring Report and are then submitted to the RWQCB on a quarterly basis. Standard quarterly report submittals include a presentation of the sampling and monitoring procedures (including Standard Operating Procedures), tabulated summaries of groundwater, and laboratory data, statistical analysis results and supporting calculations, groundwater potentiometric surface map, results of standard observations, and copies of Certified Analytical Reports (CARs) and associated chain-of-custody documentation. Annual reports are also prepared that include graphical summaries of monitoring data, an evaluation of the findings (City of Ukiah, 2016).

The existing groundwater monitoring network at the Landfill site consists of 18 monitoring wells located primarily along its northern and western margins. In accordance with the criteria specified in Section D(3)(b) of M&RP R1-2002-0061, the individual groundwater monitoring wells have the following use designations shown in **Table 3.7-1**. Groundwater monitoring wells 87-1, 90-1, 90-3, 90-4, 92-1 and 94-1 were completed within the Holocene alluvial deposits and range in depth from approximately 12 to 35-feet bgs. The remaining groundwater monitoring wells are completed in the Continental Basin Deposits and range in depth from approximately 23 to 160-feet bgs.

Table 3.7-1
Monitoring Well type and Designation

Type of Monitoring Well	Well Designation
Detection Monitoring Wells	87-1, 90-1, 90-2, 90-5, 90-6, 90-7, 90-8, 92-2, 92-3, 94-1, 94-2, 96-1, 96-2 and 96-3
Corrective Action Monitoring Wells:	90-3, 90-4, 92-1 and 92-4
Points of Compliance Wells:	87-1, 90-2, 90-3, 90-4, 90-5, 90-7 and 90-8

Data used to represent the existing groundwater quality conditions were obtained from the 2018 Annual Detection Monitoring Report, which was submitted to the RWQCB by the City of Ukiah in January 2019 (EBA, 2019a). The Landfill wells were sampled in October 2018. Information presented in **Table 3.7-2,** below, summarizes the pertinent detections and exceedances of constituents of concern found in the detection/corrective action monitoring wells that intersect the two water bearing units beneath the Landfill.

Summary of Groundwater Data

Table 3.7-2 lists the constituents, well number, reported concentration, and notes, if any, regarding the nature or evaluation of the measured concentration in the monitoring well. In most cases, the reported constituents are detected in the groundwater, but the concentrations reflect historic trends or are representative of background or naturally occurring conditions. Such is the

case for the annual constituents of concern (COCs), which include aluminum, arsenic, barium, chromium iron, selenium, and nickel. Sulfate and chloride were shown to increase but only negligibly. The volatile organic compounds (VOCs), namely acetone, benzene, naphthalene, toluene, and miscellaneous xylenes, found in detection well 90-8 and corrective action well 92-4 are generally consistent with historical conditions and do not appear to be related to the Landfill.

Table 3.7-2
Summary of Pertinent Detections and Exceedances
Detection and Corrective Action Monitoring Wells

Parameter	Monitoring Well Number	Concentrations	Evaluation
DETECTION MONITORING WELLS			
Sulfate (µg/L)	90-7	12	Negligible Exceedance
Sulfate (µg/L)	96-1	27	Negligible Exceedance
Chloride (µg/L)	96-2	18	Negligible Exceedance
Volatile Organic Compounds (µg/L)			
Acetone	94-2	14	Generally Consistent with Historical Conditions
Benzene	90-7, 90-8, 94-2	0.5, 280, 0.61 (1)	
m,p Xylenes	90-8	0.55 (1)	
Naphthalene	90-8	1.9 (1)	
Toluene	90-8	0.44 (1)	
Xylenes Total	90-8	0.55 (1)	
Total Petroleum Hydrocarbons as Gasoline (µg/L)	90-8	480	Detection primarily associated with substantial benzene peak.
Annual Constituents of Concern (COcs) (mg/L)			
Aluminum, dissolved	87-1, 90-6	0.080, 0.34	Concentrations detected for the compounds are naturally occurring. Conditions are generally consistent with historical annual observations
Arsenic dissolved	(2)	0.014 to 0.20	
Barium, dissolved	(3)	0.060 to 5.1	
Chromium (hexavalent), dissolved	90-5, 90-8	0.017, 0.010	
Iron, dissolved	(5)	0.12 to 19	Below Primary Maximum Contaminant Level (PMCL)
Nickel, dissolved	90-5	0.017	
Oil and Grease	90-8	75	Second Detection since 2015.
CORRECTIVE ACTION MONITORING WELLS			
Volatile Organic Compounds (µg/L)			
Acetone	90-3, 90-4 (1)	14, 22	Generally Consistent with Historical Conditions
Benzene	92-4 (1)	120	
m,p Xylenes	92-4 (1)	0.88	
Naphthalene	92-4	1.5	
Xylenes Total	92-4 (1)	0.88	

Table 3.7-2
Summary of Pertinent Detections and Exceedances
Detection and Corrective Action Monitoring Wells

Parameter	Monitoring Well Number	Concentrations	Evaluation
Total Petroleum Hydrocarbons as Gasoline (µg/L)	92-4	210	Detection primarily associated with substantial benzene peak.
Annual Constituents of Concern (COcs) (mg/L)			
Aluminum, dissolved	92-1	0.26	Concentrations detected for the compounds are naturally occurring. Conditions are generally consistent with historical annual observations.
Arsenic dissolved	(5)	0.0059 to 0.31	
Barium, dissolved	(5)	0.93 to 3.8	
Iron, dissolved	(5)	0.72 to 8.7	
bis (2-ethylhexyl)phthalate (µg/L)	90-4	21	
Nickel, dissolved	91-2	0.036	Below Primary Maximum Contaminant Level
Selenium, dissolved	92-1	0.0092	

(1) Previous site characterization suggests that the Benzene, Toluene, Ethylbenzene and/or Xylenes detections in this groundwater monitoring well do not appear to be related to the landfill and may either be naturally occurring or derived from an alternate source
(2) Detected Monitoring Wells 90-2, 90-5, 90-7, 90-8, 92-2, 92-3, 94-2, and 96-2.
(3) Detected in 87-1, 90-2, 90-5, 90-6, 90-7, 90-8, 92-2, 92-3, 94-2, 96-1, 96-2, and 96-3.
(4) Detected in 87-1, 90-5, 90-6, 90-8, 92-2, 92-3, 94-2, and 96-2
(5) Detected in 90-3, 90-4, 92-1, and 92-4.
µg/L: micrograms per liter (equivalent to parts per billion).

These VOC's were detected in upgradient wells on the east end of the Landfill property and may either be derived from an alternate, possibly upgradient source (Lawrence and Associates, 1998 *in* EBA 2019a). The RWQCB concurred with this finding in a letter dated July 29, 1998, which stated that the presence of VOC's in the eastern wells is not considered a violation of the WDRs. Consistent detections of benzene have been observed at similar concentrations in monitoring well 90-8 since 1991 (EBA, 2019a). Total Petroleum Hydrocarbons as Gasoline (TPH-g) were detected in wells 90-8 and 92-4 at 480 micrograms per liter (µg/L) and 210 µg/L, respectively. As gasoline contains benzene, toluene, xylenes, and other VOCs, the gasoline detected in monitoring wells 90-8 and 92-4 is the likely source of the benzene concentrations.

Hydrogeologic Influence of Landfill on Vichy Springs Resort

In 1994, Vichy Springs Resort, located one-quarter mile southeast of the Landfill, reported that the temperature in the spring water at the resort had decreased by 12 degrees and the flow rate decreased by 19.5 gallons per minute (gpm) immediately after the Landfill installed corrective action monitoring well 92-4 on March 15, 1994. Monitoring well 92-4 and the next closest well, detection monitoring well 90-8, are located at the southeast end, near the entrance of the Landfill property, about 1,100-feet from Vichy Springs Resort. Detection monitoring well 90-8 and monitoring well 92-4, were drilled to a depth of 140-feet bgs and 135-bgs, respectively and completed in the Continental Basin Deposits.

The City of Ukiah commissioned a study (EBA, 1994) of Vichy Spring's claims and in August 1994, submitted the final report to the North Coast RWQCB. The study focused on the underlying geology, the potential for heat loss due to a release of carbon dioxide, flow reduction, and water chemistry. In general, the study found that the water in the well and the water at Vichy Springs originate from two different formations and are chemically distinct. The groundwater found in monitoring wells 92-4 and 90-8 come from water bearing sediments in the Continental Basin Deposits and the water at Vichy Springs comes from groundwater deep in the Franciscan Complex bedrock. This was evident by comparing the organic and inorganic chemical composition of groundwater in the Franciscan bedrock and Continental Basin Deposits. These findings were then verified by the stable isotope analysis conducted on water samples from the Landfill monitoring wells and local springs, including Harmon Springs, City Range Spring, Ardeche Spring and Vichy Springs. Furthermore, the study found that the small diameter and comparatively shallow monitoring wells installed at the Landfill and the amount of water that is extracted from them, could not account for the volume of heat loss and reduction of spring flow rate reported by Vichy Springs.

The study concluded that it was highly improbable that drilling and constructing two monitoring wells could have influenced or adversely impacted the spring water temperature and flow rate at Vichy Springs. The SWRCB reviewed the study and completed an independent review of the available supporting documentation; its findings supported the City of Ukiah's position. In its letter dated October 31, 1994 (SWRCB, 1994), the SWRCB stated:

> " . . . (1) the monitoring well was drilled into a different geological formation from the formation underlying the hot springs; (2) apparently no pressure effects were noted during drilling; (3) the temperature of the water in the monitoring well apparently ranges between 59°-77°F, in contrast to the 90°F temperature of the hot spring; and (4) data from Lawrence Livermore Lab shows that the water in the monitoring well and the hot spring have different oxygen isotope values and therefore are from separate water sources and have no apparent mixing relationship. One would expect waters which are in the same hydrothermal regime to have similar oxygen isotope values and elevated temperatures. Furthermore, if the monitoring well were in fact responsible for the drop in temperature of the spring, one would not have expected the temperature in the spring to have recovered almost to its pre-drilling temperature without a subsequent change in the condition of the well, e.g., plugging. In summary, we have not seen convincing evidence to support the conclusion that the drilling of this monitoring well could have impacted the temperature and flow rate of the hot spring."

3.7.2.5 Flooding and Flood Hazards

Flooding is the inundation of normally dry land as a result of a rise in the level of surface waters or the rapid accumulation of stormwater runoff. Flooding can occur when excessive precipitation generates stormwater runoff that exceeds the carrying capacity of the drainage system. The Federal Emergency Management Agency (FEMA) delineates regional flooding hazard areas in the area as part of the National Flood Insurance Program. Official Flood Insurance Rate Maps

(FIRMs) for the Project Area indicate areas that have a 1 percent chance of flooding in any given year (100-year flood hazard zone). The FIRM map indicates the landfill is located outside the 500-year flood hazard area and outside the 100-year flood hazards area. (**Figure 3.7-2**).

Flooding as a result of a seiche or inundation due to dam failure can also be a consideration for assessing flood hazards. A seiche is a rhythmic motion of water in a partially or completely enclosed (landlocked) large water body caused by landslides, earthquake-induced ground accelerations, or ground offset. Seiches can result in long-period waves that cause run-up or

overtopping of adjacent landmasses, similar to tsunami runup. The landfill is not located in close proximity to a large enclosed body of water capable of producing seiche waves. Flooding from dam failure can result from both natural and human causes, including earthquakes, erosion, improper siting and/or design, and rapidly rising floodwater during heavy storms. The type of failure, ranging from instantaneous to gradual, is dependent on the building material of the dam. Dam failure can potentially cause loss of life and property damage, displacement of persons residing in the inundation path, and damage to infrastructure. The Ukiah Valley and the area around the Russian River is within the mapped dam inundation hazard area for Coyote Dam at Lake Mendocino (City of Ukiah, 2011). The gentle topography of the Ukiah Valley along the Russian River provides a wide dam inundation area. According to the dam inundation area map (City of Ukiah, 2011), the main channel of flooding would likely follow Highway 101. Inundation is predicted to occur along most creek channels from the river nearly to the base of the foothills on the west side of the Valley. The California DWR, Division of Safety of Dams (DSOD) oversees the construction of dams that are over 25-feet high and impound over 15 acre-feet of water, or over 6-feet high and impound over 50 acre-feet of water, which includes the Coyote Dam. The Ukiah Landfill is not located within an area at risk of inundation from dam failure.

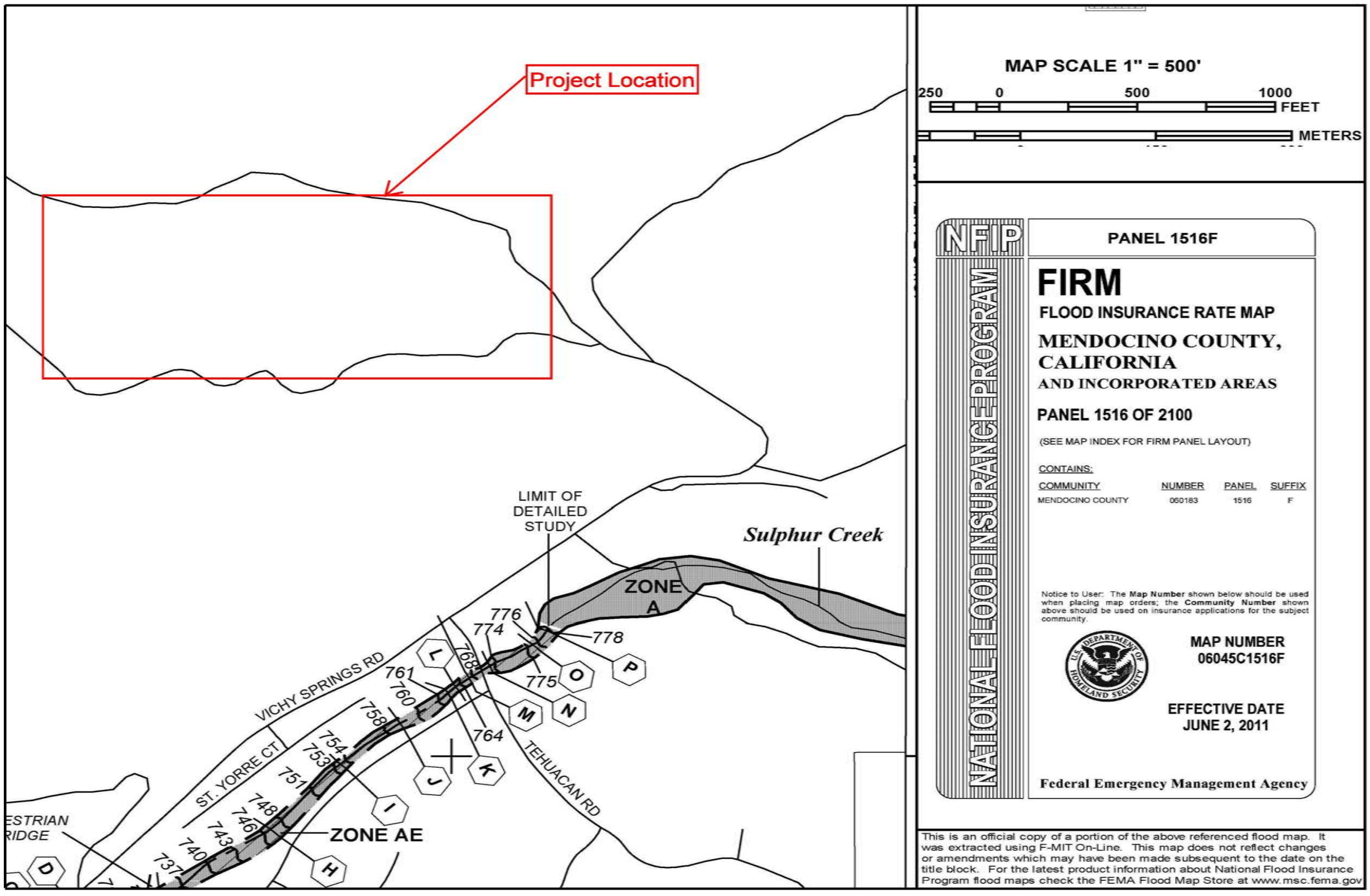
3.7.3 Regulatory Setting

A discussion of the relevant federal, state and local regulations is provided below.

3.7.3.1 Federal Regulations

Clean Water Act

Under the Clean Water Act (CWA) of 1977, the U.S. Environmental Protection Agency (USEPA) seeks to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The statute employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. The CWA authorizes the USEPA to implement water quality regulations. The relevant sections of the CWA are summarized below.



Source: EBA

SMB ENVIRONMENTAL

Figure 3.7-2
FEMA Flood Insurance Map

CWA Section 303: Water Quality Standards and Implementation Plans

Section 303 of the CWA requires states to designate beneficial uses for water bodies or segments of water bodies and to establish water quality standards to protect those uses for all waters of the U.S. Under Section 303(d) of the CWA, states, territories, and authorized tribes are required to develop lists of impaired waters. Impaired waters are waters that do not meet water quality standards established by the state, even after point sources of pollution have been equipped with the minimum required levels of pollution control technology. The law requires that these jurisdictions establish a priority ranking for listed waters and develop action plans to improve water quality. Inclusion of a water body on the Section 303(d) List of Impaired Water Bodies triggers development of a Total Maximum Daily Load (TMDL) for that water body and a plan to control the associated pollutant/stressor on the list. The TMDL is the maximum amount of a pollutant/stressor that a waterbody can assimilate and still meet the water quality standards. Typically, a TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. In accordance with Section 303(d), the RWQCB has identified impaired water bodies within its jurisdiction, and the pollutant or stressor responsible for impairing the water quality.

The Upper Russian River and its tributaries are listed as being impaired due to sedimentation/siltation and temperature. Detailed discussion of impaired water bodies relevant to the Project, including the pollutants that cause the impairments, and the potential sources of the pollutants are discussed under Section 3.7.2, above. To control sediment in discharges and restore sediment impaired water bodies, the RWQCB has adopted the Total Maximum Daily Load Implementation Policy Statement for Sediment Impaired Receiving Waters in the North Coast Region, which is also known as the Sediment TMDL Implementation Policy, on November 29, 2004. This Policy was adopted through Resolution R1-2004-0087. The goals of the Policy are to control sediment waste discharges to impaired water bodies so that the TMDLs are met, sediment water quality objectives are attained, and beneficial uses are no longer adversely affected or impaired as a result of sediment. Under the Sediment TMDL Implementation Policy, RWQCB staff control sediment pollution through existing permitting and enforcement tools.

Prior to issuance of any National Pollutant Discharge Elimination System (NPDES) permits for construction activities, operational discharges, or licenses (discussed below), a review and authorization process by the applicable RWQCB is required to ensure such permits and licenses are protective of designated beneficial uses and water quality and that TMDL requirements are incorporated as permit conditions in a manner consistent with relevant plans, policies, and guidelines.

CWA Section 401: Water Quality Certification

Section 401 of the CWA (33 U.S.C. §1341) requires any applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into navigable waters to obtain a certification from the State in which the discharge originates. The certification ensures that the discharge will comply with the applicable effluent limitations and water quality standards

(see Section 3.3 Biological resources for additional details). [The RWQCB is responsible for implementing section 401 of the CWA in California.

CWA Section 402: National Pollutant Discharge Elimination System

The NPDES permit program under section 402 of the CWA is one of the primary mechanisms for controlling water pollution through the regulation of sources that discharge pollutants into waters of the United States. The USEPA has delegated authority of issuing NPDES permits in California to the California State Water Resources Control Board (SWRCB), which has nine regional boards. The North Coast Regional Water Quality Control Board (RWQCB) regulates water quality in the Project area. The NPDES permit program is discussed in detail under State Regulations, below.

California Toxics Rule, 40 CFR 131.38

On May 18, 2000, the USEPA promulgated numeric water quality criteria for priority toxic pollutants and other provisions for water quality standards to be applied to waters within California. USEPA promulgated this rule based on the Administrator's determination that the numeric criteria are necessary in California to protect human health and the environment. The rule fills a gap in California water quality standards that was created in 1994 when a state court overturned the state's water quality control plans containing water quality criteria for priority toxic pollutants. Thus, the state of California has been without numeric water quality criteria for many priority toxic pollutants as required by the CWA, necessitating this action by USEPA. These federal criteria are legally applicable in the state of California for inland surface waters, enclosed bays, and estuaries for all purposes and programs under the CWA. The USEPA and the SWRCB have the authority to enforce these standards, which are incorporated into the NPDES permits that regulate existing discharges in the project area.

3.7.3.2 State Regulations

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) provides the basis for water quality regulation within California. This Act establishes the authority of the SWRCB and the nine RWQCBs. The SWRCB administers water rights, sets State policy for water pollution control, and implements various water quality functions throughout the State, while the RWQCBs conduct planning, permitting, and most enforcement activities.

The Porter-Cologne Water Quality Control Act requires the SWRCB and/or the RWQCBs to adopt statewide and/or regional water quality control plans, the purpose of which is to establish water quality objectives for specific water bodies. The RWQCB has prepared the *North Coast Water Quality Control Plan* (Basin Plan) that establishes water quality objectives and implementation programs to meet the stated objectives and to protect the beneficial uses of the water bodies. The act also authorizes the NPDES program under the CWA, which establishes

effluent limitations and water quality requirements for discharges to waters of the state. Most of the implementation of SWRCB's responsibilities is delegated to the nine regional boards. Under the NPDES program, the North Coast RWQCB has established permit requirements for stormwater runoff in the Project area (see below).

North Coast Water Quality Control Plan (Basin Plan)

The RWQCB prepared the Basin Plan (2006) for the North Coast region that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the region. The goal of the Basin Plan is to provide a definitive program of actions designed to preserve and enhance water quality and to protect beneficial uses of water in the North Coast Region. The beneficial uses listed for the Russian River and its tributaries include: municipal and domestic supply, agricultural supply, industrial service supply, industrial process supply, groundwater recharge, navigation, hydropower generation, water contact and noncontact recreation, commercial and sport fishing, warm and cold freshwater habitat, wildlife habitat, fish migration, fish spawning, reproduction, and/or early development, estuarine habitat, and aquaculture (RWQCB, 2006). The Basin Plan provides water quality objectives for inland surface waters such as the Upper Russian River segment located in the Project vicinity, that are incorporated into NPDES permits, discussed below.

NPDES Waste Discharge Program

The federal Clean Water Act established the NPDES program to protect the water quality of receiving waters of the United States. Under the Clean Water Act, Section 402, discharging pollutants to receiving waters of the United States is prohibited unless the discharge is in compliance with an NPDES permit. Effluent limitations serve as the primary mechanism in NPDES permits for controlling discharges of pollutants to receiving waters both from construction activities and from discharges from operation of municipal or industrial facilities. When developing effluent limitations for an NPDES permit, a permit applicant must consider limits based on both the technology available to control the pollutants (i.e., technology-based effluent limits) and limits that are protective of the water quality standards of the receiving water (i.e., water quality-based effluent limits[4] if technology-based limits are not sufficient to protect the water body.). For inland surface waters and enclosed bays and estuaries, the water-quality-based effluent limitations are based on criteria in the National Toxics Rule and the California Toxics Rule, and objectives and beneficial uses defined in the applicable Basin Plan. There are two types of NPDES permits: individual permits tailored to an individual facility and general permits that cover multiple facilities or activities within a specific category. The NPDES permits relevant to construction and post-closure maintenance of the Project are described below.

NPDES Construction General Permit

The State of California adopted a Construction General Permit on September 2, 2009 (Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ and 2012-0006-DWQ) (General Construction

NPDES Permit or CGP). The General Construction NPDES Permit regulates construction site stormwater management. Dischargers whose projects disturb one or more acres of soil, or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the general permit for discharges of stormwater associated with construction activity. The Project would be required to comply with the permit requirements to control stormwater discharges from the construction sites. Construction activity subject to this permit includes clearing, grading, and disturbances to the ground, such as stockpiling or excavation, as well as construction of buildings and linear underground projects (LUP), including installation of water pipelines and other utility lines. Portions of the Project would fall under the Type 1 LUP category if the following conditions are met:

- Construction occurs on unpaved improved roads, including their shoulders or land adjacent to them;
- The areas disturbed during a single construction day are returned to their preconstruction condition, or to an equivalent condition (i.e., disturbed soils such as those from trench excavation are hauled away, backfilled into the trench, and/or placed in spoils piles and covered with plastic), at the end of that same day;
- Vegetated areas disturbed by construction activities are stabilized and revegetated at the end of the construction period; and
- When required, adequate temporary soil stabilization best management practices (BMPs) are installed and maintained until vegetation has reestablished to meet the permit's minimum cover requirements for final stabilization.

In the Project Area, the Construction General Permit is implemented and enforced by the RWQCB, which administers the stormwater permitting program. To obtain coverage under this permit, project operators must electronically file Permit Registration Documents, which include a Notice of Intent, a Stormwater Pollution Prevention Plan (SWPPP), and other compliance-related documents. An appropriate permit fee must also be mailed to SWRCB. The SWPPP identifies BMPs that must be implemented to reduce construction effects on receiving water quality based on potential pollutants. The BMPs identified are directed at implementing both sediment and erosion control measures and other measures to control potential chemical contaminants. In addition, the SWPPP is required to contain a visual monitoring program and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, vehicle and equipment washing and fueling. The SWPPP also includes descriptions of the BMPs to

[4] Water quality-based effluent limits specify the level of pollutant (or pollutant parameter), generally expressed as a concentration,

reduce pollutants in stormwater discharges after all construction phases have been completed at the site (post-construction BMPs). Dischargers are responsible for notifying the RWQCB of violations or incidents of non-compliance, as well as for submitting annual reports identifying deficiencies of the BMPs and how the deficiencies were corrected.

The Construction General permit includes several new requirements (as compared to the previous Construction General Permit, 99-08-DWQ), including risk-level assessment[5] for construction sites, an active stormwater effluent monitoring and reporting program during construction (for Risk Level II and III sites), rain event action plans for certain higher risk sites[6], and numeric effluent limitations (NELs) for pH and turbidity as well as requirements for qualified professionals that prepare and implement the plan. The risk assessment and SWPPP must be prepared by a State-qualified SWPPP Developer and implementation of the SWPPP must be overseen by a State-qualified SWPPP Practitioner. Project construction activities would be consistent with the Construction general Permit; compliance is required by law and the provisions of the permit and BMPs for construction and post-construction phases have proven effective in protecting water quality at construction sites and downgradient receiving waters.

Landfill Discharge Requirements

Storm water discharges associated with the landfill site have been regulated under the General Industrial NPDES Storm Water Permit. The General Permit, (Order No. 2014-0057-DWQ, No. CAS000001), was issued by the State Water Resources Control Board (SWRCB). The permit regulated direct storm water discharges and storm water discharges from the sedimentation basins. In 2015, the RWQCB approved a Notice of Termination (NOT), ending coverage under the Industrial Stormwater Permit. As described below, monitoring and control systems for surface water discharges, leachate management, groundwater, and gas are in place and will continue as part of post-closure maintenance program regulatory requirements under RWQCB Waste Discharge Requirements (WDRs). Additionally, direct stormwater discharges to the unnamed ephemeral creek (see Section 3.7.2, above) and discharges from sediment capture ponds are required to conform to Basin Plan water quality objectives protective of the designated beneficial uses for the Russian River and its tributaries (discussed above).

Landfill discharges associated with the landfill closure are regulated as WDRs by the RWQCB, which include surface water, groundwater, and leachate monitoring requirements and discharge prohibitions. Environmental monitoring at the landfill was originally regulated under Order 75-43 in conformance with Title 23 of the California Code of Regulations (23 CCR). In September 1993, Order 75-43 was amended by Order 93-83 as a mechanism to implement State Water Resources Control Board Resolution No. 93-62 and federal municipal solid waste regulations (i.e., "Subtitle D") per Title 40 of the Code of Federal Regulations (40 CFR), Parts 257 and 258. Concurrent with this amendment was the preparation of a Report of Waste Discharge (ROWD)

5 that is allowable
The Construction General Permit defines three levels of risk (Risk Level I, II, and III) that may be assessed for a construction site. Risk is calculated based on the "project sediment risk", which determines the relative amount of sediment that can be discharged given the project and location details, and the "receiving water risk" (the risk sediment discharges pose to the receiving waters).

6 Those sites that have a high potential for mobilizing sediment in stormwater and drain to a sediment-sensitive waterbody.

for the purpose of formally updating the landfill's WDRs and to address groundwater impacts previously identified at the site. The combination of these two documents was subsequently used by the RWQCB to issue new WDRs (Order 94-123) for the site in October 1994.

In 1995, an Engineering Feasibility Study (EFS) was conducted to evaluate corrective action alternatives for the mitigation of groundwater impacts identified at the site and to assess potential leachate management options (EBA, 2019a). Findings from the EFS included recommendations to upgrade the groundwater monitoring network, performance of a health-based risk assessment, and modification of the leachate collection/management facilities (see Section 2.2 for detailed description of the landfill environmental control systems for leachate and groundwater). The monitoring system upgrades and health-based risk assessment were subsequently completed in the Fall of 1996. Modifications to the leachate collection/management facilities, which included the diversion of collected leachate to an aboveground storage tank (AST) and pumping to the City's sewer piping system via a combination force main/gravity drain, were also completed in the Fall of 1996.

Following completion of the respective corrective action measures, monitoring and reporting of the environmental control systems was implemented on a quarterly basis in accordance with Order 94-123. On June 27, 2002, the RWQCB adopted the current WDRs (Order R1-2002-0061) for the site to address interim closure, corrective action needs, and submittal of plans to complete cap construction in accordance with 27 CCR. Landfill discharges conducted in accordance with the prohibitions and requirements specified under Order R1-2002-0061 are consistent with the provisions of SWRCB Order No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California.

A Mitigated Negative Declaration was prepared and adopted by the City of Ukiah on July 19, 2000, to satisfy the requirements of the California Environmental Quality Act. The Regional Water Board considered the Mitigated Negative Declaration and determined that closure and post-closure maintenance activities conducted in accordance with Order R1-2002-0061 will not result in significant adverse environmental impacts. Required mitigations include continued surface water quality monitoring upstream and downstream of the landfill property in the ephemeral creek, monitoring of VOC impacts in groundwater, and landfill gas extraction and venting rates. Additional mitigations include operating the gas extraction system and initiating corrective action as necessary to mitigate any impacts.

Anti-Degradation Policy

The SWRCB Anti-Degradation Policy, formally known as the Statement of Policy with Respect to Maintaining High Quality Water in California (SWRCB Resolution No. 68-16), restricts degradation of surface and ground waters. Specifically, this policy protects water bodies where existing quality is higher than necessary for the protection of beneficial uses and requires that existing high quality be maintained to the maximum extent possible.

Under the Anti-Degradation Policy, any actions that can adversely affect water quality in all surface and groundwaters must: (1) be consistent with maximum benefit to the people of California; (2) not unreasonably affect present and anticipated beneficial use of the water; and (3) not result in water quality less than that prescribed in water quality plans and policies. Furthermore, any actions that can adversely affect surface waters are also subject to the federal Anti-Degradation Policy (40 CFR Section 131.12) developed under the CWA. Discharges from the Project that could affect surface water quality would be required to comply with the Anti-Degradation Policy, which is included as part of the NPDES permit requirements for point discharges (discussed below).

3.7.4 Impact Analysis

This section discusses the significance criteria used to evaluate potential impacts, the approach to analyzing water resources related impacts, and the potential impacts related to the construction and post-closure maintenance of the Project.

3.7.4.1 Significance Criteria

Based on the Appendix G of the CEQA *Guidelines*, the Project would result in a significant impact if it would:

- Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade surface or groundwater quality.

- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would:

    - result in substantial erosion or siltation on- or off-site;

    - substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;

    - Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

    - Impede or redirect flood flows.

- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.

- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Due to the location and characteristics of the Project site, certain hydrologic conditions are not associated with the Project and therefore, are not considered potential impacts. These hydrologic conditions are addressed briefly below and are not discussed further in this document.

In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation

The Project site is not located within the 100-year flood hazard zone designated by the Federal Emergency Management Agency (FEMA), is not in a tsunami hazard inundation zone, and is located at approximately 700-feet above mean sea level in an area not subject to current or projected future coastal flooding that may result due to sea level rise. A seiche is caused by oscillation of the surface of a large enclosed or semi-enclosed body of water due to an earthquake or large wind event. The Project site is not located near a large enclosed or semi-enclosed body of water. Therefore, no impact would occur related to the release of pollutants due to project inundation.

3.7.4.2 Methodology

The impact analysis for the proposed Project is based on a review of the existing conditions in Section 3.7.2 above and assessment of the changes that would occur due to construction and ongoing post-closure maintenance of the Project. The impact analyses determine if, and to what degree, the Project could change the existing hydrology, water quality, and flooding conditions described in Section 3.7.2. Construction and post-closure maintenance of the Project would be regulated by the various laws, ordinances, regulations, and policies summarized in Section 3.7.3. Compliance with applicable federal, state, and local laws and regulations is assumed in the analysis of impacts because these regulatory requirements are mandatory and the application of the associated protective measures (such as BMPs, Monitoring and Reporting Plans, and the application of corrective actions) are non-discretionary, and are proven to minimize and/or avoid hydrologic or water quality impacts. Further, regulatory agencies with technical jurisdiction and authority for oversight would require adherence to regulatory requirements as a condition of Project or permit approval and would continue to enforce applicable requirements throughout Project construction and operation phases. Mandatory compliance with regulations would ensure that Project construction and operation is consistent with the governing regulatory requirements, plans, and policies described in Section 7.3.3.

3.7.4.3 Impacts and Mitigation Measures

Impact 3.7-1: Would the Proposed Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

Construction of the project would include earthwork activities (i.e., grading, excavation, and other soil-disturbing activities) and the placement of imported engineered soils. Stormwater runoff from disturbed soils associated with construction activities is a common source of pollutants (mainly sediment) to receiving waters. Earthwork activities can render soils and sediments more susceptible to erosion from stormwater runoff and result in the migration of soil and sediment in stormwater runoff to storm drains and downstream water bodies, such as the ephemeral creek, which is tributary to the Russian River and is listed on the 303(d) list as impaired for sediment. In addition, construction would likely involve the use of various materials typically associated with construction activities such as paint, solvents, oil and grease, petroleum hydrocarbons, concrete and associated concrete wash-out areas. If improperly handled, these materials could result in pollutants being mobilized and transported offsite by stormwater runoff (nonpoint source pollution) and degrade receiving water quality.

Because the Project exceeds one acre in size, all construction activities would be required to comply with NPDES regulations and obtain coverage under the State Construction General Permit (CGP). Under the CGP, the City of Ukiah or their contractor(s) would be required to implement construction BMPs as set forth in a detailed SWPPP. SWPPPs are a required component of the CGP and must be prepared by a Qualified SWPPP Developer (QSD) and implemented by a Qualified SWPPP Practitioner (QSP). SWPPPs must describe the specific erosion control and stormwater quality BMPs being implemented to minimize pollutants in stormwater runoff, and detail their placement and proper installation. The BMPs are designed to prevent pollutants from coming into contact with stormwater and to keep all products of erosion and stormwater pollutants from moving offsite into receiving waters. Typical BMPs to be implemented at construction sites include placement of fiber rolls or gravel barriers to detain small amounts of sediment from disturbed areas, and temporary or permanent covering of stockpiles to prevent rainfall from contacting the stockpiled material. In addition to erosion control BMPs, SWPPPs also include BMPs for preventing the discharge of pollutants other than sediment (e.g. paint, solvents, concrete, petroleum products) to downstream waters. BMPs for pollutants include conducting routine inspections of equipment for leaks, maintaining containers of supplies such that the contents are clearly labeled, the integrity of the containers is not compromised, and ensuring that construction materials are disposed of in accordance with applicable regulations.

Under the provisions of the CGP, the State-certified QSD is responsible for determining site risk level for sediment transport, developing the SWPPP, and managing its implementation. Site risk level is determined using a combination of the sediment risk of the project and the receiving water quality risk. Projects can be characterized as Risk Level 1, Level 2, or Level 3, and the minimum best management practices (stormwater controls) and monitoring that must be implemented during construction are based on the risk level. Under the direction of the QSD, the QSP is required to conduct routine inspections of all BMPs, conduct surface water sampling, when necessary, and report site conditions to the State and/or Regional Water Quality Control Board as part of CGP compliance monitoring and reporting using the Stormwater Multi-Application Reporting and Tracking System (SMARTS). Compliance with the CGP is required by law and has proven effective in protecting water quality at construction sites.

Project construction would mainly involve grading for topographic contouring related to the proposed cover and shallow subsurface excavation. If shallow groundwater were encountered during excavation activities, it would have to be pumped out of the construction trench to create a dry work area. It is unlikely that such excavations would intercept shallow groundwater. If excavations intersect unanticipated shallow groundwater and dewatering activities are required, dewatering would be temporary, highly localized, and would typically involve the extraction of low volumes of shallow groundwater from excavation trenches. Additionally, given the known issue of contaminants in groundwater at the site, any construction related excavation dewatering effluent would be collected in mobile storage tanks (e.g., Baker Tanks™) or conveyed in pipes for treatment and disposal either via the LCRS or hauled off-site to an appropriate licensed treatment and disposal location.

Following completion of construction, consistent with the landfill's WDRs (Order R1-2002-0061; see Section 7.3.3), the leachate, groundwater, and surface water monitoring program required under the MRP (RWQCB, 2002b) would continue to be conducted to ensure the landfill is in compliance with all water quality standards. Monitoring under the MRP would minimize or avoid potential impacts on surface water and groundwater quality through the required implementation of additional monitoring or corrective actions, if a WQPS exceedance is determined to have occurred. As discussed in detail in Section 7.3.3, landfill discharges conducted in accordance with the prohibitions and requirements specified under Order R1-2002-0061 are consistent with the provisions of SWRCB Order No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California. Further, the RWQCB has determined that closure and post-closure maintenance activities conducted in accordance with Order R1-2002-0061 will not result in significant adverse environmental impacts with implementation of continued surface water quality monitoring upstream and downstream of the landfill property in the ephemeral creek, monitoring of VOC impacts in groundwater, and initiating corrective action as necessary. Additionally, as described in Section 2.3 as well as discussed in detail below under Impact 3.7-3, drainage, stormwater detention, erosion, and sediment reduction improvements (such as the proposed cover) will be completed as part of the proposed Project which further reduce the potential for water quality impacts related to erosion and sedimentation to occur following completion of construction.

Compliance with the requirements of the CGP, including the implementation of associated BMPs as part of the SWPPP, as well as WDR requirements specified under Order R1-2002-0061, including discharge prohibitions, monitoring, and corrective actions under the MRP, would prevent the discharge of pollutants to surface waters or groundwater and minimize or eliminate potential degradation of surface water or groundwater quality during construction of the Project. Water quality impacts related to violation of water quality standards or degradation of water quality due to discharge of construction-related stormwater runoff from implementation of the Project would be less-than-significant.

Significance: Less-than-Significant.

Impact 3.7-2: Would the Proposed Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?

The proposed impermeable landfill cover, by design, could reduce some, if not all surface infiltration that would otherwise percolate to the shallow water bearing sediments in the Holocene deposits or the Continental Basin Deposits beneath the Waste Management Unit (WMU). However, the majority of recharge to these alluvial deposits is provided by the ephemeral stream and surface infiltration elsewhere throughout in the watershed. Considering the area of landfill coverage compared to the entire recharge area occupied of the Holocene and Continental Basin Deposits, the reduction of infiltrated surface water caused by the Proposed Project would be negligible and would not substantially change existing (pre-Project) shallow groundwater conditions. As there is no nearby domestic or industrial groundwater pumping from the Holocene alluvium or the Continental Basin Deposits, any reduction in shallow groundwater infiltration caused by the proposed landfill cover would not diminish the supply or hinder the use of groundwater by local users or neighboring groundwater supply wells. Given that the Ukiah Valley Groundwater Basin covers 60 square miles, the reduction in surface water infiltration attributable to the proposed landfill cover accounts for 0.1 percent of the recharge area; hence, the Proposed Project would not significantly reduce the groundwater inflow to the basin or impede sustainable groundwater management.

Groundwater monitoring would continue during the post-closure maintenance period although certain parameters would be eliminated from the monitoring program, monitoring frequency would be reduced, and certain wells would be decommissioned. Analyses for calcium, sodium, magnesium, potassium, bicarbonate, carbonate, and fluoride would be eliminated because, while informative during site characterization, these parameters would not be useful for post-closure characterization for health and toxicity issue. Quarterly monitoring would be limited to certain existing wells along the western boundary (87-1, 90-2, 94-2, 96-1, and 96-3) because they are located between the waste management unit and downgradient, off-site receptors that could possibly be impacted by a potential future release from the closed landfill. Monitoring of remaining wells would be reduced to a semi-annual schedule. Monitoring wells 90-8 and 92-4 would be removed from the monitoring network since these wells are located outside the watershed of the WMU and do not appear to be in hydraulic connection with groundwater underlying the landfill footprint. The proposed adjustments to the groundwater monitoring for post-closure maintenance appears adequate to identify future potential impacts to groundwater quality within and downgradient of the closed WMU.

As presented in the Environmental Setting section above, there is substantial evidence to conclude that the 1994 drilling and construction of monitoring wells in the units of the Continental Basin Deposits did not influence or adversely impact the spring water temperature and flow rate at Vichy Springs. The groundwater that feeds Vichy Springs originates in the Franciscan Complex bedrock and the groundwater that is present in the Holocene and Continental

Basin Deposits sediments overlying the Franciscan Complex bedrock are distinctly different in origin and water chemistry. Based on this evidence, it is reasonable to conclude that the grading, cover installation, and the post-closure maintenance condition expected under the Proposed Project would not influence or adversely impact spring temperature or discharge rate at the Vichy Springs Resort.

In summary, while the proposed Project could reduce infiltration to the sediments underlying the Landfill WMU, the reduction would be negligible and would not adversely impact local or regional groundwater management. By reducing infiltration, the addition of the proposed landfill cover would not exacerbate existing groundwater degradation, nor would it generate new sources of groundwater contamination. The post-closure groundwater management strategy would be adequate to detect substantial changes in groundwater flow, levels or quality if they were to occur during the post closure maintenance period. Based on these findings, impacts to groundwater resources would be less-than-significant**.**

Significance: Less-than-Significant.

Impact 3.7-3: Would the Proposed Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would result in substantial erosion, siltation, polluted runoff or flooding on- or off-site?

The Proposed Project would replace the existing landfill cover with an impermeable geomembrane and synthetic turf cover system that would reduce stormwater infiltration into the Waste Management Unit and reduce erosion/sediment transport from the landfill cover. The proposed cover system will be installed over approximately 40 acres (comprising the Waste Management Unit) of the 284-acre site. As described in Section 2, *Project Description*, in addition to the new cover, other miscellaneous improvements are proposed, including drainage and erosion control measures, sediment basin improvements, access roads, leachate control system improvements, and installation of a landfill gas collection system.

The drainage improvements are designed to route off-site drainage and runoff around the landfill while having on-site runoff sheet flow to shallow swales and drainage ditches which will convey stormwater into an underground drainage system that discharges into the ephemeral creek via new and/or upgraded stormwater outfall structures. The proposed Project would not involve the direct alteration of a stream or river course (the unnamed ephemeral creek channel will not be substantially altered or re-aligned) and would not substantially alter on-site drainage patterns; on-site stormwater runoff would continue to flow downgradient and be discharged to the unnamed ephemeral creek bounding the Project site, as occurs under existing conditions.

The proposed impermeable landfill cover will increase the volume of stormwater leaving the site. The addition of impervious surfaces decreases rainfall infiltration into soils and increases runoff flow rates and volumes. Increased runoff can erode downgradient slopes and surface water

channels as well as increase the transport of sediment and other pollutants downgradient. Additionally, increased peak stormwater discharges can overwhelm stormwater conveyance systems and cause flooding on-site or downgradient. The following assessment focuses on hydrologic and water quality related impacts that could result from the proposed addition of the impermeable landfill cover and implementation of a stormwater management system associated with the Project.

Hydrologic Analysis

The City's civil engineer completed a series of hydrologic and hydraulic analyses (hydrologic study) for the Proposed Project (EBA, 2015, 2016, 2019c, 2019d, 2019e). The hydrology study was conducted in accordance with 27CCR, §21150 for determining design parameters for the final closure drainage facilities. The hydrologic analysis was peer-reviewed by the City's environmental consultant for accuracy and to verify that methodologies and assumptions employed were defensible and appropriate and that the results were valid. Where applicable, the results and findings of the hydrologic study are incorporated into the analysis of the Project's potential environmental impacts presented here. Discussed below is a summary of the model analysis methodology and results, followed by an assessment of the Project's potential environmental impacts related to erosion, siltation, polluted runoff and flooding from the proposed Project.

Methodology

The Project site is located within an undeveloped 1.4 square mile tributary sub-watershed within the larger Russian River watershed. All surface drainage from the sub-watershed flows downgradient via ephemeral channels to a confluence point at the western property boundary of the landfill, and from there to the Russian River main stem. The hydrologic study included a detailed review of the pre- and post-project hydrologic characteristics of the 1.4 square mile sub-watershed and 40-acre Project site. Model-based analyses were conducted to quantify changes to runoff rates and volumes resulting from implementation of the Project and to determine drainage patterns and flood risks. The hydrologic study assessed potential hydromodification impacts to the unnamed ephemeral creek from increased runoff and altered drainage patterns and the model results were incorporated into the engineering design for a stormwater management system to ensure adequate conveyance capacity and stability for 100-year storm events.

The 1.4 square mile sub-watershed that contains the Project site was divided into sub-drainages and peak runoff flow rates and volumes were calculated using the rational method as outlined in the County of Mendocino Road and Development Standards (County of Mendocino, 2008). A runoff coefficient of 0.90 was used for areas of the landfill receiving closure and 0.45 was used for areas outside of the landfill as average slopes at the site exceed 25% (Standard D12; County of Mendocino, 2008). Watershed areas, hydraulic distances, and slopes were determined from design drawings and site maps (EBA, 2019c, 2019d, 2019e). Hydrographs were created for the pre-closure and post-closure conditions for the 2, 10, 25, and 100-year, 24-hour storm events using the computer program, "HydroCAD". The pre-closure and post-closure hydrographs were then compared to determine how the closure improvements (i.e. new cover and storm drainage

system) affected the storm water volumes and rates downstream of the Project site at the western edge of the property boundary. Discharges and channel velocities were calculated using the computer program "Hydraflow Extensions".

Accurate hydrologic modelling requires rainfall characteristics that are representative of the study area. Rainfall intensity for design of the drainage facilities was calculated from the 100-year recurrence interval rainfall intensity-duration chart for Mendocino County, Ukiah-Lake Mendocino Dam (EBA, 2015, 2019c). The storm duration and intensity for stormwater system design included consideration of the rainfall depths and associated runoff from the 2-year 24-hour storm (3.57 inches), the 10-year 24-hour storm (5.27 inches) the 25-year 24-hour storm (6.23 inches), and the 100-year 24-hour storm (7.62 inches) to determine peak runoff rates and total volume generated during design storms. The hydrology of the sub-watershed area was modelled in the pre- and post-project condition for the design storms to ensure that the stormwater management system was designed and sized appropriately for the proposed and foreseeable level of development at the Project site and to assess potential hydromodification related impacts.

Results

Hydrologic study results for the 1.4 square mile sub-watershed area under the pre- and post-project condition show that the proposed Project would not increase peak discharge rates and stormwater volumes discharged from the Project site to an extent that would cause a significant impact related to hydromodification, erosion, or flooding (EBA, 2019e). The proposed cover system would increase the peak discharge rate for the sub-watershed area (Table 3.7-3, but the proposed stormwater system improvements would minimize or avoid impacts related to erosion, hydromodification, and flooding. The proposed design elements for stormwater capture, treatment, storage, conveyance and drainage routing are sized appropriately for calculated peak discharges associated with the required design storms for the post-closure condition. The results of the hydrologic study demonstrate that the proposed Project would comply with the applicable stormwater management requirements specified in: 27CCR, §21150 for final closure drainage facilities design parameters and 27CCR, §20320(e) / §20365 for on-site drainage control facilities designed to prevent inundation from a 100-year 24-hour storm event (EBA, 2016). Additionally, as assessed in detail below for each topic, the stormwater system has been designed, based on engineering and model analysis, to ensure hillside, channel, and culvert stability for the 100-year/24-hour design storm and to reduce turbidity, erosion, and sedimentation.

Table 3.7-3
Summary of Hydrologic Model Analysis Results

Project Site Condition	Sub-Watershed Discharge Summary by Design Storm			
	2-year	10-year	25-year	100-year
Sub-watershed Volume (cf)				
Pre-closure Volume	3,462,444	7,255,008	9,636,688	13,277,958
Post-Closure Volume	3,645,000	7,520,897	9,940,282	13,626,923
Difference in Volume	182,556	265,889	303,594	348,965
Percent Volume Increase	5.0%	3.5%	3.1%	2.6%
Sub-watershed Discharge (cfs)				

Table 3.7-3
Summary of Hydrologic Model Analysis Results

Project Site Condition	Sub-Watershed Discharge Summary by Design Storm			
	2-year	10-year	25-year	100-year
Pre-closure Flow Rate	369.68	530.73	636.88	796.10
Post-Closure Flow Rate	388.08	557.14	668.57	835.71
Difference in Flow Rate	18.4	26.4	31.7	39.6
Percent Flow Rate Increase	5.0%	5.0%	5.0%	5.0%
Channel Stage				
Pre-closure Depth of Flow	3.52	4.11	4.43	4.87
Post-Closure Depth of Flow	3.60	4.19	4.52	4.96
Difference in Depth of Flow	0.08	0.08	0.09	0.09
Percent Depth of Flow Increase	2.2%	1.9%	1.6%	1.8%

Source: EBA, 2019e

Erosion and Siltation

As described under 3.7-1, above, during construction of the proposed Project, the City would be required to comply with the NPDES regulations and apply for coverage under the CGP because ground disturbance at the Project site would exceed one acre. Under the CGP, the Project applicant would be required to prepare a SWPPP. The SWPPP must include site-specific erosion and sedimentation control practices and would limit the amount of runoff that may be directed offsite during construction. Compliance with the requirements of the CGP, SWPPP, and the implementation of associated BMPs would prevent erosion and siltation on- and off-site during construction. Impacts related to erosion and/or siltation due to altered drainage patterns during construction would be ***less-than-significant.***

Following construction, the proposed landfill cover will provide an impermeable surface protecting the Waste Management Unit from stormwater infiltration. The cover will increase the volume and rate of stormwater being discharged from the site (Table 3.7-3). However, as assessed by EBA (2015) the potential for hydromodification related impacts to occur within the ephemeral channel or downstream are minimal. The hydrologic analysis conducted by EBA (2015, 2016, 2019e) assessed the pre- and post-project condition which, when compared, demonstrates that for a 2-year 24-hour storm, an additional 182,577 cubic feet of stormwater would be discharged from the 1.4 square mile watershed, representing a 5.3% increase. EBA (2015, 2019e) assessed this increase (and those associated with other design storms) to determine if such an increase would result in hydromodification impacts. Calculations show that time of concentrations changed from 38.8 minutes to 38.7 minutes (0.3% change), resulting in flows associated with the 2-year storm event to increase from 369.68 cfs to 388.08 cfs (5% increase). Hydraulic calculations were performed to determine the hydraulic capacity of the existing channel, which demonstrate that, for the 2-year storm event, flow depth (creek stage) increases from 3.52 feet to 3.660 feet (2.2% increase) and corresponding velocities increase from 8.90 feet per second to 8.98 feet per second (0.9% increase). Similar increases were determined for the 10-, 25-, and 100-year storm events (Table 3.7-1). Such increases were not determined to be significant increases in the context of the 1.4 square mile watershed and were not determined to cause hydromodification related impacts, such as erosion or channel incision and subsequent

sedimentation of surface waters on-site or downstream (EBA 2015, 2016, 2019e). Additionally, as discussed below, drainage, stormwater detention, erosion, and sediment reduction improvements will be completed as part of the Project which further reduce the potential for hydromodification impacts.

Stormwater outfall structures

The proposed drainage facilities consist of a network of benches, channels/swales, and storm drains that collect and convey stormwater run-off to a series of corrugated metal pipe (CMP) discharge culverts. These CMP culverts discharge to the unnamed ephemeral creek channel at various locations along the length of the landfills' northern boundary. In general, the drainage system is designed to intercept run-off at intervals along the inside edges of berms, benches, or access roads.

The proposed project includes the removal and/or replacement of fourteen stormwater outfalls that currently or will discharge stormwater to the unnamed ephemeral creek. Seven existing outfalls will be removed, four will be replaced with upgraded structures and three will be installed as new outfalls. As discussed in Section 3.7.2, the existing outfalls are of poor design and are causing erosion and sedimentation within the creek channel. The disturbed area of each new outfall location is minimal in size with an estimated width of 6-feet and extending up 10-feet from the top of bank into the bed of the tributary stream. Fill quantities have been calculated to be approximately three cubic yards of engineered fill and durable rock for each outfall location. Work in the creek channel will not occur when flows are present and erosion control measures will be employed at each location upon completion stabilize disturbed soils, minimize erosion, and provide protection to the disturbed area in accordance with the Closure Plans (City of Ukiah, 2019).

The existing outfalls that are proposed for removal are all located above and outside of the bed of the channel and therefore will result in minimal disturbance to the ephemeral creek below the top of bank. Each of the proposed new or upgraded outfall structures will be excavated into the bed and bank of the creek and will include energy dissipating rock aprons located within the flow line of ephemeral creek that will direct stormwater to the existing channel. The changes to the drainage outfalls therefore result in a net improvement to the existing drainage system components regarding potential erosion and sedimentation.

The volume of discharge, velocity and normal depth of flow for the 2-, 10-, 25-, and 100-year storm events for each outlet discharging directly to the creek was assessed by EBA (2016). The hydraulic calculations were incorporated into the proposed design of the outfall structures, including the rip rap energy dissipation components, to ensure erosion and scour does not occur for the worst-case discharge conditions related to the 100-year storm event at each outlet. Additionally, the outfall structure calculations and design incorporated information and requirements from Table 865.2 - Permissible Shear and Velocity for Selected Lining Materials of the Caltrans Highway Design Manual and excerpts from the California Stormwater BMP

Handbook for Construction for "Velocity Dissipation Devices" to ensure regulatory consistency and minimization of potential erosion and sedimentation within the creek channel.

Sediment Ponds

A sedimentation pond is located at the western end of the landfill to control sediment run-off from slope areas along the western and portions of the southern fill boundaries. Two additional sedimentation ponds are located at the northeastern end of the landfill to contain sediment run-off from the eastern portion of the landfill site and the soil borrow area. The sediment ponds will continue to collect sediment as part of the proposed Project, reducing sediment and turbidity in downstream receiving waters from landfill stormwater runoff. Additionally, as described in Section 3.7.2, the sediment pond at western edge of the property boundary, discharging to the ephemeral creek at the downstream edge of the landfill property, has a riser outlet structure and an additional overflow pipe in the embankment. The riser outlet structure is currently not functioning, and the pond fills up, then spills through the overflow pipe in the embankment. As part of the proposed Project the riser outlet structure would be replaced, and the sediment pond would function as a detention structure for metered outflow. (Calculations completed by EBA (2015, 2016) analyzed the pre- and post-project detention capacity for the 2 year 24-hour storm event. Using the program Hydroflow Hydrographs, hydrographs were created for the pre- and post-project conditions of the tributary watershed to the sediment pond and then routed through the pond to determine capacity and the potential for reducing peak flows, and thus potential erosion and/or hydromodification within the creek channel. Pre-project discharges from the pond associated with the 2-year 24-hour storm event are 2.08 cfs. With modifications to the outlet structure, the sediment pond will have a storage capacity sufficient to reduce flows leaving the pond by 1.51 cfs to 0.57 cfs (EBA, 2015), thereby reducing peak discharges and potential erosion and sedimentation in the ephemeral creek channel as compared to baseline conditions.

Erosion Control Features

The proposed Project includes features and provisions to minimize the potential for erosion as required by 27CCR, §21150. The following erosion control features and provisions would reduce erosion from stormwater runoff on the landfill site and, subsequently, reduce sedimentation and turbidity in downstream receiving waters (City of Ukiah, 2019). The geosynthetic final cover system will substantially eliminate the potential for stormwater erosion and the discharge of sediment from the landfill surface as no soil component will be utilized in the final cover design. The final surface of the soil borrow area, as well as other areas disturbed by the construction operations, will be repaired/graded as necessary and then hydroseeded. Areas with surface slopes steeper than ten percent will also be covered with 1.5 inches of straw and secured with erosion control netting. Drainage channels outside the landfill footprint that will potentially be subjected to high flow velocities will be lined with rock rip-rap to protect against erosion. All drainage outfalls will be lined with rock rip-rap. Aggregate base will be placed on perimeter access roads to allow for all-weather access and will also reduce the potential for sediment-laden run-off from these areas.

Conclusion

Compliance with the requirements of the WDRs specified under Order R1-2002-0061, including discharge prohibitions, monitoring, and corrective actions under the MRP, would prevent the discharge of pollutants, including sediment, to surface waters or groundwater. Increases to stormwater discharge rates and volumes from the landfill would not cause hydromodification impacts on-site or downstream as such increases are not significant in the context of the 1.4 square mile contributing watershed the Project site is within (EBA, 2015, 2016, 2019e). Also, any such increases to discharge rates and volumes will be offset by the proposed improvements to the stormwater system, the outfall structures, the sediment ponds, and the site-wide erosion control features. Further, the proposed drainage system has been designed consistent with the requirements of 27CCR, §21150. The proposed improvements to the stormwater outfall structures located within the ephemeral creek will adhere to the requirements of a *Streambed Alteration Agreement (1602 Permit)* from the California Department of Fish and Game, a *Water Quality Certification (401 Permit)* from the RWQCB, and a *Clean Water Action Section 404 Permit (404 Permit)* from the United States Army Corps of Engineers. Adherence to the provisions of regulatory requirements and permits, which would require source controls of stormwater volumes and implementation of BMPs for stormwater quality management, such as through the proposed stormwater management system, would ensure impacts related to erosion and/or siltation due to altered drainage patterns following completion of construction would be less-than-significant.

Flooding as a Result of Increased Runoff

The Project area is not located within a flood hazard risk area associated with a 100-year flood (**Figure 3.7-2 above**) and, as discussed in detail under "Erosion and Siltation, above, the Project would not result in substantially altered on-site drainage patterns (i.e., only minor changes to drainage patterns). Implementing the proposed Project would create an additional 40 acres of impervious surfaces within the 1.4 square mile sub-watershed area, which is largely undeveloped. As described above, the proposed Project will result in a 2.6% increase in stormwater volume associated with the 100-year 24-hour storm event for the sub-watershed (Table 3.7-3), which would not result in overtopping of channel banks on-site or downstream (EBA 2015, 2019e). The proposed design elements for stormwater capture, treatment, storage, conveyance and drainage routing are sized appropriately for calculated peak discharges associated with the required design storms.

Title 27 of the California Code of Regulations (27CCR), §20260(c) requires that the Project be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency. As required, the drainage system components are designed to accommodate 100-year, 24-hour precipitation conditions with sizing and capacity to safely convey storm flows associated with 100-year storm (EBA, 2019c, 2015, 2016). The results of the hydrologic study demonstrate that the proposed Project would comply with the applicable stormwater management requirements for on-site drainage control facilities designed to prevent inundation from a 100-year 24-hour storm event (EBA, 2016). Impacts related to flooding due to

altered drainage patterns or the addition of impervious surfaces following completion of construction would be ***less-than-significant***.

Stormwater System Capacity and Polluted Runoff

As described above under "Flooding as a Result of Increased Runoff", above, the Project's proposed stormwater management system has been designed consistent with regulatory requirements, including those related to conveyance capacity for peak discharges associated with the 100-year/24-hour storm. Stormwater treatment measures, such as the use of erosion control features and sediment ponds for sediment capture, are incorporated into the design of the stormwater management system to ensure pollutants are not mobilized and transported to downgradient waters. As described in detail under HY-1, above, the proposed Project would not result in new sources of pollutants as a result of construction or post-closure maintenance that could be transported via storm runoff. Impacts related to exceeding stormwater conveyance infrastructure or creating additional sources of polluted runoff would be less-than-significant.

Impeding or Redirecting Flood Flows

The Project site is not located within the 100-year flood hazard zone designated by FEMA (**Figure 3.7-2 above**). The FIRM prepared for the Mendocino County, Map Number 06045C1516F, 2011, indicates the landfill is located within "Other Areas" (outside the 500-year flood boundary) and outside the 100-year flood hazards area. As described above, the stormwater management system proposed as part of the Project is sized appropriately for the calculated peak discharges associated with the 100-year/24-hour design storm. The design of the stormwater management system considered upslope runoff contributions which flow onto the Project site and is consistent with the requirements of Title 27 of the California Code of Regulations (27CCR), §20260(c) which requires that the Project be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency. As required, the drainage system components are designed to accommodate 100-year, 24-hour precipitation conditions with sizing and capacity to safely convey storm flows associated with 100-year storm. Impacts related to impeding or redirecting flood flows would be less-than-significant.

Significance: Less-than-Significant.

Impact 3.7-4: Would the Proposed Project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

As discussed above under Impacts 3.7-1, 3.7-2, and 3.7-3, no water quality degradation would occur as a result of the proposed project as compared to baseline conditions. As described under topic Impact 3.7-1, the Proposed Project would have a less-than-significant impact on surface water and groundwater quality on-site and off-site. This includes the Russian River and its

tributaries, which are subject to the RWQCB Basin Plan water quality objectives. Basin Plan water quality objectives include parameters such as turbidity/sediment. The Basin Plan water quality objectives are designed to preserve and enhance water quality and protect the beneficial uses of all regional terrestrial surface water bodies (e.g., creeks, rivers, streams, and lakes) and groundwaters within the RWQCB's jurisdictional area. As discussed in Section 3.7.3, the Russian River is currently classified as impaired for sediment/turbidity and temperature. As discussed under Impact 3.7-3, the Proposed Project would result in a reduction of sediment in stormwater runoff through improved discharge and erosion structures and the new cover system for the Waste Management Unit.

The Project would comply with the requirements of the CGP under the NPDES Permit program, including implementation of BMPs and other requirements of a SWPPP, as well as the WDR requirements of Order R1-2002-0061 and the associated MRP, all of which are designed to ensure stormwater discharges associated with construction and post-closure maintenance of the Project site comply with applicable water quality standards. The Project would not require ongoing substantial groundwater withdrawals or reduce groundwater recharge, as discussed under Impact 3.7-2, and therefore would not conflict with or obstruct implementation of a sustainable groundwater management plan. Impacts relating to conflict or obstruction of implementing a water quality control plan or sustainable groundwater management plan would be less-than-significant.

Significance: Less-than-Significant.

3.7.5 Cumulative Effects

The geographic scope for assessing potential cumulative hydrology and water quality impacts consists of the Project site and surrounding lands within the 1.4 square mile sub-watershed. The analysis of cumulative impacts on hydrology and water quality considers those cumulative projects that would be constructed at the same time as the Proposed Project. There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts to hydrology or water quality. As described below, the Proposed Project would not result in or contribute to cumulative impacts; cumulative impacts to hydrology and water quality would be mitigated on a project-by-project level in accordance with applicable regulatory requirements, and through the established regulatory review process.

The analysis of cumulative impacts considers that all future development with the potential to impact hydrology and water quality would be required to demonstrate compliance with applicable federal and state regulatory requirements, which are intended to reduce and/or avoid potential adverse environmental effects on surface and groundwater resources as a result of multiple

actions, such as development projects within a watershed. Through implementing regulatory stormwater management requirements, surface water, groundwater, and aquatic habitats are protected from potential sources of degraded water quality, increased flow rates and runoff volumes, which can result in downstream erosion, sedimentation, and other water quality and quantity impacts to a watershed system.

Construction of the proposed Project would include preparation of a SWPPP and implementation of BMPs required under the CGP. Once construction is completed, the Project would be required to adhere to provisions of the RWQCB WDRs and associated MRP for the landfill site. The Project includes a stormwater management system which includes a series of drains, swales, conveyance pipes, and sediment ponds to treat stormwater (i.e. capture sediment) and new and upgraded outfall structures that reduce erosion and sedimentation as compared to baseline conditions, and control an anticipated increase in stormwater runoff from the increase in impervious area associated with the proposed cover system. Implementation of the Project would not substantially increase the rate or amount of peak runoff in a manner that would result in hydromodification impacts, increase flooding or flood risks, erosion, and/or sedimentation on- or off-site, or reduce groundwater recharge.

The cumulative projects identified in Table 3.7-3 could involve excavation and use of heavy equipment during construction. Therefore, the cumulative projects have the potential to degrade surface water quality as a result of construction-related soil erosion or accidental discharges of hazardous construction chemicals. As discussed in Section 3.7.3, the Russian River and its tributaries is currently listed on the 303(d) list as impaired for sediment. The Russian River Sediment TMDL Implementation Policy implements controls on sediment waste discharges to impaired water bodies so that the TMDLs are met, sediment water quality objectives are attained, and beneficial uses are no longer adversely affected or impaired as a result of sediment. Under the Sediment TMDL Implementation Policy, RWQCB staff control sediment pollution through existing permitting and enforcement tools. Prior to issuance of any NPDES permits for construction activities, operational discharges, or licenses, a review and authorization process by the RWQCB is required to ensure such permits and licenses are protective of designated beneficial uses and water quality and that TMDL requirements are incorporated as permit conditions in a manner consistent with relevant plans, policies, and guidelines.

Compliance with the CGP and WDR requirements for the proposed Project and compliance with NPDES requirements, including those relating to the Sediment TMDL Implementation Policy, for future projects would protect surface water quality from impacts resulting from cumulative development in the watershed. With adherence to the described regulatory requirements, the effects of the Project, combined with those of cumulative projects, would not cause a cumulatively significant effect to surface water or groundwater resources and the Project would not result in a cumulatively considerable contribution to any significant cumulative effect.

Significance: Less-than-Significant.

3.7.6 References

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3.8 Noise

3.8.1 Introduction

This chapter evaluates the potential noise impacts of the Proposed Project. This chapter provides a brief technical background on "sound", as well as, existing noise sources and levels in the Project vicinity. This evaluation reviews applicable State and local noise regulations, followed by analysis of potential noise impacts of construction and operation of the Proposed Project.

3.8.2 Environmental Setting

3.8.2.1 Noise Descriptors

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound. Sound pressure level has become the most common descriptor used to characterize the "loudness" of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Decibels are measured using different scales, and it has been found that A-weighting of sound levels best reflects the human ear's reduced sensitivity to low frequencies, and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. All references to decibels (dB) in this report will be A-weighted unless noted otherwise.

Several time-averaged scales represent noise environments and consequences of human activities. The most commonly used noise descriptors are the equivalent A–weighted sound level over a given time period (Leq)[1]; average day–night 24-hour average sound level (Ldn)[2] with a nighttime increase of 10 dB to account for sensitivity to noise during the nighttime; and community noise equivalent level (CNEL)[3], also a 24-hour average that includes both an evening and a nighttime sensitivity weighting. Table 3.8-1 identifies decibel levels for common sounds heard in the environment.

3.8.2.2 Noise Attenuation

Stationary point sources of noise, including construction equipment, attenuate (lessen) at a rate of 6 to 7.5 dB per doubling of distance from the source, depending on ground absorption. Soft sites attenuate at 7.5 dB per doubling because they have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. Hard sites have reflective surfaces (e.g., parking lots or smooth bodies of water) and therefore have less attenuation (6.0 dB per doubling). A street or roadway with moving vehicles (known as a "line" source), would typically attenuate at a lower rate, approximately 3 to 4.5 dB each time the distance doubles from the source, that also depends on ground absorption (Caltrans, 1998). Physical barriers located between a noise source and the noise receptor, such as berms or sound walls, would increase the attenuation that occurs by distance alone.

[1]The Equivalent Sound Level (Leq) is a single value of a constant sound level for the same measurement period duration, which has sound energy equal to the time–varying sound energy in the measurement period.
[2]Ldn is the day–night average sound level that is equal to the 24-hour A-weighted equivalent sound level with a 10-decibel penalty applied to night between 10:00 p.m. and 7:00 a.m.
[3]CNEL is the average A-weighted noise level during a 24-hour day, obtained by addition of 5 decibels in the evening from 7:00 to 10:00 p.m., and an addition of a 10–decibel penalty in the night between 10:00 p.m. and 7:00 a.m.

Table 3.8-1
Typical Noise Levels

Noise Level (dB)	Outdoor Activity	Indoor Activity
90+	Gas lawn mower at 3 feet, jet flyover at 1,000 feet	Rock Band
80–90	Diesel truck at 50 feet	Loud television at 3 feet
70–80	Gas lawn mower at 100 feet, noisy urban area	Garbage disposal at 3 feet, vacuum cleaner at 10 feet
60–70	Commercial area	Normal speech at 3 feet
40–60	Quiet urban daytime, traffic at 300 feet	Large business office, dishwasher next room
20–40	Quiet rural, suburban nighttime	Concert hall (background), library, bedroom at night
10–20		Broadcast / recording studio
0	Lowest threshold of human hearing	Lowest threshold of human hearing

Source: (modified from Caltrans Technical Noise Supplement, 1998)

3.8.2.3 Sensitive Receptors

Some land uses are considered more sensitive to ambient noise levels than others due to the amount of noise exposure, in terms of both duration and insulation from noise, and the types of activities typically involved. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, parks and outdoor recreation areas are generally more sensitive to noise than commercial and industrial land uses.

The Project site is mostly surrounded by open space. The nearest sensitive receptor is the Vichy Springs Resort and Spa, located approximately 600 feet south of the site entrance. The northwest corner of the site (sediment pond) is at least 1,000 feet from rural residences on Fawnwood Drive (single family dwellings). There are also several residential dwellings south of the landfill adjacent to Vichy Springs Road.

Construction noise from the proposed project would be impeded from reaching these homes by the southern ridge of the landfill. However, Vichy Springs Road would be used to transport construction equipment and materials to the site, and noise from passing construction traffic would temporarily increase existing noise levels at these homes.

Existing Noise Sources

To quantify existing ambient noise levels, three short-term (10-minute) noise measurements were taken at the Project site. Measurements were made using Metrosonics db308 Sound Level Meters calibrated before and after the measurements. These measurements were taken in the middle of a private road to the old gun club, next to the pond (Site 1), at the landfill locked gate (Site 2), and 40 feet from road centerline of Vichy Springs Road at Medicine Way (Site 3).

The noise measurements are summarized in Table 3.8-2 below. In general, the Project site is a very quiet location. The predominant sources of noise in the vicinity of the Project site were birds, water, distant gun shots, and traffic from Vichy Springs Road.

Table 3.8-2
Existing Noise Measurements

Location	Time Period – Wednesday December 14, 2016	Noise Levels (dB)	Noise Sources
Site 1: Middle of a private road to the old gun club, next to pond	1:28 p.m. to 1:38 p.m.	5-minute Leq's: 42, 43	Noises included dripping water in pond, small bird noises (including ducks on the pond), a few shots from a distant gun range (less than 42 dB), and a distant overhead plane.
Site 2: At the landfill locked gate	1:44 p.m. to 1:54 p.m.	5-minute Leq's: 47, 52	Truck on Vichy Springs was 43 dB. Quieter noises included mechanical noise (saw or drill) from the direction of Vichy Springs, birds, frogs, distant people talking, and distant gun shots (all <41.4 dB).
Site 3: 40 feet from road centerline of Vichy Springs Road at Medicine Way	2:04 p.m. to 2:14 p.m.	5-minute Leq's: 59, 63	14 cars passed, four vehicles measured at: 76 dB, 75 dB, 74 dB, and 71 dB. A bus was 71 dB and a truck was 70 dB. Quieter noises included a background spring (46 dB), light rain (>41.4 dB), and backyard creek.

Source: RCH Group, 2017

3.8.3 Regulatory Context

Pertinent local noise regulations are discussed within the following section. There are no applicable state or federal noise requirements.

3.8.3.1 Local Regulations and Plans

Mendocino County General Plan Noise Element

The Noise Element identifies noise levels acceptable for various land uses (see **Figure 3.8-1**). These levels are designed to achieve acceptable interior noise levels with standard building practice while maintaining an outdoor environment that can be considered reasonably pleasant.

Mendocino County Noise Ordinance

Noise sources that are controlled by local regulation are generally considered stationary sources. These sources include noise from a variety of sources such as mechanical equipment, amplified music, public events, barking dogs, etc. are most typically regulated by ordinance. In Mendocino County, these standards are found in Appendix C of Title 20 of the County Code Zoning Ordinance.

Based on the County's noise regulations, the stationary noise standards for light and heavy industrial uses are established at 70 and 75 dBA. These levels are not to be exceeded for more than 30 minutes in any hour throughout an entire day.

For Vichy Springs Resort (600 feet south of the site), the receiving land use category is Limited

Figure 3.8-1

Commercial, Some Multifamily. For this land use category, Appendix C of Mendocino County Code of Ordinance establishes the daytime noise level standard at 60 dB (level not to be exceeded more than 30 minutes in any hour between 7:00 a.m. and 10:00 p.m.) and the nighttime noise level standard at 55 dB (level not to be exceeded more than 30 minutes in any hour between 10:00 p.m. and 7:00 a.m.).

City of Ukiah Municipal Code

§6054 Construction of Buildings and Projects states "it shall be unlawful for any person within a residential zone, or within a radius of five hundred feet (500') therefrom, to operate equipment or perform any outside construction or repair work on buildings, structures or projects or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist or any other construction type device (between the hours of 7:00 P.M. of one day and 7:00 A.M. of the next day) in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance unless beforehand a permit therefore has been duly obtained from the Director of Public works. No permit shall be required to perform emergency work as defined in §6046 of this Article." (Ord. 748, Article 1, adopted 1980).

3.8.4 Impact Analysis

This section discusses the significance criteria used to evaluate the potential impacts from construction and operation of the Proposed Project.

3.8.4.1 Significance Criteria

Appendix G of the CEQA Guidelines (CEQA Statute & Guidelines, 2019) states the project would result in a significant impact to noise if it would:

- Generate a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Generate excessive groundborne vibration or groundborne noise levels; or
- For a project located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, expose persons residing or working in the project area to excessive noise levels.

For long-term noise increases, noise levels from Proposed Project operations that would be incompatible with Mendocino County General Plan land use guidelines would result in potentially significant noise impacts. Noise levels exceeding the Normally Acceptable standards for a land use category would be potentially significant (see **Figure 3.8-1**). For residential uses this would be 60 dB, Ldn and for Transient Lodging – Motels, Hotels this would be 65 dB, Ldn.

For temporary noise increases, Proposed Project construction noise occurring outside of the acceptable hours of construction established in Ukiah Municipal Code would result in a potentially significant impact. Since Mendocino County currently does not include established construction hours in the Noise Ordinance, this analysis uses the construction hours established in the City of Ukiah Noise Ordinance to assess the impact of construction activity. Construction activity, repairs, and operation of equipment is generally prohibited between the hours of 7:00 p.m. of one day to 7:00 a.m. of the next day (Ukiah City Code, 2019), thus, acceptable hours for construction are 7:00 a.m. to 7:00 p.m.

For vibration, a peak particle velocity (ppv) threshold of 0.5 inch per second or greater can cause architectural damage and minor structural damage. The Federal Transit Administration (FTA) recommends a threshold of 0.5 ppv for residential and commercial structures, 0.25 ppv for historic buildings and archaeological sites, and 0.2 ppv for non-engineered timber and masonry buildings (FTA, 2006). Vibration generated from Proposed Project construction in excess of the FTA's recommended thresholds would result in a potentially significant vibration impact.

Airport noise could be potentially be significant if there were an airport or private airstrip within two miles of the Project site.

3.8.4.2 Approach to Analysis

The following discussions provide specific guidance as to how the significant levels for noise were determined.

- **Review of historic noise levels reported in other documents for the Ukiah Landfill.** Previous environmental reports, acoustic analyses, city provisions and contracts, and legal information was analyzed and considered for this analysis.
- **Review of public comments submitted.** A letter that previously stated concern about adverse noise impacts on nearby sensitive receptors resulting from truck and construction noise was reviewed and considered for this analysis.
- **Noise Measurements and estimates.** Existing noise measurements were gathered from three representative locations around the Ukiah Landfill, including Vichy Springs Road. The noise analysis uses a federal agency publication (FHWA, 2006) as the best sources of information to estimate noise levels from construction equipment.
- **Standard attenuation formulas.** The analysis uses accepted standardized attenuation formulas when reviewing potential ambient noise and groundborne vibration impacts to sensitive receptors.

3.8.4.3 Impacts and Mitigation Measures

Impact 3.8-1: Would the Proposed Project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Proposed Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction Related Noise Impacts

The Proposed Project would introduce temporary construction traffic and increases in ambient noise levels. On-road trucking construction activities would be a source of noise generation. This may potentially affect sensitive receptors along Vichy Springs Road. The Proposed Project would limit construction truck traffic to the hours of 7:00 a.m. to 7:00 p.m.

Construction would result in a temporary increase in ambient noise levels in the vicinity of the Proposed Project. Temporary heavy equipment operations such as grading and excavation and work-related construction of the final cover would be a source of noise. Construction activities would require the use of numerous pieces of noise-generating equipment, such as excavating machinery (e.g., loaders, etc.) and other construction equipment (e.g., scrapers, dozers, compactors, trucks, etc.).

The noise levels generated by construction equipment would vary greatly depending upon factors such as the type and specific model of the equipment, the operation being performed, the condition of the equipment and the prevailing wind direction. The maximum noise levels for various types of construction equipment that could be used during project construction are provided in **Table 3.8-3** below. Maximum noise levels generated by construction equipment used for the Proposed Project would range from 74 to 85 dB, L_{max} at a distance of 50-feet and 49 to 58 dB, L_{max} at 600-feet (the distance to the nearest off-site sensitive receptor).

The nearest sensitive receptor would be approximately 600-feet from the closest construction activities. Construction noise levels would be less than this estimate most of the time and would fluctuate throughout the day depending on the equipment use, construction schedules, and location of construction during extended periods of time. Furthermore, the majority of construction activities would occur greater than 1,000-feet from the northernmost cabin of Vichy Springs Resort. At this distance, maximum noise levels from construction (as shown in Table 3.8-3) would be below the Appendix C County noise standards (60 dB, Ldn for limited commercial) and below the land use noise compatibility standards in Figure 3.8-1 (65 dB, Ldn for motels and hotels). As a result, any temporary construction related noise would be considered less-than-significant.

Noise from the operation of off-road equipment is controllable by ordinance. However, most jurisdictions in California exempt temporary construction equipment operations noise from numerical standards compliance as long as a number of specified conditions are met. Project construction would comply with the City of Ukiah construction noise guidelines set forth in the Noise Ordinance that allow use of construction equipment from 7:00 a.m. to 7:00 p.m. Construction activities and vehicles use would occur within the allowable hours contained in the City of Ukiah construction noise guidelines. Construction activities associated with the Proposed Project would occur as close as 600-feet (minor grading and road construction); however, the majority of construction activities would occur greater than 1,000-feet from Vichy Springs Resort. At this distance, construction activity and off-road equipment noise would also be impeded from reaching any nearby sensitive receptors by an intervening ridge on the south side of the project site. Table 3.8-3 shows that the noise levels with an intervening ridge would be approximately 39 to 48 dB, L_{max} at 1,000-feet. Because of the low background levels in the project vicinity, these noise levels might be audible, but they would not interfere with off-site normal conversations or be a substantial increase over other ambient noise from daily activities. Since construction activities would comply with the acceptable hours for construction in the City of Ukiah Noise Ordinance (7 a.m. to 7 p.m.) and would not exceed the normally accepted compatibility standards for Vichy Springs Resort (65 dB, Ldn), or be a substantial increase above ambient levels, the Proposed Project would not result in any significant effects relating to construction noise.

Table 3.8-3
Typical Noise Levels from Construction Equipment (L_{max})

Construction Equipment	Noise Level (dB, L_{max} at 50 feet)	Noise Level (dB, L_{max} at 600 feet)	Noise Level (dB, L_{max} at 1,000 feet)
Dump Truck	76	49	39
Air Compressor	78	51	41
Backhoe	78	51	41
Dozer	82	55	45

Table 3.8-3
Typical Noise Levels from Construction Equipment (L_{max})

Construction Equipment	Noise Level (dB, L_{max} at 50 feet)	Noise Level (dB, L_{max} at 600 feet)	Noise Level (dB, L_{max} at 1,000 feet)
Compactor (ground)	83	56	46
Crane	81	54	44
Excavator	81	54	44
Flat Bed Truck	74	47	37
Paver	77	50	40
Grader	85	58	48
Compressor (Air)	78	51	41
Generator	81	54	44
Roller	80	53	43
Vibratory Concrete Mixer	80	53	43
Concrete Mixer Truck	79	52	42
Front End Loader	79	52	42

Notes: L_{max} = maximum sound level
An attenuation rate of 7.5 per doubling distance was used to convert the FHWA noise levels at 50-feet to the noise levels at 600-feet.
A deduction of 5 dB was applied to the estimated noise levels at 1,000 feet) to account for the ridgeline that would act as a noise barrier and attenuate noise levels reaching sensitive receptors south of the ridgeline.
Source: Federal Highway Administration (FHWA) Roadway Construction Noise Model User's Guide, 2006.

Operational Noise Impacts

Noise from post-construction operations would be minimal and compatible with the surrounding land uses. Post-construction noise would include post-closure maintenance, periodic vehicle traffic from applicable agencies when conducting maintenance and monitoring procedures, and landfill gas monitoring. None of these sources would result in a substantial increase in noise levels in the site vicinity or along Vichy Springs Road. Any permanent increase in ambient noise levels in the site vicinity would not be substantially greater than existing levels without the Proposed Project, and the Proposed Project would not result in any significant effects relating to operational noise and no mitigation measures are required.

Significance Determination: Less-Than-Significant.

Impact 3.8-2: Would the Proposed Project generate excessive groundborne vibration or groundborne noise levels?

Construction operations have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. The ground vibration levels associated with various types of construction equipment are summarized in Table 3.8-4. Ground vibration generated by construction equipment spreads through the ground and diminishes rapidly in magnitude with increases in distance. The effects of ground vibration may be imperceptible at the lowest levels, low rumbling sounds and detectable vibrations at moderate levels, and slight damage to nearby structures at the highest levels.

At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in structural damage. For most structures, a peak particle velocity (ppv) threshold of 0.5 inch per second or less is sufficient to avoid structural damage. The

Federal Transit Administration recommends a threshold of 0.5 ppv for residential and commercial structures, 0.25 ppv for historic buildings and archaeological sites, and 0.2 ppv for non-engineered timber and masonry buildings *(FTA, 2006*). The Office of Historic Preservation (OHP) listed Ukiah Vichy Springs Resort as a historical landmark in 1988 (OHP, 2019). Vichy Springs Resort would follow the standard of 0.25 ppv for vibration threshold recommendations.

The Proposed Project would not involve the use of any equipment or processes that would result in potentially significant levels of ground vibration (i.e., pile drivers). Vibrational effects from typical construction activities are only a concern when conducted within 25-feet of existing structures (Caltrans, 2002). As shown in Table 3.8-4, the predicted vibration levels from dozers and trucks at a distance of just 25-feet would not exceed the 0.5 ppv threshold for residential and commercial structures or the 0.25 ppv threshold for historic buildings and archaeological sites. Residential dwellings along Vichy Springs Road are not within 25-feet of the centerline of the road and would not be affected by vibration from nearby use of Vichy Springs Road for construction truck traffic activity at this distance.

Table 3.8-4
Representative Vibration Source Levels for Construction Equipment

Equipment	Peak Particle Velocity at 25-Feet (in/sec)
Large Bulldozer	0.089
Loaded Trucks	0.076
Jackhammer	0.035
Small Bulldozer	0.003

Source: Federal Transit Administration, 2006.

In addition, the Proposed Project is located in an area characterized by open space and rangeland and the nearest sensitive receptor structure is approximately 600-feet away from the nearest proposed construction activity at the landfill. The potential vibration levels caused by the equipment at the landfill would be much less than the threshold of perceptibility. As a result, potential vibration effects associated with construction truck traffic or the use of construction equipment at the landfill would not result in any potentially significant groundborne vibration impacts to structures or people. Therefore, vibration impacts would be a less than significant and no mitigation measures are required.

Significance Determination: Less-Than-Significant.

Impact 3.8-3: Would the Proposed Project be located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, and/or expose people residing or working in the project area to excessive noise levels.

The site is not located within the vicinity of a private airstrip or an area covered by an airport land use plan or within two miles of a public or public use airport. Temporary construction activity at the site would not expose people working at the site to excessive noise levels and no impact would occur and no mitigation measures are required.

Significance Determination: No Impact.

3.8.5 Cumulative Effects

There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative noise impacts.

Significance: Less-than-Significant.

3.8.6 References

California Department of Transportation (Caltrans), *Technical Noise Supplement*, 1998.

California Department of Transportation (Caltrans), *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects,* October 1998.

California Department of Transportation (Caltrans), *Transportation Related Earthborne Vibrations*, February, 2002.

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Office of Historic Preservation (OHP), *Ukiah Vichy Springs Resort (listed 8/23/1988),* 2019. http://ohp.parks.ca.gov/ListedResources/Detail/980

Office of Planning and Research (OPR), *General Plan Guideline, Appendix D,* 2017. http://opr.ca.gov/docs/OPR_Appendix_D_final.pdf

Chapter 4 Alternatives

This chapter describes the alternatives to the Proposed Project and includes a discussion of the CEQA requirements for alternatives, alternatives evaluated in this EIR, alternatives considered and eliminated, and the selection of the environmentally superior alternative.

4.1 CEQA Requirements for Alternatives

CEQA requires that a reasonable range of feasible alternatives be evaluated in an EIR. The CEQA Guidelines, Section 15126.6, *Consideration and Discussion of Alternatives to the Proposed Project*, specify the following:

> "(a) Alternatives to the Proposed Project. An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation. An EIR is not required to consider alternatives that are infeasible. The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting (and eliminating) those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason. (*Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553 and *Laurel Heights Improvement Association v. Regents of the University of California* (1988) 47 Cal.3d 376)."

With respect to the feasibility of alternatives, the CEQA Guidelines state, "among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, jurisdictional boundaries, and whether an applicant can reasonably acquire, control or otherwise have access to the alternative site." The CEQA Guidelines also state that the alternatives discussion should not be remote or speculative, and need not be presented in the same level of detail as the assessment of the Proposed Project.

4.1.1 Factors in the Selection of Alternatives

CEQA Guidelines §15126.6(c) recommends that an EIR briefly describe the rationale for selecting the alternatives to be discussed. A reasonable range of alternatives is considered for this analysis. The following factors were considered in identifying a reasonable range of alternatives to the Project:

- Does the alternative accomplish all or most of the primary Project objectives?
- Is the alternative feasible, from an economic, environmental, legal, social and technological standpoint?
- Does the alternative avoid or lessen any significant environmental effects of the Project?

4.2 Alternatives Evaluated in this PEIR

As described in **Chapter 1 – Introduction and Chapter 2 – Project Description**, the overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, groundwater/surface water monitoring systems, and site security. The Final CPMP for the Ukiah Landfill has been prepared for and conditionally approved by the following agencies:

- California Department of Resources Recycling and Recovery (CalRecycle)
- Mendocino County Department of Public Health
- North Coast Regional Water Quality Control Board
- Mendocino County Air Quality Management District

The Final CPMP has been prepared in accordance with Title 27 of the California Code of Regulations (27 CCR), and Chapters 3 and 4 and the Code of Federal Regulations (CFR) 40, Subpart F. The objectives of the plan are identified below.

- To provide a detailed plan and schedule for closure implementation.
- To provide a plan and schedule for the inspection, maintenance and monitoring procedures to be implemented during the post-closure maintenance period.
- To allow the applicable agencies to monitor closure and post-closure activities to determine that all landfill closure and post-closure maintenance and monitoring requirements are being followed in accordance with the approved plan.
- To provide a basis for the establishment of an accurate detailed cost estimate for closure and post-closure maintenance.

As detailed in Chapter 3 – Environmental Analysis, the Proposed Project would have several potentially significant impacts to the environment. However, with the implementation of the identified and corresponding mitigation measures, all of the potentially significant impacts can be avoided or reduced to less-than-significant levels. Therefore, in the selection of alternatives, there is no need to identify alternatives to avoid or less any environmental effects of the Project, because no unavoidable significant impacts have been identified. Also, as explained in more detail in 4.3 Alternatives Considered and Eliminated, only the Proposed Project is determined to be potentially feasible. An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative (CEQA, 15126.6 (f)(3)). As a result, for this Proposed Project, the only alternative that needs to be evaluated in this Draft EIR is the CEQA required No Project Alternative (Mount Shasta Bioregional Ecology Center v. County of Siskiyou, 2012). CEQA does not require the analysis of the other considered alternatives that are not potentially feasible. The No Project Alternative is discussed below. In addition, below we have also provided a discussion of the other alternatives that were considered and eliminated - along with the rationale.

4.2.1 No Project Alternative

CEQA Guidelines §15126.6(e) provides that a No Project Alternative shall also be evaluated along with its impact. According to the CEQA Guidelines, the No Project Alternative shall discuss the existing conditions at the time the Notice of Preparation was published, as well as what would be reasonably expected to occur in the foreseeable future if the Project were not approved, based on current plans and consistent with available infrastructure and community services.

Under the No Project Alternative, the City would not close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, none of the new components and systems required for closure of the landfill would be implemented. This includes, but is not limited to the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, and landfill slope stability as well as drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, and groundwater/surface water monitoring systems. The on-going maintenance of the landfill, would probably continue in a manner similar to existing maintenance of the landfill, since it ceased receiving waste.

The No Project Alternative would result in less significant temporary construction related impacts than the Proposed Project. All of the potentially significant impacts associated with the construction and operation of the Project would not occur under this alternative. However, the No Project Alternative would fail to meet any and/or all of the objectives of the Project. Under the No Project Alternative, the Ukiah Landfill would not be properly closed according to state and local regulations and would be susceptible to slope instability, potential water quality impacts to surface water and groundwater resources due to inadequate cover leading to drainage and erosion issues during inclement weather/stormwater, and the potential for inadequate LFG control and monitoring leading to air quality issues and impacts. Under the No Project Alternative, the City would be potentially susceptible for a variety of water quality and air quality violations and fines.

4.3 Alternatives Considered and Eliminated

Summarized below are the alternatives that were considered and eliminated from further consideration – along with the rationale for elimination.

Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative. The Natural or Clay Layer closure option was a 1974 standard that was officially adopted in 1985 as part of then Subchapter 15 of Title 27 of the California Code of Regulations (27 CCR). However, over the last 35-plus years, the waste industry, along with the regulatory agencies and surrounding communities has recognized that there are serious short-falls with compacted clay layers from both a performance and cost perspective – especially on sites with slope stability issues. The Ukiah Landfill is located on steep, 2:1 plus, slope and the potential for a clay and/or geosynthetic clay layer alternative failure is unreasonably quite high. Such a failure would result in significant water quality issues to the unnamed creek alongside the Ukiah Landfill, which drains into Sulfur Creek and then the Russian River. Further, forensic analyses of a number of natural landfill cover slope failures over the last 20-plus years has shown that both Compacted Clay and Geosynthetic Clay Liners fail due to pore water pressure rise in saturated cover soils building up beneath the clay layers; particularly on steep slopes such as the conditions of the Ukiah Landfill. In short, the heavy clay layers assist in the probability in slope instability. Further, CalRecycle has approved

numerous alternative landfill covers that are similar to the Proposed Project throughout the State of California and they have proven to be a viable alternative, especially on landfills with steep slopes.

From an environmental perspective, this compacted clay and/or geo synthetic clay layer alternative would also cause a substantial increase in temporary construction impacts to air quality, noise, and traffic issues over the Proposed Project as it would require the need to excavate and/or import (transport) significant quantities of clay sources and natural vegetation cover soils of to the site and spread them over the 40-acre Ukiah Landfill. Also, from an operational standpoint, this alternative would result in increased maintenance impacts and costs to maintain the natural grass/vegetation to prevent fires and keep rodents from compromising the clay layer structure, which would then contribute to a substantial increase in traffic, air quality, noise, and other potential environmental impacts.

The City has proposed the Proposed Project and artificial cover alternative because it has many beneficial advantages over the compacted clay and/or geo synthetic clay layer alternative as the Proposed Project provides: 1) A proven stable cover on steep slopes due to the elimination of low interface strength pore water pressure and gas relief layers, 2) Decreased exposure to construction-related air quality, noise, and traffic impacts and potential long-term water quality impacts to surface and groundwater resources which could lead to significant fines, and 3) significant lower capital and on-going/perpetual maintenance costs. As a result, this compacted clay and/or geo synthetic clay layer alternative has been considered, but is eliminated from further consideration as it does not perform as well as the Proposed Project. This alternative is not considered feasible because it is not capable of being accomplished in a successful manner within a reasonable period of time, taking into account environmental, economic and technological factors (CEQA Guidelines, Section 15364).

Relocation of the Ukiah Landfill. Moving all the waste from one landfill to another is often referred to as a Clean Closure. It is typically only done on small unpermitted landfills or dumping areas. The relocation of the solid waste in the Ukiah Landfill is considered to be a technically unfeasible alternative. In addition to being cost prohibitive, it would require countless truck trips causing significant and unavoidable traffic and noise impacts. In addition, there is no nearby approved or permitted place to relocate the solid waste material. Further, there are countless unknown hazards and hazardous waste risks that could affect the health and safety of the construction workers, Vichy Springs Resort and nearby residents. As a result, this alternative has been eliminated from further consideration. This alternative is not considered feasible because it is not capable of being accomplished in a successful manner within a reasonable period of time, taking into account environmental, economic and technological factors (CEQA Guidelines, Section 15364).

Alternative/Synthetic Specialized Tufted Geotextile Landfill Turf Cover Color. The Proposed Project's alternative/synthetic specialized tufted geotextile turf landfill cover of the Proposed Project was selected to provide a natural shade of color in order to help mimic the existing natural color and blend into the surrounding environment. Artificial or synthetic specialized tufted geotextile covers generally come in three (3) natural colors – olive-green, tan, and a blend of olive-green and tan. For the Proposed Project the olive-green color was selected as the preferred color as it provides arguably the best color option to blend into the natural and surrounding environment. With the required minimum of a 5/8 thick sand infill layer on top, the cover will look like a blend of olive-green and tan. No other colors such as black, blue, red, orange, grey, white or various color pallets of those or other color options are available in alternative/synthetic specialized tufted geotextiles for landfills and would not provide any better ability to blend into the surrounding environment. Further, the 40-acre Ukiah Landfill is not accessible and visible

from anywhere on the Vichy Springs Resort Property and/or the general public. The 40-acrte Ukiah Landfill is and will remain inaccessible to the general public and is and will not be visible anywhere from a public access point as well as anywhere on the Vichy Springs Resort Property. As a result, this alternative has been duly considered but eliminated from further consideration because it would not avoid any significant environmental (aesthetic) impacts.

4.4 Environmentally Superior Alternative

Section 15126.6(e)(2) of the CEQA Guidelines requires an EIR to identify an environmentally superior alternative. Of the two alternatives considered in this section (Proposed Project and the No Project Alternative), the Proposed Project would be the environmentally superior to the No Project Alternative. The No Project Alternative would not meet any of the goals and objectives of the Proposed Project. Under the No Project Alternative, the Ukiah Landfill would not be properly closed according to state and local regulations and would be susceptible to slope instability, potential water quality impacts to surface water and groundwater resources due to inadequate cover leading to drainage and erosion issues during inclement weather/stormwater, and the potential for inadequate LFG control and monitoring leading to air quality issues and impacts. Under the No Action Alternative, the City would be potentially susceptible for a variety of water quality and air quality violations and fines. As a result, the Proposed Project is considered to be the environmentally superior alternative.

Chapter 5 Growth Inducement Effects

This section presents potential growth inducement effects of the Proposed Project. The scope of the analysis and key attributes of the analytical approach are presented below to assist readers in understanding the manner in which the impact analyses have been conducted in this Draft EIR.

5.1 Determination of Growth Inducement Effects

Section 15126.2(d) of the CEQA Guidelines requires that an EIR discuss "the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. This discussion should include an analysis of how the proposed project might remove barriers to population growth and characteristics of the project that might encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. (CEQA Guidelines §15126.2(d)). In discussing potential growth, it should not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

Case law interpreting section 15126.2(d) of the CEQA Guidelines suggests that a program EIR is not required to make a detailed analysis of the project's impacts on growth. *(Napa Citizens for Honest Government v. Napa County Bd. of Supervisors* (2001) 91 Cal.App.4th 342, 369.) "Nothing in the Guidelines, or in the cases, requires more than a general analysis of projected growth." *(Id.)* Nonetheless, a general discussion and analysis is important to fully informing the decision makers and the public regarding the potential impacts of a project (*Laurel Heights II* (1993) 6 Cal. 4th. 1112.).

Growth can potentially impact the environment in a variety of ways. These impacts may include the following:

- Increasing pressure to convert agricultural resources to residential and commercial uses;
- Reducing air quality due to increased traffic, use of fireplaces etc.;
- Harm to biological resources due to increasing pressure to develop habitat;
- Hydrology/water quality impacts due to increases in impervious surface and sources of pollutants
- Land use planning impacts;
- Population/housing;
- Public services impacts due to increased demand;
- Transportation/traffic impacts; and/or
- Utilities/service systems impacts

However, many of these potential impacts of growth can be avoided or minimized by through good land use planning practices.

5.2 Assessment Methods

The overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include

the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, groundwater/surface water monitoring systems, and site security.

Project implementation includes the final closure of the Ukiah landfill in accordance with local, regional, state and federal requirements. No residential or other development is proposed that would result in additional population growth. No infrastructure is required to be extended to the site that would induce population growth in the area.

5.3 Conclusions on Growth Inducement

The Proposed Project or the official and proper closing of the Ukiah Landfill will not indirectly or directly remove barriers to population growth and/or encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.

Chapter 6 Cumulative Effects

This section presents potential cumulative environmental impacts of the Proposed Project. The scope of the analysis and key attributes of the analytical approach are presented below to assist readers in understanding the manner in which the impact analyses have been conducted in this Draft EIR.

6.1 Determination of Cumulative Effects

The CEQA guidelines (Section 15355) define cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." This section of the Guidelines further notes that:

a) *The individual effects may be changes resulting from a single project or a number of separate projects.*

b) *The cumulative impact from several projects is the change in the environment, which results in the incremental impacts of the project when added to other closely related past, present, and reasonable foreseeable probably future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.*

A cumulative impact is significant if, when considered collectively with the impacts of the other projects, it exceeds the threshold of significance for a particular individual environmental resource area, as described in Chapter 3 - Environmental Analysis.

6.2 Assessment Methods

For the purposes of this analysis, potentially significant cumulative effects are addressed in terms of short-term cumulative impacts (i.e., those impacts that would be cumulatively considerable during construction) and long-term cumulative impacts (i.e., those impacts that would be cumulatively considerable during operation). As described in Chapter 3 – Environmental Analysis, the construction and operation of the Proposed Project would have less-than-significant effects to the environment with the implementation of the identified mitigation measures. There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts.

6.3 Conclusion on Cumulative Effects

The Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts on the environment.

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Chapter 8 References

Presented below are the major references used in the preparation in of Chapter 1 – Introduction, Chapter 2 – Project Description, and throughout this EIR. In addition, additional references are provided at the end of each individual environmental resources subchapter as presented in Chapter 3.0 – Environmental Analysis.

- California Environmental Quality Act (Public Resources Code Section 21000et seq.) of 1970 (as amended)
- California Environmental Quality Act Guidelines (California Code of Regulations, Title 14)
- City of Ukiah, Final Closure and Postclosure Maintenance Plan, April 2019

Appendix A

Final Closure and PostClosure Maintenance Plan

FINAL CLOSURE AND POSTCLOSURE MAINTENANCE PLAN

FOR

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

APRIL 2019

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CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SECTION 1
INTRODUCTION

EBA Engineering (EBA) has prepared this Final Closure and Postclosure Maintenance Plan (Final CPMP), City of Ukiah Landfill, Mendocino County, California (herein after referred to as the "Landfill"), for the City of Ukiah (City) in accordance with Title 27 of the California Code of Regulations, Division 2, Subdivision 1. The Landfill is a Class III disposal site that occupies approximately 40 acres of the 283.5-acre site. This Final CPMP was developed to address closure and postclosure maintenance for the entire landfill.

In general, the intent of this Final CPMP is to identify and describe the tasks for closing and maintaining the Landfill in a manner that will protect the public health and safety and the environment. Details of the respective programs are presented herein under Section 2 (*Final Closure Plan*) and Section 3 (*Final Postclosure Maintenance Plan*). This plan also serves as the basis for developing a reasonable estimate of maximum expected costs to close the entire landfill and maintain the landfill during the postclosure maintenance period (30 years). The estimated costs for each of the programs are presented in Section 4 (*Closure and Postclosure Maintenance Cost Estimates*). Finally, Section 5 (*Disbursement Schedule for Closure*) presents a preliminary fund disbursement schedule during implementation the final closure construction activities. As an aid to the reader, references to Title 27 of the California Code of Regulations throughout this report are cited as 27CCR followed by the corresponding section number(s).

A copy of this Final CPMP will be maintained at the City's Department of Public Works office (300 Seminary Avenue, Ukiah, California 95482) throughout the closure and postclosure maintenance period.

1.1 LANDFILL HISTORY AND DEVELOPMENT

The Landfill, which is owned and operated by the City, is located at 3100 Vichy Springs Road, approximately three miles east of Ukiah in Mendocino County, California. Waste disposal operations at the Landfill began in 1955 at the eastern end of the waste management unit (WMU) footprint and progressed upslope and westward. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the WMU to separate the waste from the realigned creek channel. The method of operation during the Landfill's development was a fill and cover approach in a canyon/gully terrain. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing Ukiah and the surrounding area. The Landfill ceased operations in September 2001.

Environmental monitoring at the Landfill was originally regulated under Waste Discharge Requirements (WDR) Order No. 75-43 in conformance with Title 23 of the California Code of Regulations (23CCR). In September 1993, WDR Order No. 75-43 was amended by WDR Order No.93-83 as a mechanism to implement State Water Resources Control Board Resolution No. 93-62 and federal municipal solid waste regulations (i.e., "Subtitle D") per Title 40 of the Code of Federal Regulations (40 CFR), Parts 257 and 258. Concurrent with this amendment was the preparation of a Report of Waste Discharge (RoWD) (EBA, 1993) for the purpose of formally updating the Landfill's WDRs and to address groundwater impacts previously identified at the site. The combination of these two documents was subsequently used by the California Regional Water Quality Control Board, North Coast Region (RWQCB) to issue a new WDR (WDR Order No.94-123) for the site in October 1994. In August 1999, the initial Final CPMP (EBA, 1999) was submitted for the Landfill which resulted in the eventual issuance of interim closure WDRs (WDR Order No. R1-2002-0061) by the RWQCB in June 2002. WDR Order No. R1-2002-0061 represents the current WDR regulating environmental monitoring at the Landfill.

1.2 PURPOSE OF PLAN

The purpose of this Final CPMP is to identify, describe and provide cost estimates for the tasks necessary to close and maintain the Landfill in a manner which will protect the public health and safety and the environment. The Final CPMP for a Class III facility must meet the requirements of 27CCR, Division 2, Subdivision 1, Chapter 4. Accordingly, this Final CPMP provides the various information and describes the tasks that will be employed to comply with the said regulations. The following provides a synopsis of the information included herein as they pertain to the proposed final closure and postclosure maintenance activities:

Final Closure

- Various site maps showing the site location, physical and topographic features, and current monitoring and control systems.
- Proposed postclosure land use and an estimate of the maximum extent requiring closure.
- Details regarding site security and structure removal.
- Final cover design and grading characteristics, including presentation of an engineered alternative final cover system and supporting documentation (i.e., engineered alternative analysis, Technical Specifications and Construction Drawings).
- Final cover survey information.

- A construction quality assurance (CQA) program for the final cover construction project.
- Drainage and erosion control provisions.
- Descriptions of the current environmental monitoring and control systems.
- Closure provisions for a former leachate surface impoundment.
- Sequence of closure stages.
- Closure cost estimate and disbursement schedule.

Final Postclosure Maintenance

- Emergency Response Plan.
- Details of responsible parties and resources during the postclosure maintenance period.
- Presentation of the inspection and maintenance program that will be employed as part of postclosure maintenance, including the final cover and grading, drainage system, various monitoring and control systems, and site security.
- Reporting provisions for the various inspection and monitoring/control systems.
- Postclosure maintenance cost estimate.

Please note that this Final CPMP supersedes all previous closure/postclosure maintenance documents submitted to date. The original Final CPMP was submitted in August 1999 (EBA, 1999) that proposed a prescriptive standard final cover system (i.e., compacted clay liner [CCL] for the low-hydraulic conductivity layer [LHCL]). In March 2003, an engineered alternative analysis (EBA, 2003) was submitted to the RWQCB for approval that incorporated a geosynthetic clay liner (GCL) to replace the CCL as the LHCL due to the significantly higher cost associated with the CCL final cover system. This alternative was proposed again as part of a Joint Technical Document (JTD) dated January 2008 (EBA, 2008) and subsequent addendum dated June 2013 (EBA, 2013a).

In August 2015, a second addendum (Addendum No. 2) to the JTD (EBA, 2015) was submitted for approval that incorporated a new engineered alternative design ("ClosureTurf™") to replace the previously proposed GCL final cover system. The alternative design was pursued due to the significant cost savings over the associated GCL final cover system scenario, as well as an increase in cover system stability. Whereas the California Department of Resources Recycling and Recovery (CalRecycle) and Mendocino County Health & Human Services Agency (i.e., Local Enforcement Agency [LEA]) conditionally approved the proposed alternative design (separate letters dated October 21 and November 9, 2015, respectively), both agencies requested that the design and

associated provisions be summarized in a new stand-alone Final CPMP. A new stand-alone Final CPMP (EBA, 2016a) was subsequently submitted on March 8, 2016. Following its submittal, miscellaneous comments were issued by the respective regulatory agencies. The various issues were addressed in an updated Final CPMP dated May 2016 (EBA, 2016b).

As part of the regulatory review of the May 2016 Final CPMP, several unresolved issues remained pertaining to the final cover design and maintenance provisions. The most prominent of these issues corresponded to the proposed thicknesses of the foundation layer (i.e., one foot versus two feet) and geomembrane thickness (50-mil versus 60-mil). After multiple deliberations, an agreement was reached to adhere to the 2-foot thick foundation layer standard, while the 50-mil geomembrane thickness was conditionally approved with provisions for increased postclosure maintenance funding. These items, along with the other previous regulatory comments, have been incorporated into this latest version of the Final CPMP.

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SECTION 2
FINAL CLOSURE PLAN

This Final Closure Plan has been prepared to meet the following primary objectives: develop a detailed plan and schedule for the City to implement upon closure of the WMU; allow for monitoring of closure activities to determine that the requirements of landfill closure have been implemented in accordance with the appropriate plan; provide a basis for the City to establish an accurate detailed estimate of closure costs; and enable CalRecycle and the LEA to assess the reasonableness of the cost estimate for non-water quality aspects of closure. The contents of this Final Closure Plan have developed to comply with the requirements set forth in 27CCR, §21769(c)(2) and §21800.

2.1 SITE MAPS

2.1.1 Location Maps
27CCR, §21790(b)(2)

The Landfill is located at 3100 Vichy Springs Road, approximately three miles east of Ukiah in Mendocino County, California. A site location map showing the location of the Landfill is presented as Figure 1 (Appendix A). The Landfill's WMU occupies approximately 40 acres of permitted landfill area on a 283.5-acre parcel having a maximum width of approximately 1,000 feet in the north-south direction and a maximum length of about 3,500 feet in the east-west direction. A City-owned shooting range is situated on the Landfill property approximately 2,000 feet southeast of the WMU footprint.

Land adjacent to the Landfill property is zoned primarily as rangeland and is used for grazing. Dwellings within 1,000 feet of the landfill property include a group of structures owned by Gilbert and Marjorie Ashjoff that are located within 500 feet of the Landfill's south property line and a single-family residence located approximately 900 feet west of the Landfill's western property boundary. A rural residential development is located approximately ¼-mile west of the Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000 feet southward of the Landfill property boundary and is separated from the Landfill by an intervening ridge.

It should be noted that the City owns an approximate 97-acre parcel (Assessor's Parcel No. 178-210-01) that adjoins a portion of the Landfill's southern property boundary. This property, which has been previously identified as the "Gun Club Parcel", was purchased as

a buffer zone to limit future development adjacent to the Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the Landfill property.

Site plans showing the general site configuration (i.e., property boundary, limit of waste, entry road, etc.) and existing site features are presented as Figures 2 and 3 (Appendix A). Also shown on Figure 2 are the locations of dwellings and structures located within 1,000 feet of the Landfill property boundary.

2.1.2 Topographic Maps
27CCR, §21769(c)(2)(D)

Existing ground surface elevations at the Landfill range from approximately 710 feet above mean sea level (MSL) near the western footprint, to about 970 feet MSL along the southeast footprint. The WMU has been graded to form a series of terraces stepping down from south to north. Slopes on the WMU range from approximately 2:1 to 3:1 (horizontal to vertical). The final cover system elevations and slope configurations will generally coincide with the existing surfaces described above. Please refer to Sheets 100 and 101 of the Construction Drawings (Appendix J) for maps illustrating the existing and proposed final grades, respectively.

2.1.3 Current Monitoring and Control Systems Maps
27CCR, §21790(b)(4)

Enclosed in Appendix A are a series of site maps illustrating the various current monitoring and control systems at the Landfill. The types of monitoring and control systems include: landfill gas (LFG)(Figure 4); leachate (Figure 5); groundwater (Figure 6); and surface water (Figure 7). The Landfill is also currently equipped with drainage and erosion control features that include benches, ditches and down drains on the slope areas, as well as four sedimentation ponds. Please refer to Sheet 100 of the Construction Drawings (Appendix J) for the locations of these features.

2.2 PROPOSED POSTCLOSURE LAND USES
27CCR, §21769(c)(2)(H) and §21790(b)(5)

Postclosure land use for the Landfill will be non-irrigated open space.

2.3 ESTIMATE OF MAXIMUM EXTENT REQUIRING CLOSURE
27CCR, §21790(b)(6)

The WMU covers approximately 40 acres of the 283.5-acre site. The limits of waste are based on City survey records and historical topographical maps of the site. Exploratory trenching to verify the waste limits will not be necessary as the waste limits are well established. The limit of existing waste is shown on Figures 2 and 3 (Appendix A).

2.4 CLOSURE DATE
27CCR, §21790(b)(7)

The Landfill discontinued waste disposal operations in September 2001. At the time the waste disposal operations ceased, intermediate cover soil had been placed over the entire WMU footprint. In October and November, 2001, a drilling program was implemented by Rau and Associates, Inc. for the City to verify the thickness of the in-place intermediate cover over the entire WMU surface. The survey consisted of a series of shallow borings drilled at a spacing of approximately 50 feet apart on the roads and benches and approximately 100-foot spacing on the slopes. A total of 433 borings were drilled using a hydraulic drill motor (mounted on a backhoe boom) equipped with 4-inch diameter solid-stem augers. A hand-operated post-hole digger was used in areas not accessible by the backhoe-mounted drill. Findings from this investigation revealed that the thickness of the intermediate cover is equal to or greater than 2 feet for approximately 81 percent of the WMU surface, whereas approximately 93 percent of the WMU surface contains at least one foot of intermediate cover. The average thickness of the intermediate cover for the remaining seven percent is approximately 8 inches. These areas are primarily concentrated along the toe near the northern sedimentation pond and within the southern high point of the WMU.

The intermediate cover has been maintained by the City since its placement, pending implementation of the final closure construction project.

2.5 SITE SECURITY AND STRUCTURE REMOVAL
27CCR, §21790(b)(8)(A)

2.5.1 Site Security

Access to the Landfill is via Vichy Springs Road only. Unauthorized access is currently prevented by perimeter barbed-wire fencing and a locked gate located at the site access road. “No Trespassing” signs are also posted at the east and west boundaries of the site. Site security upon closure will be provided by the City and will conform with the requirements of 27CCR, §21135. Site security components will include:

- A lockable gate at the Landfill entrance from the site access road (existing).
- “No Trespassing” signs (existing). “Methane Hazard” signs will also be posted at the site entrance and every 1,000 feet along the perimeter barbed-wire fencing.
- At least one sign posted in a visible location at the site access road indicating where the Final CPMP is located. The sign will also include a telephone number for emergency notification. A sign of this nature will remain posted throughout the postclosure maintenance period.

- Lockable utility boxes, or gates, or both, enclosing the environmental control systems (existing).

- Security fencing and lockable gate around the gas control system's flare station and equipment complex.

- Perimeter barbed-wire fencing (existing).

2.5.2 Structure Removal

As required under 27CCR, §21137, all site structures will be removed as part of the final closure construction project. These structures include the gatehouse and truck scale. The gatehouse debris will be transported and disposed of at a permitted solid waste disposal facility. The truck scale, in turn, will be dismantled and either re-assigned/sold for use at an alternate location or transported and disposed of at a permitted solid waste disposal facility.

2.6 FINAL COVER AND GRADING

2.6.1 Final Cover Requirements
27CCR, §21090(a) and §21800(b)(8)(B)

The following subsections provide the necessary information to address the various final cover requirements stipulated in 27CCR, §21090(a)(1 through 6). Specific topics include: final cover design; discharge of leachate, condensate and/or other liquids to the final cover; and stability of the final cover.

Final Cover Design

The proposed final cover system will consist of a patented geosynthetic product identified as "ClosureTurf™". ClosureTurf™ is a three-component system comprised of a structured geomembrane, a specialized tufted geotextile, and a sand infill layer. The structured geomembrane component serves as the LHCL, whereas the specialized tufted geotextile and sand infill layer represent the erosion-resistant layer as defined in 27CCR. This proposed final cover system represents an engineered alternative design to the prescriptive standard (i.e., CCL) and therefore requires regulatory approval. As such, an engineered alternative analysis was prepared that demonstrated its viability as a final cover alternative. A copy of the engineered alternative analysis, which includes literature for the ClosureTurf™ product, is enclosed in Appendix D. Please note that product literature pertaining to ultra-violet (UV) longevity and supporting infiltration equivalency calculations that were included in EBA's May 26, 2017 Response to Comments (EBA, 2017) to supplement the engineered alternative analysis have been incorporated into Appendix D.

Overall, the proposed final cover system design can be summarized as follows (in ascending order):

- Minimum 2-foot thick soil foundation layer.
- 50 mil linear low-density polyethylene (LLDPE) geomembrane liner (Super Gripnet® with Spike Down).
- Specialized tufted geotextile (Engineered Turf).
- Minimum 5/8-inch thick sand infill layer.

As noted above, the erosion-resistant layer for the proposed final cover system is comprised of the Engineered Turf and sand infill layer. As presented in the engineered alternative analysis (Appendix D), the combination of these components are designed to provide weathering resistance and geomembrane protection when subjected to the most extreme conditions, including rain, wind, heat, and UV exposure. Based on the absence of a traditional erosion-resistant layer constructed of soil, the proposed system is not subject to erosional channeling that can lead to exposure of the geomembrane component. As a result of the aforementioned characteristics, the proposed system meets the performance criteria specified in 27CCR with regard to resisting the foreseeable erosion effects by wind-scour, raindrop impact, and run-off.

In addition to the above features, the final cover system will also be equipped with a gas relief component. This component will consist of a series of 3.5-foot wide collection strips placed parallel to the slopes on the outer edges of the respective benches. The collection strips, which will be constructed of the same Super Gripnet® with Spike Down material described above for the geomembrane liner component, will be connected to the gas control system to prevent the build-up of gas pressures beneath the final cover system. Pressure release valves will also be installed at regular intervals between the collection strips as an additional precautionary measure.

Please refer to the Technical Specifications (Appendix H), Construction Quality Assurance (CQA) Plan (Appendix I), and Construction Drawings (Appendix J) for details regarding material and installation specifications for the respective final cover system components described above.

Discharges of Liquids to Covers (Leachate and Condensate)

The discharge of leachate, LFG condensate or other waste liquids onto the final cover is not proposed at the Landfill. Instead, these liquids will be processed through the facility's existing leachate collection and pumping system as described in Subsection 2.10 (*Leachate Monitoring and Control Systems*) of this Section.

Discharges of Liquids to Covers (Other Liquids)

The discharge of other liquids onto the final cover is also not proposed at the Landfill. Postclosure land use will be non-irrigated open space. As a result, monitoring of potential liquid through flow to the underlying waste will not be necessary.

Please note that the need for dust control provisions (other than during final closure construction) as outlined in CalRecycle citations 27CCR, §20800 and §21600(b)(8)(D) during the postclosure maintenance period is not anticipated since the access areas will be covered with aggregate base rock (perimeter access road) and engineered turf (benches) at the time of closure. In regards to final closure construction, the Technical Specifications (Appendix H) for construction stipulate that dust control provisions must be such as to protect against excess water application that could result in potential through flow into underlying waste or run-off into surface water drainages.

Stability Analysis

In accordance with 27CCR, §21090(a)(6), a stability analysis was performed for the proposed final cover system to demonstrate conformance with 27CCR, §21750(f)(5). In this regard, an infinite-slope stability analysis for the ClosureTurf™ final cover system is presented in Appendix E. This represents the same analysis included in the May 2016 Final CPMP (EBA, 2016b). The analysis also summarizes the results of an earlier stability and seismic hazard analysis performed for the Landfill that is referenced in the Landfill's January 2008 JTD (EBA, 2008). The earlier study includes critical cross sections used in the stability analysis and the results of a two-dimensional limit equilibrium analysis for a sliding block failure through the base of the waste mass. The study also presents the results of a seismic response analysis and seismic displacement analysis using the procedures outlined in Bray et al., 1995; Matasovic, 1995; and Matasovic, 1997.

Findings from the stability analysis are summarized as follows:

- A deterministic seismic hazards assessment performed for the site concluded that the Maacama Fault, with an estimated Maximum Credible Earthquake (MCE) of 7.1Mw is located 0.6 miles (1.0 kilometers) west of the site and is expected to generate the highest average peak bedrock acceleration of 0.66g.

- The static factor of safety of the entire waste mass was modeled by evaluating failure mechanisms passing through refuse and the base of the WMU and indicate a static factor of safety greater than 1.7 for failure through the base of the WMU at critical cross section B.

- The yield acceleration (Ky) of the waste mass under seismic conditions is 0.13g.

- Seismic displacement analyses using the program YSLIP PM (Matasovic, 1997) indicate that permanent seismically induced displacements will be less than 8 inches for failure through the base of the WMU.

As the final waste mass grades have not been increased with the ClosureTurf™ final cover system design, EBA does not believe additional global stability analyses are warranted and the corresponding findings from the previous analysis remain valid for the final closure design presented in this current version of the Final CPMP.

Please note that a probabilistic analysis predicts a peak ground acceleration of 0.52g at the Landfill with a 475-year return period (10 percent exceedance in 50 years) and a shear-wave velocity of 270 meters per second (California Geologic Survey, Probabilistic Seismic Hazards Ground Motion Interpolator). Given the deterministic nature of EBA's evaluation, it is our opinion that the seismic hazard analysis is appropriate for the Landfill final closure design.

2.6.2 Grading Requirements
27CCR, §21090(b) and §21800(b)(8)(B)

Grading plans for the WMU are shown on Sheet 101 and Sheets 300 through 302 of the Construction Drawings (Appendix J). As shown on the grading plans, the final cover slopes on the WMU will range from approximately 2:1 to 3:1 (horizontal to vertical). These slope inclinations are sufficient to prevent ponding on the WMU surface. In addition, as previously outlined in Subsection 2.6.1 (*Final Cover Requirements*), the physical characteristics of the Engineered Turf and sand infill layer (i.e., erosion-resistant layer) meet the performance criteria specified in 27CCR with regard to resisting the foreseeable erosion effects by wind-scour, raindrop impact, and run-off. Finally, the WMU is designed with a perimeter drainage system that will serve to protect against potential run-on from adjoining surfaces.

Grading plan design considerations included provisions to ensure compliance with prescribed clearance specifications beneath a set of high power transmission lines that extend over the WMU (see Sheets 301 and 302 of the Construction Drawings [Appendix J] for location). Pacific Gas and Electric (PG&E) states that the minimum required ground clearance is 28 feet. As a means of integrating this specification into the design, a survey of the transmission lines was performed by PG&E in the Summer of 2018. Results from this survey determined that existing refuse will need to be excavated from beneath portions of the transmission lines in order to attain the prescribed clearance. The excavated refuse will be relocated to other areas within the WMU. Please refer to Sheet 102 of the Construction Drawings (Appendix J) for the corresponding refuse re-location areas.

As part of the final closure construction project, borrow soil material will be required for construction of the foundation layer and placement of engineered fill and trench backfill. The borrow area for this soil will correspond to an on-site area located northeast of the WMU. This area corresponds to the same borrow area used during landfill operations. Excavation within this borrow area will conform to the grading plan shown on Sheet 303 of the Construction Drawings (Appendix J).

27CCR, §21800(b)(8)(B) requires information regarding the types and estimated quantities of materials needed for construction of the final cover system. In this regard, the majority of the final cover system will be comprised of geosynthetic products associated with the ClosureTurf™ system. The estimated quantity of these materials is approximately 1.9 million square feet. As for the soil components, on-site materials will be used for the foundation layer, engineered fill, and trench backfill as outlined in the previous paragraph.

The estimated quantity of borrow soil material for this purpose is approximately 100,000 cubic yards.

2.6.3 Final Cover Surveys
27CCR, §21090(e)

A topographic map of the completed final cover grades will be produced at a minimum scale of 1 inch to 100 feet and accompany the CQA Certification Report. In addition, iso-settlement maps will be produced every five (5) years thereafter to calculate any differential settlement. The iso-settlement maps will be prepared with a maximum contour interval of 2 feet and a scale of 1 inch equals 60 feet. As required by 27CCR, §21090(e)(4), each iso-settlement map will highlight areas of repeated or severe differential settlement. The delineation of such areas will be made by, or under the supervision of, a registered civil engineer or registered geologist.

2.7 CONSTRUCTION QUALITY ASSURANCE (CQA)
27CCR, §21790(b)(8)(C)

A CQA program will be implemented for closure of the WMU to verify that materials, construction methods, and testing procedures are in accordance with the intent and purpose of the Technical Specifications. Implementation of the CQA program will be administered by a registered civil engineer or certified engineering geologist in accordance with 27CCR, §20324(b)(1) and (2). The results of the CQA program will be summarized in a "CQA Certification Report" containing all reports associated with the construction activities. This document will provide evidence that the CQA program was implemented as proposed and that the construction proceeded in accordance with design criteria, plans and specifications.

2.7.1 CQA Plan

A CQA Plan for the Landfill is enclosed in Appendix I. As required by 27CCR, §20324(c), the contents of the CQA Plan include the following:

- A description of the CQA management organization and reporting protocol; and
- A description of CQA testing protocols for preconstruction, construction and post-construction testing including:
    - Procedures and equipment to be utilized for field testing and sampling;
    - Location, method, and frequency of sampling;
    - Laboratory testing procedures to be used during construction;
    - Pass/fail criteria for sampling and testing methods;
    - Frequency of performance audits; and
    - Inspection frequencies.

Closure construction will be administered by a qualified consultant or a City registered civil engineer, acting as the CQA Officer. The CQA Officer will supervise the execution and overall progress of the project. He will be assisted by a CQA Certifying Engineer, CQA Monitors, a CQA Surveyor, independent soil and geosynthetic testing laboratories, and a consulting design and construction management firm, if necessary. The construction work will be done by a licensed construction contractor who will be selected through a public bidding process.

2.7.2 Closure Construction Documentation

The closure operations will be conducted under the supervision of the CQA Officer. Inspection, field and laboratory data sheets, and other relevant closure activity documentation will include the following:

- Daily summary reports;
- Daily field logs (Inspection Data Sheet);
- Construction monitoring forms;
- Laboratory testing reports;
- Non-conformance/corrective action forms;
- Acceptance reports;
- Meeting/discussion summary reports;
- Photograph logs;
- Document control; and
- As-built record drawings.

Please refer to Section 01400 of the Technical Specifications (Appendix H) for further details regarding the nature and content of the respective documentation listed above.

At the completion of the project, a CQA Certification Report prepared and certified by the CQA Officer will be submitted to the RWQCB, CalRecycle, and the LEA. The CQA Certification Report will consist of information and data generated by the CQA program and will document that the final closure construction is in compliance with the design intent of the Construction Drawings and Technical Specifications. At a minimum, the CQA Certification Report will contain the following information:

- Summary of construction methods for each unit of construction completed;

- Summary of the CQA program implemented during construction and specific CQA activities (monitoring and testing) performed for each unit of construction completed;

- Results of conformance testing and construction testing;
- Revisions made to the Construction Drawings and variances from Technical Specifications allowed; and

- Final as-built record documents.

The CQA Certification Report shall be a self-standing document and contain all subordinate reports. The CQA Certification Report will also contain a statement of compliance with the design intent of the Construction Drawings and Technical Specifications, signed and stamped by the CQA Certifying Engineer, a professional engineer or certified engineering geologist registered in the State of California. The certificate of closure will include a statement by the Operator, under penalty of perjury, pursuant to 27CCR, §21880(a), that with the exception of deviations due to reasonably unforeseeable circumstances, the Landfill was closed in accordance with the approved Final Closure Plan.

2.7.3 Documentation Archive Storage

A copy of the CQA Certification Report, as well as all original closure construction documents, will be stored and maintained throughout the postclosure maintenance period in a protected location that is accessible to RWQCB, CalRecycle, and LEA personnel during normal business hours. At the present time, the City offices at 300 Seminary Avenue, Ukiah are proposed as the storage location for the CQA Certification Report.

2.8 DRAINAGE AND EROSION CONTROL *27CCR, §21790(b)(8)(D)*

2.8.1 Drainage System

The proposed drainage system for the WMU and borrow area have been designed to comply with the requirements of 27CCR, §21150. Overall, the proposed drainage facilities consist of a network of benches, channels/swales, and storm drains that collect and convey stormwater run-off to a series of corrugated metal pipe (CMP) discharge culverts. These CMP culverts discharge to the unnamed ephemeral creek channel at various locations along the length of the WMU's northern boundary. In general, the drainage system is designed to intercept run-off at intervals along the inside edges of berms, benches, or access roads. A sedimentation pond is located at the western end of the WMU to control sediment run-off from slope areas along the western and portions of the southern fill boundaries. Two (2) additional sedimentation ponds are located at the northeastern end of the WMU to contain sediment run-off from the eastern portion of the WMU and the soil borrow area. Please refer to the 200 Series and 300 Series sheets of the Construction Drawings (Appendix J) for plan views and details of the various drainage system components. The supporting drainage calculations for sizing the various drainage system components are enclosed in Appendix F. As required by 27CCR, §21150, the drainage system components are designed to accommodate 100-year, 24-hour precipitation conditions.

As noted above, a portion of the stormwater run-off from the WMU is discharged via CMP culverts to the unnamed ephemeral creek channel. While such provisions are currently employed at the Landfill, the design of the new drainage outfalls into the creek have been

modified to reduce the potential for erosion. Since this provision will require accessing the creek to install the new drainage outfalls, a series of permits must be obtained before implementing the improvements. These permits include: *Streambed Alteration Agreement (1602 Permit)* from the California Department of Fish and Game; *Water Quality Certification (401 Permit)* from the RWQCB; and a *Clean Water Action Section 404 Permit (404 Permit)* from the United States Army Corps of Engineers. As outlined later in Subsection 2.14 (*Sequence of Closure Stages*) of this Section, provisions are currently being made to acquire these permits.

2.8.2 Erosion Control

The overall design includes features and provisions to minimize the potential for erosion as required by 27CCR, §21150. The following bullet items provide a summary of the erosion control features and provisions:

- The selected contractor will be required to prepare a construction Storm Water Pollution Prevention Plan (SWPPP) before the commencement of work and to implement the provisions of the SWPPP for the duration of the construction project.

- The geosynthetic final cover system (ClosureTurf™) will essentially eliminate the discharge of sediment from the WMU surface as no soil component will be utilized in the final cover design.

- The final surface of the soil borrow area, as well as other areas disturbed by the construction operations, will be repaired/graded as necessary and then hydroseeded. The aforementioned areas with surface slopes steeper than ten percent will also be covered with 1.5 inches of straw and secured with erosion control netting.

- Drainage channels outside the WMU footprint that will potentially be subjected to high flow velocities will be lined with rock rip-rap to protect against erosion.

- Drainage outfalls will be lined with rock rip-rap.

- Aggregate base placed on perimeter access roads to allow for all-weather access will also serve to reduce the potential for sediment-laden run-off from these areas.

Please refer to Sheet 308 of the Construction Drawings (Appendix J) for additional details regarding straw wattle, drainage inlet, and check dam provisions.

2.9 GAS MONITORING AND CONTROL SYSTEMS *27CCR, §21790(b)(8)(E)*

2.9.1 Gas Monitoring System

The gas monitoring system consists of ten gas monitoring points (GAS-1 through GAS-10) located at various locations along the Landfill property boundary. The locations of the gas monitoring points are shown on Figure 4 (Appendix A). No changes to the monitoring system components are proposed as part of closure. Each of the gas monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter polyvinyl chloride (PVC) casing and capped with labcock valves. The monitoring probes range in depth from approximately 9 to 250 feet below ground surface (BGS). The number and depth of monitoring probes at each location are based on site lithology (i.e., permeable zones) and the maximum depth of refuse as measured within 1,000 feet of the monitoring point in question.

Table B-1 in Appendix B of this document provides a summary of the gas monitoring point construction characteristics. Copies of exploratory boring logs for the respective gas monitoring points are enclosed in Appendix C.

2.9.2 Gas Control Systems

The Landfill is currently equipped with a partial perimeter gas collection system that was installed between the southwestern edge of the WMU and the property line in 1997 as a mitigation measure against subsurface gas migration. The system consists of 17 vertical extraction wells installed in native geologic materials and completed at depths ranging from 35 to 133 feet BGS. The wells are connected to a 6-inch diameter, high-density polyethylene (HDPE) header pipe that leads to a vacuum blower located at the western end of the WMU. The vacuum blower creates a vacuum in the header pipe that draws the gas from the soil through the extraction wells and subsequently to the blower. Discharge from the system is vented directly to the atmosphere via a 4-foot tall, 4-inch diameter stack. This system continues to operate on an intermittent basis. Please refer to Table B-2 in Appendix B of this document for individual gas extraction well construction characteristics.

A full-scale gas control system for the entire WMU is planned for installation as part of the final closure construction project. This system as currently proposed will consist of 18 extraction wells (EW-1 through EW-18), aboveground conveyance piping, and a flare station that will include a totally-enclosed vertical ground flare (flare) for combustion of the collected gas. Information pertaining to this system, including design criteria/rationale and details for the various system components, are presented in the *Updated Design Plan for Landfill Gas Collection and Control System (Updated Design Plan)* dated April 2019 (EBA, 2019). A copy of the Updated Design Plan is enclosed in Appendix G. The corresponding Technical Specifications and Construction Drawings for the system are enclosed in Appendices H and J, respectively.

It should be noted that once the full-scale gas control system is installed and operational, the need to operate the partial perimeter gas collection system may no longer be

necessary. Under this scenario, the partial perimeter gas collection system will either be abandoned or maintained for emergency use only.

2.10 LEACHATE MONITORING AND CONTROL SYSTEMS *27CCR, §21790(b)(8)(F)*

The WMU is unlined and is not equipped with an engineered or blanket leachate collection and removal system (LCRS). Instead, leachate collection for the WMU currently consists of a series of PVC piping and French drain systems installed to collect leachate from seeps occurring along existing WMU slope faces. Leachate collected by these components is then conveyed by gravity flow to a primary buried pipeline located along the northern toe of the WMU. The buried pipeline, in turn, drains the leachate westward and ultimately discharges to the leachate management facilities located at the western toe of the WMU. A description of the leachate management facilities is as follows:

- Discharge from the primary buried pipeline is diverted to a subsurface concrete sedimentation chamber equipped with a valved sediment drain at its base. The clarified leachate within the chamber is then discharged (by gravity flow) to an adjacent pump station wet well (identified herein as the "leachate wet well") via a 10-inch diameter overflow line.

- Clarified leachate discharged to the leachate wet well is then pumped to a 63,500-gallon leachate aboveground storage tank (AST) for temporary storage. The leachate wet well is equipped with two (2) 25-gallon per minute (gpm), low-head, submersible pumps that are actuated by high/low water level controls. If the clarified leachate discharge rate exceeds the leachate wet well's pumping capacity (50 gpm), the excess leachate is currently diverted to an emergency leachate pond via a 10-inch diameter overflow line.

- As noted above, leachate from the leachate wet well is diverted to the leachate AST. The leachate AST is constructed of AWWA factory epoxy lined and coated bolted steel. As was the case for the leachate wet well, the AST is also equipped with a 10-inch diameter overflow line that diverts leachate to the emergency leachate pond in the case of an emergency.

- Leachate stored in the leachate AST is subsequently pumped to a sewer line connection located on Vichy Springs Road via a force main/gravity drain. The force main/gravity drain is constructed of 4-inch diameter PVC and is approximately 5,200 feet in length. The pump lift station for the leachate AST is equipped with two (2) 45-gpm pumps (one duty, one standby), thereby giving the system a total pumping capacity of 90 gpm.

In addition to the aforementioned features, three leachate level monitoring wells (LW-1, LW-2, and LW-3) have been installed at the Landfill as part of a previous study. However, these leachate wells have not been used historically for monitoring as they are not identified in the Landfill's existing Monitoring and Reporting Program (M&RP). The

locations of these monitoring wells, as well as the other leachate management facilities described above, are shown on Figure 5 (Appendix A). In addition, a summary of the leachate well construction characteristics and copies of exploratory boring logs are presented in Table B-3 (Appendix B) and Appendix C, respectively.

Several upgrades to the leachate control system as described above will be implemented as part of the final closure construction project. These upgrades will include lining the existing leachate wet well and sedimentation chamber to provide a higher degree of containment. In addition, the emergency leachate pond will be backfilled and an underground storage tank (UST) system installed to provide new overflow protection provisions. Finally, the leachate wet well and leachate storage tank will be retrofitted with communication telemetry to enhance emergency capabilities.

2.11 GROUNDWATER MONITORING SYSTEM

The groundwater monitoring network currently consists of 18 groundwater monitoring wells primarily concentrated along the northern and western margins of the WMU. No changes to the monitoring system components are proposed as part of closure. The locations of the groundwater monitoring wells are shown on Figure 6 (Appendix A). Groundwater monitoring well 87-1 was installed in 1987 and was subsequently used as part of the Water Quality Solid Waste Assessment Test (SWAT) conducted at the Landfill during the late 1980s. The remaining groundwater monitoring wells were installed over the period of 1990 through 1996 as a mechanism to characterize groundwater impacts at the site and to upgrade the Landfill's detection monitoring network. In accordance with the criteria specified in Section D(3)(b) of M&RP Order No. R1-2002-0061, the respective groundwater monitoring wells have the following use designations:

Detection Monitoring Wells:

- 87-1, 90-1, 90-2, 90-5, 90-6, 90-7, 90-8, 92-2, 92-3, 94-1, 94-2, 96-1, 96-2, and 96-3

Corrective Action Monitoring Wells:

- 90-3, 90-4, 92-1, and 92-4

Point of Compliance Wells:

- 87-1, 90-2, 90-3, 90-4, 90-5, 90-7, and 90-8

The two (2) primary water-bearing formation deposits underlying the site correspond to Quaternary alluvial deposits and Plio-Pleistocene upper/lower continental basin deposits. Groundwater monitoring wells completed within the Quaternary alluvial deposits include 87-1, 90-1, 90-3, 90-4, 92-1, and 94-1. These groundwater monitoring wells range in depth from approximately 12 to 35 feet BGS. The remaining groundwater monitoring wells are completed in the Plio-Pleistocene upper or lower continental basin deposits and range in depth from approximately 23 to 160 feet BGS.

Table B-4 in Appendix B of this document provides a summary of the groundwater monitoring well construction characteristics. Copies of exploratory boring logs for the respective groundwater monitoring wells are enclosed in Appendix C.

2.12 SURFCE WATER MONITORING SYSTEM

The surface water monitoring system for the Landfill is comprised of two (2) surface water sampling stations (S-1 and S-2) located along the unnamed ephemeral creek that flows along the northern margin of the WMU from east to west. The surface water sampling stations are shown on Figure 7 (Appendix A). As illustrated on Figure 7, S-1 and S-2 are located upstream and downstream of the WMU, respectively.

It should be noted that a Notice of Termination (NOT) for the Landfill's former stormwater permit (WDID Number 123I001656) was approved by the RWQCB on July 30, 2015 on the basis that industrial activity no longer occurs at the site, nor will it occur in the future as the end use of the Landfill during the postclosure maintenance period will be non-irrigated open space. Surface water monitoring and inspection at the Landfill will continue to be performed as part of the Landfill's postclosure maintenance program (see Section 3), thereby providing long-term provisions for monitoring surface water quality.

2.13 CLOSURE OF SURFACE IMPOUNDMENT

As part of the January 2008 JTD (EBA, 2008), recommendations were provided for assessing the unlined leachate surface impoundment for potential environmental impacts. Authorization to proceed with the assessment was issued by the RWQCB in their letter dated April 24, 2013. The work was subsequently implemented by EBA on August 6, 2013. The scope of work entailed the advancement of four (4) soil borings within the footprint of the surface impoundment to depths ranging from 11.5 to 16.5 feet BGS and the collection of four (4) soil samples from each borehole for chemical analysis. All soil samples from each borehole were analyzed for volatile organic compounds (VOCs), arsenic, and barium. In addition, one (1) soil sample from each borehole was analyzed for organochlorine pesticides, polychlorinated biphenyls, organophosphorus pesticides, chlorinated herbicides, and oil and grease.

Findings from the aforementioned investigation were summarized in a technical report dated October 3, 2013 (EBA, 2013b) and submitted to the RWQCB, CalRecycle, and LEA. Results from the soil sampling activities did not reveal any evidence of appreciable residual contamination associated with the former leachate surface impoundment operations. Based on these results, it was concluded by EBA that no further assessment or remedial actions were necessary. Furthermore, it was recommended that the leachate surface impoundment be backfilled with "clean" engineered fill and the final ground surface graded to promote positive drainage and prevent ponding. These provisions, which are included in the Technical Specifications (Appendix H) and Construction Drawings (Appendix J), meet the closure requirements for surface impoundments as outlined in 27CCR, §21400.

2.14 SEQUENCE OF CLOSURE STAGES
27CCR, §21800(c)

As previously described, the Landfill discontinued waste disposal operations in September 2001 and has been inactive since that time. Thus, the actual implementation of the final closure construction project represents the final sequence of the closure stages. In this regard, the remaining sequence of events that are required to complete the project are as follows:

- Solicitation of competitive bids from qualified contractors to implement the final closure project. The competitive bid process will commence in August 2019 and the contract awarded to the successful bidder by December 2019.

- Completion of the California Environmental Quality Act (CEQA) process, which is currently in progress. The estimated completion date for the CEQA process is August 2019.

- Acquisition of 1602, 401, and 404 permits to allow for streambed alteration associated with the installation of new drainage outfalls in the unnamed ephemeral creek channel. As with the CEQA process, this task is currently in progress with an estimated completion date of December 2019.

- Commence the construction operations by May 2020. Based on an estimated construction period of six months, the corresponding completion date for the construction operations is October 2020.

- Completion of the CQA Certification Report by January 2021.

Please note that a definitive construction schedule for the various tasks associated with the final closure construction project will become available upon selection of a qualified contractor. Such a schedule will be provided to the applicable regulatory agencies at that time.

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SECTION 3
FINAL POSTCLOSURE MAINTENANCE PLAN

This section describes the responsibilities, resources, and inspection frequencies for implementing postclosure maintenance for the Landfill upon closure. Specific inspection and maintenance activities are detailed in the subsequent subsections. The contents of this Final Postclosure Maintenance Plan (Final PMP) have been developed to comply with the requirements set forth in 27CCR, §21769(c)(2) and §21830.

3.1 EMERGENCY RESPONSE PLAN
27CCR, §21830(b)(1)

An Emergency Response Plan (ERP) has been prepared for the Landfill in accordance with 27CCR, §21130 and is presented in Appendix K. The ERP identifies steps to be taken in the event of a failure or breakdown of the WMU under potential contingency situations. Appropriate agency and business points of contact are also included in the ERP.

3.2 RESPONSIBLE PARTIES AND RESOURCES
27CCR, §21830(b)(2)

3.2.1 Responsible Parties

The Landfill is wholly owned by the City. Maintenance responsibilities following Landfill final closure will be assigned to the City of Ukiah Public Works Department (Public Works Department). The Public Works Department will be responsible for all inspection, maintenance and monitoring activities related to the final cover system, drainage systems, final grading, environment monitoring and control systems, and emergency response. The person at the Public Works Department responsible for managing the postclosure maintenance activities and the corresponding emergency phone numbers are as follows:

Name	Position	Emergency Phone Numbers
Tim Eriksen	Director of Public Works / City Engineer	(707) 463-6280
Tim Eriksen	Off-hour Emergencies	(707) 972-0839

The work address for Mr. Eriksen and the City office is:

- City of Ukiah
  Public Works Department
  300 Seminary Avenue
  Ukiah, CA 95482

3.2.2 Resources

Current resources of the Public Works Department for inspection, maintenance, and monitoring of the Landfill are as follows:

- *Technical Services Staff:*
  - Public Works Director/City Engineer (Registered Civil Engineer)
  - Deputy Director of Public Works (Registered Civil Engineer)
  - Senior Civil Engineer (Registered Civil Engineer)(position currently vacant)
  - Water, Sewer, and Street Maintenance Supervisor
  - Street Maintenance Leadman
- *Annual Maintenance Contracts:*
  - Gas control system
- *Annual Consultant Agreement for Environmental Monitoring and Consulting Services:*
  - Detection and corrective action monitoring systems
  - Gas monitoring system

Routine and periodic inspection will be conducted by the Street Maintenance Leadman. At least twice a year and immediately after any special events such as major earthquakes, storms, and fires, a thorough and comprehensive inspection will be conducted by one of the three Registered Civil Engineers. Inspection frequency will be as shown in the following table:

INSPECTION RESPONSIBILITIES AND FREQUENCIES				
Activities	***Immediately***	***Monthly***	***Quarterly***	***Semi-Annually***
Special Events	RCE			
Security		SML[(1)]	SML[(2, 3)]	RCE
Final Cover		SML[(1)]	SML[(2)]	RCE
Final Grading		SML[(1)]	SML[(2)]	RCE
Drainage System		SML[(1)]	SML[(2)]	RCE
Leachate Control System		SML[(1)]	SML[(2)]	RCE
Detection and Corrective Action Monitoring System			C[(4)]	C[(4)]
Gas Monitoring System			C	
Gas Control System		C		

RCE: Registered Civil Engineer
SML: Street Maintenance Leadman
C: Consultant

(1) During the wet season (October 1 through April 30)
(2) During the dry season (May 1 through September 30)
(3) Assumes consultant will check security monthly between quarterly inspections as part of gas control system monitoring.
(4) Combination of quarterly and semi-annual sampling frequencies as described in Subsection 3.5.2 (*Monitoring Program*).

3.3 POSTCLOSURE PLANNED USES *27CCR, §21830(b)(3)*

The end use of the Landfill will be non-irrigated open space. The area will be returned to a natural setting with the exception that all necessary access roads, monitoring wells and drainage structures will remain.

3.4 AS-BUILTS FOR MONITORING AND CONTROL SYSTEMS *27CCR, §21830(b)(4)*

Descriptions of the current monitoring and control systems at the Landfill were previously presented in Section 2 (*Final Closure Plan*). Please refer to the following subsections and appendices for details and as-built information:

Gas Monitoring System

- Subsection 2.9.1, Figure 4 (Appendix A), Table B-1 (Appendix B), Appendix C

Gas Control Systems
- Subsection 2.9.2, Figure 4 (Appendix A), Table B-2 (Appendix B)

Leachate Monitoring and Control Systems
- Subsection 2.10, Figure 5 (Appendix A), Table B-3 (Appendix B), Appendix C

Groundwater Monitoring System
- Subsection 2.11, Figure 6 (Appendix A), Table B-4 (Appendix B), Appendix C

Surface Water Monitoring System
- Subsection 2.12, Figure 7 (Appendix A)

Other than the full-scale gas control system to be installed during the final closure construction project (see Subsection 2.9.2 and Appendix G for further details), no other changes to the current monitoring and control systems will be implemented as part of final closure.

3.5 INSPECTION/MAINTENANCE AND MONITORING PROGRAMS *27CCR, §21830(b)(5)*

The following subsections provide a summary of the inspection/maintenance and monitoring programs that will be employed as part of postclosure maintenance. Specific features and components to be targeted by the inspection/maintenance program include the final cover, final grading, drainage system, leachate control system, detection and corrective action monitoring system, gas monitoring system, and security. The monitoring program, in turn, will focus on implementing monitoring and sampling tasks to comply with applicable regulations and facility permits.

3.5.1 Inspection/Maintenance Program

Final Cover

The final cover is designed to limit water infiltration, minimize leachate generation, prevent exposure of waste to people and animals, limit gas emissions, minimize odor, control fires, and provide for a pleasant appearance. As such, the postclosure maintenance program will be instituted to ensure that the final cover continues to meet these objectives. The final cover areas will be visually inspected on a monthly or quarterly basis as previously outlined in Subsection 3.2.2 (*Resources*) and evaluated for:

- Breaches in the liner system
- Odors
- Exposed refuse
- Slope failure
- Leachate seeps
- Sand migration

Based on the nature of the final cover system and the absence of a vegetative soil layer, erosional damage does represent a potential concern at the Landfill. Thus, from an integrity perspective, a physical breach in the final cover's liner system would be the most probable cause prompting the need for final cover maintenance. In this regard, the detection of odors, exposed refuse, and/or leachate seeps would be indicative of a potential breach. In the event a breach is identified, the damaged portion of the liner will be repaired as soon as practical depending upon contractor availability and liner material delivery, as well as weather. With that being said, every effort will be made to implement the repairs as soon as practical. In the interim, provisions will be employed to temporarily tarp and secure the area to prevent water infiltration into the refuse. All repairs to the liner will be to design conditions and in accordance with the Technical Specifications for the respective final cover components. Any underlying subgrade improvements will also be repaired in accordance with the foundation layer Technical Specifications.

Since the sand infill layer is an integral part of the final cover system, the surface of the final cover will be inspected for evidence of bare patches and/or excessive sand accumulation. Bare patches will be repaired by either manually redistributing the sand in the immediate area or adding new sand material. The resulting sand thickness for either approach shall be 5/8-inch minimum. In the case of excessive sand, the accumulated sand will be manually spread around the immediate area to achieve a uniform thickness of at least 5/8-inch. If excess sand remains after such provisions, the excess sand will be physically removed and stockpiled at a location off of the WMU surface. Any areas of displacement or migration that are 1/8-acre in size or larger will be repaired upon their discovery as soon as weather and access conditions permit. Any discernable smaller areas that are identified during the annual facility inspection will be prepared as part of annual winterization maintenance activities in preparation for the wet season. In addition to the monthly and quarterly inspections as previously outlined in Subsection 3.2.2 (*Resources*), inspection of the sand fill layer will also be performed after major storm events.

Final Grading

Surface grading of a closed WMU, when properly designed and constructed, can be an economical method of controlling infiltration and promoting surface water run-off. The final grading configuration is designed to compensate for the effects of settlement, thereby preventing the need for difficult and costly maintenance and repair. Thus, the postclosure maintenance program will be implemented to ensure that the WMU final grades are maintained properly to ensure final cover integrity and effectiveness. The final cover areas will be visually inspected on a monthly or quarterly basis as previously outlined in Subsection 3.2.2 (*Resources*) and evaluated for:

- Visible depressions
- Ponded water
- Settlement and subsidence

Based on the steep slopes that exist throughout the WMU, any settlement that might occur that could potentially compromise drainage or induce ponding would likely be limited to bench areas. If such deficiencies are identified, or in the unlikely scenario that an area(s)

requiring repair occurs on a slope between benches, the ClosureTurf™ material will be removed from the area in question, additional foundation layer soil will be placed and compacted within the depressed area to restore positive drainage, and the exposed area recovered with either the existing (if condition is suitable) or new ClosureTurf™ material. Foundation layer placement and liner repairs will be in accordance with the CQA Plan for the respective final cover components.

As an additional means of monitoring settlement and subsidence, the entire site will be aerially photographed every five years during the postclosure maintenance period and iso-settlement maps prepared to calculate any differential settlement. The iso-settlement maps will be generated with a maximum contour interval of 2 feet and a scale of 1 inch equal to 60 feet.

Drainage System

Drainage control problems can result in accelerated erosion of a particular area. In addition, differential settlement of drainage control structures can limit their usefulness and may result in failure to direct stormwater properly off of the site. Therefore, the postclosure maintenance program will be implemented to ensure that the integrity and effectiveness of the final drainage system are maintained throughout the postclosure maintenance period. The final drainage system will be inspected on a monthly or quarterly basis as previously outlined in Subsection 3.2.2 (*Resources*) and evaluated for:

- Evidence of erosion
- Standing water
- Formation of gullies
- Settlement, blockage of and damage to drainage channels, structures, swales, and culverts

Deficiencies, damage to, and failure of the drainage system will be repaired and restored within two weeks, weather permitting, to design conditions and in accordance with construction specifications. Temporary repairs may be made until permanent repairs can be scheduled. Culverts and drainage basins will be cleaned of sediments before they are no longer able to function properly. Drainage inlet grates will be kept free of debris. Drainage channels will be maintained to permit free flow and sealed or repaired to maintain structural integrity of the system.

Leachate Control System

The leachate control system will be inspected on a monthly or quarterly basis as previously outlined in Subsection 3.2.2 (*Resources*). In addition, preventive maintenance will be carried out on all components of the system at regular intervals to ensure proper operations. This consists of performing manufacturer's recommended maintenance on the pump system and monthly/quarterly (depending upon frequency shown in Subsection 3.2.2) inspection of the collection and storage system. This inspection includes assessing the condition of system components for possible leakage, failure, or damage, and adjusting individual pump controls or liquid levels for optimum performance. Any potential or existing

failure points will be noted and repairs implemented promptly. The leachate collection lines will be flushed as needed to remove any sediment buildup in the piping system.

Detection and Corrective Action Monitoring System

The leachate wet well will be inspected on a monthly or quarterly basis in conjunction with the leachate control system inspection as described in the previous subsection. The surface water monitoring system, in turn, requires no maintenance since there is no dedicated equipment or features. Finally, the groundwater and leachate monitoring wells will be inspected regularly in conjunction with the scheduled monitoring tasks (quarterly) for signs of failure or deterioration. If damage is discovered, the nature and extent of the problem will be recorded. A decision will be made to replace or repair the monitoring well. Possible repairs include redevelopment, chemical treatment, partial casing replacement or repair, resealing the annulus, pumping, and testing. If a monitoring well needs to be replaced, it will be properly decommissioned. Damaged monitoring wells will be scheduled for repair or replacement within one (1) month after identifying the problem. As for general maintenance, the following provisions will be performed on a quarterly basis:

- Cut weeds in 2-foot radius around each well, as needed.
- Replace locking well caps, as needed.
- Lubricate enclosure locks and hinges, as needed.

Gas Monitoring System

The gas monitoring system will be inspected quarterly in conjunction with scheduled monitoring tasks. System components will be repaired and replaced as required to maintain full system capabilities as intended at initial installation. Quarterly maintenance provisions will include the following:

- Cut weeds in 2-foot radius around each point, as needed.
- Replace probe parts, as needed.
- Lubricate enclosure locks and hinges, as needed.

Site Security

Site security upon closure will conform with the requirements of 27CCR, §21135. Perimeter fencing will be maintained to exclude cattle from the site. Other security provisions will include:

- Lockable gate at the site entrance.
- Lockable utility boxes, or gates, or both, enclosing the environmental control systems.

At least one sign will be posted in a visible location at the site access road indicating where the Final CPMP is located. The sign will also include a telephone number for emergency notification and will remain throughout the postclosure maintenance period.

3.5.2 Monitoring Program

The monitoring program applies to the environmental monitoring and control systems during the postclosure maintenance period and will coincide with applicable regulations and facility permits. The following subsections present the nature and scope of the respective monitoring components. Please note that in the case of detection and corrective monitoring for leachate, groundwater, and surface water, the scope and frequencies specified herein are proposed and will ultimately be dictated by the postclosure maintenance M&RP to be adopted by the RWQCB.

Detection and Corrective Action Monitoring

For the purpose of this Final PMP, it is assumed that detection and corrective action monitoring for leachate, groundwater, and surface water during the postclosure maintenance period will be similar to what is currently required under existing M&RP Order No. R1-2002-0061, with several modifications. The proposed modifications are outlined below. Please note that the current monitoring frequency required under existing M&RP Order No. R1-2002-0061 is quarterly for each of the aforementioned media.

- Eliminate the analyses for calcium, sodium, magnesium, potassium, bicarbonate, carbonate, and fluoride. Whereas these selected metals and general chemistry parameters were meaningful during previous site characterization work (i.e., definition of water types), they do not represent useful indicator parameters for potential releases, nor do they represent parameters of concern with respect to health and toxicity issues.

- Limit the quarterly monitoring frequency to selected groundwater monitoring wells located along the western property boundary, while reducing the monitoring frequency in the remaining groundwater monitoring wells to semi-annual. The western property boundary groundwater monitoring wells, which include 87-1, 90-2, 94-2, 96-1, and 96-3, are recommended for continued quarterly monitoring since they are situated between the WMU and downgradient off-site receptors that could possibly be influenced by a potential release.

- Remove groundwater monitoring wells 90-8 and 92-4 from the groundwater monitoring network since these monitoring wells are located outside the WMU's watershed and do not appear to be in hydraulic communication with groundwater underlying the WMU.

- Add semi-annual water level monitoring of leachate monitoring wells LW-1 through LW-3. The monitoring should be performed during the first and third quarters to allow for evaluation of seasonal variations.

- Reduce the quarterly monitoring frequency for surface water to semi-annual. The basis for this modification is that surface water flow in the ephemeral creek has historically occurred only between November and April, and sometimes intermittently during this time frame depending upon rainfall totals. Based on this

limited flow period, quarterly monitoring is not appropriate for the site. The semi-annual monitoring should be performed during the first and fourth quarters to provide the best odds for surface water flow being present.

Summaries of the scope and frequency of monitoring/testing proposed herein are presented in Table B-5 (Leachate), Table B-6 (Groundwater), and Table B-7 (Surface Water) of Appendix B.

The monitoring and testing activities will be performed using industry standard protocols. Provisions will include: use of dedicated pumps, sanitized portable pumps, and/or sanitized bailers; measurement of field parameters during purging and sampling; collection of quality assurance/quality control (QA/QC) samples; sample preservation during transport; chain-of-custody documentation; and laboratory QA/QC testing. Field procedures, field data, and laboratory test results will be summarized in the report submittals as described in Subsection 3.7 (*Reporting*).

Perimeter Gas Monitoring

The perimeter gas monitoring system will be monitored on a quarterly basis as required by 27CCR, §20921. The scope of monitoring at each probe will include: measuring static pressure conditions using a Magnehelic pressure gauge; purging the equivalent of one (1) probe volume using an air pump; and measuring methane, oxygen, and carbon dioxide concentrations initially, during and upon completion of the purging operations using a calibrated portable gas detector. The regulatory compliance level for methane along the landfill property boundary is 5 percent by volume.

Gas Emissions Monitoring

The gas control system and WMU surface will be monitored to comply with Assembly Bill 32 requirements in accordance with 17CCR, §95469. The scope of monitoring will include the following:

- Instantaneous surface monitoring will be conducted on a quarterly basis to determine if surface emissions of 500 parts per million by volume (ppmv) or greater, other than non-repeatable, momentary readings, are present at any location on the WMU surface. The monitoring will be accomplished using a calibrated portable gas detector.

- Integrated surface monitoring will be conducted on a quarterly basis to determine if the average methane concentration within designated grid areas exceed 25 ppmv. The monitoring will be accomplished using a calibrated portable gas detector.

- Any components of the gas control system that are under positive pressure will be monitored on a quarterly basis to determine if any leaks are present at methane concentrations exceeding 500 ppmv. The monitoring will be accomplished using a calibrated portable gas detector.

- The wellhead for each extraction well will be monitored on a monthly basis to determine whether the extraction well is being operated under vacuum conditions (i.e., negative pressure). The monitoring will be performed using a Magnehelic pressure gauge.

- The flare will be monitored for temperature and flow rate using dedicated instrumentation and the corresponding data documented using a continuous recorder. In addition, the flare will be source tested on an annual basis to verify compliance with emissions and destruction efficiency criteria.

The test methods and procedures employed to perform the respective monitoring provisions outlined above will be in accordance with the applicable subsections of 17CCR, §95471. This includes portable gas detector instrumentation and calibration, emissions monitoring procedures, wind speed data collection, and precipitation documentation. In addition, in the event that an emissions and/or operating threshold is identified, corresponding corrective actions will be implemented within the time frames specified in 17CCR, §95469. Please refer to the gas control system's Updated Design Plan (Appendix G) for further details regarding the methods and procedures.

Source Testing

In accordance with 17CCR, §95464(b)(4), an initial source test of the flare will be performed within 180 days of initial start-up of the gas control system. This will be followed by annual source testing thereafter during the postclosure maintenance period, or at an alternate frequency if approved by the Mendocino County Air Quality Management District (MCAQMD). The source testing will be performed by a qualified contractor experienced in this type of testing.

3.6 OPERATIONS AND MAINTENANCE PLAN FOR GAS CONTROL SYSTEM *27CCR, §21830(b)(6)*

Preventive maintenance for the existing partial perimeter gas collection system will be carried out on all mechanical equipment at manufacturer's recommended intervals. This includes cleaning, lubrication, and replacement of worn parts. The accessible portions of gas collection piping will be thoroughly inspected on a regular basis for detection of potential failure points and necessary repairs will be noted and implemented. System failures, such as pipe leaks or breaks that reduce gas collection efficiency and control effectiveness will be addressed to operating permit conditions. As previously noted, this system may become obsolete upon installation and operation of the full-scale gas control system. If that is the case, the maintenance provisions described above will be suspended accordingly.

In regards to the proposed full-scale gas control system, please refer to the corresponding Updated Design Plan (Appendix G) for details regarding operation and maintenance of the system. Please note that the totally-enclosed vertical ground flare has yet to be fabricated,

nor has the MCAQMD formally approved the system through the issuance of an Authority to Construct Permit. Any operation and/or maintenance provisions provided by the flare manufacturer or mandated by the MCAQMD through the permitting process will be incorporated into the operations and maintenance program accordingly.

3.7 REPORTING
27CCR, §21830(b)(7)

With the exception for the gas monitoring system (see below), the reporting requirements for the leachate control system, detection and corrective action monitoring system, and gas control system are permit specific. Under the current WDR/M&RP (Order No. R1-2002-0061), the leachate, groundwater, and surface monitoring and/or control data are reported to the RWQCB on a quarterly basis. However, a semi-annual reporting frequency is being requested as part of the new WDR to be issued for postclosure maintenance. As for gas control, documentation as to operation of the existing partial perimeter gas collection system is included as part of the perimeter gas monitoring reports prepared for 27CCR. As for the proposed full-scale gas control system, reporting will be dictated by the Permit to Operate to be issued by the MCAQMD. The reporting frequency recommended in the Updated Design Plan (EBA, 2019) is annually.

In regards to the gas monitoring system, the scope and frequency of reporting is dictated by 27CCR, §20934, which requires quarterly report submittals within a time period specified by the LEA but no more than within 90 days of sampling. Each report shall include methane concentrations, documentation of sampling conditions (i.e., barometric pressure, atmospheric temperatures, general weather conditions, and probe pressures), instrumentation utilized, monitoring personnel, and a brief description of methods.

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SECTION 4
CLOSURE AND POSTCLOSURE MAINTENANCE COST ESTIMATES

In accordance with 27CCR, §21769(c)(2)(A), §21800(c) and §21830(b)(8), engineer's cost estimates for closure of the Landfill and associated postclosure maintenance have been prepared by a Registered Professional Engineer or Certified Engineering Geologist and are presented in Appendix L. As presented in Appendix L, the estimated cost for closure of the Landfill is ***$10,987,856***. This cost includes a 20 percent contingency factor. The estimated cost for postclosure maintenance of the Landfill is ***$7,191,931*** for the 30-year postclosure maintenance period. This cost was calculated by multiplying the annual cost for maintenance and monitoring by 30 years (duration of postclosure maintenance period).

The aforementioned information represents the cost of closing the Landfill at the point in its active life (i.e., current site conditions) when the extent and manner of operation would make closure the most expensive. The closure and postclosure maintenance costs will be updated annually to incorporate changes resulting from increased or decreased site activities or monitoring. Any modifications to these costs will be submitted to CalRecycle for approval.

As required by 27CCR, Chapter 6, the operator of a disposal facility is responsible for establishing a "demonstration of financial responsibility" to provide funding for site closure and postclosure maintenance costs. Financial mechanisms to provide for such funding have been established by the City.

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SECTION 5
FUND DISBURSEMENT SCHEDULE

In accordance with 27CCR, §21790(b)(8)(F), a preliminary fund disbursement schedule for the final closure construction project has been prepared and is enclosed in Appendix N. Please note that the fund disbursement schedule presented in Appendix M is preliminary in nature as it is based on engineer's estimates for both construction sequencing and associated costs. Both of these variables as presented are subject to change based on the contractor selected from the competitive bid process. It should be further noted that the closure costs, which are based on the engineer's cost estimate presented in Section 4 (*Closure and Postclosure Maintenance Cost Estimates*), exclude the 20 percent contingency. An updated fund disbursement schedule will be provided to the applicable regulatory agencies upon selection of a qualified contractor.

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SECTION 6
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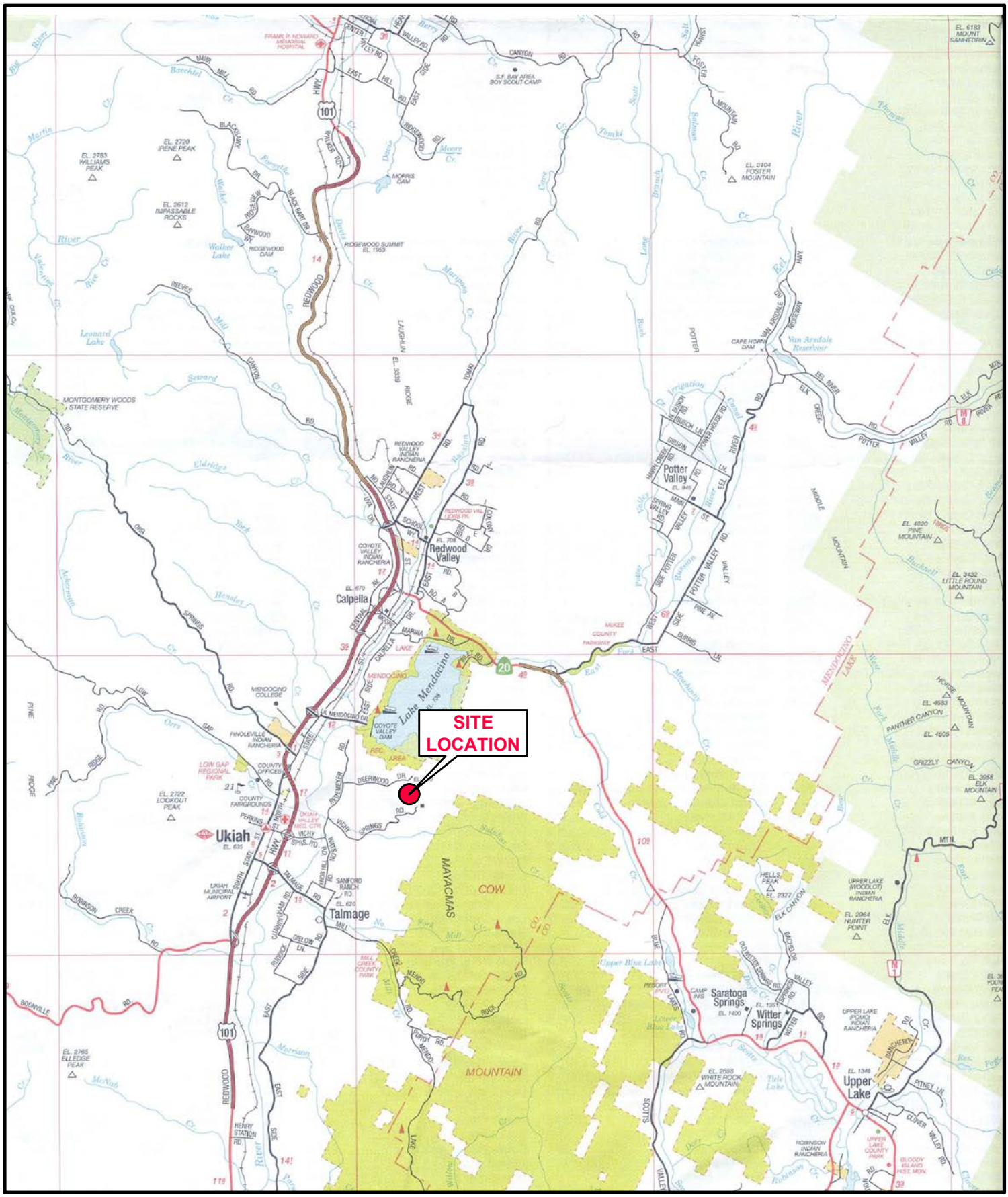
APPENDIX A

FIGURES

Q:\02-907\Location Map Phase-Task 10.dwg, 4/10/2019 8:31:17 AM



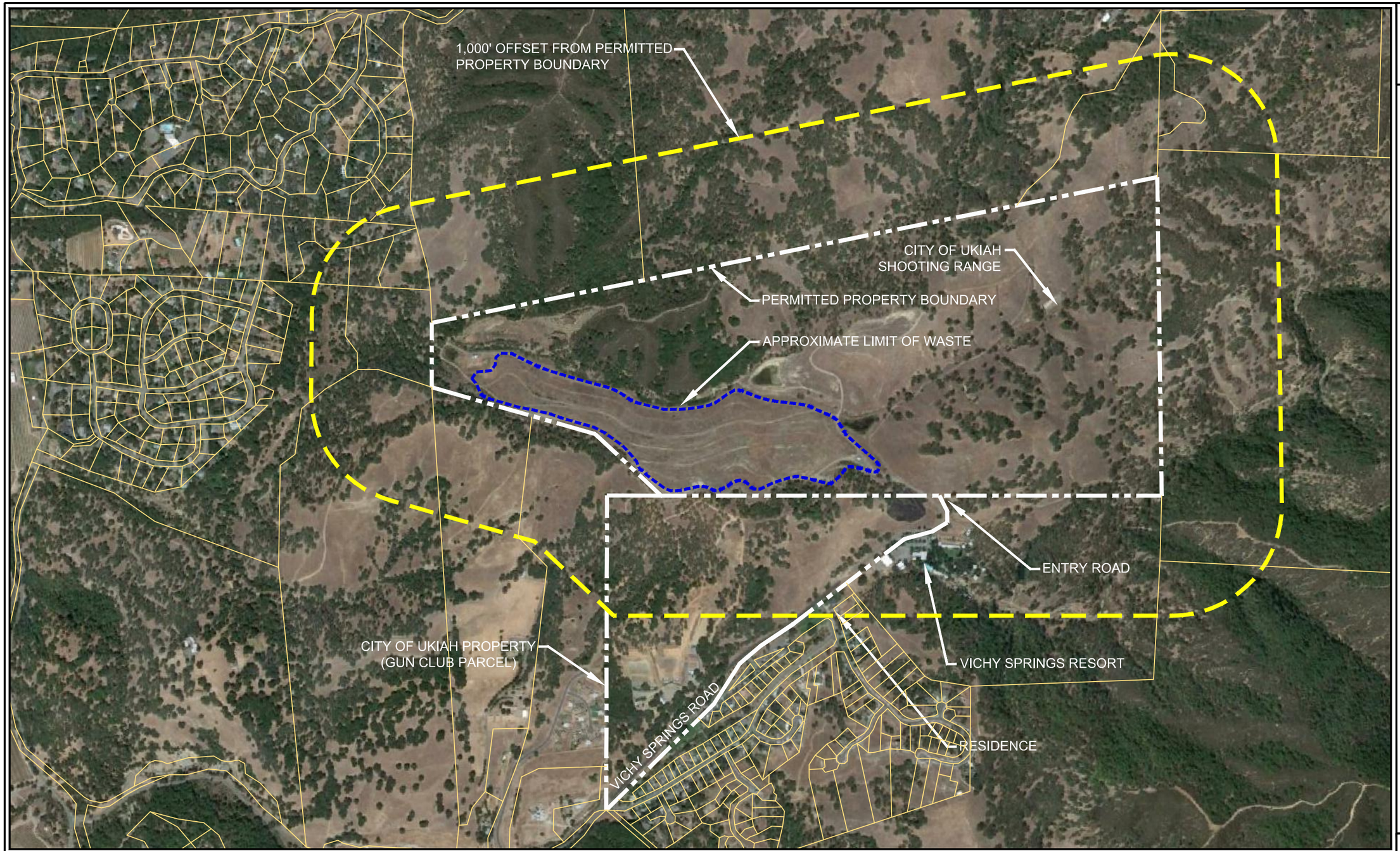
EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

SITE LOCATION MAP

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

FIGURE
1

02-907



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0 400 800
1" = 800'

FIGURE 2 02-907

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

SITE PLAN

COUNTY MENDOCINO

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

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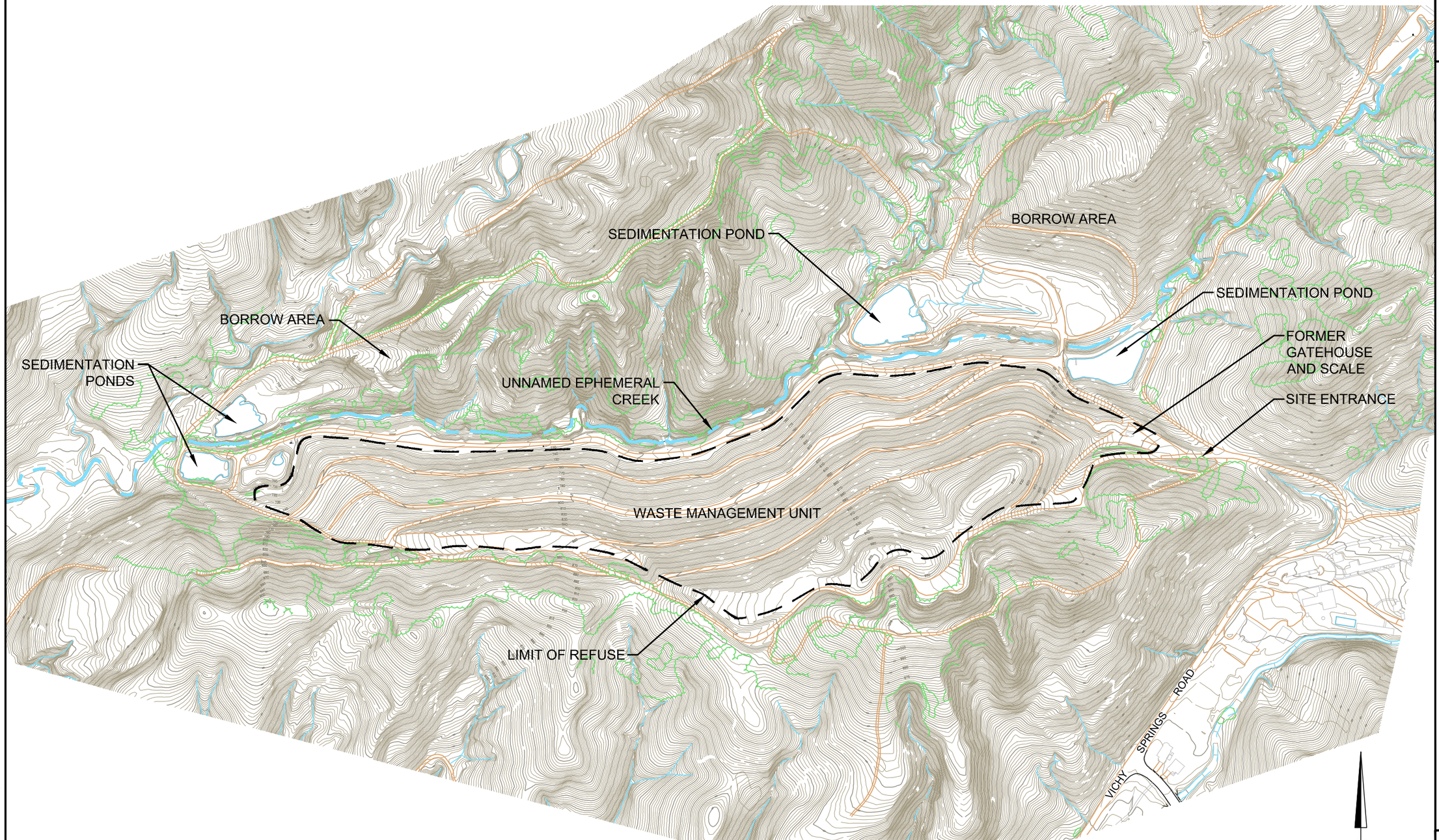

FIGURE 3

02-907

COUNTY

MENDOCINO

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

EXISTING SITE FEATURES

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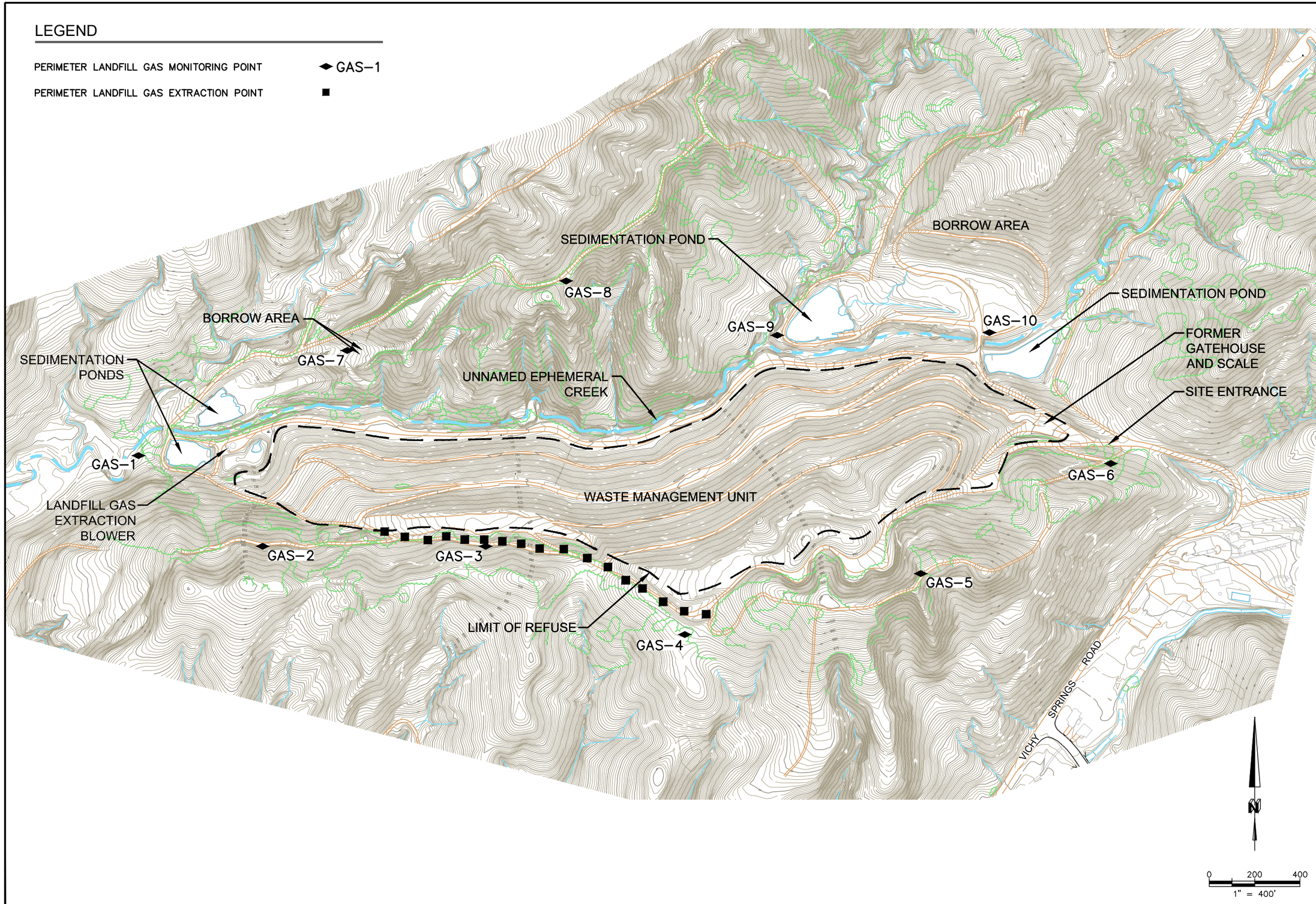

FIGURE 4

02–907

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

GAS MONITORING/CONTROL SYSTEMS

MENDOCINO COUNTY

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544–0784

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LEGEND

LEACHATE WELL ■ LW–1

SEDIMENTATION POND

BORROW AREA

BORROW AREA

SEDIMENTATION POND

SEDIMENTATION PONDS

UNNAMED EPHEMERAL CREEK

LW–3

FORMER GATEHOUSE AND SCALE

SITE ENTRANCE

LW–1

LW–2

WASTE MANAGEMENT UNIT

LEACHATE WET WELL

LEACHATE STORAGE TANK AND PUMP STATION

FORMER LEACHATE POND

LIMIT OF REFUSE

VICHY SPRINGS ROAD

N

0 200 400

1" = 400'

FIGURE 5

02-907

COUNTY

LEACHATE MONITORING/CONTROL SYSTEMS

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

MENDOCINO

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LEGEND

DETECTION GROUNDWATER MONITORING WELL ● 90–1

CORRECTIVE ACTION GROUNDWATER MONITORING WELL ◔ 90–3

BORROW AREA

SEDIMENTATION POND

BORROW AREA

94–1

SEDIMENTATION POND

FORMER GATEHOUSE AND SCALE

SITE ENTRANCE

90–6

UNNAMED EPHEMERAL CREEK

92–3

90–5

90–8

92–4

95–1

94–2

96–2

92–2

96–1

90–4

90–3

90–2

87–1

92–1

90–1

96–3

SEDIMENTATION PONDS

WASTE MANAGEMENT UNIT

90–7

LIMIT OF REFUSE

VICHY SPRINGS ROAD

N

0 200 400

1" = 400'

FIGURE 6

02-907

COUNTY

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

GROUNDWATER MONITORING SYSTEM

MENDOCINO

EBA ENGINEERING
825 SONOMA AVENUE
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LEGEND

SURFACE WATER SAMPLING STATION ▲ S–1

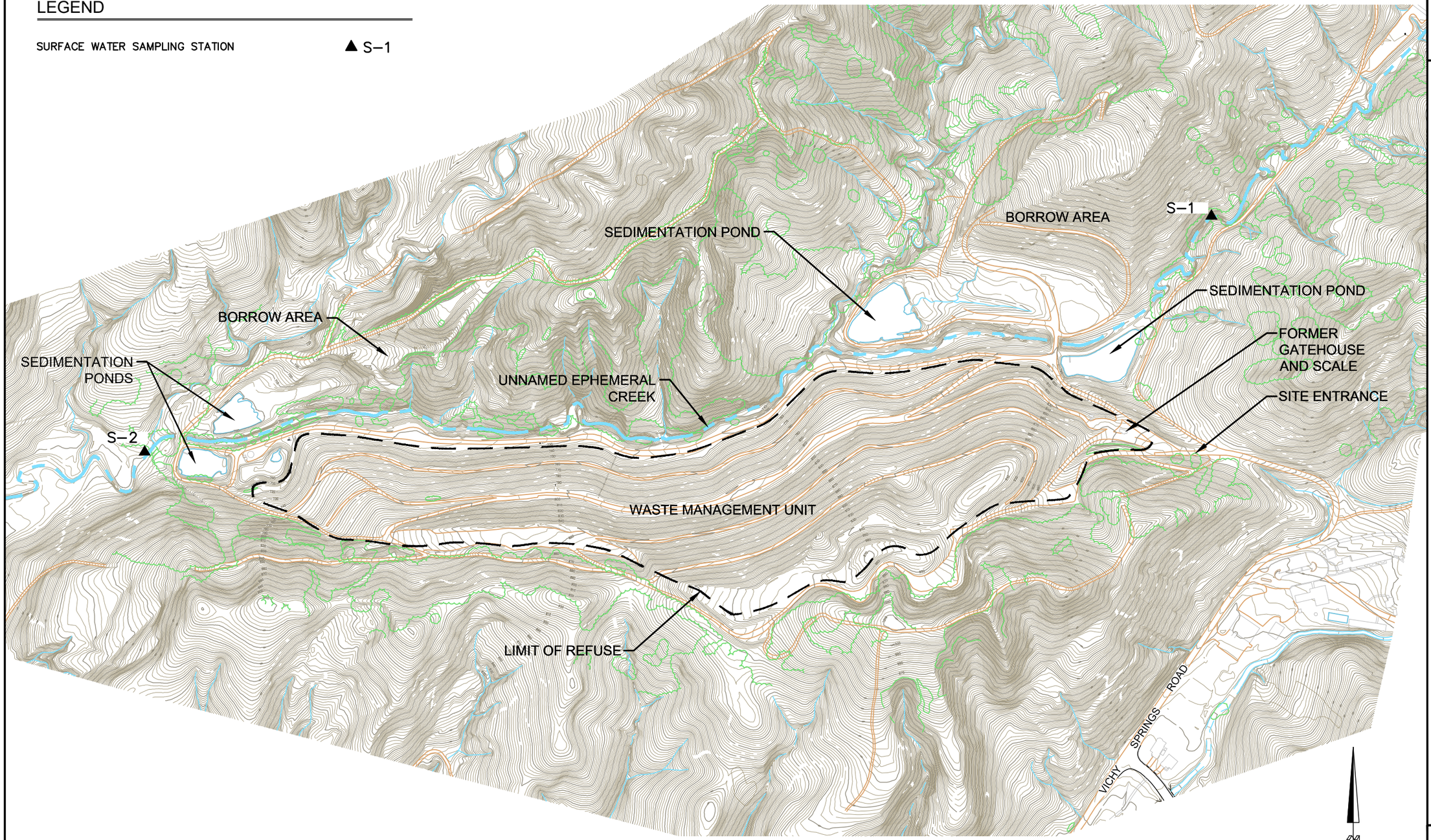

FIGURE 7

02-907

SURFACE WATER MONITORING SYSTEM

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

COUNTY MENDOCINO

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APPENDIX B

TABLES

Table B-1
Perimeter Gas Monitoring Point Construction Information
City of Ukiah Landfill

Point No.	*Total Depth*	*Top of Casing Elevation (Feet Mean Sea Level)*	*Probe*	*Gravel Pack Interval*	*Screened Interval*
GAS-1	11'	686.59	---	4.5' - 9'	5' - 9'
GAS-2	126'	839.65	Shallow	5' - 10'	5' - 10'
			Intermediate	13' - 60'	30' - 60'
			Deep	65' - 105', 110' - 126'	80' - 100', 110' - 125'
GAS-3	135'	861.42	Shallow	4' - 15'	5' - 15'
			Intermediate	20' - 66.5'	35' - 65'
			Deep	83.5' - 135'	85' - 135'
GAS-4	145'	919.33	Shallow	5' - 11'	5' - 10'
			Intermediate	15' - 75'	52.5' - 72.5'
			Deep	85' - 145'	113' - 143'
GAS-5	250'	1,032.24	Shallow	5' - 10'	5' - 10'
			Intermediate 1	15' - 113'	73' - 113'
			Intermediate 2	118' - 166.5'	126' - 166'
			Deep	171.5' - 250'	210' - 250'
GAS-6	144.5'	865.60	Shallow	6.5' - 14.5'	7.5' - 12'
			Intermediate	19' - 69'	20' - 68.5'
			Deep	74' - 144.5'	78' - 144'
GAS-7	84.5'	771.52	Shallow	5' - 11'	5.5' - 10.5'
			Intermediate	16' - 42.5'	16.5' - 42'
			Deep	47.5' - 84.5'	47.5' - 82.5'
GAS-8	174.5'	920.47	Shallow	6.5' - 12.5'	7.5' - 11'
			Intermediate	17' - 84'	18' - 84'
			Deep	89.5' - 171.5'	90' - 165'
GAS-9	30'	763.85	Shallow	4.5' - 9.5'	5' - 9'
			Intermediate	14.5' - 20'	15' - 19.5'
			Deep	25' - 30'	25.5' - 30'
GAS-10	59'	788.54	Shallow	4.5' - 10'	5' - 9.5'
			Intermediate	14.5' - 28'	15' - 27.5'
			Deep	33' - 59'	33' - 55

Table B-2
Perimeter Gas Extraction Well Construction Information
City of Ukiah Landfill

Well No.	*Well Depth*	*Screened Interval*	*Plate Elevation (Feet MSL)*
PG-1	80'	27' - 76'	824.75
PG-1A	35'	15' - 35'	829.60
PG-2	90'	35.5' - 88'	838.09
PG-2A	40'	20' - 40'	852.19
PG-3	101'	44.5' - 99'	857.51
PG-3A	52'	24.5' - 47'	859.52
PG-4	107'	39' - 80'	868.00
PG-4A	50'	25' - 50'	873.24
PG-5	85'	44' - 83'	874.88
PG-5A	50'	24' - 50'	879.12
PG-6	93'	43' - 93'	889.07
PG-6A	51'	16' - 50'	899.90
PG-7	133'	45' - 120'	913.36
PG-7A	45'	15' - 42'	922.24
PG-8	117'	47' - 117'	927.50
PG-8A	50'	15' - 47'	931.22
PG-9	117'	47' - 114'	936.69

MSL = Mean Sea Level

Table B-3
Leachate Well Construction Information
City of Ukiah Landfill

Well No.	*Well Casing Dia.*	*Well Completion Depth*	*Well Screened Interval*	*Top of Casing Elevation (1) (Feet MSL)*	*Screen Size*	*Filter Pack Interval*	*Filter Pack Material*
LW-1	4"	55.0'	35.0' - 55.0'	762	0.020"	30.0' - 55.5'	#3 Monterey
LW-2	4"	29.0'	9.0' - 29.0'	777	0.020"	5.0' - 29.5'	#3 Monterey
LW-3	4"	15.0'	5.0' - 15.0'	772	0.020"	4.0' - 17.0'	#3 Monterey

Dia. = Diameter
MSL = Mean Sea Level

(1): Approximate

Table B-4
Groundwater Monitoring Well Construction Information
City of Ukiah Landfill

Well No.	*Well Casing Dia.*	*Well Completion Depth*	*Well Screened Interval*	*Top of Casing Elevation (Feet MSL)*	*Screen Size*	*Filter Pack Interval*	*Filter Pack Material*
87-1	2"	16.0'	6.0' - 16.0'	684.95	0.020"	5.0' - 16.0'	#3 Monterey
90-1	2"	14.0'	5.5' - 14.0'	679.52	0.020"	5.0' - 14.0'	#3 Monterey
90-2	2"	49.0	19.0 - 49.0'	686.00	0.020"	18.0' - 50.0'	#3 Monterey
90-3	2"	35.0'	25.0' - 35.0'	722.39	0.020"	24.5' - 35.0'	#3 Monterey
90-4	2"	34.0'	19.0' - 34.0'	720.90	0.020"	18.0' - 35.0'	#3 Monterey
90-5	2"	34.0'	19.0' - 34.0'	746.37	0.020"	18.0' - 35.0'	#3 Monterey
90-6	2"	37.5'	17.5' - 37.5'	758.94	0.020"	16.5' - 39.25'	#2/16 Monterey
90-7	2"	159.0'	135.0 - 159.0'	832.85	0.020"	135.0' - 160.0'	#3 Monterey
90-8	2"	138.5'	110.0' - 138.5'	839.03	0.020"	97.0' - 140.0'	#3 Monterey
92-1	2"	28.0'	15.0' - 28.0'	707.89	0.010"	13.0' - 28.0'	#2/12 Monterey
92-2	2"	40.0'	20.0' - 40.0'	711.67	0.010"	18.0' - 40.0'	#2/12 Monterey
92-3	2"	49.5'	29.5' - 49.5'	745.50	0.010"	28.0' - 49.5'	#2/12 Monterey
92-4	2"	130.0'	90.0' - 130.0'	805.81	0.020"	86.0' - 130.0'	#3 Monterey
94-1	2"	12.0'	6.0' - 12.0'	796.97	0.020"	4.0' - 12.0'	#12/14 Monterey
94-2	2"	75.0'	55.0' - 75.0'	708.35	0.020"	52.0' - 75.0'	#2/12 Monterey
96-1	4"	23.5'	8.0' - 23.0'	702.34	0.010"	7.0' - 23.0'	#2/12 Lone Star
96-2	4"	28.5'	13.5' - 28.5'	702.09	0.010"	11.5' - 23.0'	#2/12 Lone Star
96-3	4"	26.5'	11/5' - 26.5'	701.74	0.010"	11.0' - 23.0'	#2/12 Lone Star

Dia. = Diameter
MSL = Mean Sea Level

Table B-5
Summary of Leachate Monitoring Parameters
City of Ukiah Landfill

Parameter	*Units*	*Frequency*
Field Parameters		
Total Flow	gallons	Monthly
Flow Rate	gallons per day	Monthly
Specific Conductance	µmhos/cm	Quarterly
pH	pH units	Quarterly
Temperature	degrees F	Quarterly
Monitoring Parameters		
Total Dissolved Solids	mg/L	Quarterly
Chloride	mg/L	Quarterly
Nitrate-Nitrogen	mg/L	Quarterly
Total Ammonia	mg/L	Quarterly
Sulfate	mg/L	Quarterly
Chemical Oxygen Demand	mg/L	Quarterly
Biological Oxygen Demand	mg/L	Quarterly
Total Ammonia	mg/L	Quarterly
Total Alkalinity	mg/L	Quarterly
Volatile Organic Compounds (EPA Method 8260 with MtBE)	µg/L	Quarterly
Total Purgeable/Extractable Petroleum Hydrocarbons	mg/L	Quarterly
1-Year Constituents of Concern		
Inorganics (Dissolved Metals)[1]	mg/L	Annually
Extractable Oil and Grease	mg/L	Annually
5-Year Constituents of Concern		
Semi-Volatile Organic Compounds (EPA Method 8270)	µg/L	Every 5 Years
Organochlorine Pesticides (EPA Method 8081)	µg/L	Every 5 Years
Polychlorinated Biphenyls (PCBs) (EPA Method 8082)	µg/L	Every 5 Years
Organophosphorus Compounds (EPA Method 8141)	µg/L	Every 5 Years
Chlorophenoxy Herbicides (EPA Method 8150)	µg/L	Every 5 Years

µmhos/cm: Micromhos per Centimeter
degrees F: Degrees Fahrenheit
mg/L: Milligrams per Liter
µg/L: Micrograms per Liter
MtBE: Methyl tert-Butyl Ether

(1): Per Appendix II, Subtitle D, 40 Code of Federal Regulations (40 CFR).

Table B-6
Summary of Groundwater Monitoring Parameters
City of Ukiah Landfill

Parameter	*Units*	*Frequency*
Field Parameters		
Temperature	degrees F	Quarterly[2] / Semi-Annually[3]
Groundwater Elevation	Feet Above MSL	Quarterly[4]
Specific Conductance	µmhos/cm	Quarterly[2] / Semi-Annually[3]
pH	pH units	Quarterly[2] / Semi-Annually[3]
Turbidity	NTUs	Quarterly[2] / Semi-Annually[3]
Monitoring Parameters		
Total Dissolved Solids	mg/L	Quarterly[2] / Semi-Annually[3]
Chloride	mg/L	Quarterly[2] / Semi-Annually[3]
Sulfate	mg/L	Quarterly[2] / Semi-Annually
Nitrate-Nitrogen	mg/L	Quarterly[2] / Semi-Annually[3]
Manganese	mg/L	Quarterly[2] / Semi-Annually[3]
Boron	mg/L	Quarterly[2] / Semi-Annually[3]
Un-Ionized and Total Ammonia	mg/L	Quarterly[2] / Semi-Annually[3]
Total Alkalinity	mg/L	Quarterly[2] / Semi-Annually[3]
Volatile Organic Compounds (EPA Method 8260 with MtBE)	µg/L	Quarterly[2] / Semi-Annually[3]
Total Purgeable/Extractable Petroleum Hydrocarbons	mg/L	Quarterly[2] / Semi-Annually[3]
1-Year Constituents of Concern		
Inorganics (Dissolved Metals)[1]	mg/L	Annually
Extractable Oil and Grease	mg/L	Annually
5-Year Constituents of Concern		
Semi-Volatile Organic Compounds (EPA Method 8270)	µg/L	Every 5 Years
Organochlorine Pesticides (EPA Method 8081)	µg/L	Every 5 Years
Polychlorinated Biphenyls (PCBs) (EPA Method 8082)	µg/L	Every 5 Years
Organophosphorus Compounds (EPA Method 8141)	µg/L	Every 5 Years
Chlorophenoxy Herbicides (EPA Method 8150)	µg/L	Every 5 Years

degrees F: Degrees Fahrenheit
MSL: Mean Sea Level
µmhos/cm: Micromhos per Centimeter
NTUs: Nephelometric Turbidity Units
mg/L: Milligrams per Liter
µg/L: Micrograms per Liter
MtBE: Methyl tert-Butyl Ether

(1): Per Appendix II, Subtitle D, 40 Code of Federal Regulations (40 CFR).

(2): Corresponds to groundwater monitoring wells 87-1, 90-2, 94-2, 96-1 and 96-3.

(3): Corresponds to groundwater monitoring wells 90-1, 90-3, 90-4, 90-5, 90-6, 90-7, 92-1, 92-2, 92-3, 94-1 and 96-2.

(4): Corresponds to all groundwater monitoring wells listed above in Footnotes 2 and 3.

Table B-7
Summary of Surface Water Monitoring Parameters
City of Ukiah Landfill

Parameter	*Units*	*Frequency*
Field Parameters		
Temperature	degrees F	Quarterly
Specific Conductance	µmhos/cm	Quarterly
pH	pH units	Quarterly
Dissolved Oxygen	mg/L	Quarterly
Turbidity	NTUs	Quarterly
Monitoring Parameters		
Total Suspended Solids	mg/L	Quarterly
Total Settleable Solids	mg/L	Quarterly
Total Dissolved Solids	mg/L	Quarterly
Chloride	mg/L	Quarterly
Total-Nitrogen	mg/L	Quarterly
Un-Ionized and Total Ammonia	mg/L	Quarterly
Sulfate	mg/L	Quarterly
Chemical Oxygen Demand	mg/L	Quarterly
1-Year Constituents of Concern		
Inorganics (Dissolved Metals)[1]	mg/L	Annually
Extractable Oil and Grease	mg/L	Annually
5-Year Constituents of Concern		
Volatile Organic Compounds (EPA Method 8260 with MtBE)	µg/L	Every 5 Years
Semi-Volatile Organic Compounds (EPA Method 8270)	µg/L	Every 5 Years
Organochlorine Pesticides (EPA Method 8081)	µg/L	Every 5 Years
Polychlorinated Biphenyls (PCBs) (EPA Method 8082)	µg/L	Every 5 Years
Organophosphorus Compounds (EPA Method 8141)	µg/L	Every 5 Years
Chlorophenoxy Herbicides (EPA Method 8150)	µg/L	Every 5 Years

degrees F: Degrees Fahrenheit
µmhos/cm: Micromhos per Centimeter
NTUs: Nephelometric Turbidity Units
mg/L: Milligrams per Liter
µg/L: Micrograms per Liter
MtBE: Methyl tert-Butyl Ether

(1): Per Appendix II, Subtitle D, 40 Code of Federal Regulations (40 CFR).

APPENDIX C

EXPLORATORY BORING LOGS

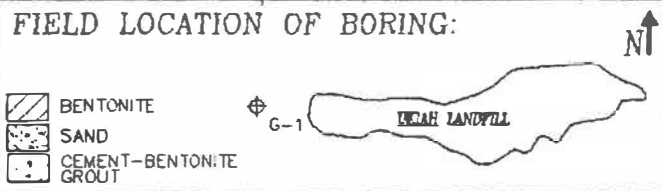
PERIMETER GAS MONITORING POINTS

LOG OF EXPLORATORY BORING

EBA

PROJECT: CITY OF UKIAH LANDFILL
SHEET 1 OF 1
JOB NUMBER 93-461 (1.2)
BORING: GAS-1
DATE: 9-15-94
LOGGED BY: CJB
DRILLER: CLEAR HEART CONSTRUCTION
WELL CASING ELEVATION: ~690 MSL

FIELD LOCATION OF BORING:



EQUIPMENT AND SPECIFICATIONS:
3/4" SCHEDULE 80 PVC CASING
1/4" PEA-GRAVEL 4'-11', # 12/14 SAND 3.5' - 4'
0.040" SCREEN 4' - 11'

WATER DEPTH	6		
TIME	14:30		
DATE	9-15-94		

SAMPLER TYPE	RECOVERY	INITIAL WATER	BLOWS/6 in.	DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
				1	SM	SILTY SAND (SM), light yellowish brown (2.5Y, 6/3), dry, ~5 - 10% Clay	
				2			
				3			
				4			
			9	5			
		▽	13				
2"	15/18		22	6	GM	SANDY GRAVEL (GM), olive brown (2.5Y, 4/4), Sub-angular 0.5 - 1" ø medium grained Sandy matrix, Saturated @ 6".	
				7			
				8			
				9			
				10		BASAL CONTACT WITH PLIO-PLEISTOCENE DEPOSITS	
			5				
2"	18/18		11	11	CL	SILTY CLAY (CL), Mottled dark gray (2.5Y, N4/), and olive brown (2.5Y, 4/3), Moist, mod. plasticity	
			18			Total Depth = 10'	
				12		Sampler Driven to 11.5'	
				13			
				14			
				15			
				16			
				17			
				18			
				19			
				20			
				21			
				22			
				23			
				24			

461TIBL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 1 OF 6

BORING: GAS-2

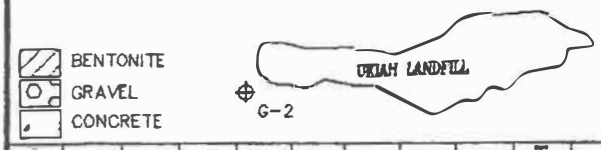
JOB NUMBER: 93-461 (4a)

DATE: 9-22-94

LOGGED BY: DFB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 837 MSL

FIELD LOCATION OF BORING:



EQUIPMENT AND SPECIFICATIONS:

Three Probes: 3/4" ϕ, SCH 80 PVC w/0.040" Slotted Casing and 3/8" pea Gravel

A: Slotted = 5 - 10', Gravel = 5 - 10', Bentonite = 10 - 13'

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION C B A
								1				Silty Clay (CL), olive gray (5Y, 4/2), 95% mod. plastic fines, < 5% fine sand and fine gravel, firm, slighty damp	
								2					
								3					
								4					
							X	5		CL		Silty Clay (CL), light olive brown (2.5Y, 5/4), as above	
								6					
								7					
								8		ML		Sandy Silt (ML), olive yellow (5Y, 6/6), low plasticity fines, slighty damp	
								9					
							X	10		CL		Silty Clay (CL), olive (5Y, 5/4), 80% low - mod. plastic fines, 20% very fine sand, firm, slighty damp, slight FeO staining	
								11					
								12					
								13					
								14				Clay (CH), dark gray (5Y, 4/1), high plasticity fines, slightly damp, soft - firm	
							X	15		CH			
								16					
							X	17		CL		Silty Clay (CL), olive gray (5Y, 5/2), 95% low plasticity fines, 5% fine sand, soft - firm slightly damp	
								18					
								19					
							X	20				Silty Clay, as above	
								21					
								22					
								23					
								24				As above, olive brown (2.5Y, 4/4)	

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 2 OF 8

BORING: GAS-2

JOB NUMBER: 93-461 (4a)

DATE: 9-22-94

LOGGED BY: DFB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 837 MSL

EQUIPMENT AND SPECIFICATIONS:

B: Slotted = 30 - 60', Gravel 13 - 60', Bentonite 60 - 65'

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH / TIME / DATE
								26		CL	
								27		ML	Sandy Silt (ML), yellowish brown (10YR, 5/6), 75 - 80% low - non plastic fines, 20 - 25% fine - med. sand, well rounded, KJf chert and greenstone, slightly damp, firm - soft
							X	28			@ 27.5' Sandy Silt, olive brown (2.5Y, 4/3), 75% low plasticity fines, 25% fine - med. sand
								29			
							X	30			
								31			
								32			
								33			
								34			@ 34' higher sand content, 60% low plastic fines, 40% fine sand, slightly damp, firm
							X	35			
								36			
							X	37			
								38		CL	Silty Clay(stone) (CL), very dark gray (2.5Y N3/), mod. - high plasticity fines, soft - firm, slighty damp
								39			
							X	40			
								41			
								42			
								43			@ 43' light gray (2.5Y, 6/1), 95% mod. - high plasticity fines, 5% fine sand, slighty damp
								44			
							X	45			
								46			
								47			
								48			@ 48.5' very dark gray (2.5Y, N3/), 95% mod. - high placticity fines, 5% fine sand
								49			
							X				

CASING CONSTRUCTION: C B

461LFGBL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS | SHEET 3 OF 6
BORING: GAS-2
JOB NUMBER: 93-461 (4a) | DATE: 9-22-94
LOGGED BY: DFB | DRILLER: WEEKS DRILLING, AIR ROTARY
WELL CASING ELEVATION: EST. EG = 837 MSL

FIELD LOCATION OF BORING:



EQUIPMENT AND SPECIFICATIONS:

C: Slotted = 80 - 100', Blank 100 - 110', Slotted 110 - 125'
Gravel = 65 -105', Bentonite 105 - 110', Gravel 110 - 125'
Bentonite 125 - 126.5'

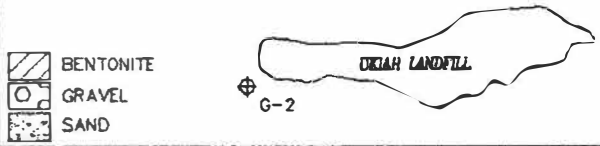
SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	WATER DEPTH				DESCRIPTION	CASING CONSTRUCTION C B
											TIME					
											DATE					
								51		CL					@ 54' Scattered gravel < 1%, up to 1.25" ø. KJf greenstone, well rounded	
							X	55							@ 55' Silty Clay(stone), no gravel	
								56								
								57								
								58								
								59								
								60							Silty Clay(stone), as above, no gravel, soft - firm, slighty damp	
								61								
								62								
								63								
								64								
							X	65								
								66								
								67								
								68								
							X	69							Clay(stone) (CH), very dark gray (5Y, 3/1), high plasticity fines, stiff - very stiff, slighty damp	
								70		CH						
								71								
								72								
								73								
								74							as above, black (5Y, 2.5/1)	

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS | SHEET 4 OF 8
BORING: GAS-2
JOB NUMBER: 93-461 (4a) | DATE: 9-22-94
LOGGED BY: DFB | DRILLER: WEEKS DRILLING, AIR ROTARY
WELL CASING ELEVATION: EST. EG = 837 MSL
EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH _ / TIME / DATE
							X	80			
								81		CL-ML	Silty Clay(stone) - Clayey Silt (CL-ML), dark greenish gray, (5G, 4/1), 95% mod. plastic fines, 5% fine - med. sand, firm - stiff, slighty damp
								82			
								83			
								84			
								85			
								86			
							X	87		ML-SM	Silty Sand(stone) - Sandy Silt(stone) (ML-SM), light olive brown, (2.5Y, 5/6), 50% low plasticity fines, 50% fine sand, well rounded, soft - firm, slighty damp
								88			
								89			
								90			
								91			
								92			@ 92' Scattered gravel, 5 - 10%, up to 0.75" ø, well rounded
								93			@ 92.5' no gravel
								94			
							X	95			Silty Sand(stone), olive grey (5Y, 4/2), 45% low plasticity fines, 55% fine - med. sand, KJf (chert, greenstone), med.dense, slighty damp
								96			
								97			
								98			
								99			

CASING CONSTRUCTION

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 5 OF 8

BORING: GAS-2

JOB NUMBER: 93-461 (4a)

DATE: 9-22-94

LOGGED BY: DFB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 837 MSL

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH / TIME / DATE
							X	101		CL	Sandy Clay(stone) (CL), dark blue gray, (5B, 4/1), 70 – 75% mod. – high plasticity fines, 25 – 30% fine – med. sand, firm, slighty damp
								102			
								103			
							X	104			Silty Clay(stone) (CL), dark greenish gray, (4G, 4/1), 95% mod – low plasticity fines, 5% fine sand, soft – firm, slighty damp
								105		CL	
								106			Clay(stone) (CH), dark greenish gray, (5G, 4/1), high plasticity fines
								107		CH	
								108			
								109		CL	Silty Clay(stone) (CL), as above at 103.5' – 105.5'
								110			
								111			
								112			
								113			
								114			
								115			
								116			Clay(stone) (CH), as above, high plasticity fines, firm – stiff, slighty damp
								117		CH	
								118			
								119			
								120		SC-SM	Clayey-Silty Sand(stone) (SC-SM), dark greenish gray, (5G, 4/1), 35 – 40% low – mod. plastic fines, 60 – 65% fine – med. sand, well rounded, loose – med. dense, slighty damp
							X	121			
								122		SM	Silty Sand(stone), as above, low plasticity fines, and fine sand, med.– dense, slighty damp
								123			
							X	124			

CASING CONSTRUCTION

C

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 6 OF 8

BORING: GAS-2

JOB NUMBER 93-461 (4a)

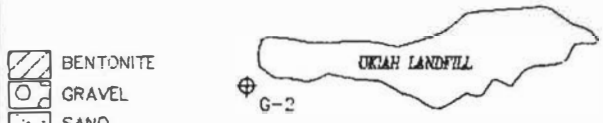
DATE: 9-22-94

LOGGED BY: DFB DRILLER: WEEKS DRILLING. AIR ROTARY

WELL CASING ELEVATION: EST. EG = 837 MSL

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
							X	126		SM	Gravelly Sand (SW), dark greenish gray, (5G, 4/1), < 5% fines, 85% fine - course sand, 15% fine gravel, well rounded, moist - very
						▽	X	127		SW	
								128			@ 126.5' very moist - wet, first encountered water @ 126.5'.
								129			TD = 126.5'
								130			
								131			
								132			
								133			
								134			
								135			
								136			
								137			
								138			
								139			
								140			
								141			
								142			
								143			
								144			
								145			
								146			
								147			
								148			
								149			

WATER DEPTH			
TIME			
DATE			

CASING CONSTRUCTION

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 1 OF 3

BORING: GAS-3

JOB NUMBER: 93-461 (4a)

DATE: 9-26-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

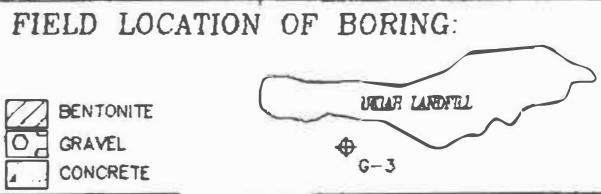
WELL CASING ELEVATION: EST. EG = 860 (MSL)

EQUIPMENT AND SPECIFICATIONS:

Three Probes: 3/4" ø, SCH 80 PVC w/0.040" Slotted Casing and 3/8" pea Gravel

A: Slotted = 5 - 15', Gravel = 4 - 15', Bentonite = 15 - 20'

FIELD LOCATION OF BORING:



WATER DEPTH			
TIME			
DATE			

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
							X	5		ML	Silty Clay (ML), brown
								8		SM	Sandy Silt (SM), grayish brown
								9			Silty Clay (ML), dark grayish brown (10YR, 4/2), damp (weathered Claystone)
							X	10		ML	
								13			Sandy Silt (SM)
							X	15		SM	decreasing Sand content @ 15'
								19			Silty Clay (CL), light olive gray (5Y, 6/2), damp, 10 - 20% very fine Sand to coarse Sand, subangular
							X	20		CL	
							X	24		ML	

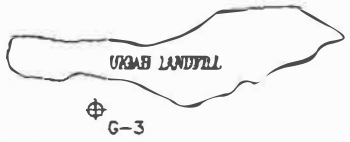
CASING CONSTRUCTION: C B A

GAS3BL.DWG

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS	SHEET 2 OF 6
JOB NUMBER: 93-461 (4a)	BORING: GAS-3
LOGGED BY: CJB	DATE: 9-26-94
WELL CASING ELEVATION: EST. EG = 860 (MSL)	DRILLER: WEEKS DRILLING, AIR ROTARY

FIELD LOCATION OF BORING:



EQUIPMENT AND SPECIFICATIONS:

B: Slotted = 35 – 65', Gravel 20 – 66.5', Bentonite 66.5 – 83.5'

WATER DEPTH			
TIME			
DATE			

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE DEPTH / SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION C	CASING CONSTRUCTION B
								26		ML	Sandy Clayey Silt (ML), light yellowish brown (10YR, 6/4), dry – damp, ~5% coarse Sand, (2 mm CC%), 20% very fine Sand, 65% Silt, 10% medium plasticity Clay		
							X	27			Claystone (CL), dark gray (10YR, 4/1), damp, ~2% coarse Sand (2 mm ø), 10% very fine Sand, 10 – 15% Silt, hard		
								28					
								29					
								30			decreasing Clay content @ 30', increasing Silt becoming dark grayish brown (10YR, 4/2), damp		
								31					
								32					
							X	33					
								34					
								35		CL	increasing Clay content @ 34.5', very dark gray (10YR, 3/1), damp, hard, <5% very fine Sand, primarily Silt and medium plasticity Clay		
							X	36					
								37					
								38					
							X	39					
								40					
								41					
								42					
								43					
							X	44			Sandy Clayey Silt (ML), dark gray (7.5YR, N4/), damp, ~20% fine Sand, ~10% medium plasticity fines		
								45					
								46		ML			
							X	47					
								48					
							X	49					
										ML	Sandy Clayey Silt (ML), olive gray (5Y, 4/2), damp, ~15 – 20% fine Sand, ~5% Clay		

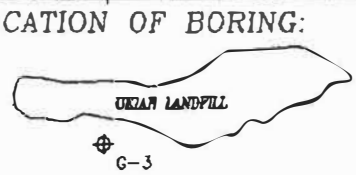
EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS | SHEET 3 OF 6
JOB NUMBER: 93-461 (4a) | BORING: GAS-3
LOGGED BY: CJB | DATE: 9-22-94
DRILLER: WEEKS DRILLING, AIR ROTARY
WELL CASING ELEVATION: EST. EG = 860 (MSL)
EQUIPMENT AND SPECIFICATIONS:

C: Slotted = 85 – 135', Gravel 83.5 – 135'

FIELD LOCATION OF BORING:

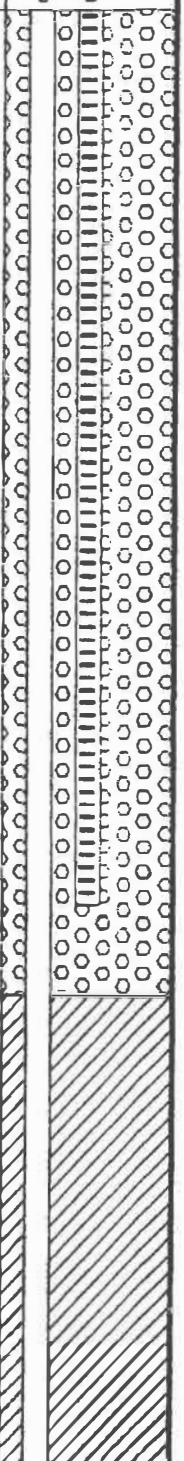


SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								51		ML	
							X	52			Silty Gravelly Sand (SM), dark greenish gray, (5GY, 4/1), 20% Gravel (5 mm ø up to 1" ø) rounded, ~5% Clay, 50% Sand (very fine Sand to coarse)
								53			
								54		SM	
								55			
								56			
								57			Sandy Clayey Silt (ML), mottled dark gray (2.5Y, N4/) to dark brown (10YR, 3/3), damp, ~40% very fine Sand, 20% mod. plasticity fines, harder @ 59'
								58			
							X	59			
								60		ML	
								61			
								62			
								63			
										ML	Sandy Silt (ML), dark gray, (5Y, 4/1), ~40% course Sand, <5% Clay, damp to moist
								64			
							X	65		ML	Sandy Silt (ML), dark gray, (2.5Y, N4/), ~20% very fine Sand, <5% Clay, damp
								66			
								67			
							X	68			
								69			
								70			
							X	71			Clayey Gravel (GC), dark gray (2.5Y, N4/), moist, ~60% coarse Sand and Gravel (1 mm to 1" ø), subangular
							X	72		GC	
								73			Clayey Gravel (GC), as above with ~75% angular gravel, 0.5" ø, moist
										GC	
							X	74			Silty Sand (SM), dark gray (2.5Y, N4/), dry to damp, ~50% Sand & Gravel up to 1 cm ø.
										SM	

WATER DEPTH
TIME
DATE

CASING CONSTRUCTION

C B



EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 4 OF 6

BORING: GAS-3

JOB NUMBER: 93-461 (4a)

DATE: 9-26-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 860 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE DEPTH / SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
											WATER DEPTH	
											TIME	
											DATE	
							X	76			~5% Clay	C
								77			becoming wet at 77'	
								78		SM		
								79				
								80				
								81				
								82				
							X	83			becoming dry at 83.5'	
								84				
							X	85			Silty Gravel (GM),dark grey (2.5Y, N4/) damp, > 85% Gravel, subangular up to 1" ø	
								86		GM		
								87		SM	Silty Sand (SM), very dark gray (2.5Y, N3/), moist, ~5% Gravel, subrounded up to 1" diameter, ~75% Sand, ~5% Clay	
							X	88				
								89				
								90				
								91			Claystone (CL), with Silt, very dark gray (2.5Y, N3/), damp, very hard	
							X	92				
								93		CL		
								94				
							X	95		SM	Silty Sand (SM), gray, damp	
								96			Gravel zone @ 96.5'	
							X	97			Claystone (CL), as above	
								98		CL		
								99				
							X				Silty Sand zone @ 99.5 - 100'	

461LFGBL.DW

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS	SHEET 5 OF 6
JOB NUMBER: 93-461 (4a)	BORING: GAS-3
LOGGED BY: CJB	DATE: 9-26-94
WELL CASING ELEVATION: EST. EG = 860 (MSL)	DRILLER: WEEKS DRILLING, AIR ROTARY
EQUIPMENT AND SPECIFICATIONS:	

FIELD LOCATION OF BORING:



WATER DEPTH			
TIME			
DATE			

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH	DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
								101				Claystone (CL), as above, damp	C
							X	102					
								103					
								104					
								105			CL		
								106					
							X	107					
								108					
							X	109			SM	Silty Sand (SM), dark gray, damp, ~80% fine Sand, <5% Clay	
								110				Claystone (CL), as above	
								111					
							X	112			CL	increasing Sand content @ 112' (~25% fine Sand), damp	
								113					
								114					
							X	115					
								116					
								117					
								118				increasing Silt content 118 – 118.5'	
								119					
								120					
								121					
							X	122				Silty Sand, (SM) as above @ 109', damp	
								123			CL		
								124				becoming Gravelly @ 124.5', ~5% subrounded Gravel 2 cm ø, damp – moist	
							X						

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LFG WELLS

SHEET 6 OF 6

BORING: GAS-3

JOB NUMBER: 93-461 (4a)

DATE: 9-26-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: EST. EG = 860 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:

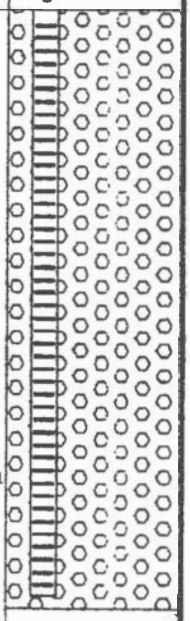


SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								126			
								127			
							X	128			becoming moist to wet @ 128'
								129		SM	
								130			
								131			
								132			Gravelly Sand (SP), dark gray, (2.5Y, N4/), moist to wet, ~5% Silt, ~5% Gravel up to 1 cm ø, very coarse Sand
							X	133		SP	
								134			
								135			Total Depth = 135'
								136			
								137			
								138			
								139			
								140			
								141			
								142			
								143			
								144			
								145			
								146			
								147			
								148			
								149			

WATER DEPTH			
TIME			
DATE			

CASING CONSTRUCTION

C



461LFGBL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL | SHEET 1 OF 7
BORING: GAS-4
JOB NUMBER: 93-461 (2.2) | DATE: 7/27/94
LOGGED BY: DFB | DRILLER: WEEKS DRILLING
WELL CASING ELEVATION: GS = 915 MSL (est.)

FIELD LOCATION OF BORING:



EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY			GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION A B C
							X	5				Silty Sand (SM); pale yellow(2.5Y 7/4); 30-40% low plasticity fines, 60-70% v. fine sand, dry, med. dense.	
								8		SM		Scattered gravel - KJf - sandstone & chert - sub ∠ round.	
							X	10				As above, no gravel.	
							X	15		CL		Sandy Clay (CL), yellow brown (2.5Y, 6/4) 85% mod. plasticity fines, 15% fine sand, dry, dense - stiff.	
							X	20				Silty Clay (CL), lt. olive brown (2.5Y, 5/4) 95% mod. plasticity fines, < 5% fine sand, scattered gravel, damp, Med. dense - stiff.	

461BL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL | SHEET 2 OF —
BORING: GAS-4
JOB NUMBER: 93-461 (2.2) | DATE: 7/27/94

FIELD LOCATION OF BORING: N



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 P.C W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10", gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY			GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION B	C
								26						
								27						
								28						
								29						
							X	30				Slighty moist, stiff, no gravel.		
								31						
								32						
								33						
								34						
							X	35		CL		Sandy Clay (CL) olive (5Y, 5/3), 65-75% mod. - high plasticity fines, 25-30% fine sand, 5% gravel to 1 1/2" ø - Franciscan sandstone & chert - well rounded, damp, stiff.		
								36						
								37						
								38				less gravel w/ depth.		
								39						
								40				Clay(stone) (CH) Gray Green (2.5Y N5/), mod. plasticity fines, damp, stiff.		
							X	41		CH				
								42				@ 42' back to yellow sandy Clay - moist.		
								43		CL				
								44						
							X	45		CH		@ 44.5' Clay(stone) (CH) dark blue gray (5B 4/1) mod. plasticity fines, minor sand (<5%), scattered KJf gravel - sub ∠ to round, Dry, stiff - very stiff.		
								46						
								47						
								48				@ 48' color change - Dark greenish gray (5G, 4/1)		
								49						
							X			CL		@ 49' - Sandy Clay (CL) - 75% med. plasticity fines,		

461BL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL | SHEET 3 OF 7

JOB NUMBER: 93-461 (2.2) | BORING: GAS-4 | DATE: 7/27/94

FIELD LOCATION OF BORING:



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY	GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION
						51		CL		25% fine - med. sand, scattered gravel to 1 1/2" ø well-rounded KJf chert & sand.	B C
						52					
						53					
						54					
						55					
						56					
						57					
						58					
						59					
						60					
						61					
						62					
						63					
						64					
					X	65		CL		@ 65' - 60% low to mod. plasticity fines, 40% fine - med. sand, Damp, stiff - dense.	
						66					
						67					
						68		CL		Bit chatter (CL) - gravely zone, 25-30% fine gravel - well rounded.	
						69					
						70		CL			
						71					
						72					
						73					
						74					
					X						

461BL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL

SHEET 4 OF 7

BORING: GAS-4

JOB NUMBER: 93-461 (2.2)

DATE: 7/27/94

FIELD LOCATION OF BORING: N



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY	GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION
						76					C
						77					
						78					
						79		ML-SM		Sandy silt(stone) - Silty Sand(stone) (ML-SM), Dark blue gray (5B 4/1), 45-55% low plasticity fines, 45-55% fine sand, damp - moist, dense, Hard bit chatter.	
					X	80					
						81					
						82					
					X	83					
						84					
						85		SC		Silty, Clayey Sand(stone) (SC), Dark blue gray, 40-45% low - mod. plasticity fines, 55-60% fine & med. sand, scattered gravel (<2%), dry.	
						86					
						87					
						88					
						89					
					X	90					
						91					
						92					
						93					
						94					
					X	95					
						96		CH		Grade into Clay(stone) (CH) Dark olive gray (5y, 3/2), high plasticity fines, trace fine sand, dry - slightly damp, very stiff.	
						97					
						98					
						99					
					X					1/2' gravel layer, 20% gravel, sub rounded - then silty sand - sandy silt	

461BL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL

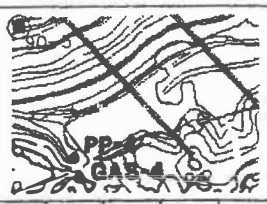
SHEET 5 OF 7

BORING: GAS-4

JOB NUMBER: 93-461 (2.2)

DATE: 7/27/93

FIELD LOCATION OF BORING:



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.

A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'

B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'

C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY	GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION
						101		SC		Clayey Sand(stone) (SC) Dark blue gray, 40% high plasticity fines, 60% fine sand, damp - moist.	C
						102					
						103					
						104					
					X	105					
						106					
						107				@ 107' scattered gravel (<5%)	
						108					
						109					
					X	110		CL		Sandy Clay(stone) (CL) Dark blue gray, 70% med. - high plasticity fines, 30% fine sand, scattered gravel well rounded, damp - stiff.	
						111					
						112					
						113					
						114					
						115					
						116					
						117					
						118				@ 118' - 122' many thin gravelly clay zones 20-30% gravel.	
						119		CL			
					X			CL			
						120		CL			
						121					
						122					
						123		CL			
						124		SC		Silty Sand(stone) (SC) Dark blue gray, 40% mod - low plasticity fines, 60% fine sand.	
					X						

EBA

LOG OF EXPLORATORY BORING

PROJECT: UKIAH LANDFILL | SHEET 6 OF 7
BORING: GAS-4
JOB NUMBER: 93-461 (2.2) | DATE: 7/27/94

FIELD LOCATION OF BORING:



LOGGED BY: DFB DRILLER: WEEKS DRILLING

WELL CASING ELEVATION: GS = 915 MSL (est.)

EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY	GRAB SAMPLE	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
									WATER DEPTH	
									TIME	
									DATE	
					X			SC	@ 125.5' Silty - Sandy Gravel (GM) 30% low plasticity fines, 20-25% fine sand, 45-50% fine gravel to 3/4" ø, well rounded, poorly consolidated, dry, sandstone & chert clasts.	C
						126		GM		
					X	127				
						128				
						129		CL-SC	Sandy Clay(stone) - Clayey Sand(stone) (CL-SC) Dark blue gray, mod. plasticity fines, fine sand, no gravel, Dry, dense - stiff.	
					X	130				
						131				
						132			@ 132' - 132.5' hard drilling.	
						133				
						134				
						135				
						136			Scattered gravel - well rounded, moist.	
						137				
						138				
						139				
						140				
					X	141				
						142			@ 141.5' - 142.5': gravelly zone.	
						143		CL-SC		
						144				
						145				
					X	146		SP	Clayey - Silty Gravelly Sand (SP) Dark blue gray, 30 - 40% low - mod plasticity fines, 50-60% fine sand, 10 - 20% fine gravel to 1/2" ø, well rounded Kjf clasts, moist - very moist, poorly consolidated.	
						147				
						148				
						149				
					X					

461B.DWG

LOG OF EXPLORATORY BORING

EBA

PROJECT: UKIAH LANDFILL | SHEET 7 OF 7
JOB NUMBER: 93-461 (2.2) | BORING: GAS-4
DATE: 7/27/94
LOGGED BY: DFB | DRILLER: WEEKS DRILLING
WELL CASING ELEVATION: GS = 915 MSL (est.)

FIELD LOCATION OF BORING:



EQUIPMENT AND SPECIFICATIONS: Nested 3: 3/4" ø SCH-80 PVC W/ 0.040" Slotted & 1/4" Pea gravel.
A: Slotted = 5-10', gravel = 11 1/2 - 5', Bentonite = 11 1/2 -15'
B: Slotted = 52 1/2 - 72 1/2', gravel = 75 - 15', Bentonite = 84 1/2 - 75'
C: Slotted = 143 -113', Gravel = 145 - 84 1/2', Bentonite = 157 - 145'

BLOWS/6 in.	DRILLING RATE (ft./min.)	SAMPLER TYPE	SAMPLE COND.	RECOVERY	PUSH SPLIT-SPOON SAMPLER	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	WATER DEPTH / TIME / DATE	DESCRIPTION	CASING CONSTRUCTION
						151		SC		grade to Clayey Sand w/ gravel - 40% high plasticity fines.	
						152					
						153					
						154					
						155		▽		@ 155' moist - very moist - stop for 1/2 hour water check. No free water.	
						156					
					X	157				Trip rod & push sample, Silty-Clayey Gravelly Sand, wet material on drill bit, very moist to saturated sampler wet 155'-157' - 1st ▽ @ 155'	
						158					
						159				TD = 157'	
						160					
						161				7/27/94 - Add bentonite to 149.5'.	
						162					
						163				7/28/94 - Add bentonite to 145'.	
						164					
						165					
						166					
						167					
						168					
						169					
						170					
						171					
						172					
						173					
						174					

461BL.DWG

LOG OF EXPLORATORY BORING

FBA

PROJECT: CITY OF UKIAH LANDFILL

SHEET 1 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

Probe A: 5 - 10', Gravel 5 - 10'

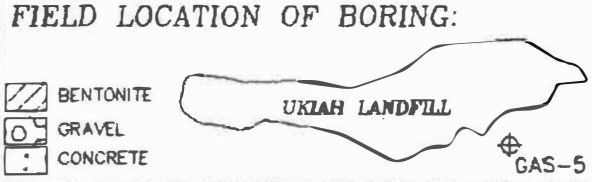
Probe B: 75 - 113', Gravel 15 - 113'

Probe C: 126 - 166', Gravel 118 - 166.5'

Probe D: 210 - 250', Gravel 171.5 - 250'

8" Direct Air

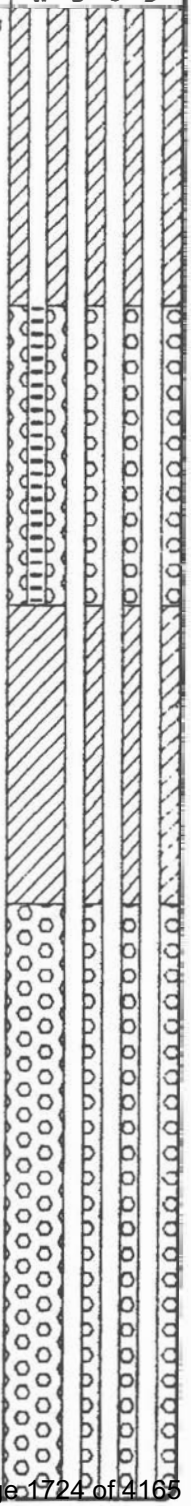
FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
											WATER DEPTH
											TIME
											DATE
							X	4			Silty Sandy Gravel (GM), pale olive (5Y, 6/3), dry, 75% cobbles up to 5" in diameter, cobble are predominantly 1 cm to 1" diameter, rounded to angular.
							X	7		GM	
							X	13			@ 13' becoming damp
							X	16			Silty Sand (SM), pale olive (5Y, 6/4), dry to damp, ~10% Silt, medium grained Sand, ~2% Gravel cobbles up to 2 cm ø, loose.
								20		SM	
								24		GM	Silty Gravel (GM), ~80% gravel up to 1" ø

CASING CONSTRUCTION

A B C D



GAS5BLOG

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 2 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

FIELD LOCATION OF BORING:



LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

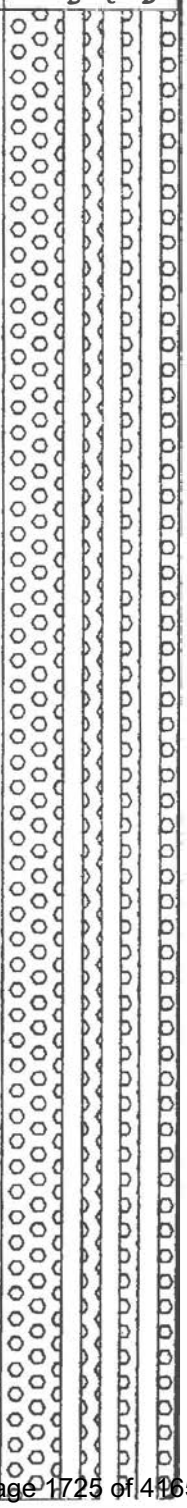
EQUIPMENT AND SPECIFICATIONS:

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								26		GM	
								27			
								28			Silty Sand (SM), as above, without gravel
								29		SM	
								30			Gravel bed @ 30 – 30.5'
								31			
							X	32			Silty Sand (SM), as above, with ~15% gravel, damp
								33			
								34		SM	
								35			
							X	36			Silty Sand (SM), as above, with ~1% 1 cm ø gravel
								37			
								38		SM	
								39			
								40			
								41			
								42			increasing Clay content to ~2% @ 42' to 44'
							X	43			
								44			increasing Gravel content to ~10% @ 44' to 46'
								45			
								46			Sandy Gravel (GM), olive (5Y, 5/4), damp ~80% Gravel up to 1" ø, ~5% Clay
								47		GM	
								48			
							X	49			

WATER DEPTH			
TIME			
DATE			

CASING CONSTRUCTION

B C D



GAS5BLDW

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 3 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



WATER DEPTH			
TIME			
DATE			

CASING CONSTRUCTION

B C D

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								51			
								52		GM	
								53			
								54			Sandy Gravel (GM), yellowish brown (10YR, 5/6), damp, Gravel predominently 0.5 cm diameter, ~5% Clay, loose
								55		GM	
								56			
								57			
							X	58			becoming moist @ 58'
								59			
								60			
							X	61			Silty Sand (SM), yellowish brown (10YR, 5/6), damp, <5% Clay, 2% Gravel @ 0.5 cm ϕ, ~80% fine to coarse Sand, loose
								62		SM	
								63			
								64			
								65			Silty Sandy Gravel (GM), yellowish brown (10YR, 5/6), damp, ~5% Clay, ~50% Gravel up to 1" diameter, loose
							X	66		GM	
								67			
							X	68			
								69			Silty Sand (SM), as above
							X	70			
								71		SM	
								72			
								73			
								74			

GASSBL.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 4 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

FIELD LOCATION OF BORING:



LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

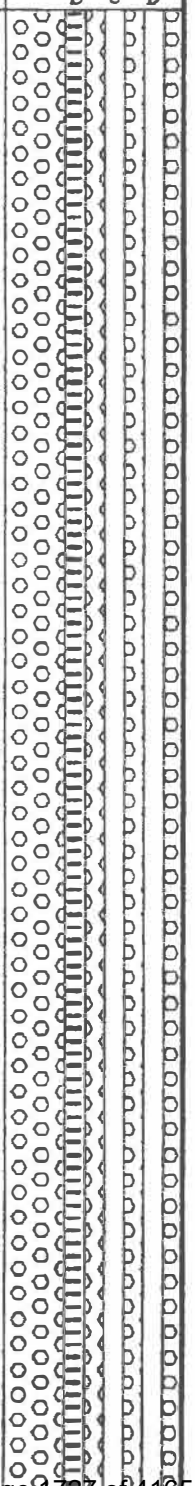
WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								WATER DEPTH			
								TIME			
								DATE			
								76			
								77			
								78			
							X	79			
								80			
								81		SM	
								82			
							X	83			Silty Sand (SM), olive (5Y, 5/3), dry to damp, ~60% Sand
								84		SM	
								85			Silty Gravel (GM), gray (10YR, 5/1), damp, 75% Gravel, 20% Sand, Gravel 1 cm to 1" ø, 2% Clay, loose
							X	86			
								87			
								88		GM	
								89			
								90			Sandy Gravel (GM), gray (10YR, 5/1), moist, ~50% Gravel, 40% Sand, 10% Silt, loose
								91			
								92			
								93			
								94		GM	
							X	95			large cobble encountered @ 96'
								96			
							X	97			
								98			
								99			

CASING CONSTRUCTION

B C D



GASSBLDG

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 5 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:

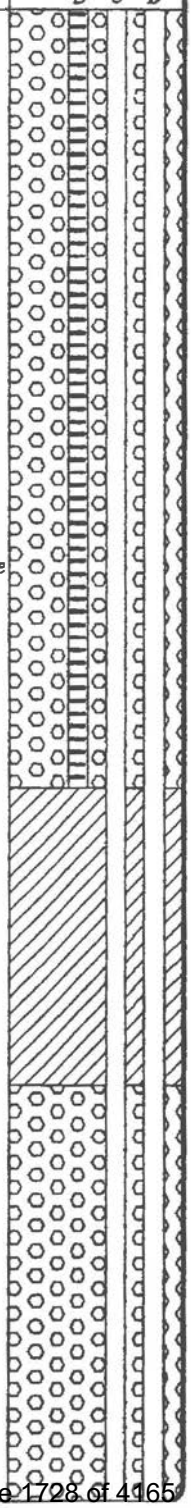


WATER DEPTH			
TIME			
DATE			

SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE DEPTH / SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								101			
								102			
								103			
								104		GM	
							X	105			
								106			
								107			
								108			
							X	109			Sandy Clayey Silt (ML), gray (10YR, 5/1), 25% fine to very fine Sand
								110			
								111			
								112			
								113			
								114			
							X	115			Sandy Gravel (GM), as above, ~5% Gravel
								116			
								117			
								118			
								119			
								120			
								121			
								122			
								123			
								124			Cobble encountered @ 124'

CASING CONSTRUCTION

B C D



GASSER.DWG

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 6 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

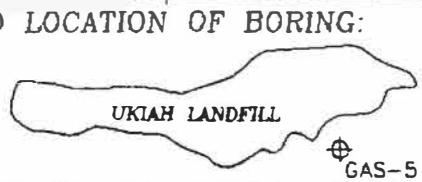
DATE: 9-27-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								126			
								127			
								128			
								129			
							X	130			
								131			
								132			
								133			
								134		GM	
								135			
							X	136			
								137			
								138			
								139			
								140			
								141			
								142			
								143			
								144			
								145			
								146			
								147			
								148			
								149			

WATER DEPTH			
TIME			
DATE			

CASING CONSTRUCTION

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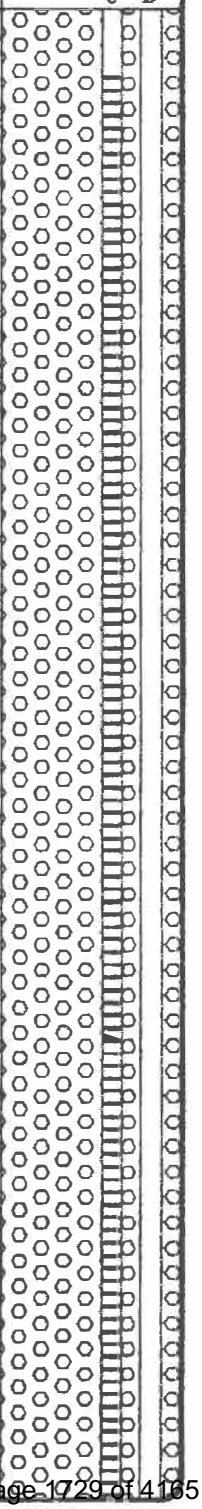

GAS5BLDW

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL
SHEET 7 OF 10
JOB NUMBER: 93-461 (4a)
BORING: GAS-5
DATE: 9-27-94
LOGGED BY: CJB
DRILLER: WEEKS DRILLING, AIR ROTARY
WELL CASING ELEVATION: ~1005 (MSL)
EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE / SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								151			
								152			cobble encountered @ 152'
								153			
								154			increasing Gravel content to 20% at 154'
								155			
								156			
								157			
								158			
								159			
								160			becoming moist @ 160'
								161		GM	
								162			
								163			decreasing Gravel content to ~10% @ 163', Gravel, < 2 cm ø
								164			
								165			
								166			
								167			Claystone (CL), gray (10YR, 5/1), damp
								168			
							X	169			
								170		CL	
								171			
								172			
								173			
							X	174		SM	Silty Sand (SM), gray (10YR, 5/1), 60% coarse Sand, 10% very fine Sand, 5% Gravel up to 0.5" in diameter, damp-moist,

WATER DEPTH	-		
TIME			
DATE			

CASING CONSTRUCTION C D

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 8 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1035 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								WATER DEPTH			CASING CONSTRUCTION
								TIME			
								DATE			
								176			
								177			
								178			
								179			
								180			
								181			
								182			increasing Gravel content @ 182'
								183			
								184			
								185		GM	
								186			
								187			
								188			
								189			
								190			
								191			
								192			
								193			
								194			
								195			
							X	196			Claystone (CL), grayish brown (10YR, 5/2), damp, Silty, hard
							X	197		CL	
								198			Claystone (CL), as above except gray (10YR, 5/1)
								199		CL	
							X				

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EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 9 OF 10

JOB NUMBER: 93-461 (4a)

BORING: GAS-5

DATE: 9-27-94

LOGGED BY: CJB

DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION
								201			
								202		CL	
								203			
								204			
							X	205			Interbedded Claystone (CL), gray (10YR, 5/1) and grayish brown (10YR, 5/2), beds vary from < 6" to 5' in thickness grayish brown from 204 - 205'
								206			
								207			
								208			
								209			
								210			grayish brown bed @ 210'
								211			
							X	212			
								213			
								214		CL	grayish brown bed @ 213.5' grayish brown bed from 214 - 215'
								215			
								216			
							X	217			mottled grayish brown to gray bed from 217 - 218', moist
							X	218			
								219			
								220			mottled, as above from 220 - 225'
								221			
							X	222			
								223			
								224			

WATER DEPTH			
TIME			
DATE			

CASING CONSTRUCTION

D

GAS5BL

EBA

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL

SHEET 10 OF 10

BORING: GAS-5

JOB NUMBER: 93-461 (4a)

DATE: 9-27-94

LOGGED BY: CJB DRILLER: WEEKS DRILLING, AIR ROTARY

WELL CASING ELEVATION: ~1005 (MSL)

EQUIPMENT AND SPECIFICATIONS:

FIELD LOCATION OF BORING:



SAMPLER TYPE	SAMPLE COND.	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	GRAB SAMPLE	DEPTH	SAMPLE SAMPLING DEPTH DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
											WATER DEPTH	D
											TIME	
											DATE	
								226				
								227			rock encountered @ 227'	
								228				
							X	229				
								230				
								231		CL		
								232				
								233				
							X	234			grayish brown from 233.5 to 236'	
								235				
								236				
							X	237				
								238			Clayey Silt (ML), brown	
								239		ML		
								240		CL	Sandy Clay (CL), gray	
								241			Silty Sand (SM), grayish brown, ~5% cobbles up to 1 cm ø	
								242		SM		
								243			Silty Gravel (GM), gray, (10YR, 5/1), damp, ~60% Sand, Gravel up to ~2 cm ø, ~10% Gravel	
								244				
							X	245				
								246		GM		
							X	247			Color change to grayish brown (10YR, 5/2) @ 247 - 248'	
								248			Claystone (CL), gray as above	
								249		CL		
											Total depth = 250'	

GAS5BLDG

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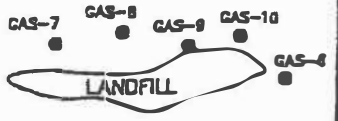
PROJECT: UKIAH LANDFILL | SHEET 1 OF 5
HOLE #: GAS-6
JOB #: C96.06.088 | DATE: 9/23-25/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN
WELL CASING ELEVATION: APPROXIMATELY 860'
EQUIPMENT AND SPECIFICATIONS:
CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION
0			ML		0-1': CLAYEY SILT
5			CL		1-10': SILTY CLAY, STIFF, DARK YELLOWISH BROWN, (10 YR 4/2), MOIST, PLASTIC, MODERATE YELLOWISH BROWN (10 YR 5/4) BELOW 6"
10			ML		10-16': CLAYEY SILT, STIFF, LIGHT OLIVE GRAY (5 Y 5/2), SLIGHTLY MOIST, MEDIUM PLASTIC
15			CL		16-20': SILTY CLAY, MODERATE YELLOWISH BROWN (10 YR 5/4), STIFF, SLIGHTLY MOIST, PLASTIC
20			ML		20-27': SANDY, GRAVELLY SILT, WITH SOME CLAY, MEDIUM DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4), SLIGHTLY MOIST, SLIGHTLY PLASTIC
25			CL		27-30': SILTY CLAY, HARD, LIGHT OLIVE GRAY (5 Y 5/2), SLIGHTLY MOIST TO NEARLY DRY, PLASTIC
30					

STEEL RISER W/LOCKING LID
2' TO 3'
WELL CONSTRUCTION
S I D

NOTES:
D = DEEP GAS PROBE
I = INTERMEDIATE GAS PROBE
S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS
SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
3/8-INCH GRAVEL
BENTONITE SEAL
SAND-CEMENT SEAL

D:\ADCADD\P\UKIAHCTY\GAS-6.DWG D.B.I. 10/3/1996

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REDDING, CA 96001
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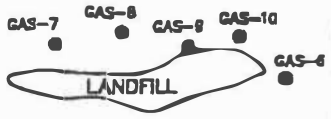
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL | SHEET 2 OF 5
HOLE #: GAS-6
JOB #: C96.06.088 | DATE: 9/23-25/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN
WELL CASING ELEVATION: APPROXIMATELY 860'
EQUIPMENT AND SPECIFICATIONS:
CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
30			CL		27-38': SILTY CLAY, STIFF, LIGHT OLIVE GRAY (5 Y 5/2), VERY PLASTIC, NEARLY DRY	
35						
			SM		38-40': GRAVELLY, SILTY SAND, MEDIUM DENSE, LIGHT OLIVE GRAY (5 Y 5/2), NEARLY DRY, WELL GRADED	
40			CL		40-42': CLAY, HARD, OLIVE GRAY (5 Y 4/1), MOIST, VERY PLASTIC	
			SM		42-43': SILTY, CLAYEY SAND	
45			CL		43-51.5': CLAY, STIFF, MEDIUM GRAY (N5), SLIGHTLY MOIST, VERY PLASTIC	
50					CEMENTED CLAYSTONE AT 51.5 TO 52'	
55			ML		52-61': CLAYEY SILT, STIFF, MEDIUM DARK GRAY (N4), SLIGHTLY MOIST, PLASTIC	
					CEMENTED SILTSTONE AT 55 TO 55.5', VERY HARD	
60						

NOTES:
D = DEEP GAS PROBE
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S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS
SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
3/8-INCH GRAVEL
BENTONITE SEAL
SAND-CEMENT SEAL

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PROJECT: UKIAH LANDFILL | SHEET 3 OF 5
HOLE #: GAS-6
JOB #: C96.06.088 | DATE: 9/23-25/96

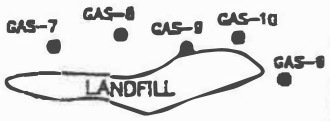
LOGGED BY: B. GARTNER DRILLER: D. JENSEN

WELL CASING ELEVATION: APPROXIMATELY 860'

EQUIPMENT AND SPECIFICATIONS:

CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
60			ML		61-62.5': CEMENTED SILTSTONE, HARD, MEDIUM DARK GRAY	
			CL		62.5-66': SILTY CLAY, VERY STIFF, MEDIUM DARK GRAY (N4), SLIGHTLY MOIST, PLASTIC, CEMENTED LAYER AT 65 TO 65.5'	
65						
			SM		66-72': GRAVELLY SAND, MEDIUM DENSE, DARK GRAY (N4), DRY, WELL GRADED, SOME SILT AND CLAY	
70						
			ML		72-77': CLAYEY SILT, MEDIUM STIFF, MEDIUM DARK GRAY (N4), SLIGHTLY MOIST, MEDIUM PLASTIC; LOOSE AND DRY WITH GRAVEL FROM 76 TO 77'	
75			SM		77-79': GRAVELLY, SILTY SAND, MEDIUM DENSE, MEDIUM DARK GRAY (N4), DRY, WELL GRADED	
80						
			ML		79-97': CLAYEY SILT, MEDIUM STIFF, MEDIUM DARK GRAY (N4), NEARLY DRY, MEDIUM PLASTIC; STIFFER BELOW 82', LOOSE AGAIN BELOW 87'	
85						
90						

NOTES:
D = DEEP GAS PROBE
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S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS
- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- BENTONITE SEAL
- 3/8-INCH GRAVEL
- SAND-CEMENT SEAL

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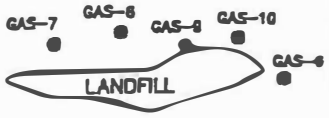
PROJECT: UKIAH LANDFILL	SHEET 4 OF 5
	HOLE #: GAS-6
JOB #: C96.06.088	DATE: 9/23-25/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 860'	
EQUIPMENT AND SPECIFICATIONS:	
CME-55 DRILLING RIG	
0-9' : 10"-HOLLOW STEM AUGER	
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
90			ML		LOOSE AT 91', CLAYEY SILT, FIRM, DARK GREENISH GRAY (5 GY 4/1), NEARLY DRY, MEDIUM PLASTIC	
95			SM		97-98.5': GRAVELLY, SILTY SAND, MEDIUM DENSE, MEDIUM BLUISH GRAY, (5 B 5/1), DRY, WELL GRADED	
			GM			
100			ML		98.5-102.5': SILTY, SANDY GRAVEL, DENSE, MEDIUM BLUISH GRAY, DRY, WITH CEMENTED FINE-GRAINED SILTSTONE LAYER AT 100 TO 101'	
			GM			
105			SM		102.5-106.5': GRAVELLY, SILTY SAND, MEDIUM DENSE, MEDIUM BLUISH GRAY, SLIGHTLY MOIST, WELL GRADED	
			GM		106.5-111': SILTY, SANDY GRAVEL, MEDIUM DENSE, MEDIUM BLUISH GRAY, SLIGHTLY MOIST	
110			ML		111-112': CEMENTED SILTSTONE	
			SM		112-117': SILTY, GRAVELLY SAND (SAME AS ABOVE INTERVALS)	
115			ML		117-123': CLAYEY SILT, MEDIUM STIFF, LIGHT OLIVE GRAY (5 Y 5/2), SLIGHTLY MOIST, MODERATELY PLASTIC	
120						

NOTES:
D = DEEP GAS PROBE
I = INTERMEDIATE GAS PROBE
S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS
- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

D:\ADCADD\P\UKIAHCTY\GAS-6.DWG D.B.I. 10/

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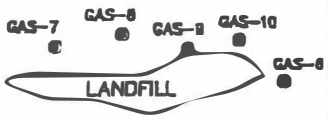
PROJECT: UKIAH LANDFILL	SHEET 5 OF 5
	HOLE #: GAS-6
JOB #: C96.06.088	DATE: 9/23-25/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 860'	
EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
120			ML		LOOSE BELOW 121'	
			SC		123-124': CLAYEY, SILTY SAND, MEDIUM DENSE, OLIVE GRAY (5 Y 5/2), SLIGHTLY MOIST, MEDIUM PLASTICITY	
125			ML		124-126.5': CEMENTED SILTSTONE, HARD, LIGHT OLIVE BROWN (5 Y 5/6), SLIGHTLY MOIST, POORLY GRADED	
			ML		126.5-129': CLAYEY, SANDY SILT, MEDIUM STIFF, LIGHT OLIVE GRAY (5 Y 5/6), SLIGHTLY MOIST, FIRM, MEDIUM PLASTICITY	
130			CL		129-132': SILTY CLAY, STIFF, LIGHT OLIVE BROWN (5 Y 5/6), SLIGHTLY MOIST, PLASTIC	
					CEMENTED SILTSTONE AT 123 TO 133.5'	
135			ML		133.5-142': CLAYEY, SANDY SILT, MEDIUM STIFF, MEDIUM BLUISH GRAY (5/B 5/1), MEDIUM PLASTIC, SLIGHTLY MOIST	
140			CL		142-143': SILTY CLAY, HARD, MODERATE YELLOWISH BROWN (10 YR 5/4), MOIST, PLASTIC	
			ML		143-144.5': CLAYEY SILT, STIFF, GREENISH GRAY (5 G 6/1), SLIGHTLY MOIST, MEDIUM PLASTIC	
145						
150						

NOTES:

D = DEEP GAS PROBE

I = INTERMEDIATE GAS PROBE

S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL | SHEET 1 OF 3
HOLE #: GAS-7
JOB #: C96.06.088 | DATE: 9/11-12/96

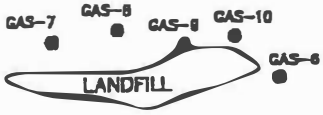
LOGGED BY: B. GARTNER DRILLER: D. JENSEN

WELL CASING ELEVATION: APPROXIMATELY 770'

EQUIPMENT AND SPECIFICATIONS:

CME-55 DRILLING RIG
0-4' : 10"-HOLLOW STEM AUGER
BELOW 4': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION
0			CL		0-12': SILTY CLAY, STIFF, LIGHT OLIVE GRAY (5 Y 5/2), MEDIUM DARK GRAY (N4), BELOW 8', MOIST, PLASTIC	
10			ML		12-15': CLAYEY SILT, SOFT, LIGHT OLIVE GRAY (5 Y 5/2), MOIST	
15			SM		15-25': SILTY SAND, MEDIUM DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4), WELL SORTED, GRAVELLY FROM 16.5 -17.5', 5% GRAVEL BELOW 17.5'; ~20% GRAVEL @ 22-24', SLIGHTLY MOIST	
25			GM		25-27.5': GRAVEL, VERY DENSE, MOSTLY FINE GRAVEL, POSSIBLY CEMENTED (DIFFICULT DRILLING)	
30			SM		27.5-38': GRAVELLY, SILTY SAND, MEDIUM DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4), SLIGHTLY MOIST	

STEEL RISER W/LOCKING LID — 2' TO 3'

WELL CONSTRUCTION: S I D

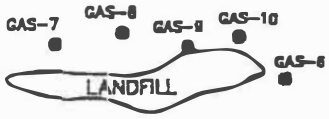
NOTES:

D = DEEP GAS PROBE
I = INTERMEDIATE GAS PROBE
S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

D:\ADCADD\P\UKIAHCTY\CAS-7.DWG D.B.I.

LAWRENCE & ASSOCIATES 2001 MARKET STREET, RM. 523 REDDING, CA 96001 PHONE : (916) 244-9703 FAX : (916) 244-5021	PROJECT: UKIAH LANDFILL	SHEET 2 OF 3
		HOLE #: GAS-7
	JOB #: C96.06.08B	DATE: 9/11-12/96
FIELD LOCATION OF GAS WELL  	LOGGED BY: B. GARTNER DRILLER: D. JENSEN WELL CASING ELEVATION: APPROXIMATELY 770' EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-4' : 10"-HOLLOW STEM AUGER BELOW 4': 6-1/8" AIR-ROTARY ROCK BIT	

DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
30			SM		27.5-38': SILTY, GRAVELLY SAND, MEDIUM DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4), SLIGHTLY MOIST, POORLY GRADED, FINE GRAINED	
35						
			ML		38-39.5': SANDY, GRAVELLY SILT, FIRM, MEDIUM BLUISH GRAY (5 B 5/1), SLIGHTLY MOIST	
40			GM		39.5-56.5': SILTY GRAVEL, DENSE, MOIST, SILTY MATRIX IS MEDIUM BLUISH GRAY; CLASTS ARE PRIMARILY SUBROUNDED; SOME SAND BY 46.5'; HARDER, SLOWER DRILLING FROM 49' TO 51' (LARGER GRAVEL)	
45						
50						
55			ML		56.5-57.5': CLAYEY SILT, MEDIUM BLUISH GRAY (5 B 5/1) TO 57.5', GRAYISH OLIVE, (10 Y 4/2) FROM 57.5 TO 60', SILTY CLAY, MOIST, PLASTIC	
			CL			
60						

NOTES:

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WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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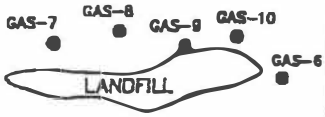
LAWRENCE & ASSOCIATES 2001 MARKET STREET, RM. 523 REDDING, CA 96001 PHONE : (916) 244-9703 FAX : (916) 244-5021	PROJECT: UKIAH LANDFILL	SHEET 3 OF 3 HOLE #: GAS-7
	JOB #: C96.06.088	DATE: 9/11-12/96
	LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
	WELL CASING ELEVATION: APPROXIMATELY 770'	
	EQUIPMENT AND SPECIFICATIONS: WL MEASURED @ 76' ON 9/12/96 AFTER PULLING ROD STATIC WL = 56.21' (9/13/96, 15:40)	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
60			CL		57.5-64.5': SILTY CLAY, SLIGHTLY MOIST, PLASTIC, DARK GRAYISH GREEN BELOW 60' (5 GY 4/1), HARD @ 63.5 TO 64.5'	
65			ML		64.5-74': CLAYEY SILT, DARK GRAYISH GREEN, SLIGHTLY MOIST, GRAVELLY FROM 66.5 TO 67.5', PLASTIC	
70						
75			SM		74-77': SILTY SAND, MEDIUM DENSE, MEDIUM BLUISH GRAY (5 B 5/1), SLIGHTLY MOIST, SOME CLAY AND GRAVEL BELOW 75'	
80			GM		77-82': SANDY, SILTY, GRAVEL, MEDIUM DENSE, VERY MOIST (MUCH MOISTER THAT ABOVE INTERVALS), MEDIUM BLUISH GRAY (5 B 5/1), LARGER, CLEANER, VERY MOIST GRAVEL BY 82', FIRST WATER AT 83'	
			GP		82-84.5': CLEAN GRAVEL, WET AT 83', SUBROUNDED	
85						
90						

NOTES:

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WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

D:\ADCADD\P\UKIAHCTY\GAS-7.DWG D.B.Z.

LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL

SHEET 1 OF 6

HOLE #: GAS-8

JOB #: C96.06.08B

DATE: 9/13-20/96

LOGGED BY: B. GARTNER DRILLER: D. JENSEN

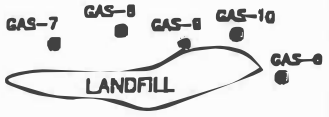
WELL CASING ELEVATION: APPROXIMATELY 922'

EQUIPMENT AND SPECIFICATIONS:

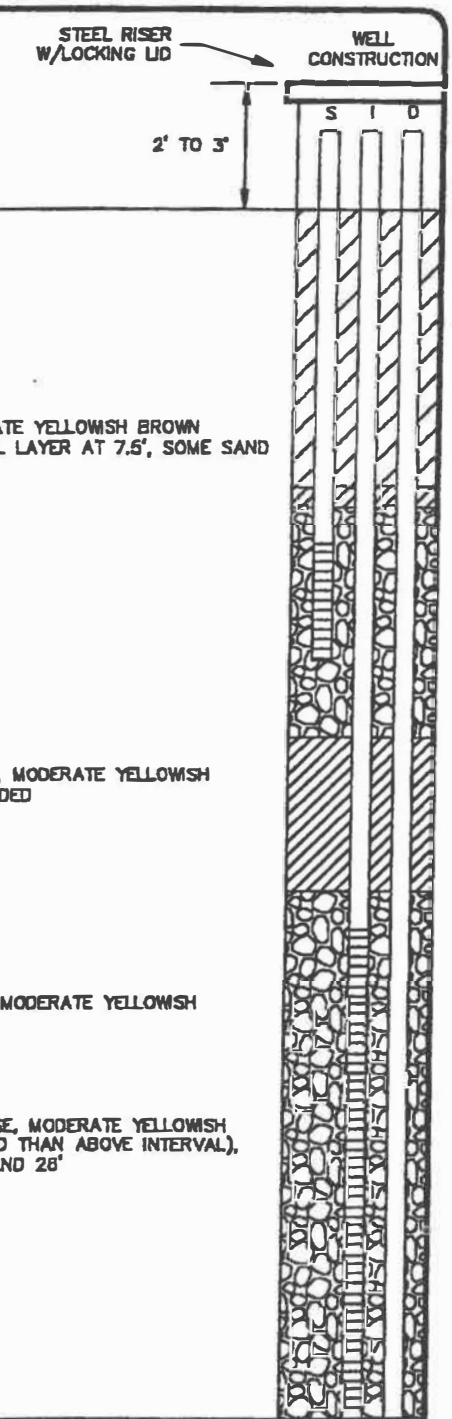
CME-55 DRILLING RIG

0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION
0			ML		0-10': CLAYEY SILT, SLIGHTLY MOIST, MODERATE YELLOWISH BROWN (10 YR 5/4), MEDIUM PLASTIC, GRAVEL LAYER AT 7.5', SOME SAND
5					
10			SM		10-18': SILTY, GRAVELLY SAND, MEDIUM DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4), MOIST, WELL GRADED
15					
20			GM		18-22.5': SILTY SANDY, GRAVEL, MEDIUM DENSE, MODERATE YELLOWISH BROWN, SLIGHTLY MOIST
25			SM-GM		22.5-25': SILTY SAND AND GRAVEL, MEDIUM DENSE, MODERATE YELLOWISH BROWN, SLIGHTLY MOIST (FINER GRAINED THAN ABOVE INTERVAL), WELL GRADED; GRAVELLY ZONE @ 25 AND 28'
30					



NOTES:

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S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS

SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)

3/8-INCH GRAVEL

BENTONITE SEAL

SAND-CEMENT SEAL

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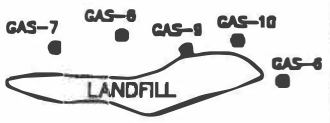
LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL | SHEET 2 OF 6
HOLE #: GAS-8
JOB #: C96.06.088 | DATE: 9/13-20/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN
WELL CASING ELEVATION: APPROXIMATELY 922'
EQUIPMENT AND SPECIFICATIONS:
CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
30						
			SM-GM		25'-37.5': SILTY SAND AND GRAVEL (SAME AS ABOVE), LARGER GRAVEL LENS AT 30.5'	
35						
40						
45						
			GM		37.5-59.5': SILTY, SANDY GRAVEL, SLIGHTLY MOIST, DENSE, MODERATE YELLOWISH BROWN (10 YR 5/4) OCCASIONAL CLAY STRINGER; CLASTS INCLUDE BASALT, SCHIST, SANDSTONE, CHERT, AND OTHER ROCK TYPES	
50						
55						
60						

NOTES:
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WELL CONSTRUCTION SYMBOLS
- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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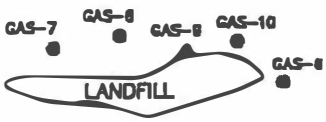
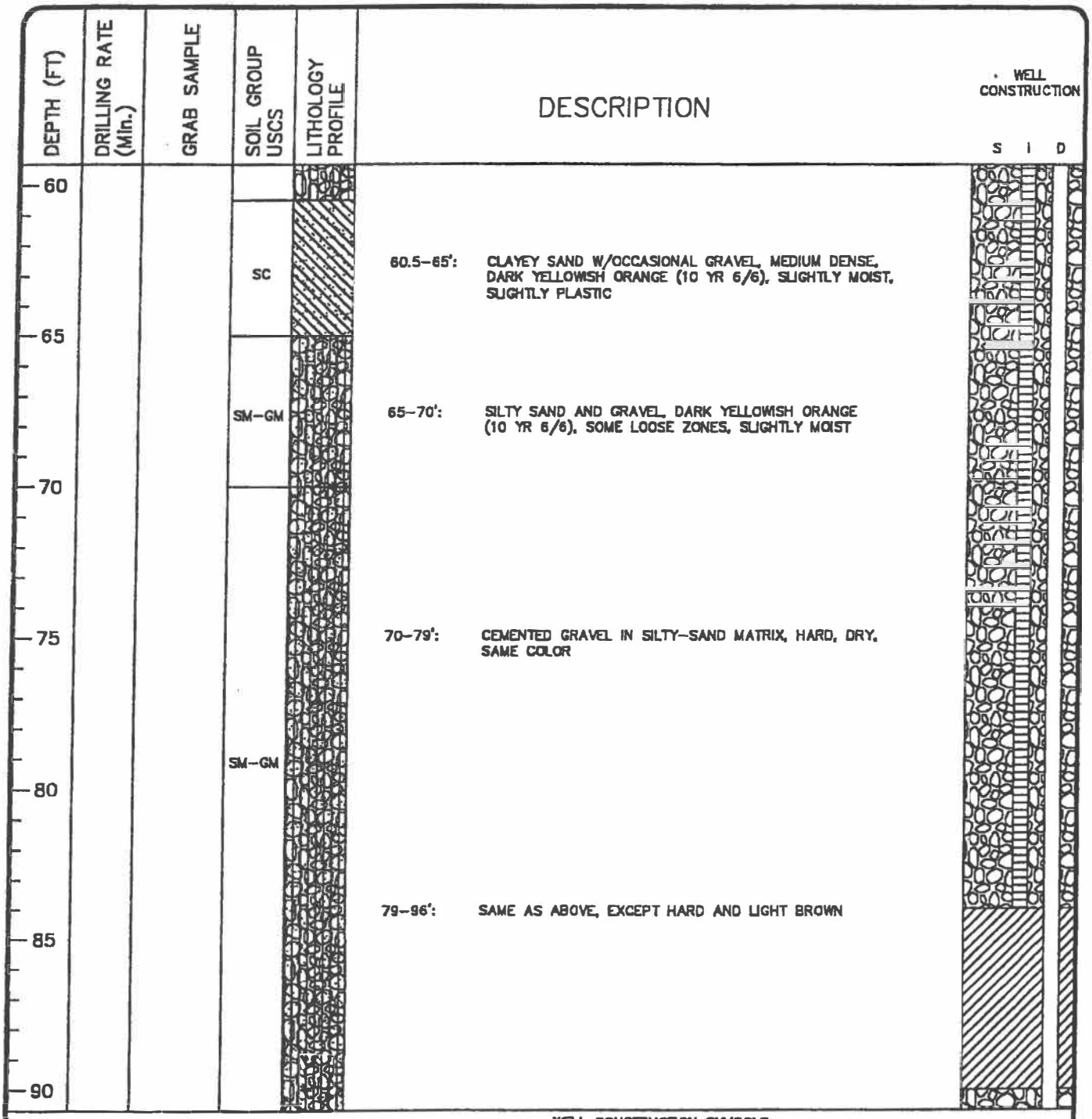
LAWRENCE & ASSOCIATES 2001 MARKET STREET, RM. 523 REDDING, CA 96001 PHONE : (916) 244-9703 FAX : (916) 244-5021		PROJECT: UKIAH LANDFILL	SHEET 3 OF 6
			HOLE #: GAS-8
		JOB #: C96.06.088	DATE: 9/13-20/96
FIELD LOCATION OF GAS WELL		LOGGED BY: C. COLES DRILLER: D. JENSEN	
		WELL CASING ELEVATION: APPROXIMATELY 922'	
		EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	



NOTES:

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WELL CONSTRUCTION SYMBOLS

SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)

3/8-INCH GRAVEL

BENTONITE SEAL

SAND-CEMENT SEAL

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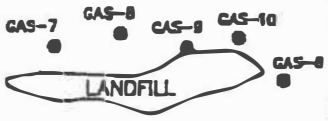
LAWRENCE & ASSOCIATES 2001 MARKET STREET, RM. 523 REDDING, CA 96001	PHONE : (916) 244-9703 FAX : (916) 244-5021	PROJECT: UKIAH LANDFILL	SHEET 4 OF 6 HOLE #: GAS-8
		JOB #: C96.06.08B	DATE: 9/13-20/96
		LOGGED BY: C. COLES	DRILLER: D. JENSEN
		WELL CASING ELEVATION: APPROXIMATELY 922'	
		EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
90						
			SM-GM		LESS CEMENTED BELOW 92'	
95						
			SM		96-98': FINE SAND AND SILT, SLIGHTLY GRAVELLY	
			SM-GM		98-98.5': CEMENTED GRAVEL IN SAND/SILT MATRIX	
100			ML		98.5-102': SILT	
			SM-GM		102-107.5': SILTY, SANDY GRAVEL, DENSE, DUSKY GREEN (5G 3/2)	
105						
110						
			SM-GM		107.5-174.5': CEMENTED GRAVEL IN A SAND AND SILT MATRIX, VERY HARD, DENSE, DUSKY GREEN, SOFTER ZONE AT 199'	
115						
120						

NOTES:

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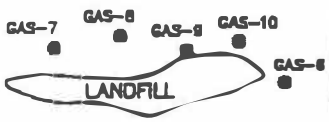
WELL CONSTRUCTION SYMBOLS

SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)

3/8-INCH GRAVEL

BENTONITE SEAL

SAND-CEMENT SEAL

LAWRENCE & ASSOCIATES 2001 MARKET STREET, RM. 523 REDDING, CA 96001	PHONE : (916) 244-9703 FAX : (916) 244-5021	PROJECT: UKIAH LANDFILL	SHEET 5 OF 6 HOLE #: GAS-8
		JOB #: C96.08.08B	DATE: 9/13-20/96
FIELD LOCATION OF GAS WELL		LOGGED BY: C. COLES DRILLER: D. JENSEN	
		WELL CASING ELEVATION: APPROXIMATELY 922'	
		EQUIPMENT AND SPECIFICATIONS: CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
120						
125						
130					107.5-174.5': CEMENTED GRAVEL IN A SAND AND SILT MATRIX, VERY HARD, DENSE, DUSKY GREEN, SOFTER ZONE AT 199'	
135			SM-GM		BELOW 139' LESS DENSE, SMALLER GRAVEL, STILL NO CLAY	
140						
145						
150						

NOTES:

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WELL CONSTRUCTION SYMBOLS

SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)

3/8-INCH GRAVEL

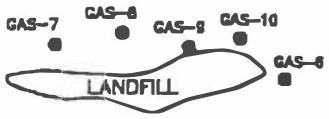
BENTONITE SEAL

SAND-CEMENT SEAL

LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL	SHEET 6 OF 6
	HOLE #: GAS-8
JOB #: C96.06.088	DATE: 9/13-20/96
LOGGED BY: C. COLLINS DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 922'	
EQUIPMENT AND SPECIFICATIONS:	
WATER AT 153' AFTER PULLING DRILLING ROD	
STATIC WATER LEVEL = 149.12' FROM TOP OF CASING (10/1/96, 13:00)	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
150						
155					BACK TO CEMENTED GRAVEL, SLIGHTLY CLAYEY, ALMOST ALL DARK GREEN ROCKS, METAVOLCANIC, SOME CHERT, <5%, MORE MOIST BELOW 151'	
160			SM-GM			
165						
170					INCREASINGLY MOIST BELOW 170'	
					NATIVE MATERIALS →	
175					WET AT 174.5'	
180						

NOTES:

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WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL

SHEET 1 OF 1

HOLE #: GAS-9

JOB #: C96.06.088

DATE: 9/9-10/96

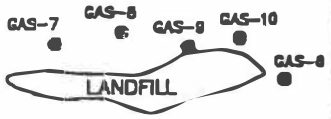
LOGGED BY: B. GARTNER DRILLER: D. JENSEN

WELL CASING ELEVATION: APPROXIMATELY 760'

EQUIPMENT AND SPECIFICATIONS:

CME-55 DRILLING RIG
8" O.D. HOLLOW-STEM AUGER

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION
0			ML		0-7': GRAVELLY SILT, DENSE, PALE YELLOWISH BROWN, (10 YR 6/2), SLIGHTLY MOIST
5					
10					
15			CL		7-30': SILTY CLAY, STIFF, PALE OLIVE (10 Y 6/2), MOIST, PLASTIC STIFFER AND LIGHT OLIVE GRAY (5 Y 5/2) BELOW 14', HARD LAYER FROM 14.5 TO 17' (CEMENTED ORANGE-BROWN SILTSTONE) HARD AGAIN @ 19', STICKY, PLUGS EASILY BELOW 19'; LESS HARD BELOW 24'.
20					
25					
30					

STEEL RISER W/LOCKING LID

2' TO 3'

WELL CONSTRUCTION

S I D

NOTES:

D = DEEP GAS PROBE

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S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS

- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

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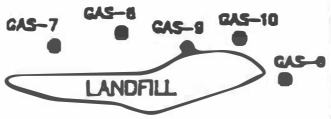
LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL	SHEET 1 OF 2
	HOLE #: GAS-10
JOB #: C98.06.088	DATE: 9/10-11/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN	
WELL CASING ELEVATION: APPROXIMATELY 795'	
EQUIPMENT AND SPECIFICATIONS:	
CME-55 DRILLING RIG 0-9' : 10"-HOLLOW STEM AUGER BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT	

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION
0-21'			CL		SILTY CLAY, STIFF, PLASTIC, MEDIUM GRAY (N5) AND OLIVE GRAY (5 Y 4/1), MOIST, PLASTIC HARD, SCRAPING @ 6'; LESS HARD @ 8.5' SWITCHED TO AIR ROTARY @ 9' MEDIUM GRAY (N-5) @ 9-12', LIGHT OLIVE GRAY (5 Y 5/2), HARD AND BOUNCING @ 14.25' MEDIUM GRAY TO LIGHT OLIVE GRAY (ALTERNATING AND VARIEGATED AT TIMES), PLASTIC, STIFF, MOIST
21-45'			ML		CLAYEY SILT W/FINE SAND, STIFF TO HARD, MEDIUM GRAY (N5) TO LIGHT OLIVE GRAY, PLASTIC; NO SAND BELOW 26'; COBBLE AT 26.5'

STEEL RISER W/LOCKING LID
2' TO 3'
WELL CONSTRUCTION
S I D

NOTES:
D = DEEP GAS PROBE
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S = SHALLOW GAS PROBE

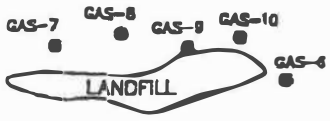
WELL CONSTRUCTION SYMBOLS
SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
3/8-INCH GRAVEL
BENTONITE SEAL
SAND-CEMENT SEAL

D:\ADCAD0\P\UKIAHCTY\GAS-10.DWG D.B.Z. 10/3/96

LAWRENCE & ASSOCIATES
2001 MARKET STREET, RM. 523
REDDING, CA 96001
PHONE : (916) 244-9703
FAX : (916) 244-5021

PROJECT: UKIAH LANDFILL | SHEET 2 OF 2
HOLE #: GAS-10
JOB #: C96.06.088 | DATE: 9/10-11/96
LOGGED BY: B. GARTNER DRILLER: D. JENSEN
WELL CASING ELEVATION: APPROXIMATELY 795'
EQUIPMENT AND SPECIFICATIONS:
CME-55 DRILLING RIG
0-9' : 10"-HOLLOW STEM AUGER
BELOW 9': 6-1/8" AIR-ROTARY ROCK BIT

FIELD LOCATION OF GAS WELL



DEPTH (FT)	DRILLING RATE (Min.)	GRAB SAMPLE	SOIL GROUP USCS	LITHOLOGY PROFILE	DESCRIPTION	WELL CONSTRUCTION S I D
30					31-31.5' HARD ZONE, (CEMENTED SILT)	
					SAME CLAYEY SILT AS DESCRIBED ABOVE, MEDIUM GRAY TO LIGHT OLIVE GRAY, MEDIUM PLASTIC, STIFF, SLIGHTLY MOIST	
35			ML			
40					LESS STIFF @ 41.5' GRAVEL LAYER @ 45 TO 45.5' (SILTY GRAVEL)	
45			GM		45.5-55.5': SILTY CLAY, STIFF, MEDIUM DARK GRAY (N4), MOIST, PLASTIC	
					EASY DRILLING @ 51.5', HARDER @ 52.5' EASIER BY BY 53', HARDER @ 55.5'	
50			CL			
55			ML		55.5-56.5': CLAYEY SILT (ML) WITH A LITTLE GRAVEL, LIGHT OLIVE GRAY, VERY HARD FROM 55.5'	
			SC		56.5-59': CLAYEY SILTY SAND, LIGHT OLIVE GRAY (SANDS FINE)	
60						

NOTES:
D = DEEP GAS PROBE
I = INTERMEDIATE GAS PROBE
S = SHALLOW GAS PROBE

WELL CONSTRUCTION SYMBOLS
- SCH. 80, 3/4-INCH PVC SCREEN, 40-SLOT (0.040-INCH SLOTS)
- 3/8-INCH GRAVEL
- BENTONITE SEAL
- SAND-CEMENT SEAL

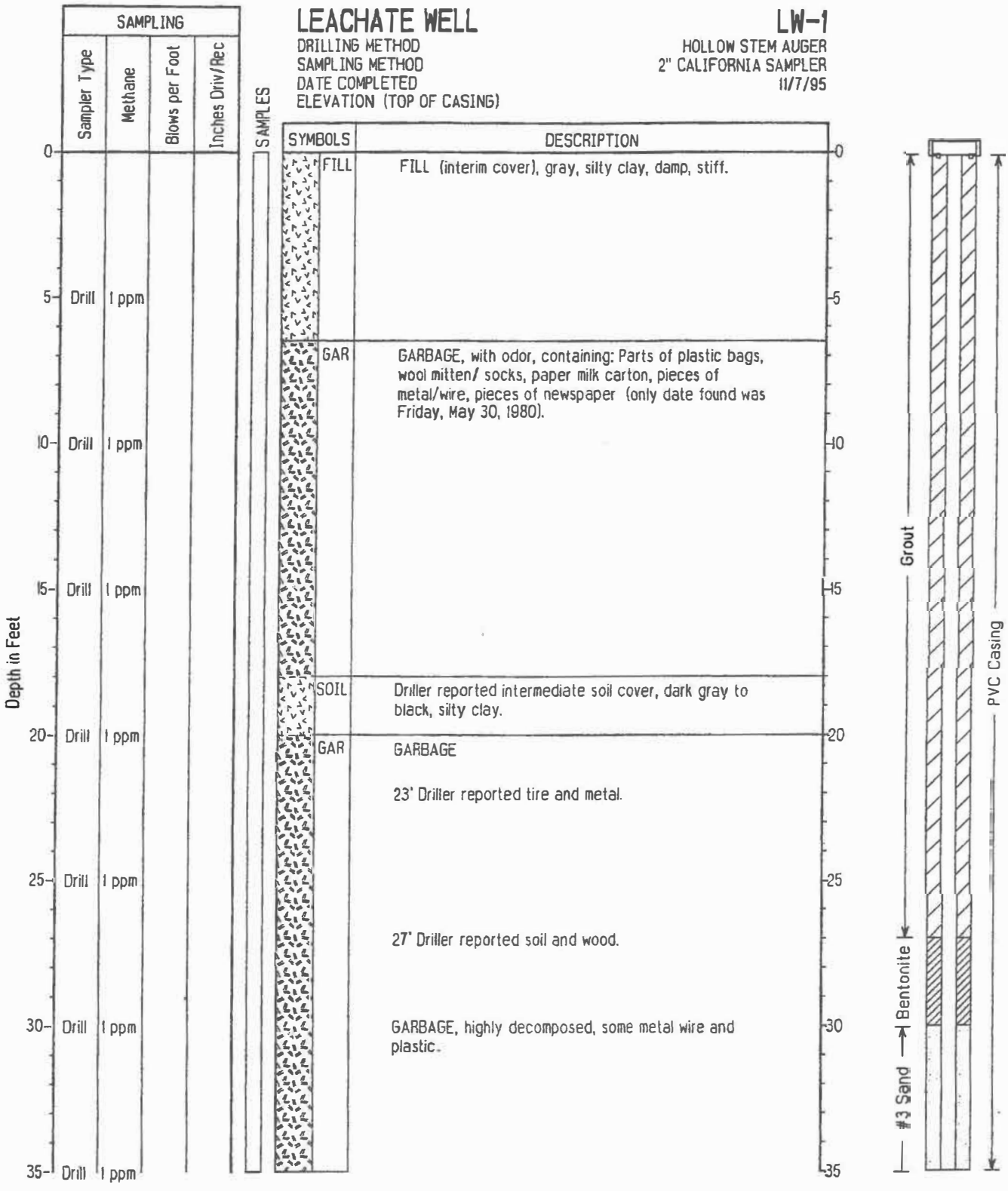
D:\ADCADD\P\UKIAHCTY\GAS-10.DWG D.B.I. 10/

LEACHATE WELLS

LEACHATE WELL

LW-1

DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2" CALIFORNIA SAMPLER
DATE COMPLETED: 11/7/95
ELEVATION (TOP OF CASING)



LEACHATE WELL LW-1

GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT
City of Ukiah
Ukiah, California

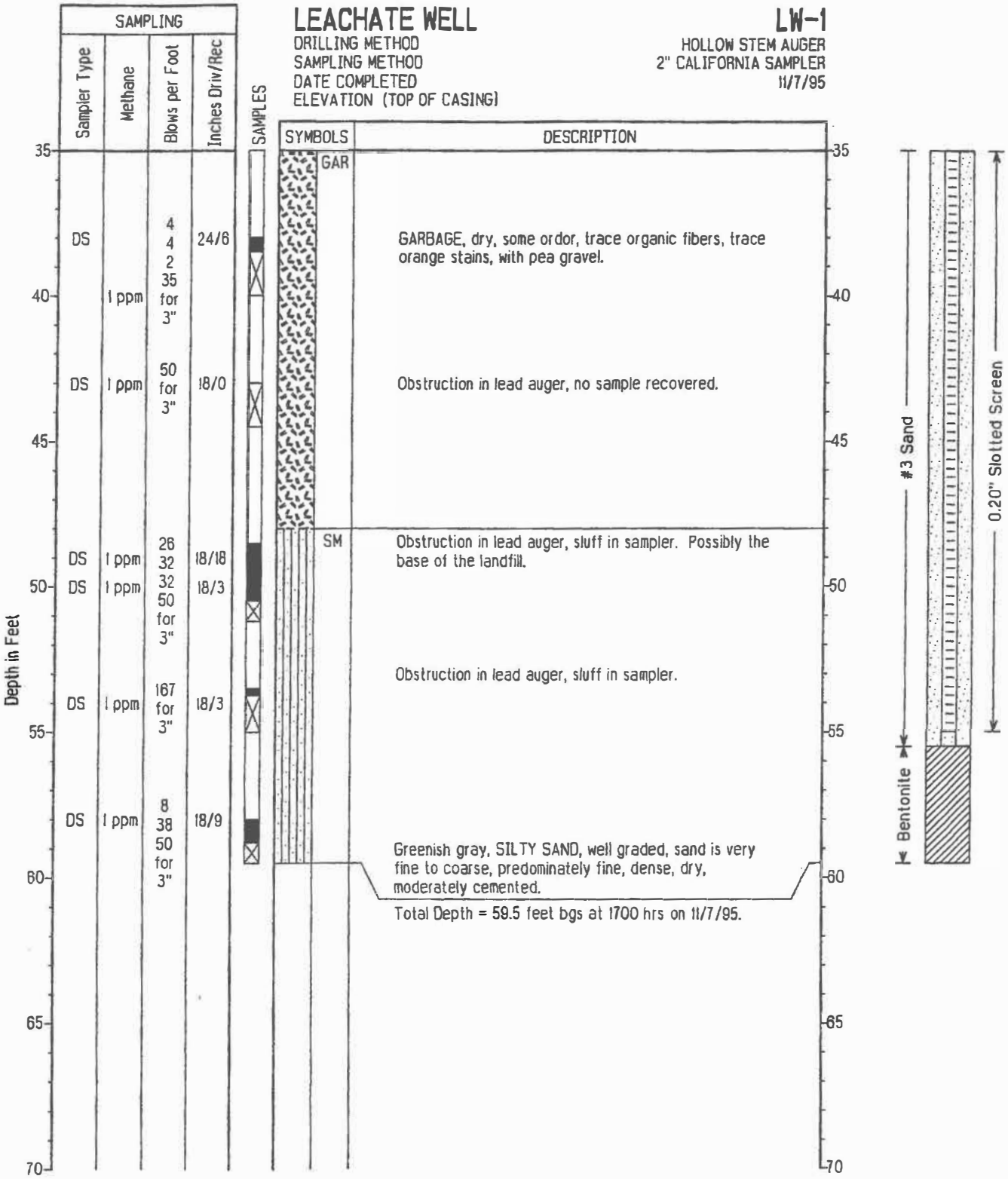
Dames & Moore

02736-0030-038 LW-1

LEACHATE WELL

DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2" CALIFORNIA SAMPLER
DATE COMPLETED: 11/7/95
ELEVATION (TOP OF CASING)

LW-1



LEACHATE WELL LW-1

GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT
City of Ukiah
Ukiah, California

Dames & Moore

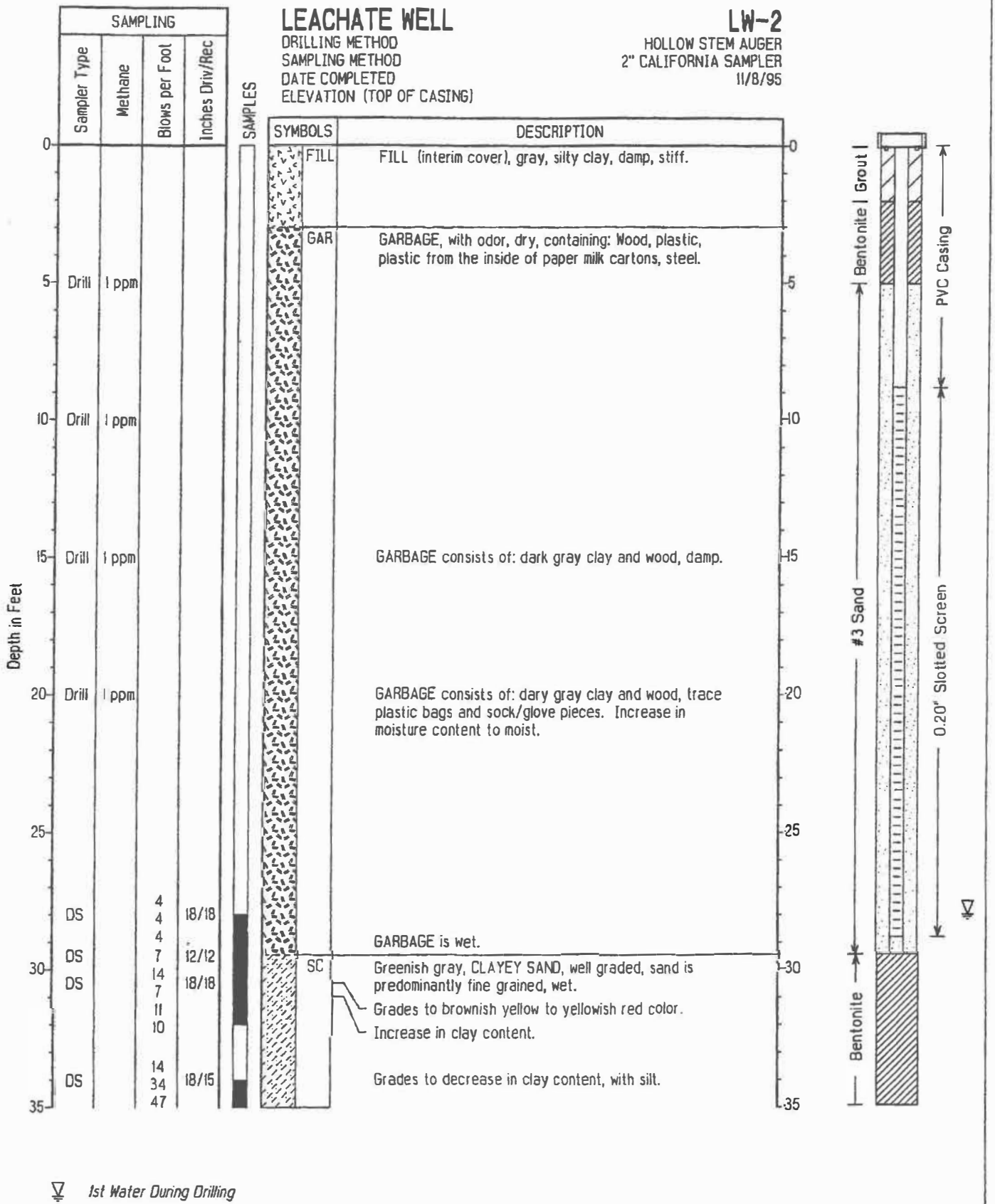
02736-0030-038 LW-1

LEACHATE WELL

DRILLING METHOD
SAMPLING METHOD
DATE COMPLETED
ELEVATION (TOP OF CASING)

LW-2

HOLLOW STEM AUGER
2" CALIFORNIA SAMPLER
11/8/95

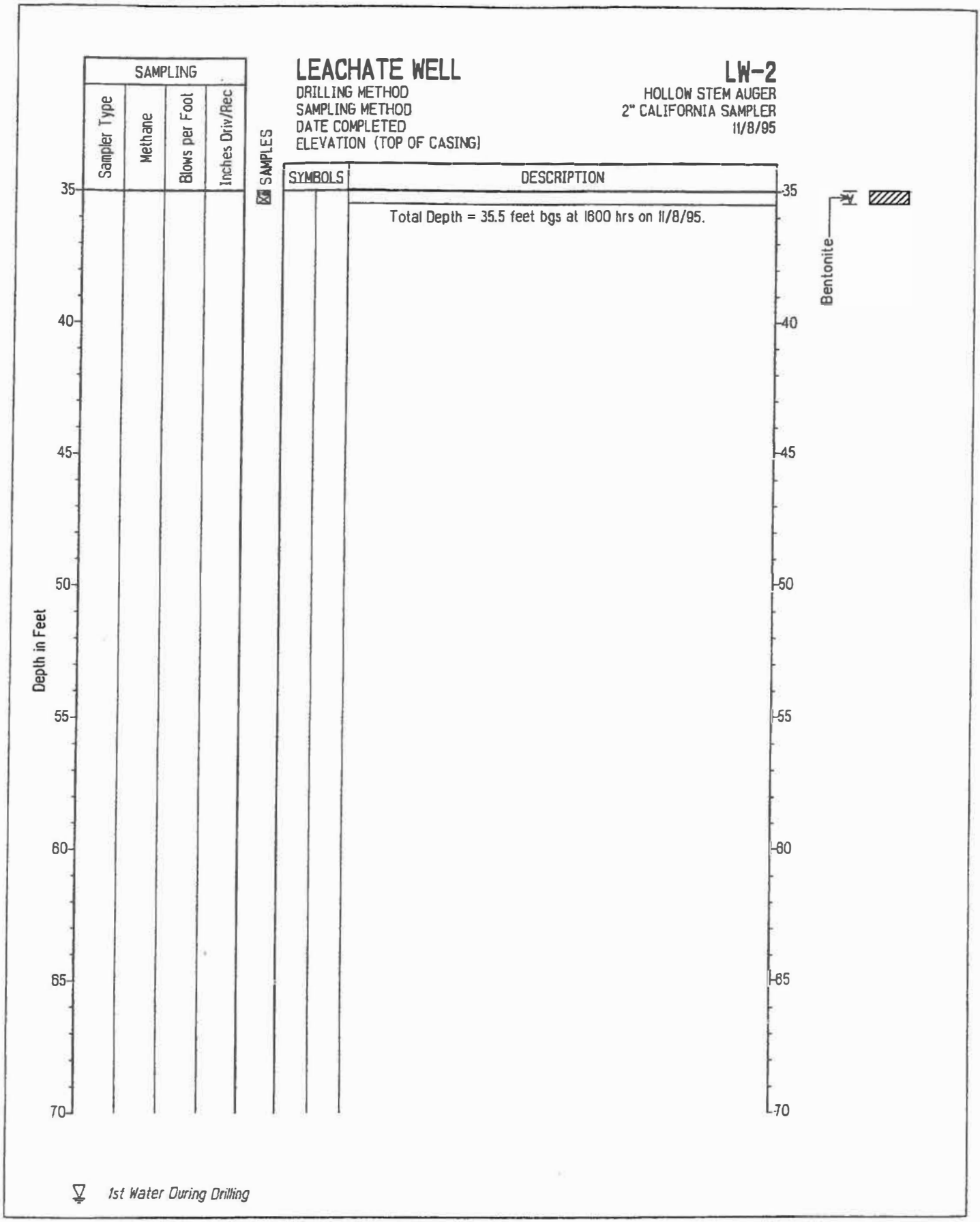


LEACHATE WELL LW-2

GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT
City of Ukiah
Ukiah, California

Dames & Moore

02736-0030-038 LW-2



LEACHATE WELL LW-2

GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT
City of Ukiah
Ukiah, California

Dames & Moore

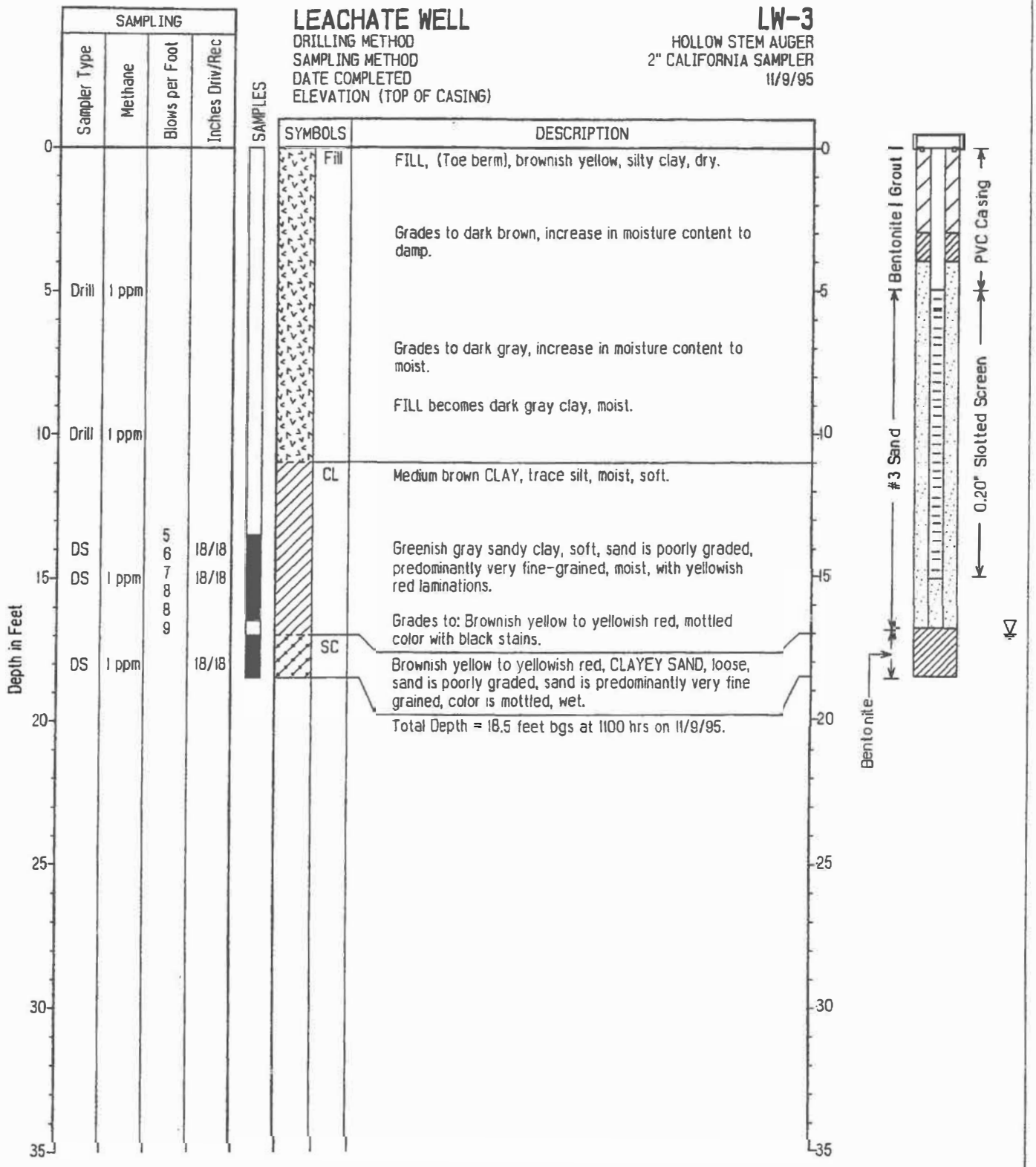
02736-0030-038 LW-2

Page 2 of 2

LEACHATE WELL

DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2" CALIFORNIA SAMPLER
DATE COMPLETED: 11/9/95
ELEVATION (TOP OF CASING)

LW-3



LEACHATE WELL LW-3

GROUNDWATER CORRECTIVE ACTION FEASIBILTY REPORT
City of Ukiah
Ukiah, California

Dames & Moore

02736-0030-038 LW-3

Page 1 of 1

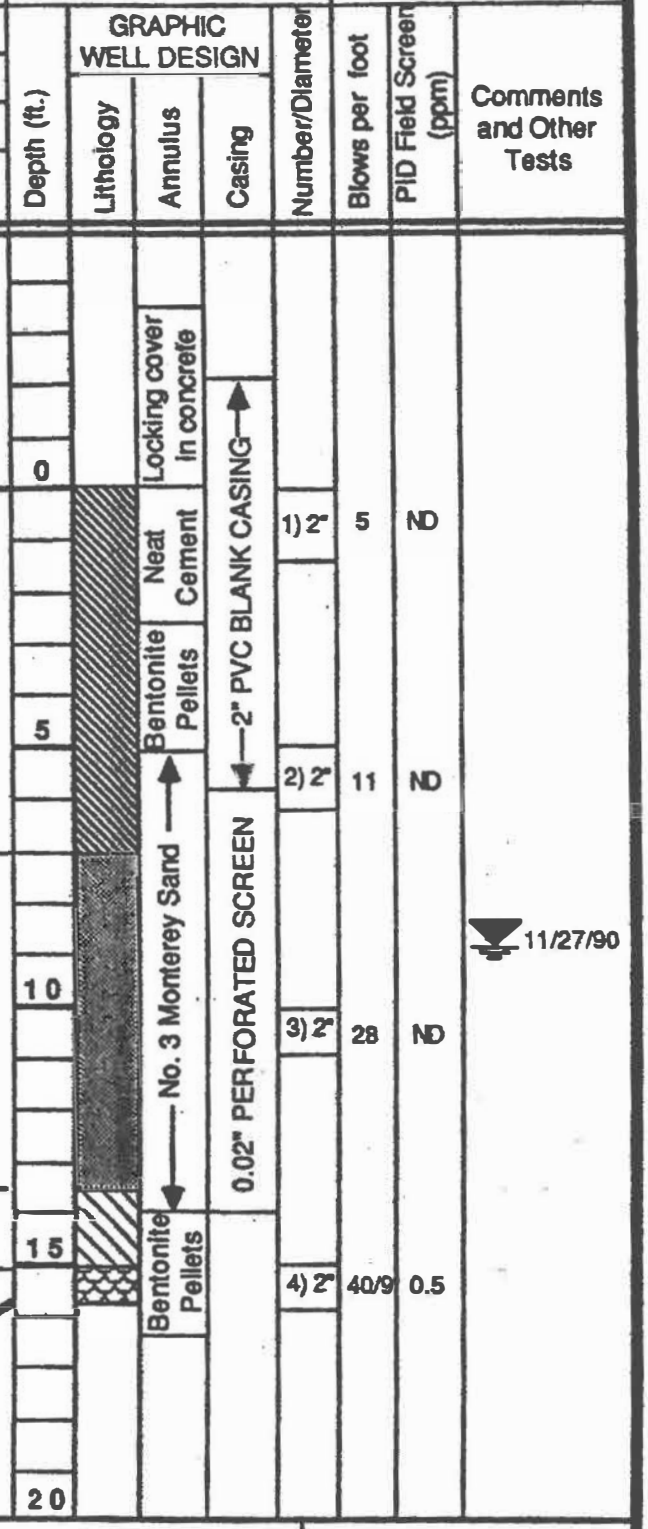
GROUNDWATER MONITORING WELLS

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 90-1**

DRILLING SUPERVISOR: Stephen Lucas, CEG# 1520
DRILLING LOGGER: Stephen Lucas
DRILLER: Clearheart Construction, Guerneville, California
DRILL RIG: Failing FA-100 Truck-mount
DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger
GROUNDWATER ELEVATION: 666.18 ft. 11/27/90

CASING: 2 in. PVC
SLOT SIZE: 0.02 in.
PERF: 5.5 ft. - 14.0 ft.

DATE: 04/09/90
SEAL: 2.5 ft. - 5.0 ft.
WELL DEPTH: 15.75 ft



DESCRIPTION OF MATERIALS

Top of casing (TOC) elevation: ~677 ft.; (2.0 ft. above existing grade)

Surface Elevation: ~675 ft.

Soft medium brown clayey sandy silt with < 1% rock fragments >0.5"

-Orange brown cuttings

-Very damp

Medium dense brown interbedded silty sand and gravels (6" - 12" thick) ; saturated

BASAL CONTACT HOLOCENE ALLUVIUM

Very stiff to hard gray and brown silty clay; Dry to damp (PLIO-PLIESTOCENE DEPOSITS)

Very dense gray and brown matrix supported clayey gravel conglomerate; rounded sandstone clasts < 1"; Dry to damp

TOTAL DEPTH 15.75 FEET

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 1

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 90-2**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520	CASING: 2 in. PVC	DATE: 08/15/90
DRILLING LOGGER: Stephen Lucas	SLOT SIZE: 0.02 in.	SEAL: 14.0 - 18.0 ft.
DRILLER: Weeks Drilling, Sebastopol, California	PERF: 19.0 - 49.0 ft.	WELL DEPTH: 50.0 ft.
DRILL RIG: Schramm T-685-H Air Rotary Truck-mount		
DRILLING METHOD: 7 - 7/8 inch Air Rotary		
GROUNDWATER ELEVATION: 680.12 ft. 11/27/90		

DESCRIPTION OF MATERIALS

Top of casing (TOC) elevation: ~685.5 ft.; (2.5 ft. above existing grade)

Surface Elevation: ~683 ft.

Medium stiff yellow brown gravelly clayey silt; (clasts < 2")

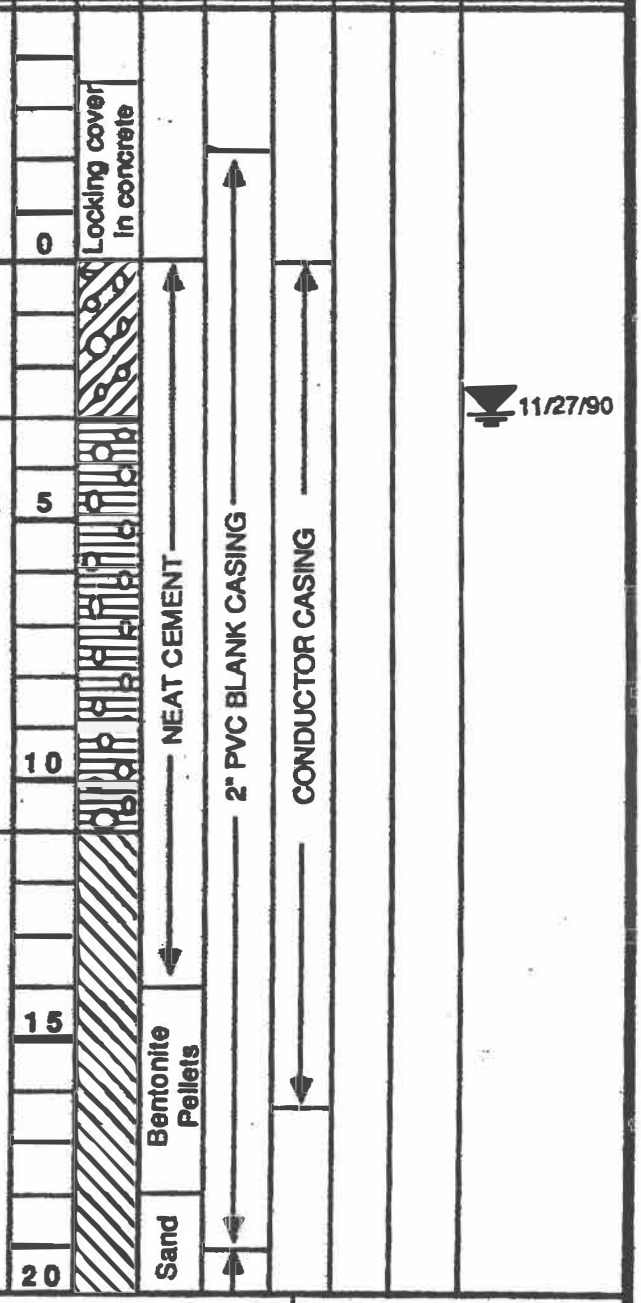
Loose to medium dense polymictic silty gravels; saturated

BASAL CONTACT HOLOCENE ALLUVIUM

PLIO-PLIESTOCENE CONTINENTAL DEPOSITS

Hard gray silty clay

continued



JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 2a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-2 *Continued*

GROUNDWATER ELEVATION: 680.12 ft. 11/27/90

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Hard gray silty clay	20					
Dense gray silty gravel	25					
Hard gray silty clay						
Hard gray clayey silty sand						
Hard gray and brown silty clay	30, 35, 40	No. 3 Monterey Sand; 0.02" PERFORATED SCREEN				
Dense gray clayey sandy gravel; moist to wet						
Hard dark gray silty clay	45					
Hard gray silty clay	50					

JOB NO. 5146-8910 | HALLENBECK & ASSOCIATES | FIGURE NO. HA - 2b

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-2 *Continued*

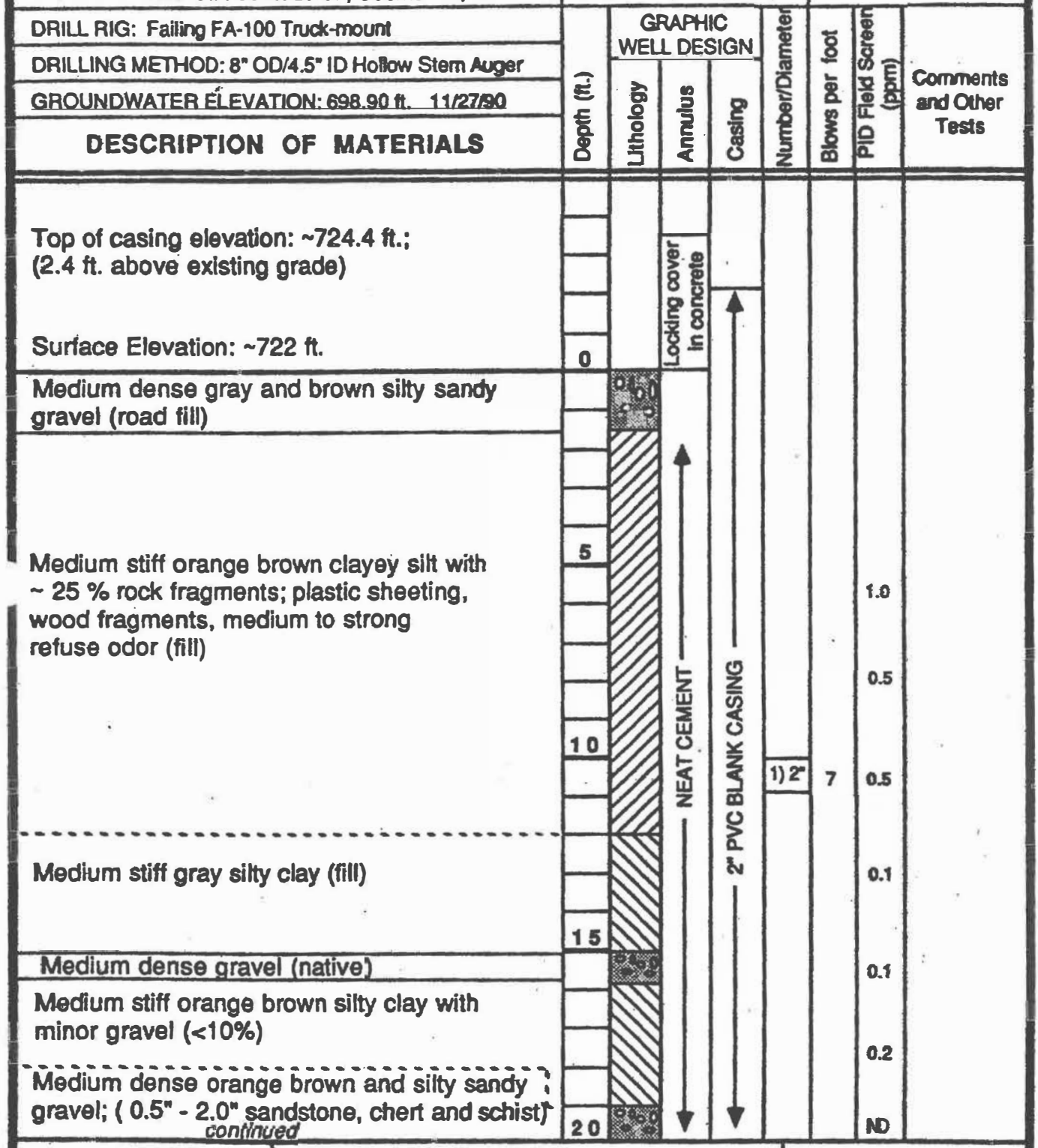
GROUNDWATER ELEVATION: 680.12 ft. 11/27/90

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	GRAPHIC WELL DESIGN: Annulus	GRAPHIC WELL DESIGN: Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Hard gray clayey silt	50		Bentonite Pellets					
	55		SLOUGH					
Dense blue gray silty sand; saturated	60							
TOTAL DEPTH 60.0 FEET	65							
	70							
	75							
	80							

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 2c

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 90-3**

DRILLING SUPERVISOR: Stephen Lucas, CEG# 1520	CASING: 2 in. PVC	DATE: 04/11/90
DRILLING LOGGER: Stephen Lucas	SLOT SIZE: 0.02 in.	SEAL: 21.5 ft. - 24.5 ft.
DRILLER: Clearheart Construction, Guerneville, California	PERF: 25.0 ft. - 35.0 ft.	WELL DEPTH: 35.0 ft.
DRILL RIG: Failing FA-100 Truck-mount		
DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger		
GROUNDWATER ELEVATION: 698.90 ft. 11/27/90		



JOB NO. 5146-8910	**HALLENBECK & ASSOCIATES**	FIGURE NO. HA-3a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-3 *Continued*

GROUNDWATER ELEVATION: 698.90 ft. 11/27/90

DESCRIPTION OF MATERIALS

Depth (ft.)	Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
20			2" PVC BLANK CASING	2) 2"	28	ND	
		Bentonite Pellets					11/27/90
						ND	
25		No. 3 Monterey Sand				ND	
			0.02" PERFORATED SCREEN				
						ND	
30				3) 2"	26	ND	
						ND	
35						ND	
40							
45							
50							

Medium dense orange brown and gray silty sandy gravel; 0.5" - 2.0" sandstone, chert and schist rock fragments; dry

Medium stiff orange brown clayey silt to silty clay; dry

Dense silty cobbles and gravels; dry

Dense olive gray sandy gravel; saturated

TOTAL DEPTH 35.0 FT.

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 3b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 90-4**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: 04/09/90

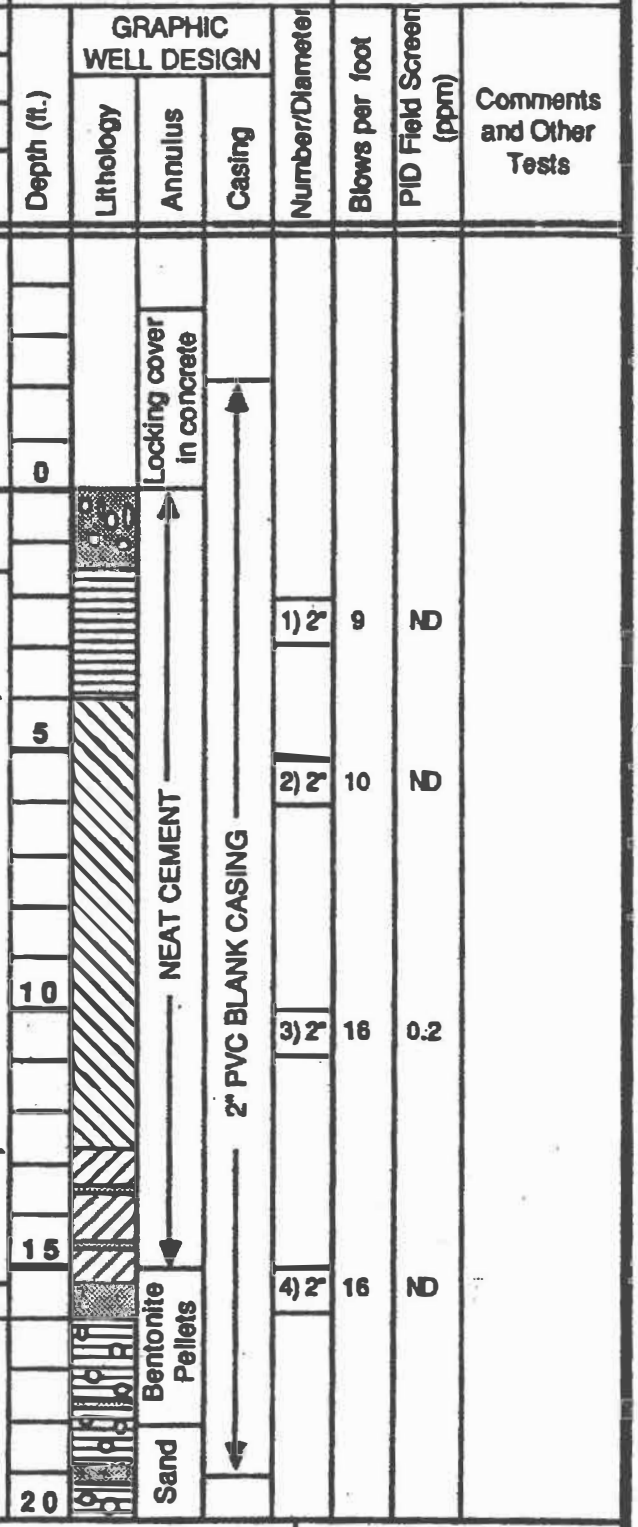
DRILLING LOGGER: Stephen Lucas | SLOT SIZE: 0.02 in. | SEAL: 15.0 ft. - 18.0 ft.

DRILLER: Clearheart Construction, Guerneville, California | PERF: 19.0 ft. - 34.0 ft. | WELL DEPTH: 34.0 ft.

DRILL RIG: Failing FA-100 Truck-mount

DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger

GROUNDWATER ELEVATION: 698.90 ft. 11/27/90



DESCRIPTION OF MATERIALS

Top of casing elevation: ~722.6 ft.; (2.6 ft. above existing grade)

Surface Elevation: ~720 ft.

Medium dense gray brown silty sandy gravel (road fill)

Medium stiff green gray silt with minor gravel; moist (fill)

Stiff dark green gray silty clay to clayey silt <5 % gravel and wood fragments; damp (fill/colluvium ?)

- Carbonized wood fragments, leaves and matted grass

Stiff blue green gray clayey silt with silty sand layers; matted, carbonized grass at bedding contacts (fill/colluvium ?)

Medium dense gray green silty sand; damp (fill)

Dense gray brown and red silty gravel with minor interbedded silty sand; moist to wet (native terrace deposit)

continued

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 4a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-4 *Continued*

GROUNDWATER ELEVATION: 698.90 ft. 11/27/90

DESCRIPTION OF MATERIALS

Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
20				5) 2"	34	ND	
							11/27/90
25				6) 2"	9	ND	
30							
35							
40							
45							
50							

Dense gray brown and red silty gravel with minor interbedded silty sand; moist to wet

Medium stiff orange brown with blue gray mottled silty sand; < 5% rounded < 0.25" pebbles; saturated

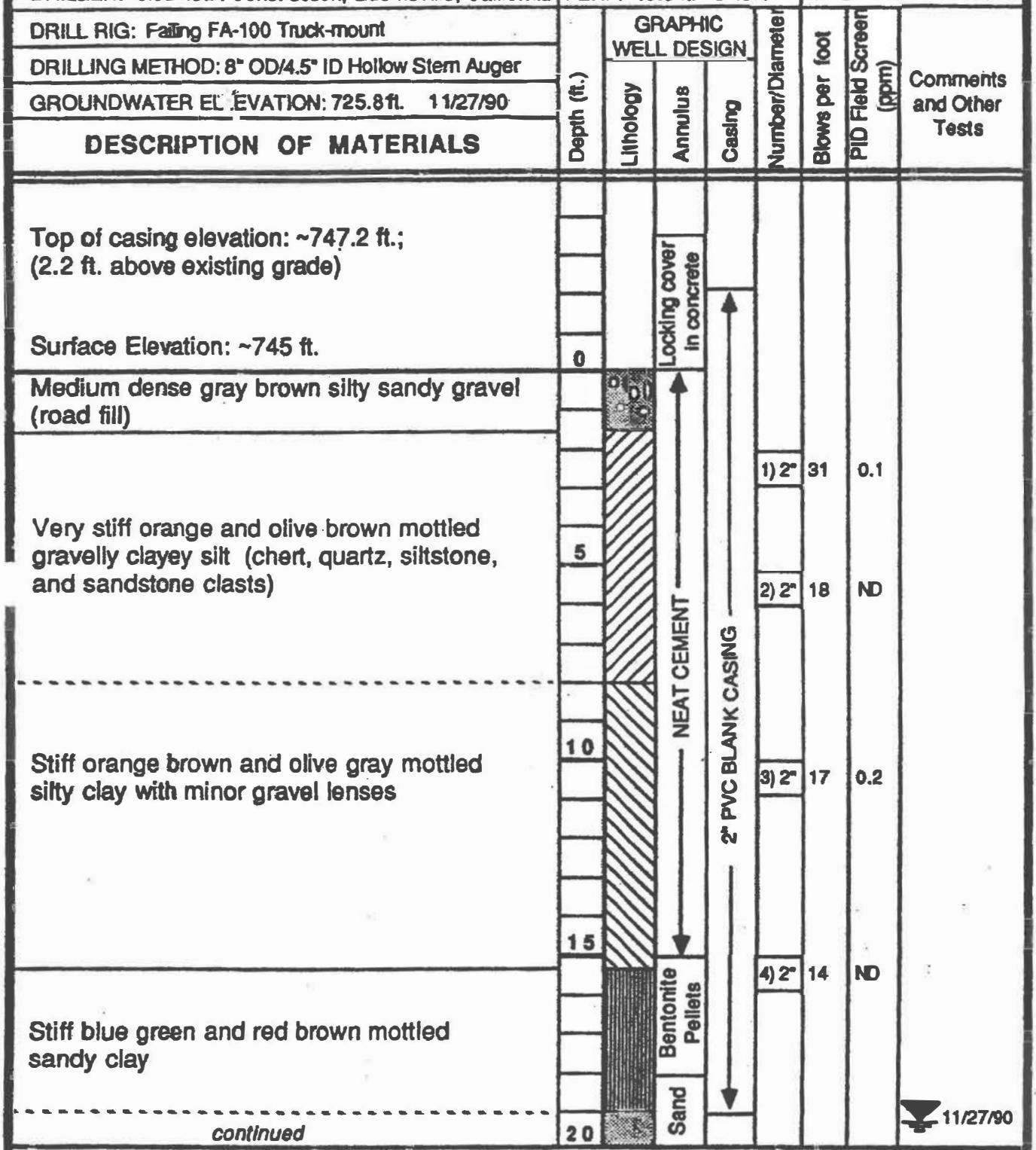
No. 3 Monterey Sand

0.02" PERFORATED SCREEN

TOTAL DEPTH 35.0 FT.

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 4b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California		WELL NO. 90-5
DRILLING SUPERVISOR: Stephen Lucas, CEG #1520	CASING: 2 in. PVC	DATE: 04/12/90
DRILLING LOGGER: Stephen Lucas	SLOT SIZE: 0.02 in.	SEAL: 15.0 ft. - 18.0 ft.
DRILLER: Clearheart Construction, Guerneville, California	PERF: 19.0 ft. - 34.0 ft.	WELL DEPTH: 34.0 ft.
DRILL RIG: Failing FA-100 Truck-mount		
DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger		
GROUNDWATER ELEVATION: 725.8 ft. 11/27/90		



JOB NO. 5146-8910	HALLENBECK & ASSOCIATES	FIGURE NO. HA - 5a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-5 *Continued*

GROUNDWATER ELEVATION: 725.81 ft. 11/27/90

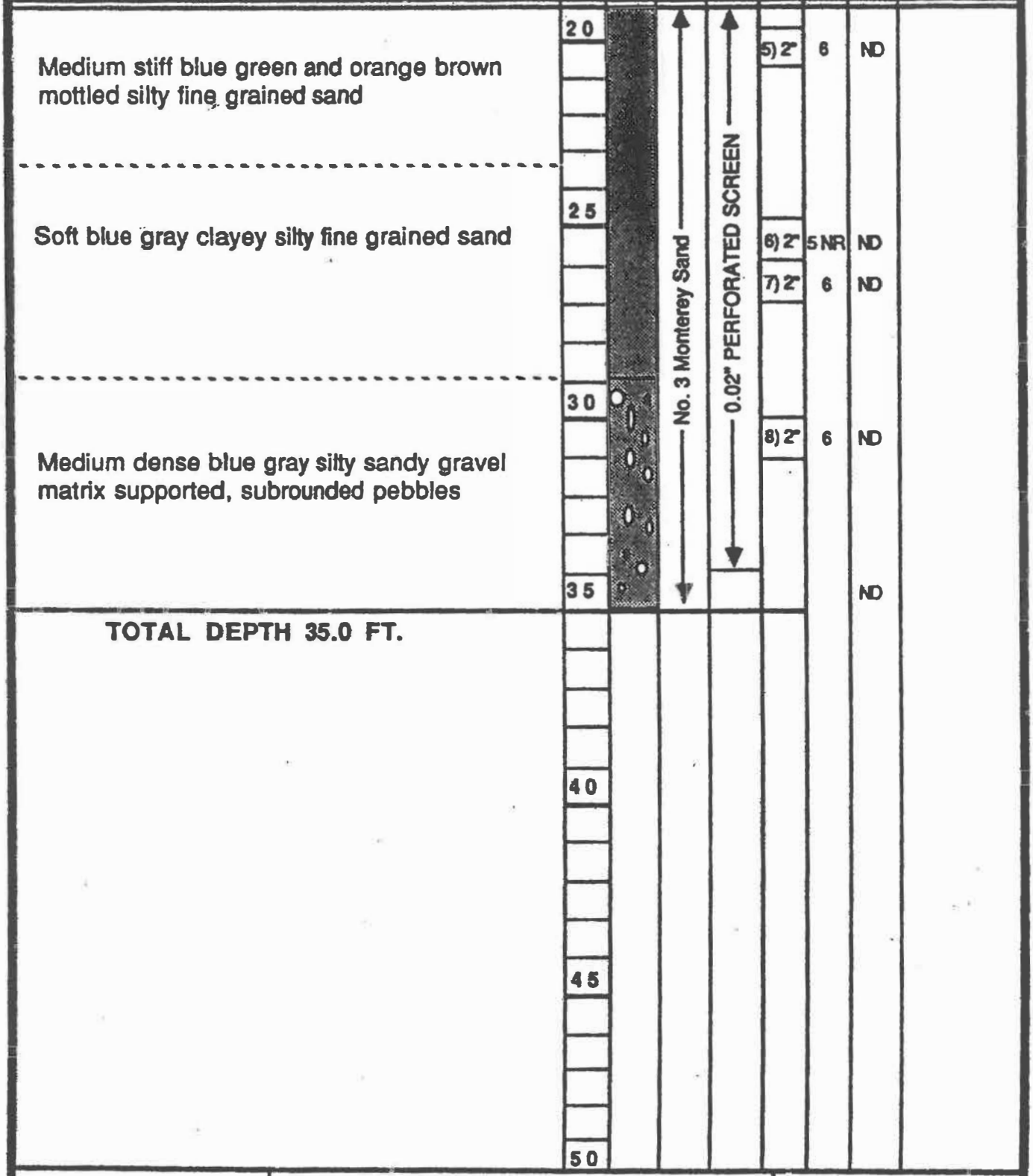
DESCRIPTION OF MATERIALS

Medium stiff blue green and orange brown mottled silty fine grained sand

Soft blue gray clayey silty fine grained sand

Medium dense blue gray silty sandy gravel matrix supported, subrounded pebbles

TOTAL DEPTH 35.0 FT.



JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 5b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 90-6**

DRILLING SUPERVISOR: Stephen Lucas, CEG# 1520 | CASING: 2 in. PVC | DATE: 04/13/90

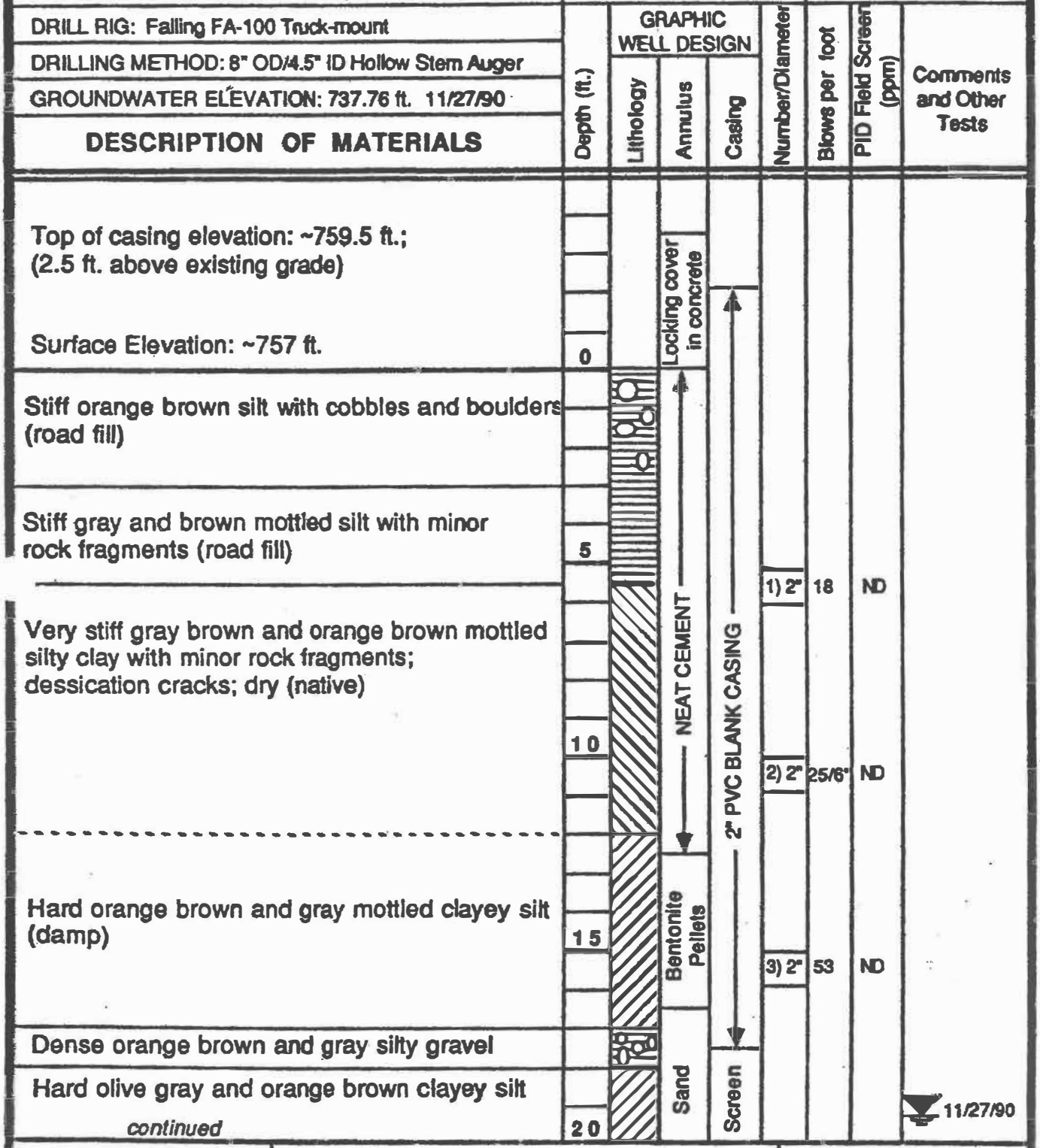
DRILLING LOGGER: Stephen Lucas | SLOT SIZE: 0.02 in. | SEAL: 13.5 ft. - 16.5 ft.

DRILLER: Clearheart Construction, Guerneville, California | PERF: 17.5 ft. - 37.5 ft. | WELL DEPTH: 39.25 ft.

DRILL RIG: Failing FA-100 Truck-mount

DRILLING METHOD: 8" OD/4.5" ID Hollow Stem Auger

GROUNDWATER ELEVATION: 737.76 ft. 11/27/90



JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 6a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-6 *Continued*

GROUNDWATER ELEVATION: 737.67 ft. 11/27/90

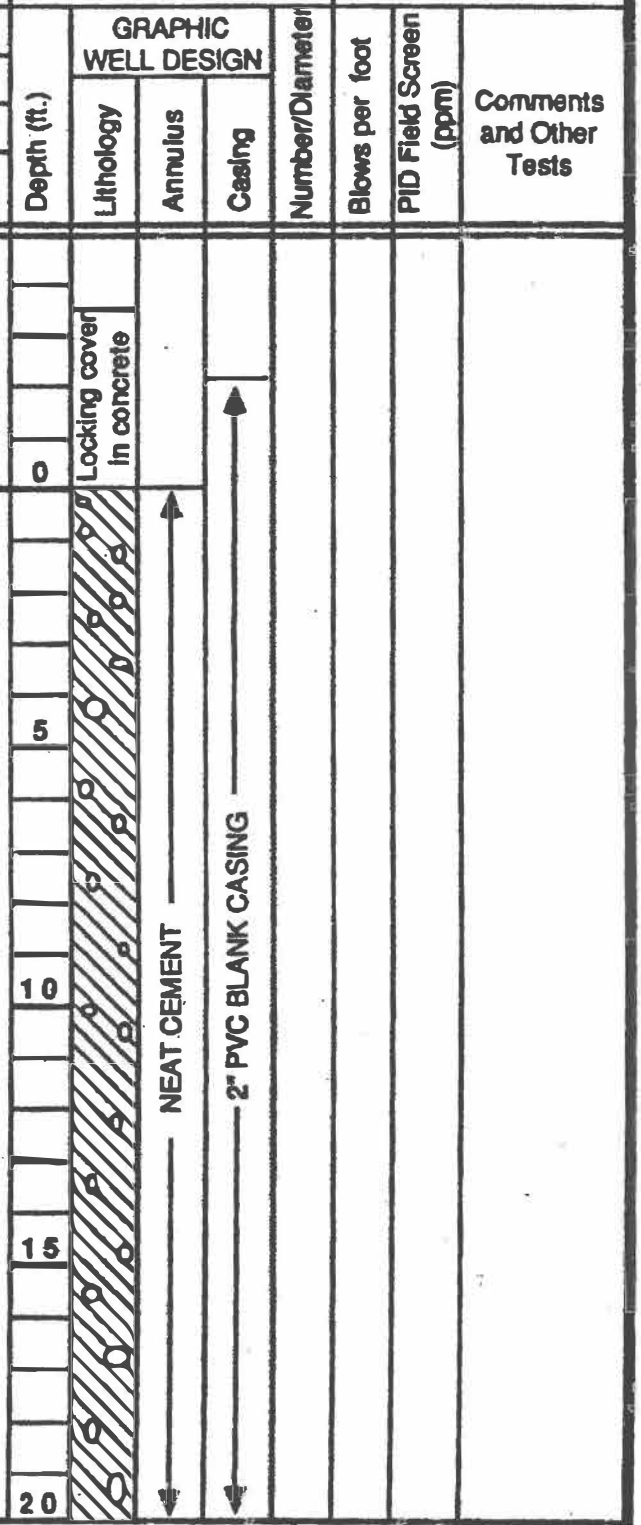
DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Hard olive gray and orange brown clayey silt	20					
	25					
- Slightly sandier; moist to wet	30					
Medium dense gravel; wet						
Very stiff gray silty clay; moist	35		5) 2"	6	ND	
Very dense silty cobbles						
DRILLING REFUSAL 39.25 FEET	40					
	45					
	50					

Annulus: No. 2/16 Monterey Sand

Casing: 0.02" PERFORATED SCREEN

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-6b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California		WELL NO. 90-7
DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520	CASING: 2 in. PVC	DATE: 08/13/90
DRILLING LOGGER: Stephen Lucas	SLOT SIZE: 0.02 in.	SEAL: 130.0 - 135.0 ft.
DRILLER: Weeks Drilling, Sebastopol, California	PERF: 139.0 - 159.0 ft.	WELL DEPTH:160.0 ft.
DRILL RIG: Schramm T-685-H Air Rotary Truck-mount		
DRILLING METHOD: 7 - 7/8 inch Air Rotary		
GROUNDWATER ELEVATION: 727.22 ft. 11/27/90		



JOB NO. 5146-8910	HALLENBECK & ASSOCIATES	FIGURE NO. HA - 7a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-7 *Continued*

GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	GRAPHIC WELL DESIGN: Annulus	GRAPHIC WELL DESIGN: Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Stiff yellow brown silty clay with minor gravel (< 15 %, ~25% are angular Franciscan sandstone clasts)	20		NEAT CEMENT	2" PVC BLANK CASING				
Hard gray clayey silt(stone)	25							
	30							
	35							
	40							
	45							
continued	50							

JOB NO. 5146-8910 | HALLENBECK & ASSOCIATES | FIGURE NO. HA - 7b

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-7 *Continued*

GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Dense gray clayey silt(stone)	50, 55	NEAT CEMENT; 2" PVC BLANK CASING				
Dense gray silty gravel						
Dense blue gray clayey silt(stone); dry to very slightly moist	60, 65, 70, 75, 80					

continued

JOB NO. 5146-8910 | HALLENBECK & ASSOCIATES | FIGURE NO. HA - 7c

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-7 *Continued*

GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS

Depth (ft.)	Lithology	GRAPHIC WELL DESIGN: Annulus	GRAPHIC WELL DESIGN: Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
80		NEAT CEMENT	2" PVC BLANK CASING				
85							
90							
95							
100							
105							11/27/90
110							

Dense blue gray clayey silt(stone); dry to very slightly moist

Dense dark gray sand(stone); dry

Dense dark gray silty clay(stone)

Dense polymictic silty gravel (sandstone and chert clasts)

Dense blue gray clayey silt(stone); dry to very slightly moist

continued

JOB NO. 5146-8910 | HALLENBECK & ASSOCIATES | FIGURE NO. HA - 7c

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-7 *Continued*

GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS

Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
110							
115							
120							
125							
130							
135							
140							

Dense blue gray clayey silt(stone);
dry to very slightly moist

NEAT CEMENT

2" PVC BLANK CASING

Bentonite Pellets

No. 3 Monterey Sand

continued

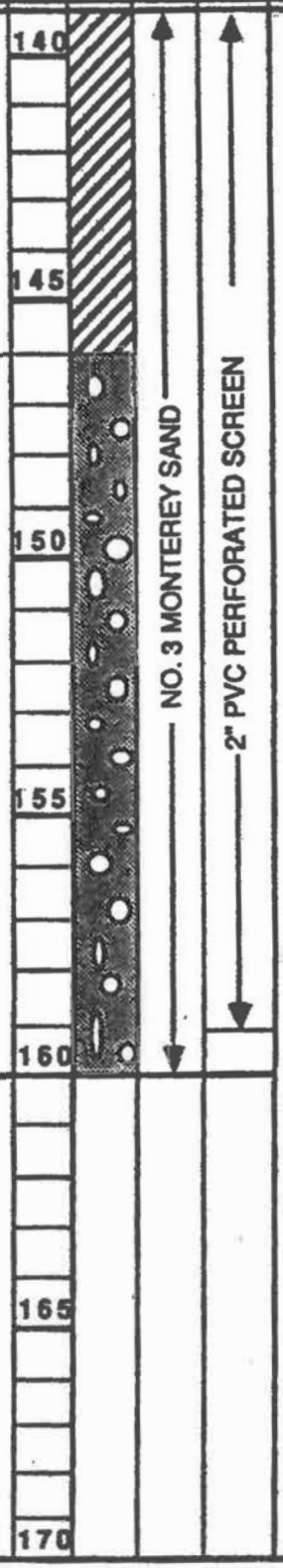
JOB NO. 5146-8910 | HALLENBECK & ASSOCIATES | FIGURE NO. HA - 7d

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-7 *Continued*

GROUNDWATER ELEVATION: 727.22 ft. 11/27/90

DESCRIPTION OF MATERIALS



Dense blue gray clayey silt(stone); dry to very slightly moist

Dense blue gray clayey silty sandy gravel; saturated

TOTAL DEPTH 160.0 FEET

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-7e

PROJECT: UKIAH CITY LANDFILL, Ukiah, California			WELL NO. 90-8
DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520	CASING: 2 in. PVC		DATE: 12/05/90
DRILLING LOGGER: Stephen Lucas	SLOT SIZE: 0.02 in.		SEAL: 92.0 - 97.0 ft.
DRILLER: Weeks Drilling, Sebastopol, California	PERF: 110.0 - 138.5 ft.		WELL DEPTH:140.0 ft
DRILL RIG: Schramm T-685-H Air Rotary Truck-mount			
DRILLING METHOD: 7 - 7/8 inch Air Rotary			
GROUNDWATER ELEVATION: 700.5 ft. * 1/9/91			

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
Top of casing (TOC) elevation: ~839.5 ft.; (2.5 ft. above existing grade) Surface Elevation: ~837 ft.	0	Locking cover in concrete				
Stiff orange brown clayey silt with minor gravel; damp to dry	5	NEAT CEMENT; 2" PVC BLANK CASING				
	10					
	15					
continued * Not stabilized	20					

JOB NO. 5146-8910	HALLENBECK & ASSOCIATES	FIGURE NO. HA - 8a

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-8 *Continued*

GROUNDWATER ELEVATION: 700.5 ft.* 1/9/91

DESCRIPTION OF MATERIALS

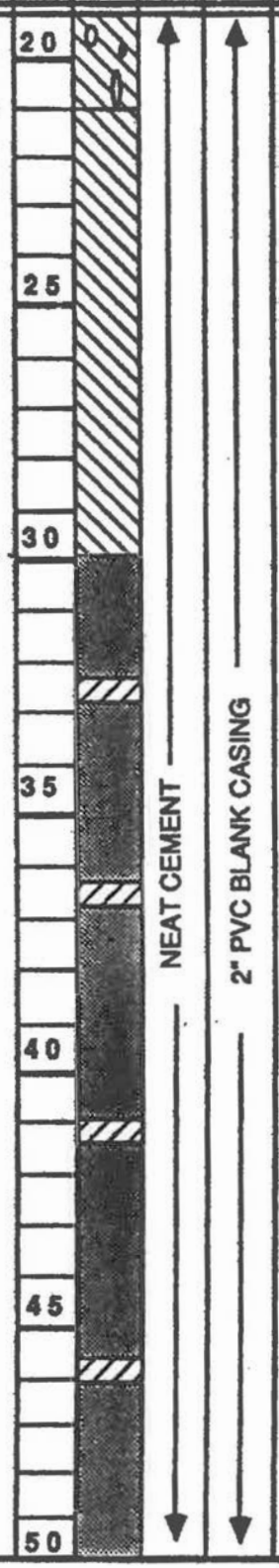
Stiff orange brown silty clay with minor gravel; damp to dry

Hard orange and gray mottled silty clay

Dense gray fine to medium grained silty sand(stone) with clayey silt interbeds

* Not stabilized

Continued



JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 8b

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-8 *Continued*

GROUNDWATER ELEVATION: 700.5 ft.* 1/9/91

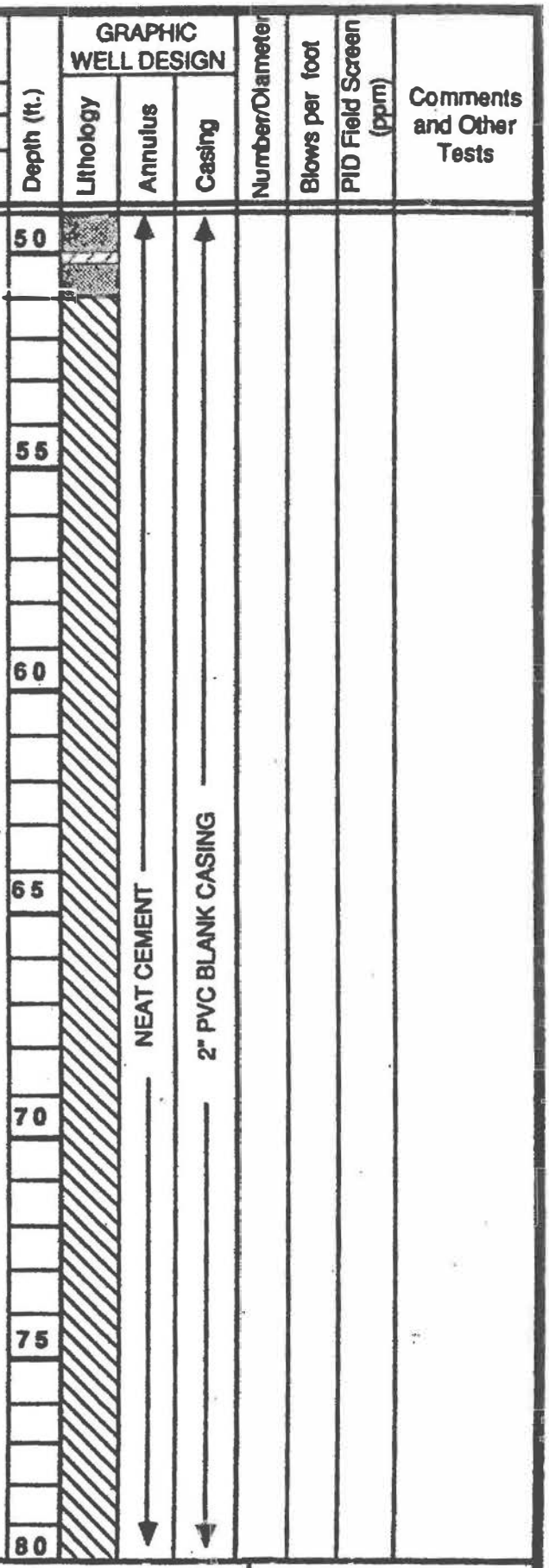
DESCRIPTION OF MATERIALS

Dense gray fine to medium grained silty sand(stone) with clayey silt interbeds

Hard gray clayey silt to silty clay

* Not stabilized

Continued



JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 8c

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-8 *Continued*

GROUNDWATER ELEVATION: 700.5 ft.* 1/9/91

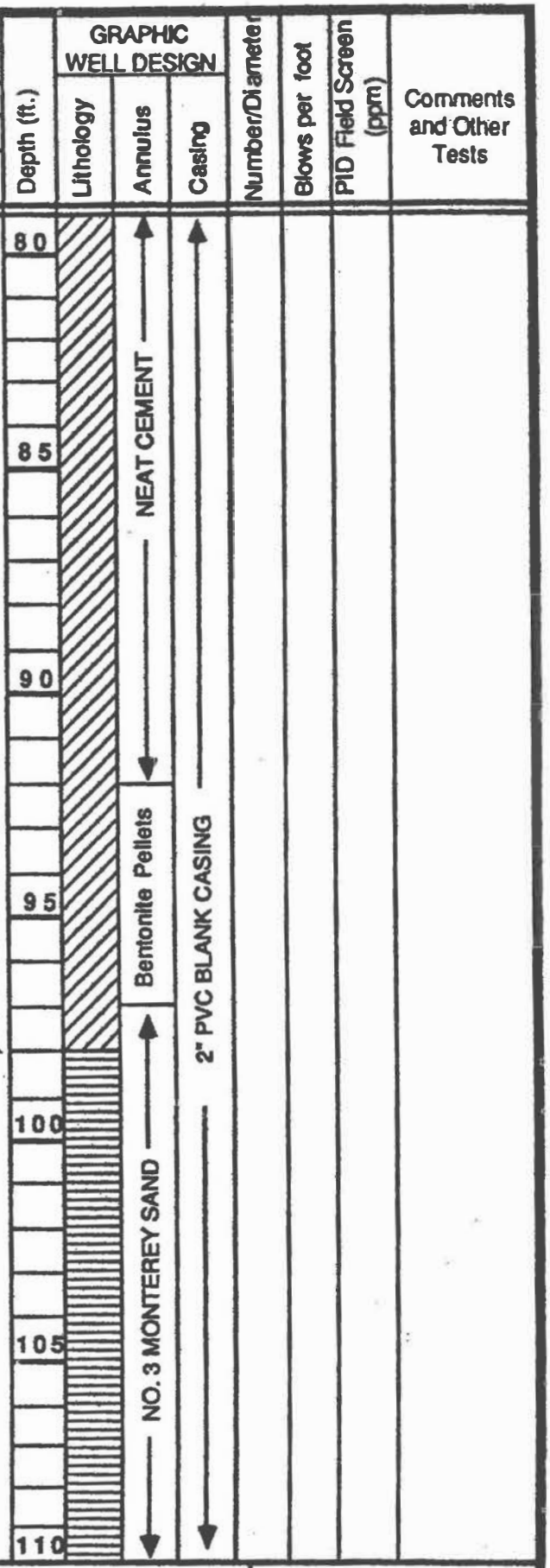
DESCRIPTION OF MATERIALS

Hard gray clayey silt to silty clay; dry

Hard gray silt with minor fine grained silty sand(stone) clasts; dry

* Not Stabilized

Continued



JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA - 8d

PROJECT: UKIAH CITY LANDFILL
Ukiah, California

WELL NO. 90-8 *Continued*

GROUNDWATER ELEVATION: 700.5 ft.* 1/9/91

DESCRIPTION OF MATERIALS

Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Number/Diameter	Blows per foot	PID Field Screen (ppm)	Comments and Other Tests
110							
115							
120							
125							
130							
135							
140							

Hard gray silt with minor fine grained silty sand(stone) clasts; dry

NO. 3 MONTEREY SAND

2" PVC 0.02" PERFORATED SCREEN

Dark gray silt

01/09/91

*Not stabilized

TOTAL DEPTH 140.0 FEET

JOB NO. 5146-8910 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-8e

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-1**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: 12-14-92

DRILLING LOGGER: Ralph Carson, Staff Geologist | SLOT SIZE: 0.01 in. | SEAL: 10.0 - 13.0 ft.

DRILLER: Clear Heart Construction, Guerneville, CA | PERF: 15.0 - 28.0 ft. | WELL DEPTH: 28 ft.

DRILL RIG: Deeprock 10K Rig

DRILLING METHOD: 8.25" ID/4.25" OD Hollow Stem Augers

GROUNDWATER ELEVATION: 689.68 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Sample Number/ Diameter	Blows per foot	PID Field screen (ppm)	Comments
Top of Casing (TOC) Elevation: 708.38 ft. (above MSL); ~2.3 ft. Above Existing Grade Surface Elevation: ~706 ft.	0	Locking cover in concrete; 2 in. Schedule 40 Threaded Solid Casing				
Pale yellow-brown, dark yellow-brown, and moderate yellow-brown mottled silty clay with minor gravel, thin to medium-sized lenses of silty sand, upper 1 ft. very moist due to recent rains, dry soil from 1 ft. to 4 ft.						
moist at 5 ft.	5	Neat Cement	1)2.5"		ND	
very moist at 10 ft.	10	Bentonite Pellets	2)2.5"		ND	
Light olive gray and moderate yellow-brown mottled silty clay with minor gravel						
Light olive gray and moderate yellow-brown mottled sandy clay with occasional thin laminations of silty sand	15				ND	18.70 BTOC 12-29-92
Moderate yellow-brown, green-gray, and light olive gray mottled sandy silt with minor gravel		No. 2/12 RMC Lonestar Sand; 0.01 in. Perforated Screen	3)2.5"			
Moderate yellow-brown, green-gray, and light olive gray mottled silty clay	20				ND	
Moderate yellow-brown and light olive gray mottled silty, fine to very coarse-grained sandy gravel; gravel is subangular to subrounded; *saturated*			4)2.5"			
Olive gray gravelly clayey silt, minor small pebbles	25				ND	

continued

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. A-1a

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-1 Continued**

GROUNDWATER ELEVATION: 689.68 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	GRAPHIC WELL DESIGN: Annulus	GRAPHIC WELL DESIGN: Casing	Sample Number	Blows per foot	PID Field screen (ppm)	Comments
Olive gray gravelly clayey silt, minr small pebbles	25		No. 2/12 Sand	0.01 In. Screen	5)2"	45	ND	
							ND	
Medium blue-gray and gray green mottled silty clay								
TOTAL DEPTH @ 28.0 FT.	30							
	35							
	40							
	45							
	50							
	55							

ND = Not Detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. A-1b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-2**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: Dec 16 & 17, 1992

DRILLING LOGGER: Ralph Carson, Staff Geologist | SLOT SIZE: 0.01 in. | SEAL: 26.0 - 28.0 ft.

DRILLER: Clear Heart Construction, Guerneville, CA | PERF: 29.5 - 49.5 ft. | WELL DEPTH: 49.5 ft.

DRILL RIG: Deeprock 10K Rig

DRILLING METHOD: 8.25" ID/4.25" OD Hollow Stem Augers

GROUNDWATER ELEVATION: > 720.92 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Sample Number	Blows per foot	PID Field screen (ppm)	Comments
Top of Casing (TOC) Elevation: 720.92 ft. (above MSL); ~1.0 ft. Above Existing Grade Surface Elevation: ~719.9 ft.	0	Locking cover in concrete				Artesian 12-29-92
Dark yellow-brown and moderate yellow-brown mottled sandy silty clay with ~10% gravel			1)2"	11	ND	
very thin laminations of silty sand	5		2)2"	7	ND	
			3)2"	13	ND	
Light olive gray, dark yellow-brown, and moderate yellow-brown mottled sandy silt with gravel, very thin laminations of silty clay, thin silty sand lenses with gravel (gravel < 1" diameter)	10		4)2"	37	ND	
Light olive gray and pale olive mottled sandy silt with gravel			5)2"	50/6"	ND	
Medium blue-gray and green-gray mottled sandy clayey silt with gravel, moist between 15 to 15.5 feet, thin to very thin laminations of silty, very fine to medium-grained sand seams and silty clay seams between 18 to 20 feet	15	Neat Cement; 2 in. Schedule 40 Threaded Solid Casing	6)2"	38/6"	ND	
			7)2"	52	ND	
	20		8)2"	37	ND	
continued	25					

JOB NO. 5146 | HALLENBECK & ASSOCIATES | FIGURE NO. A-2a

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-2 Continued**

GROUNDWATER ELEVATION: >720.92 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Sample Number	Blows per foot	PID Field screen (pp)	Comments
Medium blue-gray and green-gray mottled sandy clayey silt with gravel, moist between 15 to 15.5 feet, thin to very thin laminations of silty, very fine to medium-grained sand seams and silty clay seams between 18 to 20 feet	25	NC / BP / Solid Casing	9)2"	61	ND	
	30		10)2"	66	ND	
Medium bluish gray gravelly clayey silt	35	No. 2/12 RMC Lonestar Sand / 0.01 in. Perforated Screen				
Medium bluish gray and greenish gray mottled sandy gravelly silt interbedded with thin lenses of clayey silt and sandy gravel, sandy gravel lenses saturated, clayey silt lenses dry	40		11)2"	65	ND	
	45		12)2"	12/6"	ND	
Medium bluish gray and greenish gray mottled gravelly silty clay, dry	50		13		ND	
TOTAL DEPTH @ 50.0 FT.	55					

BP = Bentonite pellets
NC = Neat Cement
ND = Not detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. A-2b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-3**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: Dec.15 & 16, 1992

DRILLING LOGGER: Ralph Carson, Staff Geologist | SLOT SIZE: 0.01 in. | SEAL: 15.0 - 18.0 ft.

DRILLER: Clear Heart Construction, Guerneville, CA | PERF: 20.0 - 40.0 ft. | WELL DEPTH: 40 ft.

DRILL RIG: Deeprock 10K Rig

DRILLING METHOD: 8.25" ID/4.25" OD Hollow Stem Augers

GROUNDWATER ELEVATION: 724.48 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	Sample Number	Blows per foot	PID Field screen (ppm)	Comments
Top of Casing (TOC) Elevation: 744.98 ft. (above MSL); ~1.0 ft. Above Existing Grade Surface Elevation: ~744.0 ft.	0	Locking cover in concrete				
Moderate yellow-brown sandy clay with ~10% gravel, sand increases with depth, abundant thin laminations of silty sand			1)2"	20	ND	
Dark yellow-brown and moderate brown mottled silty, fine to medium sand with ~15% gravel, lenses of abundant gravel throughout	5		2)2"	19	ND	
Dark yellow-brown and moderate brown mottled sandy silt with ~5-10% gravel, very thin to thin laminations of silty sand between ? to 9 feet	10	Neat Cement; 2 in. Schedule 40 Threaded Solid Casing	3)2"	18	ND	
			4)2"	15	ND	
Dark yellow-brown, moderate brown, and light olive gray mottled slightly sandy clayey silt with thin silty clay laminations	15	Bentonite Pellets	5)2"	14	ND	
			6)2"	34	ND	
Medium blue-gray sandy clayey silt with gravel several 0.5 to 1" lenses of silty fine to medium sand between 18-19 feet	20	No. 2/12 RMC Lonestar Sand; 0.01 in. Perforated Screen	7)2"	50/6"	ND	20.5 ft. BTOC 12-29-92
			8)2"	23	ND	
Medium blue-gray and green-gray mottled sandy gravelly silt to gravelly sandy silt, silty clay laminations observed around some of the larger gravel	25		9)2"	21/1"	ND	

continued

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-3a

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-3 Continued**

GROUNDWATER ELEVATION: 724.48 ft. on 12/29/92

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	Sample Number	Blows per foot	PID Field screen (ppm)	Comments
Medium bluish gray and greenish gray mottled sandy gravelly silt to gravelly sandy silt, silty clay laminations observed around some of the larger gravel	25		No. 2/12 RMC Lonestar Sand	0.01 in. Perforated Screen	10)2"	43/6"	ND	
					11)2"	10/1"	ND	
moist at 28.5 feet	30				12)2"	13/2"	ND	
very thin to thin laminations of silty very fine to medium-grained sand between 32 to 34 feet					13)2"	50/5"	ND	
	35				14)2"	62/9"	ND	
					15)2"	43/6"	ND	
	40				16)2"	12/3"	ND	
TOTAL DEPTH @ 40.25 FT.	45							
	50							
	55							

ND = Not detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-3b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4**

DRILLING SUPERVISOR: Stephen Lucas, CEG # 1520 | CASING: 2 in. PVC | DATE: 3-15-93

DRILLING LOGGER: Stephen Lucas, Project Geologist | SLOT SIZE: 0.02 in. | SEAL: 80 - 86 ft.

DRILLER: Weeks Drilling, Ukiah, CA | PERF: 90 - 130 ft. | WELL DEPTH: 130 ft.

DRILL RIG: Ingersoll-Rand TH-60 truck-mounted air rotary rig

DRILLING METHOD: Air rotary with 7-7/8" bit

GROUNDWATER DEPTH: present at 126 ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	PID Field screen (ppm)	Comments
Top of Casing (TOC) Elevation: ~802 ft. (above MSL); ~2 ft. Above Existing Grade Surface Elevation: ~800 ft.	0	Locking cover in concrete		8 inch conductor casing installed to a depth of 20 feet and backfilled with concrete on 3-15-93. Blow out protection installed at wellhead on 3-16-92. Drilled to 130 feet without encountering free water on 3-17-93. Constructed dry well on 3-18-93. We understand that free groundwater was present in this well by late April 1993 (~6 weeks later).
Pale yellow-brown to moderate yellow-brown silty clay to clayey silt	5	Neat cement with 5% bentonite; 2" diameter threaded schedule 40 PVC well casing		
moist at 12 ft.	10			
Medium olive gray clayey silt to silty sand, some partially cemented zones of silty sand (dry)	15			
	20			
Medium olive gray clayey silt to silty clay (dry to slightly damp)	25		ND	

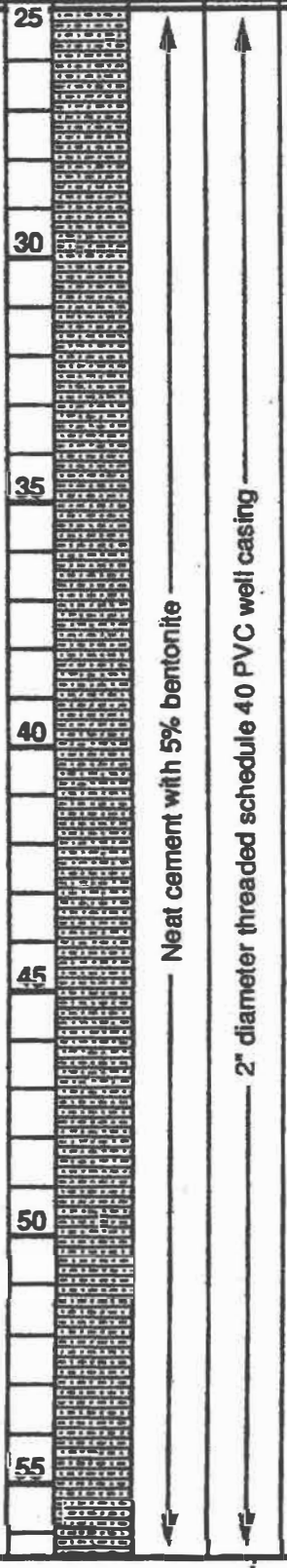
continued

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4a

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4 Continued**

GROUNDWATER DEPTH: 126 ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	PID Field screen (ppm)	Comments
Medium olive gray clayey silt to silty clay (dry to slightly damp)	25			
	30		ND	
sligtly moist zone between 34 ft. and 42 ft.	35			
	40		ND	
	45			
	50		ND	
	55			



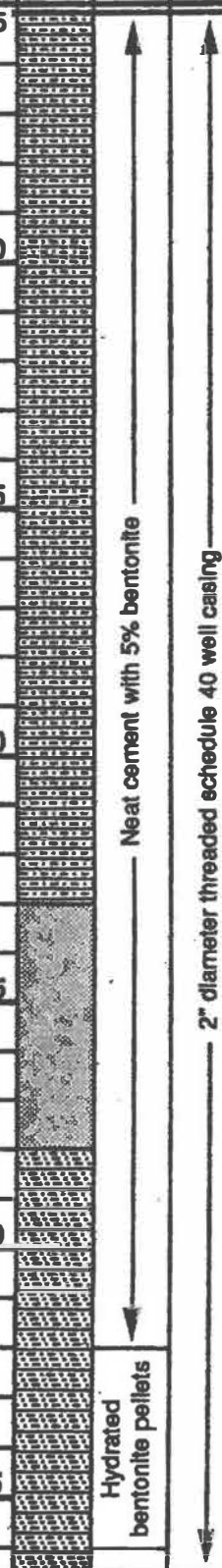
ND = Not Detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4b

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4 Continued**

GROUNDWATER DEPTH: 126 ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	PID Field screen (ppm)	Comments
Medium olive gray clayey silt to silty clay (dry to slightly damp)	55			
	60		ND	
	65			
	70		ND	
Medium blue gray silt to silty fine-grained sand(stone), very dry	75			
Dark olive gray to blue gray clayey silt (dry)	80		ND	
	85			



ND = Not Detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4c

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4 Continued**

GROUNDWATER DEPTH: 1 26ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology / Annulus / Casing	PID Field screen (ppm)	Comments
Dark olive gray to blue gray clayey silt (dry)	85	BP		BP = bentonite pellets
sligtly moist zone between 88 ft. to 89.5 ft.				
	90		ND	
Medium blue gray interbedded clayey silt and silty sand(stone)				
	95			
sligtly moist zone between 94 ft. to 97 ft.				
	100		ND	
sligtly moist zone between 104 ft. to 107 ft.	105			
	110		ND	
sligtly moist zone between 110 ft. to 113 ft.				
	115			

No. 3 RMC Lonestar Sand

2" schedule 40 threaded PVC well screen, 0.02" machined slots

ND = Not Detected

JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4d

PROJECT: UKIAH CITY LANDFILL, Ukiah, California | **WELL NO. 92-4 Continued**

GROUNDWATER DEPTH: 126 ft. on 4-29-93

DESCRIPTION OF MATERIALS	Depth (ft.)	GRAPHIC WELL DESIGN: Lithology	Annulus	Casing	PID Field screen (ppm)	Comments
Medium blue gray interbedded clayey silt and silty sand(stone)	120		No. 3 RMC Lonestar Sand	2" schedule 40 threaded PVC well screen, 0.02" machined slots	ND	
	125					
	130				ND	
TOTAL DEPTH @ 130 FT.	135					
	140					
	145					

ND = Not Detected

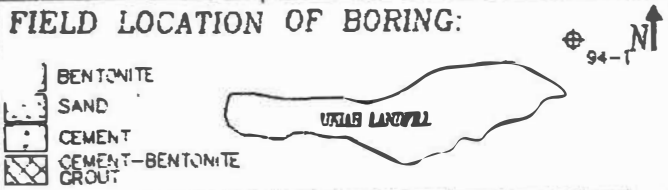
JOB NO. 5146 | **HALLENBECK & ASSOCIATES** | FIGURE NO. HA-4e

LOG OF EXPLORATORY BORING

EBA

PROJECT: CITY OF UKIAH LANDFILL
SHEET 1 OF 1
JOB NUMBER: 93-461 (1.2)
BORING 94-1
DATE 9-15-94
LOGGED BY: CJB
DRILLER: CLEAR HEART CONSTRUCTION
WELL CASING ELEVATION ~795 MSL

FIELD LOCATION OF BORING:



EQUIPMENT AND SPECIFICATIONS:
2" SCHEDULE 40 PVC CASING
12/14 SAND 4' - 12'
0.020" SCREEN 6' - 12'

WATER DEPTH	N/A		
TIME			
DATE			

SAMPLER TYPE	RECOVERY	INITIAL WATER	BLOWS/6 in.	DEPTH	RECOVERY DEPTH / SAMPLING DEPTH / DRILLING DEPTH	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
				1		SM	SANDY SILT (SM), light yellowish brown (2.5Y, 6/4), dry	
				2				
				3				
				4				
2"	3/6			5		GM	SILTY GRAVEL (GM), olive yellow (2.5Y, 6/6), dry - damp, subrounded, 0.5 - 1" diameter, gray wacke and metamorphic.	
				6				
				7				
				8				
				9				
				10				
			21					
2"	3/18		24	11			Poorly consolidated graywacke clasts > 2" diameter.	
			35				BASAL CONTACT with Plio-pleistocene deposits	
			8	12		CL	SILTY CLAY (CL), Mottled gray (2.5Y, N/5), and olive brown (2.5Y, 4/4), damp with <5% gravel (abundant @ 13') (~1mm to 3 cm diameter) numerous root hairs.	
2"	18/18		14					
			17	13				
				14				
				15			Same as above without any gravel.	
			8					
			13	16				
			22				NO FREE WATER ENCOUNTERED	
				17			Total Depth = 15'	
				18			Sampler driven to 16.5'	
				19				
				20				
				21				
				22				
				23				
				24				

461TBLDW 1520

LOG OF EXPLORATORY BORING

EBA

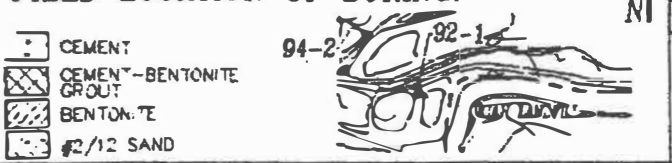
PROJECT: CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SHEET 1 OF 4
BORING: 94-2
JOB NUMBER: 93-461 (1.2)
DATE: 9-22-94

LOGGED BY: CHRIS J. BRUMMER DRILLER: WEEKS
WELL CASING ELEVATION: ~712.0

EQUIPMENT AND SPECIFICATIONS: 10" HSA with 14" Bit to 34.0'
11" Steel Conductor Casing Set to 34.5'
8" HSA 23.0' to Total Depth
2" PVC. 0.020 Screen 55.0' to 75.0'

FIELD LOCATION OF BORING:



WATER DEPTH	58'		
TIME	10:00 AM		
DATE	9-30-94		

SAMPLER TYPE	SAMPLE COND.	RECOVERY	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	BLOWS/6 in.	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
									1		SM	SILTY SAND (SM); Reddish brown (5Y, 5/4), dry.	
									2				
									3				
									4				
									5				
									6		GM	SANDY SILTY GRAVEL (GM); Reddish brown (5Y, 5/4), dry, 1" ø sub-angular cobbles, ~5% Clay.	
									7				
									8				
									9				
2"		16/16						23 38 50/4	10		SM	GRAVELLY SILTY SAND (SM); Yellowish red (5YR, 4/6), dry coarse Sand, ~10% Gravel, <5% Clay.	
									11				
									12				
									13				
									14				
2"		18/18	X				▽	10 15 15	15		SP	SAND (SP); Brownish yellow (10YR, 6/6), dry, medium to fine Gravel, ~2% pebbles (4mm to 1" ø)	
									16				
									17				
									18				
									19				
									20		CL	SILTY CLAY (CL); Dark gray (2.5YR, N4/), wet, moderate plasticity, ~20% very fine to fine Sand.	
									21				
									22				
									23				
									24				
2"		16/18	X					2 2					

LOG OF EXPLORATORY BORING

EBA

PROJECT: CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SHEET 2 OF 4
BORING 94-2
DATE 9-22-94

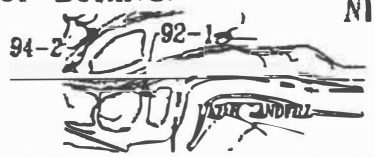
JOB NUMBER: 93-461 (1.2)

LOGGED BY: CHRIS J. BRUM MER DRILLER WE EKS

WELL CASING ELEVATION: ~712.0

EQUIPMENT AND SPECIFICATIONS: 10" HSA with 14" Bit to 34.0'
11" Steel Conductor Casing Set to 34.5'
8" HSA 23.0' to Total Depth
2" PVC, 0.020 Screen 55.0' to 75.0'

FIELD LOCATION OF BORING:



CEMENT
CEMENT-BENTONITE GROUT
BENTONITE
#2/12 SAND

WATER DEPTH	58'	
TIME	10:00 AM	
DATE	9-30-94	

SAMPLER TYPE	SAMPLE COND.	RECOVERY	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	BLOWS/6 in.	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
2"								3				becoming very dark gray (7.5YR, N3/), moist to wet. increasing Clay content, ~2% Gravel (1mm to 1 cm ϕ) decreasing Sand content.	
									26				
									27		CL		
									28				
									29			increasing Sand content, decreasing Clay content, moist to wet.	
									30				
									31				
									32			harder drilling at 32.0' (cuttings show increasing Clay content, decreasing Sand content, damp).	
			X						33		CL		
									34				
2"		15/15	X					13 38 50/3	35			SILTY CLAY (CL); Mottled dark gray (7.5YR, N4/) and dark brown (7.5YR 4/2), damp, very hard, well consolidated, no Sand or Gravel.	
									36				
									37				
									38				
									39				
									40				
2½"								18 37 50	41			Mottled gray and olive brown (2.5Y, 4/4), damp, very hard.	
									42				
									43				
									44			SANDY SILTY CLAY (CL); Dark gray (2.5Y, N4/), damp ~20 -50% Sand, very fine to fine grained.	
									45		CL		
2½"								15 33 50/5	46				
									47			faster drilling at 47.0' - 49.0'.	
									48				
									49				

LOG OF EXPLORATORY BORING

EBA

PROJECT: CITY OF UKIAH LANDFILL, MENDOCINO COUNTY, CALIFORNIA

SHEET 3 OF 4

BORING: 94-2

JOB NUMBER: 93-461 (1.2)

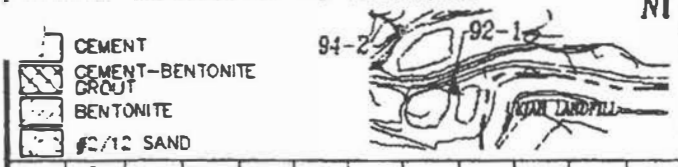
DATE: 9-22-94

LOGGED BY: CHRIS J. BRUMMER DRILLER: WEEKS

WELL CASING ELEVATION: ~712.0

EQUIPMENT AND SPECIFICATIONS: 10" HSA with 14" Bit to 34.0'
11" Steel Conductor Casing Set to 34.5'
8" HSA 23.0' to Total Depth
2" PVC, 0.020 Screen 55.0' to 75.0'

FIELD LOCATION OF BORING:



WATER DEPTH	58'
TIME	10:00 AM
DATE	9-30-94

SAMPLER TYPE	SAMPLE COND.	RECOVERY	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	BLOWS/6 in.	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
									51				
									52		CL		
2½"								50	53				
								35					
								50/5	54			loose drilling at 54.0'	
									55		SM	SILTY CLAYEY SAND (SM); Very dark gray (2.5Y, N3/), ~60% Sand (very fine Sand to medium grained Gravel), ~10% Clay, moist, very dense.	
2½"								25					
								50/5	56				
						▼	▽		57				
									58			faster drilling at 58.0'	
								20				SILTY CLAYEY SAND (SM); with Gravel. Very dark Gray, (2.5Y, N3/), ~60% Sand and Gravel, up to 1" ø, sub-angular, wet, very dense.	
2½"								40	59				
								50					
									60				
									61			hard drilling at 61.0'	
									62		SM		
									63				
									64				
									65			becoming dark gray (2.5Y, N4/), increasing Sand and Gravel content, ~5% 1" ø Gravels, 60% Sand and Gravel, ~5 - 10% Clay, very hard, wet, (free water around Gravels), some brown mottling.	
2½"								21					
								50	66				
									67			interbedded Sandy Silty Gravel and Silty Sand (~75% Sand), both with ~5 - 10% Clay.	
									68				
									69				
									70			faster drilling 70.0' - 75.0'	
								20					
2½"								40	71				
								50					
									72				
									73				
									74				

LOG OF EXPLORATORY BORING

PROJECT: CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SHEET 4 OF 4
BORING: 94-2
DATE 9-22-94

JOB NUMBER: 93-461 (1.2)

LOGGED BY CHRIS J. BRUMMER DRILLER WEEKS

WELL CASING ELEVATION ~712.0

EQUIPMENT AND SPECIFICATIONS: 10" HSA with 14" Bit to 34.0'
11" Steel Conductor Casing Set to 34.5'
8" HSA 23.0' to Total Depth
2" PVC, 0.020 Screen 55.0' to 75.0'

FIELD LOCATION OF BORING:



- CEMENT
- CEMENT-BENTONITE GROUT
- BENTONITE
- #2/12 SAND

WATER DEPTH	58'
TIME	10:00 AM
DATE	9-30-94

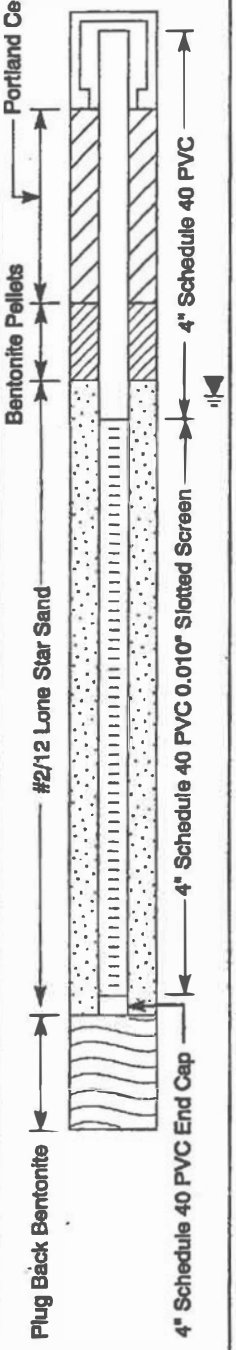
SAMPLER TYPE	SAMPLE COND.	RECOVERY	PHYS. SAMPLE	LAB SAMPLE	PID (ppm)	STATIC WATER	INITIAL WATER	BLOWS/6 in.	DEPTH	SAMPLE RECOVERY	SOIL GROUP USCS	DESCRIPTION	CASING CONSTRUCTION
2½"								30 50/5	76		SC	CLAYEY SAND (SC): Dark gray as above, ~5% Clay, medium grained Sand, Saturated rock caught in the end of the sampler. Total Depth = 75.0'	
									77				
									78				
									79				
									80				
									81				
									82				
									83				
									84				
									85				
									86				
									87				
									88				
									89				
									90				
									91				
									92				
									93				
									94				
									95				
									96				
									97				
									98				
									99				

MONITORING WELL MW-96-1

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC); Drive Sample (DS)
Date Completed: 12/20/96
Elevation (Top of Casing):

Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples	Symbols	USCS	Description
CC			60/60			GM	Reddish brown sandy clayey GRAVEL, stiff, some iron staining around clasts, rounded red chert pebbles to 2-inch diameter, dry.
CC			60/60			CL	Red-brown gravelly silty SAND, dry, poorly graded, medium sand, rounded gravel to 1/2-inch diameter, red iron oxide staining on pebbles.
CC			60/18				Sandstone pebbles to 3-inch diameter.
CC			60/24				Becomes dark brown, moist. Half-inch thick black carbonized layer, very moist.
CC			60/60			CL	Greenish gray silty CLAY, moist.
						ML	Greenish gray silty fine SAND, wet.
						CL	Greenish gray silty to fine sandy CLAY.
DS		90	18/18			ML	Greenish gray silty sandy GRAVEL, with rounded to semi-angular quartz, chert, sandstone pebbles to 2-inch diameter.

NOTES:
1. Drilled with 8-inch hollow stem auger with continuous core sampling to 26.5 feet bgs on 12/19/96 and 12/20/96. Bottom sealed with plug back bentonite to 23.5 feet bgs.
2. Reamed to 10-inch diameter to 23.5 feet bgs on 12/20/96
3. Four-inch diameter groundwater monitoring well installed on 12/20/96. Four-inch diameter Schedule 40 PVC casing from 2 feet ags to 8.0 feet bgs. Four-inch diameter Schedule 40 flush threaded PVC 0.010-inch slotted screen from 8.0 to 23.0 feet bgs. Filter pack constructed with #2/12 Lone Star sand.



MONITORING WELL MW-96-1

Groundwater Corrective Action Report
Ukiah Landfill
Ukiah, California

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

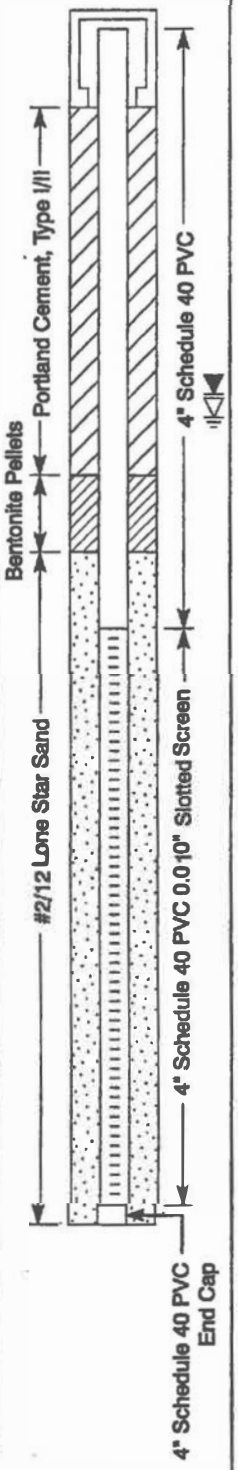
02736-004-5205-130 ah 5205A 1/13/97

MONITORING WELL MW-96-2

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC)
Date Completed: 12/19/96
Elevation (Top of Casing):

SAMPLING						
Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples	Symbols	USCS	Description
							No recovery of initial 18 inches.
CC			30/30			SM	Brownish yellow silty CLAY, moist, micaceous.
CC			60/60			ML	Greenish gray silty fine SAND, moist. Becomes gravelly.
						CL	Greenish gray silty CLAY, some reddish staining, plastic, moist.
CC			60/60			ML	Greenish gray clayey fine SAND, plastic, moist.
CC			60/30				Black carbonized seam, 1/2-inch thick.
						GM	Greenish gray, indurated, coarse GRAVEL with reddish brown chert clasts, some well rounded, wet.
CC			60/30				
CC			60/60			ML	Greenish gray CLAY, stiff, moist, plastic.

NOTES:
1. Drilled with 8-inch hollow stem auger to 29 feet bgs on 12/19/96.
2. Reamed 10-inch diameter on 12/19/96.
3. Four-inch diameter groundwater monitoring well installed on 12/19/96. Four-inch diameter Schedule 40 PVC casing from 2 feet ags to 13.5 feet bgs. Four-inch diameter Schedule 40 flush threaded PVC 0.010-inch slotted screen from 13.5 to 28.5 feet bgs. Filter pack constructed with #2/12 Lone Star sand.



MONITORING WELL MW-96-2

Groundwater Corrective Action Report
Ukiah Landfill
Ukiah, California

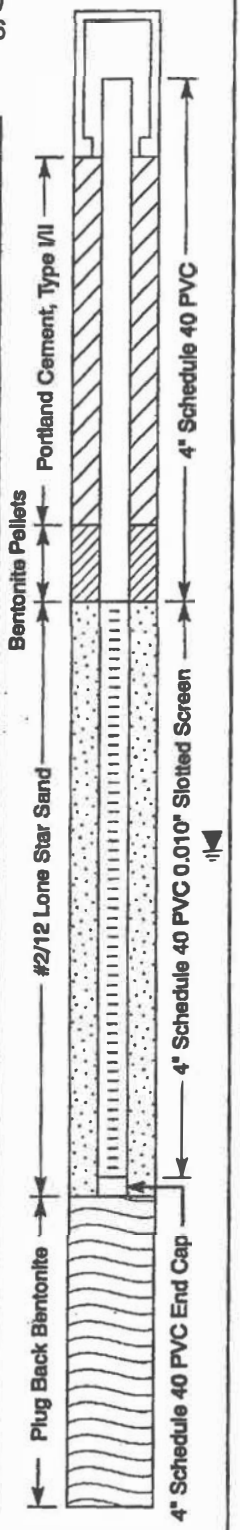
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

02736-004-5205-130 ah 5205B 1/13/97

MONITORING WELL MW-96-3

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC)
Date Completed: 12/21/96
Elevation (Top of Casing):

Depth	Sampling: Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples	Symbols	USCS	Description
0	CC			60/60			GM	Greenish brown sandy to silty GRAVEL, semi-rounded pebbles to 1/2 inch, moist.
5	CC			60/60			ML	Greenish gray gravelly to CLAYEY SILT, very stiff, with iron oxide staining, moist. Decreasing gravel.
10	CC			60/60				
15	CC			60/60			GM	Becomes gravelly. Reddish brown silty clayey GRAVEL, rounded pebbles to 2 inches, some iron staining.
20	CC			60/30				
25	DS			18/8			ML	Bluish gray gravelly to clayey SILT, with semi-rounded chert/jasper pebbles to 2 inches diameter.
	DS		72	18/18				
30	DS		69	18/18			ML	Greenish gray clayey SILT, very stiff.
	DS		63	18/18				Becomes bluish gray.
35	DS		60	18/18				



MONITORING WELL MW-96-3

Groundwater Corrective Action Report
Ukiah Landfill
Ukiah, California

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

02736-004-5205-130 ah 5205C 1/13/96

MONITORING WELL MW-96-3

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC)
Date Completed: 12/21/96
Elevation (Top of Casing):

SAMPLING						
Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples	Symbols	USCS
DS	00	56	18/18			ML

Description

NOTES:
1. Drilled with 8-inch hollow stem auger to 40 feet bgs on 12/20/96. Continuous core sampling to 25 feet bgs. Eighteen-inch dr ive samples for each 2.5 feet of boring to 40 feet bgs. Sealed with plug back bentonite to 27 feet bgs.
2. Reamed 10-inch diameter to 27 feet bgs.
3. Four-inch diameter groundwater monitoring well installed on 12/20/96. Four-inch diameter Schedule 40 PVC casing from 2 feet ags to 11.5 feet bgs. Four-inch Schedule 40 flush threaded PVC 0.010-inch slotted screen from 11.5 to 26.5 feet bgs. Filter pack constructed with #2/12 Lone Star sand.

MONITORING WELL MW-96-3

Drilling Method: 8" Hollow Stem Auger
Sampling Method: Continuous Core (CC)
Date Completed: 12/21/96
Elevation (Top of Casing):

SAMPLING							
Sampler Type	OVM	Blows per Foot	Inches Driven/Rec	Samples	Symbols	USCS	Description
DS	00	56	18/18			ML	

NOTES:
1. Drilled with 8-inch hollow stem auger to 40 feet bgs on 12/20/96. Continuous core sampling to 25 feet bgs. Eighteen-inch dr ive samples for each 2.5 feet of boring to 40 feet bgs. Sealed with plug back bentonite to 27 feet bgs.
2. Reamed 10-inch diameter to 27 feet bgs.
3. Four-inch diameter groundwater monitoring well installed on 12/20/96. Four-inch diameter Schedule 40 PVC casing from 2 feet ags to 11.5 feet bgs. Four-inch Schedule 40 flush threaded PVC 0.010-inch slotted screen from 11.5 to 26.5 feet bgs. Filter pack constructed with #2/12 Lone Star sand.

APPENDIX D

ENGINEERED ALTERNATIVE ANALYSIS

TECHNICAL MEMORANDUM

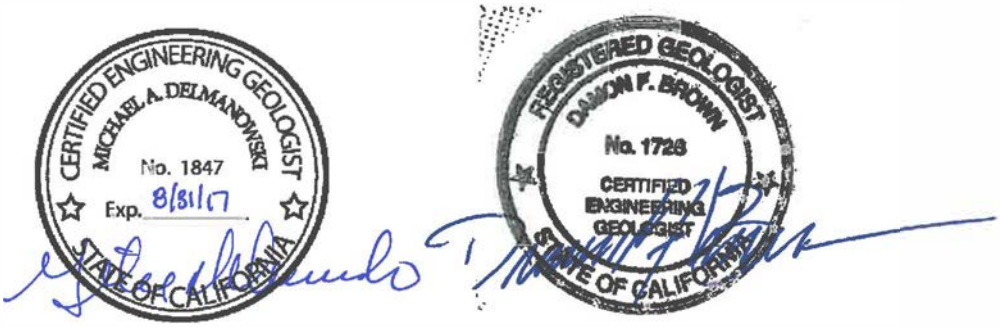
Project: City of Ukiah Landfill
Mendocino County, California

Project No.: 02-907

Subject: Engineered Alternative Analysis for Final Cover System

Date: August 2015

Prepared By: Damon Brown, P.G., C.E.G., C.Hg., EBA Engineering
Mike Delmanowski, P.G., C.E.G., C.Hg., EBA Engineering



FINAL COVER SYSTEM DESCRIPTION

The proposed final cover system will consist of a patented geosynthetic product identified as "ClosureTurf™". ClosureTurf™ is a three-component system comprised of a structured geomembrane, a specialized tufted geotextile, and a sand infill layer. The structured geomembrane component serves as the low-hydraulic conductivity layer (LHCL), whereas the specialized tufted geotextile and sand infill layer represent the erosion-resistant layer as defined in 27CCR. Literature for the ClosureTurf™ product is enclosed in Attachment 1 of this Technical Memorandum.

Overall, the proposed final cover system design can be summarized as follows (in ascending order):

- Minimum 1-foot thick soil foundation layer.
- 50 mil linear low-density polyethylene (LLDPE) geomembrane liner (Super Gripnet® with Spike Down).
- Specialized tufted geotextile (Engineered Turf).
- Minimum ½-inch thick sand infill layer.

In addition to the above features, the final cover system will also be equipped with a gas relief component. This component will consist of a series of 3.5-foot wide collection strips placed parallel and/or perpendicular to slopes and spaced at maximum 220-foot intervals. The collection strips, which will be constructed of the same Super Gripnet® with Spike Down material described above for the geomembrane liner component, will be connected to the LFG collection system to prevent the build-up of gas pressures beneath the final cover system. Pressure release valves will also be installed at regular intervals between the collection strips as an additional precautionary measure.

Please refer to the Technical Specifications (Appendix H), Construction Quality Assurance (CQA) Plan (Appendix I), and Construction Drawings (Appendix J) of this Final Closure and Postclosure Maintenance Plan for details regarding material and installation specifications for the respective final cover system components described above.

ENGINEERED ALTERNATIVE ANALYSIS

As outlined above, the proposed engineered alternative presented herein substitutes the patented geosynthetic product ClosureTurf™ in lieu of the LHCL prescriptive standard (i.e., CCL) required under 27CCR. Regulatory consideration of an engineered alternative is allowed under 27CCR, §20080(b), which stipulates that an engineered alternative may be considered if construction of the prescriptive standard is unreasonably and unnecessarily burdensome and will cost substantially more than the proposed alternative. Furthermore, the engineered alternative must be consistent with the performance goal addressed by the prescriptive standard and afford equivalent protection against water quality impairment. The following information has been compiled to demonstrate compliance with these criteria and includes data regarding the properties of the ClosureTurf™, as well as comparisons of performance and costs of the proposed ClosureTurf™ engineered alternative to that of the prescriptive standard and the previously proposed geosynthetic clay liner (GCL) final cover system.

Performance

One of the primary variables for demonstrating equivalency to the prescriptive standard is infiltration through the final cover system. In this regard, infiltration equivalency analyses have been performed on the ClosureTurf™ product versus a prescriptive Subtitle D cover system. The analyses have included the use of two methodologies: 1) the Hydrologic Evaluation of Landfill Performance (HELP) Model; and 2) the Giroud Method (Giroud et al., 1997). Both methods were employed for a generic landfill site in Texas. Findings from these analyses revealed the following:

INFILTRATION EQUIVALENCY ANALYSIS ClosureTurf™ vs. SUBTITLE D FINAL COVER SYSTEMS		
Methodology	***ClosureTurf™ Final Cover System***	***Prescriptive Subtitle D Final Cover System***
HELP Model for Site in Texas – Average Annual Infiltration (Cubic Feet)	8.3	347
Giroud Method with Silty-Sandy Soil below the ClosureTurf™ (Gallons per Day)	1.33	4.51
Giroud Method with Silty-Sandy Soil with Some Clay below the ClosureTurf™ (Gallons per Day)	0.24	4.51

As demonstrated in the above table, the ClosureTurf™ product exhibits substantially lower infiltration rates for the respective scenarios as compared to the prescriptive standard. This can be attributed to the lower hydraulic conductivity characteristics of the LLDPE geomembrane liner as compare to a CCL, as well as the more efficient removal of moisture above the LHCL component, thereby reducing the amount of potential infiltration into the WMU. Based on these circumstances, the ClosureTurf™ product meets the required performance goal for an engineered alternative by providing equal to or greater protection against potential water quality impairment. Other features afforded by ClosureTurf™ that demonstrate its suitability as an engineered alternative from a performance perspective can be summarized as follows:

- The slope stability characteristics of ClosureTurf™ far exceeds those provided by other geosynthetic products (including GCLs), which is very important based on the steep slopes that exist at the Landfill. The bottom spiked friction surface of the Super Gripnet® provides maximum interface friction and a high factor of safety against sliding at the liner/foundation layer soil interface.

- The Engineered Turf component eliminates the potential for soil creep and veneer failures resulting from saturation of the vegetative soil cover that is a required component of the prescriptive Subtitle D final cover and other traditional geosynthetic cover systems. As noted in the previous bullet item, this potential is exacerbated by the very steep slopes that exist at the Landfill.

- The drainage aspects of the ClosureTurf™ are designed to allow rainfall to penetrate rapidly through the sand infill layer and into the structured drain liner below which has a very high transmissivity for subsequent conveyance of the water off of the liner system. The sand infill has been demonstrated to handle over six inches per hour of rainfall intensity without erosion when applied on three horizontal to one vertical (3H:1V) slopes. Such rainfall energy conditions on a traditional vegetative soil cover would likely result in significant erosional damage.

- The drainage aspects of the ClosureTurf™ as described above promote very "clean" and low turbidity stormwater run-off, which represents a beneficial feature

since the collected run-off is subsequently discharged to the ephemeral creek that borders the northern boundary of the WMU. Achieving comparable stormwater run-off quality from a traditional vegetative soil cover would be difficult.

- ClosureTurf™ is designed to provide weathering resistance and geomembrane protection when exposed to extreme heat and ultra-violet (UV) exposure. Based on results of independent, real-world weathering tests and data from existing projects, ClosureTurf™ can provide decades of reliable performance beyond the standard 30-year postclosure maintenance period.

- ClosureTurf™ has been tested for wind uplift resistance and demonstrated no uplift when exposed to 120 miles per hour wind. As such, the ClosureTurf™ can withstand most wind conditions that could realistically be encountered at the site.

As presented in the product literature data enclosed herein as Attachment 1, ClosureTurf™ has been approved for use as an engineered alternative by the RWQCB at two sites in California. These sites correspond to the Crazy Horse Landfill and Portola Landfill located Monterey County and Plumas County, respectively. This product has also been successfully employed at a number of landfill sites throughout the United States, including sites in the southeast and east that are subject to much harsher weather conditions than would be experienced at the Landfill.

Installation

The installation and CQA testing of the ClosureTurf™ product at the Landfill would be significantly easier than for a CCL. The following provides a summary to support this position:

- In general, ClosureTurf™ deployment is very straightforward, both from a placement and seaming standpoint. Furthermore, heavy equipment requirements for ClosureTurf™ deployment are limited primarily to a rubber-tire forklift or equivalent. Conversely, CCL construction is very labor intensive with substantial reliance on heavy equipment (i.e., scrapers, dozers, compactors, etc.).

- Less CQA is required for ClosureTurf™ due to the consistency of the materials and manufacturing process. CQA testing for a CCL, in turn, is more extensive and occurs at a higher frequency to verify the consistency of borrow source materials and the contractor's ability to achieve moisture content, compaction, and hydraulic conductivity during construction.

- Installation of a sealed, double-ring infiltrometer (SDRI) is required to test the field permeability of CCLs, which is costly and time consuming. Such a provision is not required for ClosureTurf™.

In comparison to other geosynthetic liner systems, ClosureTurf™ is slightly more labor intensive due to the placement of the sand infill layer. However, this increased labor is

more than offset be the elimination of the vegetative soil layer. Similar to the CCL construction, construction of a vegetative soil layer is also very labor intensive with substantial reliance on heavy equipment. In addition, in the case of the GCL final cover system that was previously proposed for the Landfill, the gas relief layer material and labor requirements are significantly greater as compared to the ClosureTurf™. Thus, the ClosureTurf™ final cover system installation represents the least intensive approach from an installation standpoint.

Maintenance

ClosureTurf™ offers a significant maintenance advantage over a prescriptive Subtitle D final cover and any other traditional geosynthetic cover systems that require a vegetative soil cover. In essence, vegetative soil covers often require regular maintenance related to the repair of erosional damage, installation of erosion control measures (i.e., silt fences, hay bales, wattles, etc.), slope repairs, and revegetation. Erosion from the vegetative soil cover also causes siltation of drainage ditches and culverts that require subsequent repair. Such provisions are not required with the ClosureTurf™ product, thereby providing a significant cost savings over the course of the postclosure maintenance period.

Cost

The cost of the final cover system using ClosureTurf™ was compared to the GCL final cover system as previously proposed in the January 2008 JTD (EBA, 2008) and subsequent October 31, 2013 *Final Closure Construction Submittal Package* (EBA, 2013). Since the different products influence other aspects of the final cover construction (i.e., foundation layer, gas relief layer, erosion-resistant layer, drainage, access roads, etc.), the cost comparison included these variables in the analysis. Conversely, those final closure construction items not influenced by the final cover system design (i.e., mobilization, leachate control system improvements, LFG collection and control system, etc.) are not included in the analysis. The corresponding estimated construction costs for the two final cover systems are presented in the following table.

CONSTRUCTION COST COMPARISONS ClosureTurf™ vs. GCL FINAL COVER SYSTEMS		
Item	***ClosureTurf™ Final Cover System***	***GCL Final Cover System***
Foundation Layer / Engineered Fill	$594,530	$465,890
Gas Relief Layer	$86,200	$2,290,360
Low-Hydraulic Conductivity Layer (LHCL)(1)	$2,034,620	$1,493,690
Erosion-Resistant Layer(2)	$3,807,850	$1,866,300
Drainage System Components	$552,910	$695,590
Erosion Control	$100,300	$581,930
Access Roads	$172,580	$374,790
EXTENDED TOTAL	***$7,348,990***	***$7,768,550***

GCL: Geosynthetic Clay Liner

(1) The LHCL component for the ClosureTurf final cover system includes the Super Gripnet® with Spike Down, while the GCL final cover system includes the GCL.

(2) The erosion-resistant layer component for the ClosureTurf final cover system includes the Engineered Turf and sand infill layer, while the GCL final cover system includes a geonet composite drainage layer and vegetative soil layer.

As presented in the above table, the cost for the ClosureTurf™ final cover system is approximately $419,560 less than the GCL final cover system. In addition, as noted in the previous subsection, long-term maintenance associated with ClosureTurf™ is substantially less than any final cover system that requires an erosion-resistant layer comprised of a vegetative soil cover. The estimated cost savings from a maintenance perspective over the 30-year postclosure maintenance period equates to approximately $277,400. Thus, the overall cost savings resulting from replacing the previously proposed GCL final cover system with ClosureTurf™ is approximately $696,960.

CONCLUSIONS

As demonstrated by the comparative information presented herein, the proposed ClosureTurf™ engineered alternative meets or exceeds the performance criteria addressed by the prescriptive standard. Furthermore, the cost analysis comparing construction costs for the ClosureTurf™ versus the previously proposed GCL final cover system reveals that a significant cost savings can be realized through implementation of the ClosureTurf™ option. Based on these circumstances, it can be concluded that the ClosureTurf™ engineered alternative meets the qualifying criteria specified in 27CCR, §20080(b).

REFERENCES

EBA Engineering, January 2008, *Joint Technical Document for City of Ukiah Landfill, Mendocino County, California (Volumes I through III), EBA Project No. 02-907;* Prepared for City of Ukiah Department of Public Works by EBA Engineering, Santa Rosa, California.

EBA Engineering, October 31, 2013, *Final Closure Construction Submittal Package, EBA Project No. 02-907;* Prepared for City of Ukiah Department of Public Works by EBA Engineering, Santa Rosa, California.

Giroud, J.P., King, T.D., Sanglerat, T.R., Hadj-Hamou, T. and Khire, M.V., *Rate of Liquid Migration Through Defects in a Geomembrane Placed on a Semi-Permeable Medium*; Geosynthetics International 1997, Vol. 4, Nos. 3-4.

ATTACHMENT 1

ClosureTurf™
PRODUCT LITERATURE

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Infiltration Equivalency Analysis

ClosureTurf®

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Infiltration Equivalency Analysis

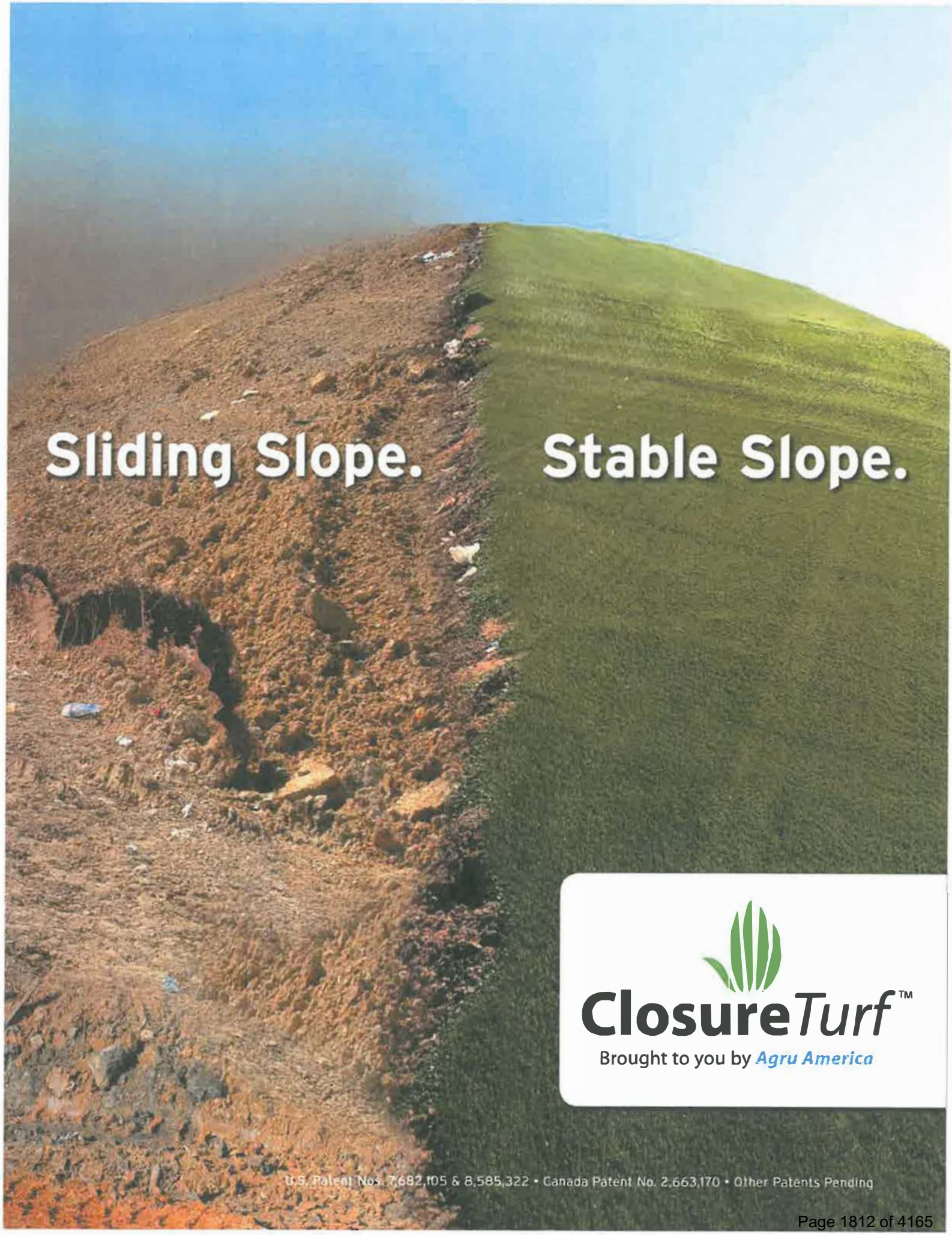
The minimum technical requirements as defined by the EPA for Subtitle D Final Cover Systems are contained in 40 CFR 258.60. This regulation allows for an alternative (performance based) cover system. One of the requirements for determining equivalency is infiltration. Typically, this is evaluated using two methodologies – (i) the Hydrologic Evaluation of Landfill Performance (HELP) Model and (ii) the Giroud Method1. Both of these methods have been used to compare the infiltration performance of the **ClosureTurf®** Final Cover System to the Prescriptive Subtitle D Cover. A comparison of infiltration rates is shown in the Table for both methodologies for a generic site in Texas.

The results demonstrate that the **ClosureTurf®** Final Cover System provides superior protection against Infiltration when compared to the Prescriptive Subtitle D Standard landfill final closure systems.

Infiltration Equivalency Analysis	ClosureTurf® Cover System	Prescriptive Subtitle D Cover System
HELP Model for Site in Texas – Average Annual Infiltration (Cubic Feet)	8.3	347
Giroud Method with Silty-Sandy Soil below the ClosureTurf® (Gallons / day)	1.33	4.51
Giroud Method with Silty-Sandy Soil with Some Clay below the ClosureTurf® (Gallons / day)	0.24	4.51

Summary of Results for Infiltration Equivalency Analyses for a Generic Site in Texas

[1] Rate Of Liquid Migration Through Defects In A Geomembrane Placed On A Semi-Permeable Medium, J.P. Giroud, T.D. King, T.R. Sanglerat, T. Hadj-Hamou and M.V. Khire, Geosynthetics International 1997, Vol. 4, Nos. 3-4.


Sliding Slope.
Stable Slope.
ClosureTurf™
Brought to you by Agru America
U.S. Patent Nos. 7,682,105 & 8,585,322 • Canada Patent No. 2,663,170 • Other Patents Pending

Soil slopes don't work, although they keep you working.

Soil erosion continually plagues the ongoing management of landfills, industrial waste sites, CCR storage areas, and other environmental containment applications requiring constant rebuilding of slopes weakened by rain and wind. In addition to ongoing maintenance headaches, traditional systems utilizing soil as their main component are costly to maintain, slow to install, and introduce unwanted slope instabilities.

There is an alternative solution available for these challenging applications which address the lessons learned by the industry since the implementation of Subtitle D. The innovative solution is called ClosureTurf™ which meets and/or exceeds the requirements set forth by the EPA in Subtitle D. A three component system, ClosureTurf is revolutionizing the way engineers, owners, government agencies and many others solve containment challenges. The ClosureTurf system offers exceptional durability and pleasing aesthetics at a lower cost than traditional practices.





ClosureTurf™ makes fast, cost-efficient erosion control so easy—it's virtually install and that's all.

ClosureTurf is a patented three component system comprised of a structured geomembrane, an engineered turf, and a specialized sand infill. The ClosureTurf system provides many advantages over a typical Subtitle D landfill cover such as:

- Reduces construction and long-term maintenance costs
- Improves short term and long term slope stability
- Excellent performance in extreme weather conditions
- Provides for enhanced gas collection (when applicable)
- Improves stormwater quality
- Incremental closures for odor control and leachate reduction (close as you go)

With several square miles of installed product, ClosureTurf has proven to be superior in performance when compared to other cover solutions—not only in the laboratory but also in real life applications where it counts. The system has a proven track record to significantly outperform traditional vegetative closure methods with regard to installation, maintenance and environmental compliance.

ClosureTurf™ delivers superior performance

Performance:

- Prevents common erosion, storm water and siltation problems–even during severe weather events.
- Utilizes the highest interface friction geomembrane available in the market which provides greater stability on steeper grades and reduces the need to rebuild slopes.
- The lifespan of the ClosureTurf system extends well beyond the required 30 year post closure maintenance period. It protects against driving forces, severe weather conditions, heat and wind uplift.



Timber Ridge Landfill

Cost Savings:

- Significantly lowers upfront capital costs.
- Dramatically reduces maintenance costs.
- Reduces the cost associated with the repair of significant failures.



Saufley Landfill



Environmental Benefits:

- Obtain control over gas collection sooner than later ("close as you go").
- Reduces environmental carbon footprint by up to 75% during construction.
- Lowers the production of leachate by allowing incremental closures.
- Durable system construction designed to safely convey internal gas pressures, reduce unwanted releases and avoid slope stability issues.
- The ClosureTurf system requires no irrigation, fertilizing, seeding or mowing.
- Provides filtration resulting in clean storm water runoff.



Crazy Horse Landfill

Other Benefits:

- Reduces overall surface emissions.
- Easily adapted during or after construction for solar field development.
- Rapid, low-impact construction.



Hartford Landfill

Take a closer look at ClosureTurf™

ClosureTurf™ is a patented, three component system comprised of a structured geomembrane, an engineered turf, and a specialized sand infill. The foundation of the system is an impermeable, highly transmissive structured geomembrane. It provides for the highest interface friction values available in the market. The engineered turf component gives the system its natural look and feel of grass while protecting the geomembrane from extreme weather conditions for the long term. The specialized sand infill component is placed between the blades of the engineered turf and allows the system to be trafficked while also providing additional protection from weathering. When required, ClosureTurf's patented surficial gas system is included with the system to vent landfill gas emissions. ClosureTurf is fast and easy to install for an aesthetically pleasing, cost-effective landfill closure solution.

STRUCTURED GEOMEMBRANE

- Studs on top provide
  - Quick drainage of high intensity rainfall events
- Spikes on bottom provide
  - High friction to subgrade
- Exceeds most regulatory thickness requirements by 20%

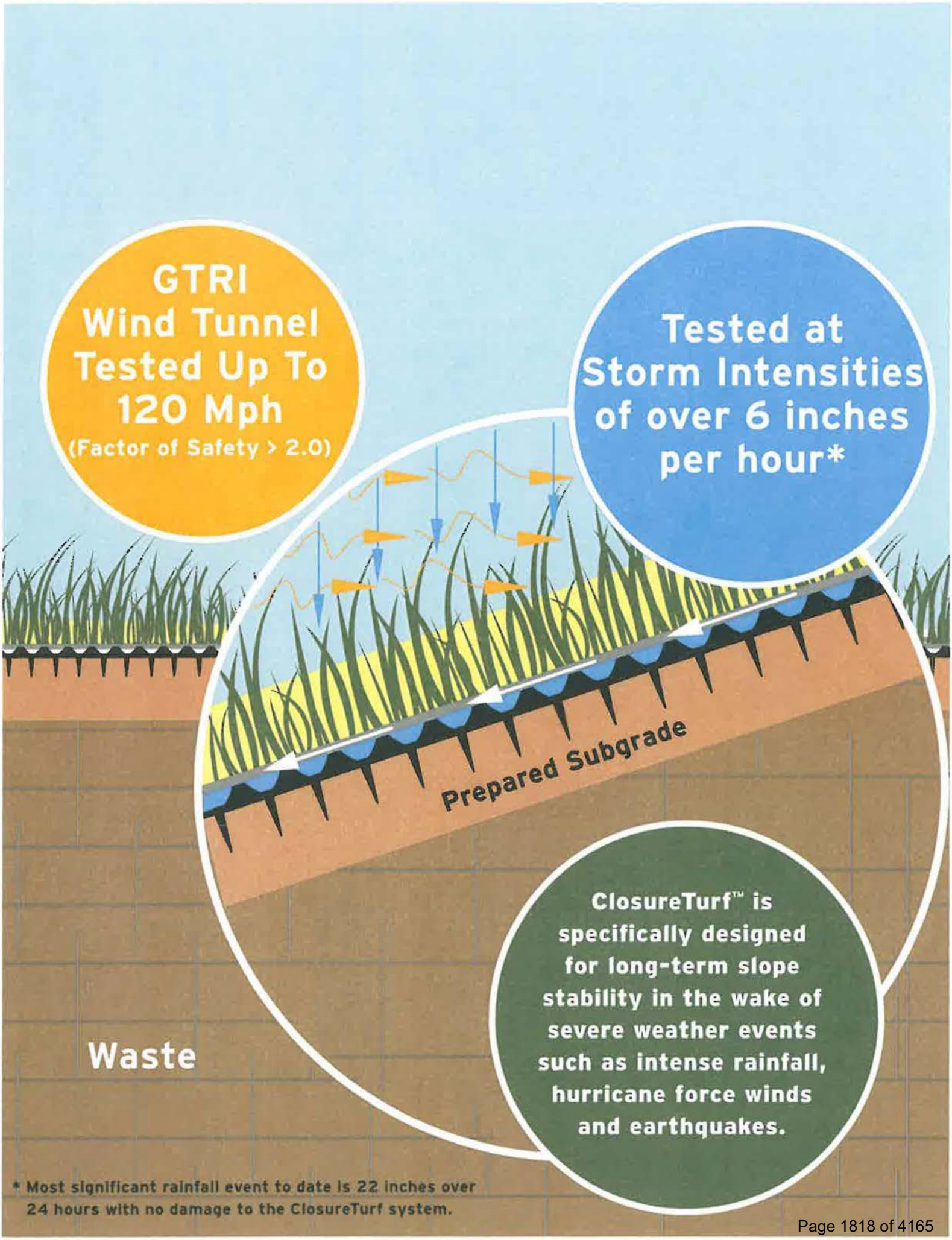
ENGINEERED TURF

- Dimensional stability
- 43° interface friction
- Aesthetically pleasing
- Virtually maintenance free
- Superior resistance to:
  - Extreme weather
  - Long-term UV light
  - Heat

SAND INFILL

- Supports traffic loads
- Provides additional UV protection
- Lab tested in high rainfall events
- Creates a non-exposed system
- Superior weathering protection
- Reduces heat absorption

ClosureTurf™


GTRI
Wind Tunnel
Tested Up To
120 Mph
(Factor of Safety > 2.0)
Tested at
Storm Intensities
of over 6 inches
per hour*
Prepared Subgrade
ClosureTurf™ is
specifically designed
for long-term slope
stability in the wake of
severe weather events
such as intense rainfall,
hurricane force winds
and earthquakes.
Waste
* Most significant rainfall event to date is 22 inches over
24 hours with no damage to the ClosureTurf system.

More engineered solutions...

CLOSURETURF™ SURFICIAL GAS COLLECTION SYSTEM

ClosureTurf's patented surficial gas collection system reduces, and in some cases, eliminates the need for traditional gas wells and piping. It can function as a standalone system or in conjunction with a traditional system. Underneath the ClosureTurf system, gas is generated and rises to the surface where a vacuum created by the differential pressures is vented through the surficial gas collection foot. This method provides an efficient method of gas collection while reducing the amount of condensate that needs to be managed.

The unique design of the ClosureTurf Surficial Gas Collection System resulted in one landfill winning an International Achievement Award for a combined gas collection and closure system and the Solid Waste Association of North America (SWANA) Gold Excellence Award for landfill gas collection in 2012.

VERSACAP™

VersaCap is a low-cost, intermediate landfill cover solution designed to help prevent erosion, infiltration, runoff and gas emissions during the operational phases of the landfill.

Fast and easy to install, VersaCap is a wind-resistant membrane comprised of a synthetic turf and specially-formulated polymer backing that improves the quality of surface water runoff and eliminates downstream siltation by preventing erosion of the cover soils. VersaCap does not require tires or sandbags to keep it in place and can easily be taken up and reused in future areas.

HYDROTURF™

HydroTurf is an economical, environmentally-friendly alternative revetment to rock riprap and piped channels. It is a patented three component system made up of a structured geomembrane, an engineered turf and a specialized pozzolanic infill (HydroBinder™). Created specifically for bench drains, downchutes and perimeter channels on landfill covers, HydroTurf will flex and move with typical differential settlements that occur on landfill covers. It provides superior hydraulic performance capable of handling large velocity and large flows resulting in very high velocities.

Delivering the same advantages as ClosureTurf, HydroTurf offers rapid, low impact installation that's significantly less costly than hard armor and piping, and is projected to last more than 100 years when properly maintained. Best of all, unlike hard armor riprap channels, HydroTurf improves the environment by producing cleaner storm water runoff.

SOLAR

The nature of the ClosureTurf system provides an excellent opportunity for generating environmentally friendly renewable energy through the implementation of solar panel arrays. ClosureTurf's geosynthetic cover enables panels to operate in a clean environment significantly reducing dust and erosion. The engineered turf provides an excellent surface for easy access and eliminates the risk of panel damage from mowing and maintenance required for other types of ground cover.

The exceptionally durable heavy load bearing ClosureTurf platform enables complete accessibility for installation, maintenance and replacement of PV panels.









ClosureTurf's proven technology is working hard for these landfills.

Industrial Ash and Sludge Lagoon, Southeast USA

- Saved 20 acres of land from destruction for borrow.
- Created a 70-acre watershed of clean runoff.
- Unique lightweight construction allowed for closure on soft, weak subgrade.

Crazy Horse Landfill, Salinas, CA

- Eliminated 26,000 truck trips for soil borrow (equivalent to 660,000 miles).
- Combination of soil import elimination and reduced heavy equipment needs reduced the project's carbon footprint by 70%.
- Eliminates dirty storm water run-off by replacing cover soils with a cover system that produces very clear and clean water free of fertilizer and muddy runoff.
- Provided the perfect foundation for solar panel racking system.
- Eliminated slope veneer failures high seismic loads (site is adjacent to San Andreas Fault).

LaSalle Landfill, Jena, LA

- Endured more than 330 inches of rainfall since installation in 2008.
- Survived a tornado when 70 mph winds hit across the front of landfill.
- Sand infill remained in place with no erosion when a levee broke releasing 5 acres of water across the turf.
- Eliminated annual slope rebuilding–a savings of over $300,000 to date.

Timber Ridge Landfill, Richwoods, MO

- Proprietary ClosureTurf system collected 500 SCFM of gas over a ten-acre closure with no vertical wells.
- Winner of the International Achievement Award for combined gas collection and closure system.
- Winner of the Solid Waste Association of North America (SWANA) Gold Excellence Award for landfill gas collection.

Based on these and other successes, ClosureTurf exceeds requirements of EPA Subtitle D and has been approved and installed in many states.

AFFILIATIONS:

Geosynthetic Institute (Partner)

Georgia Tech Research Institute (Partner)

Industrial Fabrics Association International (Member)

Colorado State University–Engineering Research Center (Partner)

CLOSURETURF IS TESTED IN ACCORDANCE WITH:

GTRI-SSWT - Aerodynamic Shear & Uplift
CSU USACE - Hydraulic Shear - Levee Overtop Simulation
ASTM D5261 - Mass per Unit Area
ASTM D4632 - Grab Tensile Properties
ASTM D4595 - Wide-Tensile
ASTM D2256 - Tensile and Elongation
ASTM D4716 - Hydraulic Transmissivity
ASTM D5321 - Interface Shear
ASTM D6460 - Large Scale Channel Hydraulics
ASTM D6241 - CBR Puncture
ASTM D6459 - Infill Stability
ASTM D4884 - Seam Strength
G147(02) & G145/G7 - UV Resistance & Stability
ASTM D7277/7276 Steady State Hydraulic Overtopping
UL94 Modifiers - Flammability


ClosureTurf™
The cost-efficient, compliance-driven, environmentally-friendly landfill solution.
With slope erosion and vegetative maintenance an ongoing battle, and compliance issues ever looming, choose the cover solution designed to eliminate the most common problems associated with landfill management.
ClosureTurf is specifically designed to solve soil erosion, slope instability, gas emissions, and high costs of installation and maintenance. Discover the solution that makes your job a lot easier, keeps you compliant and makes you look good in the process.
For more information on ClosureTurf, visit closureturf.com, email us at info@closureturf.com or call 800-373-2478.
ALL ClosureTurf COMPONENTS ARE PROUDLY MADE IN THE USA.



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ClosureTurf™

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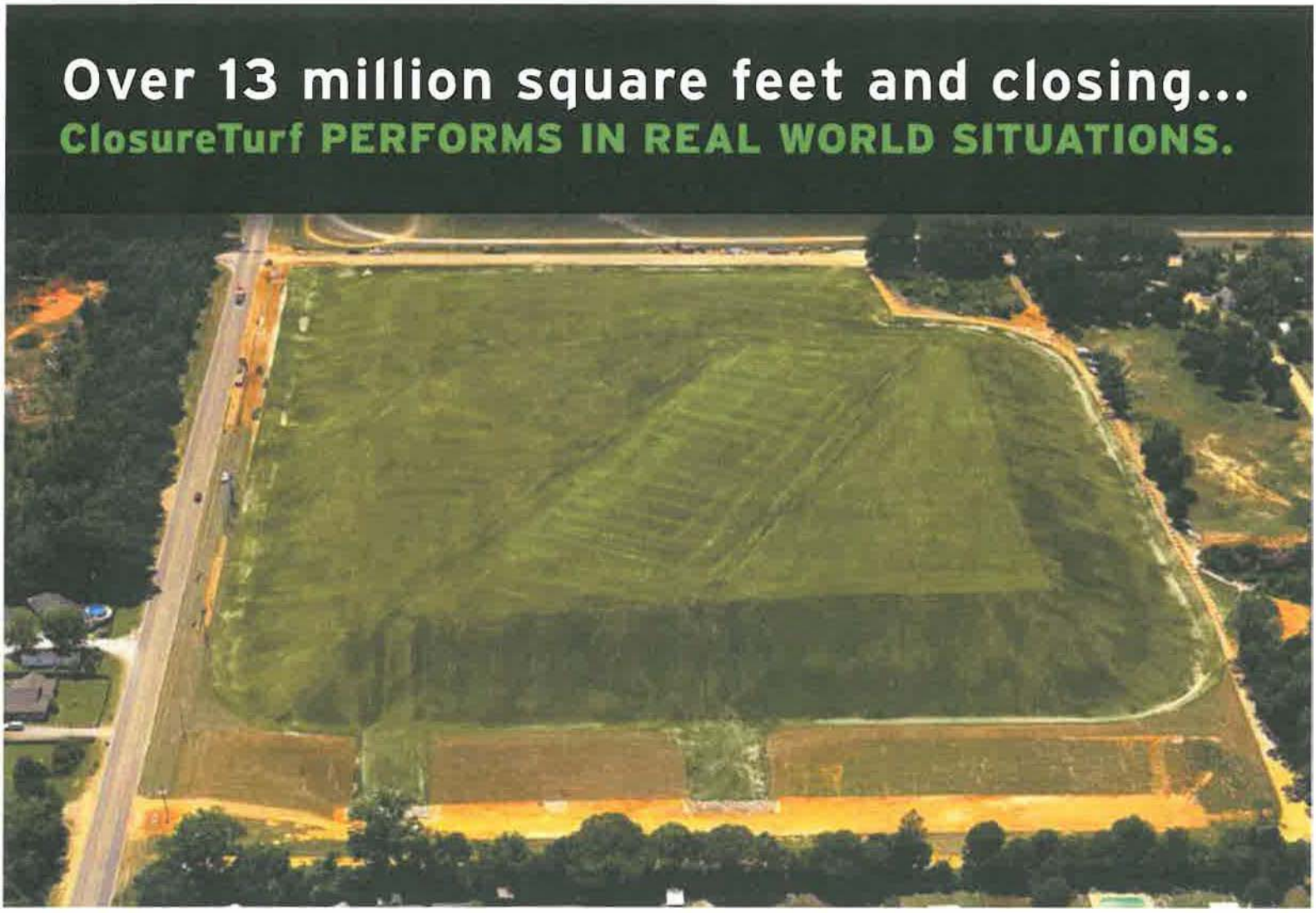
U.S. Patent Nos. 7,682,105 & 8,585,322 • Canada Patent No. 2,663,170 • Other Patents Pending



ClosureTurf™ ensures fast, cost-efficient and environmentally-friendly erosion control—even in some of the toughest applications.

ClosureTurf™ is a three component system comprised of an impermeable, highly transmissive structured geomembrane, a specialized engineered turf, and sand infill. The structured geomembrane component is the foundation of the system and provides for the highest interface friction values available in the market. The engineered turf component is placed on top of the geomembrane giving the system its natural look and feel of a grass while protecting the geomembrane component from extreme weather conditions for the long term. Finally, the sand infill placed in the engineered turf enables the system to be trafficked, while also providing for additional protection and an additional factor of safety against weathering. A virtually maintenance free technology designed to last, ClosureTurf has proven to be the most sustainable closure option available for the waste industry. See how ClosureTurf performs in some of the most demanding applications.

1

LASALLE-GRANT LANDFILL

QUICK STATS

Location: Jena, LA
Completed: 2009
Owner: Progressive Waste Solutions
Size: 9 acres



PROJECT SCOPE

The soil of the LaSalle-Grant Landfill in central Louisiana was highly erodible, had a high plasticity index, and had a natural pH of 4.0, so its characteristics weren't conducive to side slope maintenance. In fact, every spring the existing vegetative slopes required slope repair, reseeding and liming in order to remain intact. Pressure to find a more stable solution led the operator to implementing Closure Turf's 43 degree interface friction technology, which is more than a 3.0 factor of safety against sliding failure, over 10 acres of the landfill.

2

CRAZY HORSE LANDFILL

QUICK STATS

Location: Salinas, CA
Completed: 2013
Owner: Progressive Waste Solutions
Size: 68 acres



PROJECT SCOPE

Situated adjacent to the San Andreas Fault in California, the Crazy Horse Landfill in Salinas, CA, required a solution that would enable capping without modifying steep slopes of 2.25H:1V. And, since most available borrow soil was expensive and environmentally impacted with agricultural chemicals, the site was especially challenged in producing surface water quality that met the regulations. The 68-acre landfill is also situated in a residential area that demanded a final cover system that was aesthetically-pleasing and not subjected to on-going erosion and maintenance noise.

3

TIMBER RIDGE LANDFILL

QUICK STATS

Location: Richwoods, MO
Completed: 2010
Owner: Progressive Waste Solutions
Size: 10 acres



PROJECT SCOPE

Due to its location in a seismic area, concerns over slope stability that could compromise gas collection and containment was a major concern for this landfill. The lack of quality borrow soil and the high cost of procuring it made a ClosureTurf system an easy choice. Likewise, gas collection using deep wells would drastically increase installation costs and compromise speed of closure. A system that could perform effectively without deep vertical wells was greatly advantageous.

4

HARTFORD LANDFILL

QUICK STATS

Location: Hartford, CT
Completed: 2013
Owner: Connecticut Resources Recovery Authority
Size: 38 acres



PROJECT SCOPE

The vision that the owner had for the Hartford Landfill was one where they would be able support the initiatives to promote renewable energy that were consistent with both the CTDEEP and the City of Hartford, CT. ClosureTurf enabled them to do just that, by providing for the best closure technology available and is capable of incorporating traditional rigid or flexible solar photovoltaic panels.

RESULTS

Operators quickly learned of Closure Turf's ability to provide long-term erosion control as the system controlled rainfall runoff in excess of 4 inches per hour at times during it's first year in action. In fact, the system has endured more than 300 inches of rainfall since 2008. And, three months after phase one of the project was completed, a tornado producing shear winds of 70 mph hit across the front of the landfill without damaging the turf cap. Finally, the LaSalle sand infill remained in place with no erosion when a levee broke, releasing water over 5 acres of the project area.

The Closure Turf system requires no mowing, little maintenance, and has remained in tact even under the most extreme weather conditions. Low maintenance costs can relate to significant savings over the 30 year post closure period. Best of all, soil erosion, water infiltration, leachate reduction and fugitive gas emissions were immediately controlled once the ClosureTurf system was installed.

"We'd been killing ourselves working and reworking our slopes, but after we installed the Closure Turf system we didn't have to do anything to it again. The grass looks great, the sand hasn't moved and there's no erosion."

Delaney Lewis,
District Landfill Manager,
IESI Corp. A Progressive Waste Solution Company

RESULTS

Installation of the ClosureTurf system was successfully achieved with currently developed slopes under earthquake loading, eliminating 11,000 round trip truck loads (equivalent to 660,000 miles) that would have been required for soil borrow. The combination of soil import elimination and reduced heavy equipment needs reduced the project's carbon footprint by 70%.

ClosureTurf eliminated dirty storm water runoff by replacing a traditional vegetated cover with a cover system that produces very clear and clean water free of fertilizer and muddy runoff. In addition, ClosureTurf eliminated slope veneer failures from high seismic loads and reduced yearly maintenance activities for the SVSWA to essentially zero. These would have included rebuilding slopes because of erosion, revegetation, dust control efforts, mowing of weeds and grasses to reduce fire danger, and controlling rodent populations.

"We've been extremely impressed with the stability of our slopes and quality of the water runoff. Plans now include a 2 mega-watt solar array system down the road, which will mean this land will produce renewable energy source that gives back to the environment."

Dave Meza, P.E.
Project Manager
Salinas Valley Solid Waste Authority

RESULTS

ClosureTurf's patented system precluded the need for gas wells or piping. This resulted in a cost savings of $15,000 per acre that would have been required for installing deep gas wells. ClosureTurf's structured membrane reduces oxygen in the system that results in higher quality methane gas to be vented for flaring or alternative energy generation.

Under the ClosureTurf system, the gas rises to the surface due to positive pressure and generates little condensate to be collected and managed. The Timber Ridge system is consistently venting 500 SCFM of gas over a ten-acre closure with no vertical wells. This achievement has resulted in Timber Ridge winning an International Achievement Award for a combined gas collection and closure system and the Solid Waste Association of North America (SWANA) Gold Award for landfill gas collection in 2012.

"Capturing 100% of methane has provided options for carbon credits and given us more fuel to burn for generating energy. As soon as an area is closed, all emissions can be controlled which is great. And, the structured membrane protects against oxygen infiltration, eliminating that as a fire pathway."

Mike Freisen, P.E.
Regional Engineer
IESI Corp, A Progressive Waste Solution Company

RESULTS

ClosureTurf was selected for use by the owner for the following reasons: ClosureTurf's geomembrane component had a proven track record in landfill closure applications, the engineered turf with sand infill was durable and strong protecting the underlying geomembrane from ultraviolet degradation while also enabling the system to be driven across by light rubber tire vehicles without damaging the SGN required for normal solar field operations. As the best long-term solution for Hartford, ClosureTurf also provided for an aesthetically-pleasing environment in a high-profile area.

Other successful installations:

Industrial Sludge and Ash Lagoon
- **Location** Rincon, GA
- **Completed** 2013
- **Owner** GA Pacific
- **Size** 70 acres

Weatherford Landfill
- **Location** Weatherford, TX
- **Completed** 2010
- **Owner** Progressive Waste Solutions
- **Size** 8.5 acres

Berkeley County Landfill
- **Location** Moncks Corner, SC
- **Completed** 2013
- **Owner** Berkeley County
- **Size** 12 acres

Lanchester Landfill
- **Location** Narvon, PA
- **Completed** 2013
- **Owner** Chester County
- **Size** 7 acres

Tangipahoa Parish Solid Waste Facility
- **Location** Independence, LA
- **Completed** 2013
- **Owner** Tangipahoa Parish Government
- **Size** 22 acres

Timberlane Landfill
- **Location** Oakdale, LA
- **Completed** 2011
- **Owner** Progressive Waste Solutions
- **Size** 4 acres

Saufley Landfill
- **Location** Pensacola, FL
- **Completed** 2012
- **Owner** Escambia County
- **Size** 22.5 acres

Sandtown Landfill
- **Location** Sandtown, DE
- **Completed** 2013
- **Owner** Berkeley County
- **Size** 4 acres

Bi-County Landfill
- **Location** Woodlawn, TN
- **Completed** 2013
- **Owner** Montgomery County
- **Size** 5 acres

B&W Pantex Landfill
- **Location** Amarillo, TX
- **Completed** 2013
- **Owner** Department of Energy, EPA Region 6
- **Size** 5 acres

Contact Agru America for information on other successful ClosureTurf™ landfill applications across the U.S.

ClosureTurf delivers superior performance.

ClosureTurf was specifically designed to address and solve erosion, slope integrity, gas emissions, installation and maintenance cost control, EPA regulation compliance, and longevity of structure and appearance. Discover the solution that delivers on its promises. Choose ClosureTurf.

For more information on ClosureTurf, visit closureturf.com, or email us at info@closureturf.com or call 800-373-2478.

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Engineering Report

ClosureTurf™ has been extensively tested in the lab and in "real-world" applications for performance and durability.

The goal was to produce a system that performs better than current "Subtitle D" requirements and can resist the many common failure modes of today's closure covers. Traditional approaches to landfill closure have customarily involved the use of a vegetative cover. However, many of these cover systems have failed as a result of excessive erosion, gas pressure buildup, earthquake loads, poor maintenance and inadequate oversight procedures after site closure.

In response to numerous failures of these closure systems and associated rising costs, engineers have looked at new approaches in establishing a more stable and environmentally sound solution. An old solution to address cover failures and the associated environmental impacts is the implementation of exposed geomembranes. However, exposed geomembrane systems are still costly to maintain, are not wind resistant, and do not provide for an aesthetically pleasing solution. For these reasons, many state agencies do not grant final cover status to exposed geomembrane cover systems. After all, the geomembrane is still exposed to the elements for the entire duration of the application. The best approach still involves covering and protecting the underlying geomembrane, however instead of using two feet of soil to do it, it can be done with a specialized tufted geotextile ("engineered turf"), infilled with sand that has been engineered to perform better than the traditional soil cover.

Combining an engineered turf infilled with sand and a highly transmissive structured geomembrane forms a system known as ClosureTurf. The next generation closure system, ClosureTurf has proven to be environmentally protective and more stable than traditional vegetative/soil solutions as a cover system.

The engineered turf technology was originally developed for professional sports venues. Over the last decade the market has expanded greatly and technology has improved dramatically. The latest generation of polyethylene material now provides excellent residual strength and color durability against UV light.

By combining the newest technology of engineered turf with a 50 mil thick geomembrane that has the highest interface friction available in the market, and adding approximately a 0.5 inch of sand for infill, the ClosureTurf system is quickly becoming the preferred choice among the engineering community for covering landfills, mines, industrial waste sites, and CCR storage areas. The product is proven to significantly outperform current closure methods while allowing engineers to deliver a sound solution with net savings to their clients.

The driving performance criteria for the product are stability, transmissivity and durability. These criteria serve to mitigate LFG emissions and liquid infiltration for a duration that extends well beyond the post-closure period. The graphs and charts represent a summary of the performance.

U.S. Patent Nos. 7,682,105 & 8,585,322
Canada Patent No. 2,663,170
Other Patents Pending

Stability

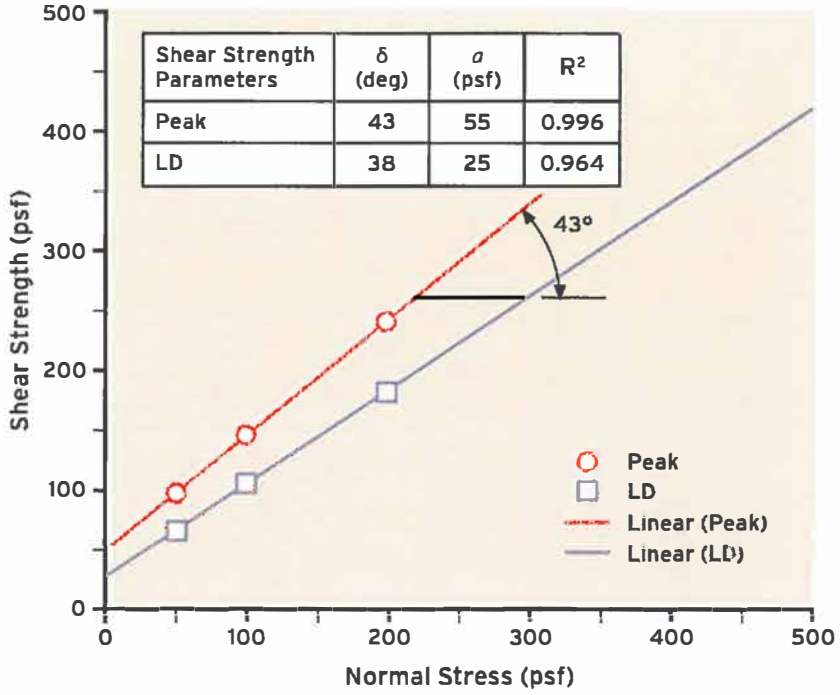
On landfills and mine piles, sliding of the soil cover along steep side slopes is of primary concern, particularly after major storm events. During a rain event, **the rainfall will penetrate quickly through the sand infill and drain directly in the drainage system below avoiding sand erosion and maintaining stability** of the sand infill. "**The infill is also held in place by the unique structure of the engineered turf** that traps the sand to anchor and ballast the engineered turf to the surface it covers. Note that:

- **ClosureTurf™ can be placed on very steep slopes**
- **Tests indicate 43 degrees interface friction value**
- **The slope stability safety factor can be calculated from the chart using the equation:**

  SF= tan φ/tan α

ClosureTurf System Interface Evaluation

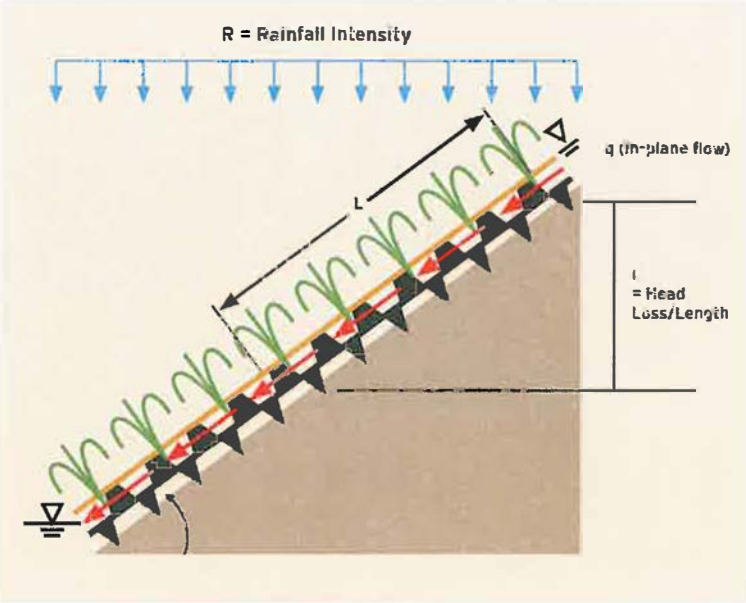
Slope angle	Slope	SF
34	1.5H: 1V	1.4
27	2.0H : 1V	1.9
18	3.0H: 1V	2.8
14	4.0H: 1V	3.7

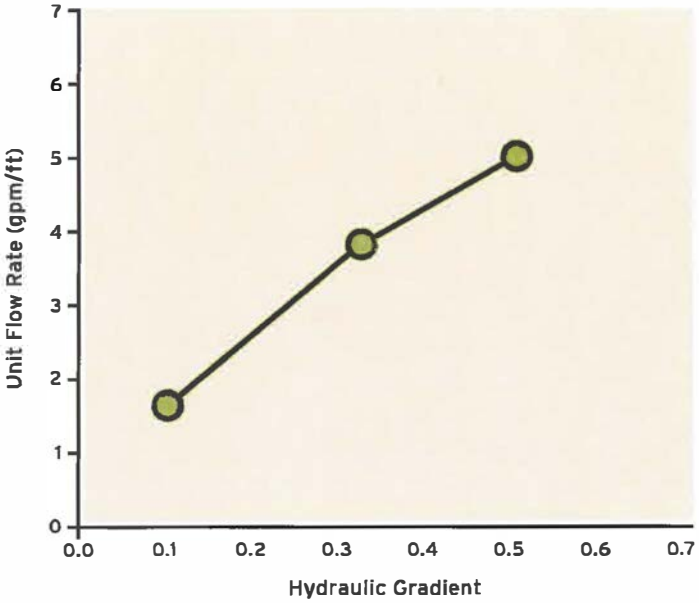


Drainage

ClosureTurf™ sand infill material is **stable on steep slopes under severe weather conditions.** The stability of the sand infill is controlled by the following product characteristics:

- **Percolation/Permeability**
- **Transmissivity**
- **Sand friction**
- **Grass interlocking grid**
- **Sand gradation**

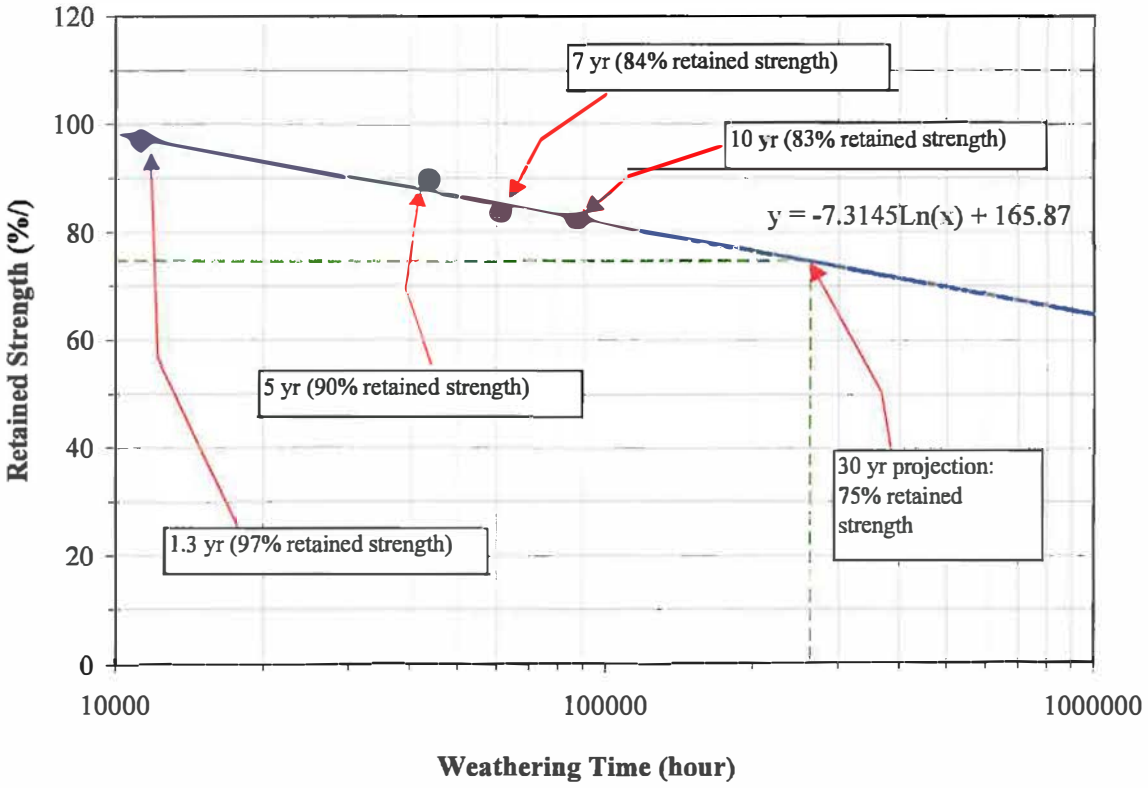




ClosureTurf was designed with the above characteristics in mind. The sand infill can handle **over six inches per hour of rainfall intensity without erosion** when applied on 3H:1V slopes.

Rainfall penetrates quickly through the sand and into the structured drain liner below which has a very high transmissivity. The energy that could cause erosion is on the structured geomembrane and not on the surface of the sand. The transmissivity is presented in the graphic at left.

Weathering Resistance For a Long Life



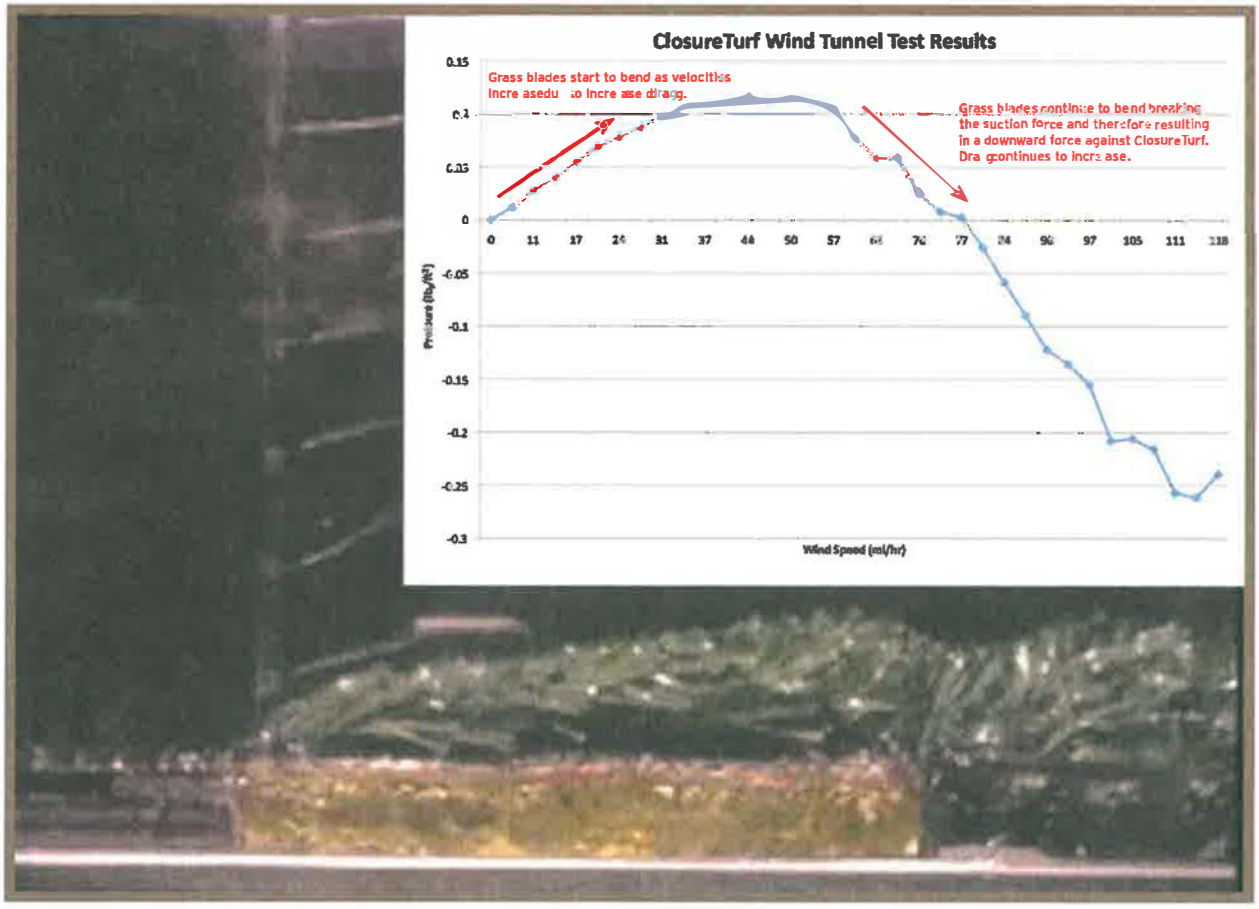
ClosureTurf™ is designed to provide weathering resistance and geomembrane protection when exposed to the **most extreme conditions**. Based on independent, real-world weathering tests performed at Atlas Material Testing Laboratories in New River, AZ. The tensile strength of the engineered turf fibers is projected to have 75% retention after 30 years. This means that with typical traffic loading forces, the material can provide over **four times the strength required after thirty years of extreme heat and UV exposure**. Based on the testing data collected and shown in the graph above, and data from many existing ClosureTurf projects, the system can **provide decades of reliable performance beyond the standard thirty-year post-closure maintenance period**.

Wind Uplift Resistance

Wind Tunnel Testing at GTRI

Since all exposed geomembranes are susceptible to damage from high winds, the technology must withstand these forces. A study was performed on the wind uplift reactions by Georgia Tech Research Institute. To complete their evaluation wind tunnel testing was performed. The ClosureTurf™ product indicated no uplift when exposed to 120 mph winds. This is in contrast with exposed geomembrane systems where extensive anchoring is required even for 30 mph winds.

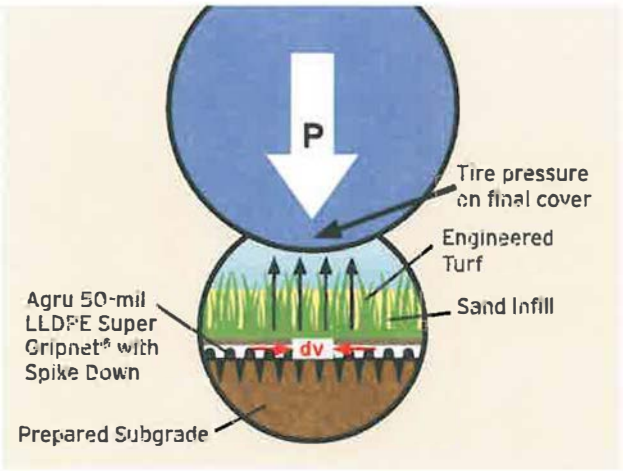
ClosureTurf technology provides features that help mitigate the forces of wind, such as a porous surface to break vacuum and engineered turf blades that will increase the aerodynamic boundary conditions and blades bending and reacting against the wind causing a resistance to the uplift.



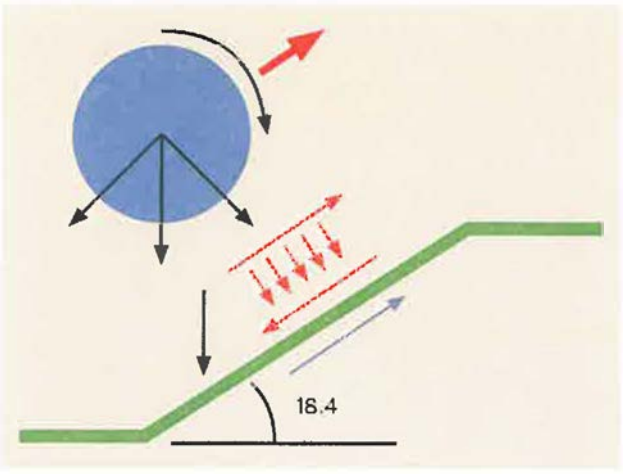
Drivability

Gas system monitoring locations or wells in the landfill will have to be accessed by persons on foot or in vehicles. The typical exposed geomembrane closures, being fully exposed, would likely be damaged during access. Further, the geomembrane can be damaged by birds or other animals. All such damage to the geomembrane would have to be continually repaired and replaced at additional costs after construction. The ClosureTurf™ is thicker, covered with sand infill that not only ballast the system but also allows for access of a 60 psi tire pressure vehicle on 3:1 slopes and up to 90 psi tire pressure in flatter areas without being susceptible to damage.



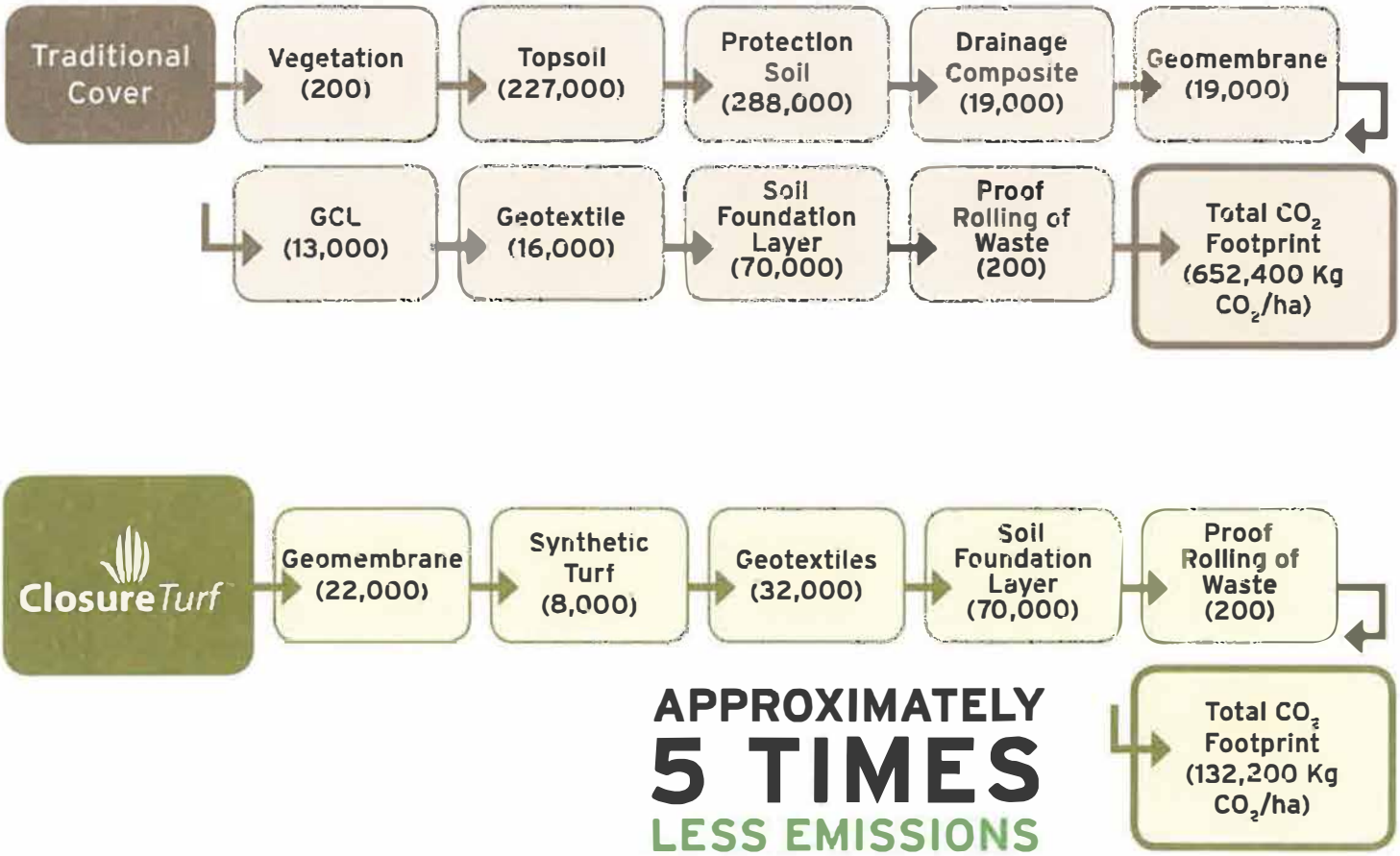






Sustainability

CO_2 Footprint: Traditional vs. ClosureTurf™ *



APPROXIMATELY
5 TIMES
LESS EMISSIONS

* Source; Koerner, R., "Traditional vs. Exposed Geomembrane Landfill Covers–Cost and Sustainability Perspectives," Geosynthetic Magazine, October 2012



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ClosureTurf™ product (US Patent No. 7,682,105 and 8,585,322; Canadian Patent No. 2,663,170; and other Patents Pending) and trademark are the property of Watershed Geosynthetics, LLC, and exclusively licensed to Agru America. All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, this information should not be used or relied upon for any specific application without independent professional examination and verification of its accuracy, suitability and applicability. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Watershed Geosynthetics LLC as to the effects of such use or the results to be obtained, nor does Watershed Geosynthetics LLC assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

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15 May 2015

José Urrutia, P.E.
Vice President of Engineering
Watershed Geosynthetics
11400 Atlantis Place, Suite 200
Alpharetta, GA 30022

Subject: Literature Review and Assessment of ClosureTurf® UV Longevity

Dear Mr. Urrutia:

Watershed Geosynthetics, Inc. (Watershed) has patented an alternative landfill closure system termed, ClosureTurf®. ClosureTurf® consists of high-density polyethylene (HDPE) grass blades tufted through a polypropylene (PP) geotextile backing which overlies Super Gripnet®, an HDPE or linear low-density polyethylene (LLDPE) geomembrane manufactured by AGRU America Inc. The addition of a layer of sand ballast during installation completes the system. The sand ballast provides cover for the lower portion of the HDPE grass blades, the PP geotextile backing, and the Super Gripnet® (Figure 1). The ClosureTurf® system, therefore, is a "hybrid" closure system in the sense that it is neither a traditional soil cover or an exposed geomembrane. ClosureTurf® has been used to close a number of landfills throughout the United States. A select list of sites where it has been used is shown in Table 1. Applications extend to other facilities as well, such as capping of coal ash ponds.

Watershed has requested that Geosyntec Consultants, Inc. (Geosyntec) provide an assessment of the longevity of the ClosureTurf® system with regard to UV degradation. Since ClosureTurf® has elements (i.e., the HDPE grass blades) that are permanently exposed to UV radiation, this assessment will be particularly focused on the exposed portion of the system. However, the UV longevity of the PP geotextile backing and HDPE geomembrane will also be addressed by reference.

Geosyntec's approach to this assessment has been to conduct a literature review of pertinent documents available (journal papers, white papers, presentations, etc.), distill the results of the review, and perform limited analysis. This report concludes with a summary of the review and analysis along with brief discussion for recommendations.

EXECUTIVE SUMMARY

The UV longevity assessment of the ClosureTurf® system (Figure 1) began with a literature review. In general, relatively little published information was discovered regarding exposed HDPE grass blade degradation. The information that is available consists of retained tensile strength test results of HDPE grass blades after exposure (1, 5, 7 and 10 years) at a field test facility in New River, Arizona (Watershed, 2014). Extrapolation of this data by Watershed (2014) resulted in a prediction of 65% retained tensile strength after 100 years of service. In addition, Richgels *et al* (2015) published half-life (i.e., 50% retained tensile strength) predictions of exposed HDPE grass blades using a laboratory data release from the Geosynthetics Institute (GSI) on HDPE geomembrane strips exposed to UV lamp irradiation. Richgels *et al* (2015) obtains an upper bound and lower bound half-life predictions of 247 years and 176 years, respectively. Extrapolation of the field data from New River, Arizona yielded a half-life of 216 years.

Geosyntec checked the calculations shown in Richgels *et al* (2015) and obtained 277 years and 214 years for the upper and lower bound estimates of HDPE grass blade half-life. Differences in the results between Geosyntec and Richgels *et al* (2015) are attributed to rounding. Geosyntec attempted to repeat these calculations for actual performance requirements (i.e., 12.5% of original tensile strength) of the HDPE grass blades rather than a randomly assigned half-life, however the predictions resulted in service lives that were too lengthy to be reasonable. The most likely explanation is that the laboratory data has not degraded enough to allow for service life predictions using 12.5% retained tensile strength. Future data releases from GSI will aid in providing more accurate predictions below the half-life.

Based on Richgels *et al* (2015) predictions, as well as the prediction given in Watershed (2014) it appears that the half-life of the HDPE grass blades exposed to Arizona-like conditions is on the order of 100 years. These results are promising; however additional field test data is needed to improve the half-life predictions, particularly since half-life predictions for exposed HDPE geomembrane are also approximately 100 years (Koerner *et al*, 2015). Understanding the differences in weathering between HDPE grass blades in a synthetic turf and an HDPE geomembrane will provide additional insight into the similar half-life predictions of the two geosynthetics. Finally, the service life of the HDPE grass blades in the ClosureTurf® system should ideally be based on its performance requirements rather than a half-life which will result in a longer service life prediction.

In addition to the HDPE grass blades, there are two unexposed elements of the ClosureTurf® system: (i) the PP geotextile backing for turf component; and (ii) the Super Gripnet® which consist of a HDPE geomembrane (see Figure 1).

Watershed has incorporated UV degradation inhibitors into the PP geotextile backing which, according to Watershed has lead to an improvement in UV resistance by a factor of 14 over the original prediction of 65% retained tensile strength after 100 years (Watershed, 2014). Koerner (2011) has estimated that covered HDPE geomembrane will have a half-life of 446 years at 20 degrees Celsius and 265 years at 25 degrees Celsius.

Therefore, the most critical component of the ClosureTurf® appears to be the exposed HDPE grass blades when it comes to UV degradation. However, degradation of the HDPE grass blades to unserviceable levels can be remediated by replacement of the turf component of the ClosureTurf® system.

BACKGROUND AND LITERATURE REVIEW SUMMARY

In total, Geosyntec has reviewed approximately 40 technical documents to date. The database is a combination of documents provided to Geosyntec by Watershed as well as documents collected by Geosyntec. A complete reference list of the documents in the database can be made available upon request.

In general, relatively little information was found on the topic of exposed HDPE grass blades with respect to degradation due to UV radiation. The documents that were obtained and reviewed are listed below.

1. Field test data provided by Watershed from the New River, Arizona testing facility on the HDPE grass blades (Watershed, 2014).

2. Testing results (Atlas-MTS) discussing the UV longevity of polyethylene and polypropylene grass used for outdoor European athletic facilities.

3. Technical paper by Richgels, *et al.* (2015a) published in the conference proceedings for Geosynthetics 2015 in Portland, Oregon.

4. Presentation by Richgels., C. at the Geosynthetics Conference for 2015 in Portland, Oregon (Richgels, 2015b).

5. Presentation by Diguilio, D. at the Northern New England SWANA Conference on 25 September 2013 (Diguilio, 2013).

The following documents on the topic of HDPE Geomembrane degradation due to UV exposure were reviewed and found to contain useful information regarding this assessment.

1. Geosynthetic Research Institute (GRI) White Paper #6 (Koerner *et al.*, 2011). This white paper contained degradation data (% retained strength and elongation) on laboratory aged samples of 1.5 mm HDPE geomembrane. Aging was completed using a UV Fluorescent device per ASTM D7238 at 70 degrees Celsius (^{o}C).

2. Geosynthetic Institute (GSI) webinar presentation by Koerner *et al.*, (2015). This presentation contained a slide that compared predicted (laboratory vs. field) half-life of geomembranes of various resins, including HDPE, as well as a suggestion for estimating lower bound half-life.

3. Journal paper authored by Rowe *et al.* (2010) published in the Journal of Geotechnical and Geoenvironmental Engineering.

DISCUSSION OF DOCUMENTS AND DATA

The data from the New River, AZ testing facility on the artificial grass component of ClosureTurf® (Watershed, 2014) appears to be the only data set of its kind in our compiled database. The data consists of tensile property testing from field samples exposed to the Arizona environment at approximate exposure periods of 1, 5, 7 and 10 years. At each of the four exposure periods, 20 samples were tested for a total of 80 tests. The average values for tensile strength retained at each corresponding time period is 97%, 90%, 84% and 83%, respectively (Figure 2).

One additional data point was found in the Atlas-MTS document. That data point indicated that approximately 90% of tensile strength of polyethylene grass would be available after 20 years of field exposure assuming average European climatic conditions (temperature, irradiance, etc.). However, the average European irradiance is approximately one-half to one-third that of Arizona (Figure 3) notwithstanding temperature effects. Therefore, the Atlas-MTS data point will be consistent with the data from the New River, AZ facility in the 7 to 10 year time frame once adjusted for the relative levels of exposure and temperature between Europe and Arizona. As such, this data point will not extend the exposure duration covered by the New River, AZ data.

The paper and corresponding presentation by Richgels (2015a, 2015b) utilized the laboratory data released from the GSI on UV degradation of HDPE samples to make upper and lower bound estimates of the field half-life of the HDPE grass blades. The upper bound method utilizes Arrhenius

modeling of lab data to project exposure times at half-life to site temperatures combined with ratios of UV irradiance between the laboratory lamp and monthly average irradiance at New River, AZ to develop half-life loss per month. A similar procedure using a linear extrapolation (rather than Arrhenius) was demonstrated for a lower bound estimate. The Watershed (2014) field data set was plotted in between the upper and lower bound estimates. This method is further discussed in the section below titled, "HDPE Grass Blade Service Life Calculations".

Koerner *et al.* (2011) discusses the UV longevity of both exposed and unexposed geomembranes made from various resins, including HDPE based on GSI's laboratory testing program. This document is particularly useful in regard to the ClosureTurf® elements that are considered non-exposed (i.e., the PP geotextile backing for the turf component and the underlying HDPE geomembrane).

The presentation by Koerner *et al.* (2015) includes estimates of half-life of exposed HDPE geomembranes as well as a recommendation for linear data extrapolation as a lower bound limit that was implemented by Richgels (2015b).

PERFORMANCE REQUIREMENTS

The definition of service life of an HDPE (or other resin) geosynthetic (grass blades and geotextiles/geomembranes) typically invokes the half-life criteria. However, the half-life criteria is arbitrary and while useful as a general indicator for comparison it does not directly relate to any aspect of field performance for ClosureTurf® or any other geosynthetic. Therefore it is more appropriate to define the service life in terms of field requirements placed on the material.

HDPE Grass Blades

For the case of the HDPE grass blades on the ClosureTurf® system, tensile strength requirements fall in the range of 2.5 to 3.5 lbs, based on applied loads of pullout forces from equipment operation and water runoff forces (Diguilo, 2013). The ClosureTurf® HDPE grass blades are manufactured with 20 lbs. of tensile strength immediately following the process (Diguilo, 2013). Therefore, without considering a factor of safety, the required tensile strength of the HDPE grass blade is equal to approximately 12.5% to 17.5% of original strength capacity.

PP Geotextile Backing and HDPE Geomembrane

Performance requirements for the PP geotextile backing and HDPE geomembrane depend on more site-specific parameters (e.g., steepness of slopes, seismicity, etc.) than the HDPE grass blades. Therefore until a parametric study is completed which will define the performance requirements over a range of expected conditions, the half-life will have to be used as a benchmark for degradation of the PP geotextile and HDPE geomembrane.

HDPE GRASS BLADE SERVICE LIFE CALCULATIONS

In order to develop a prediction for the longevity of the HDPE grass blades with respect to UV degradation, Geosyntec implemented the method found in Richgels (2015a, 2015b) for two levels of retained tensile strength. The first level is the 50% of tensile strength, or half-life, criterion that is commonly used as a benchmark for geosynthetic service life. Geosyntec performed this calculation to compare our results with the results presented by Richgels (2015a, 2015b). Once the half-life estimates were calculated, Geosyntec attempted to repeat the calculations using a retained tensile strength of 12.5% of an HPDE grass blade.

Half-Life Estimation (50% of Retained Strength)

The assessment utilized by Richgels (2015a, 2015b) begins with a laboratory data release from GSI (Figure 4). The data includes retained tensile strength of HDPE samples that have been incubated under a UV lamp at elevated temperatures, which accelerates the UV weathering process in accordance with ASTM D7238.

As mentioned, the GSI data includes samples tested at three elevated temperatures: (i) 80 degrees Celsius (^{o}C); (ii) 70°C; and (iii) 60°C. The testing program appears to have originally included only the 70°C data, with the 80 ^{o}C and 60°C testing added at a later date (therefore, weathering is not as advanced). The 70°C data set has reached approximately 66%, while the 80°C and 60°C data sets have reached approximately 78% and 86%, respectively. Nonetheless, logarithmic extrapolations to 50% retained strength were performed for each data set. The amount of exposure time (on a log scale) corresponding to the 50% retained strength plotted vs. the inverse of the corresponding temperature (80°C, 70°C and 60°C) is shown in Figure 5. Figure 5 allows for extrapolation to find the laboratory exposure time required to achieve 50% retained strength at temperatures lower than the test temperatures (i.e., actual field temperatures).

Once the curve is defined relating any temperature to a level of laboratory lamp exposure, the remaining task is to develop a relationship between laboratory exposure and field exposure for a

particular site. In this case, the testing site in New River, AZ where Watershed has performed tests on HDPE grass blades, was selected.

Richgels (2015a, 2015b) presents monthly averages at the site for: (i) peak turf temperature; and (ii) irradiance as a fraction of the laboratory lamp irradiance. Using these two values for a given month combined with the Arrhenius model, an estimate of half-life loss per month is obtained. Summation of the half-life lost per month over a year yields the annual half-life loss. The inverse of the annual half-life loss is the predicted half-life in years. Using this method, Richgels obtains a half-life of approximately 247 years, while Geosyntec obtained a half-life of 277 years using the same data (Table 2). The difference is attributable to rounding errors in the logarithmic projections.

Following the suggestion of Koerner *et al.* (2015), Richgels (2015b) treated the results of the half-life mentioned above as an upper bound estimate. For the lower bound estimate, Koerner *et al.* (2015) suggests performing a linear extrapolation of the laboratory data to lower field temperatures, rather than using the Arrhenius model.

With the linear extrapolation, the ratio of monthly irradiance to laboratory lamp irradiance is scaled linearly to calculate the number of months required to reach half-life at 80C, 70C and 60C. Linear extrapolations per month are made from the elevated temperatures to the corresponding peak turf temperature in that month. The resulting half-life loss per month is summed to obtained half-life loss per year. The inverse of that result is the half-life in years. Richgels (2015b) calculates a half-life of 176 years using this linear model. Geosyntec's calculation using the same data resulted in a half-life of 214 years (Table 3 and Figure 6). The difference in the calculations is approximately the same as with the calculation using the Arrhenius (logarithmic) model.

Figure 7 shows the calculated upper (Arrhenius - logarithmic) and lower (linear) bound curves calculated by Richgels (2015b) along with the field data on the HDPE grass blades provided by Watershed (2014). As shown in Figure 7, the trend line fit to the field data falls in between the upper and lower bound curves produced by Richgels (2015b). Note that the first point from the field data at approximately 1 year is omitted from the trend line. This is because the first data point is assumed to be within the anti-oxidant phase of degradation rather than the polymer oxidation stage as suggested by Rowe *et al.* (2010). Additional discussion regarding the stages of degradation for polyolefin materials can be found in CUR 243 (2012).

Service Life Estimation Based on Performance Requirements (12.5% of Retained Strength)

Geosyntec repeated the calculations discussed above for the estimation of half-life, but extrapolated the GSI laboratory data down to 12.5% rather than 50% at 80C, 70C and 60C. Upper bound

(Arrhenius – logarithmic) and lower bound (linear) estimates were 2,500 years and 2,043 years, respectively.

These estimates of service life are simply too large to be reasonable. A likely explanation is that the samples tested at 80C, 70C and 60C have not degraded enough to produce accurate predictions at 12.5% retained strength. As previously mentioned, the data for 80C has reached 78% retained strength; the data for 70C has reached 66% retained strength; and the data for 60C has reached 86% retained strength. Therefore, the extrapolation for each of these data sets to 50% retained strength will be much more accurate than extrapolations to 12.5%. In addition, small uncertainties in log-based extrapolations will greatly influence results.

For these reasons, it is not practical or useful at this time to quantitatively assess service life in terms of actual performance requirements when those requirements are substantially below the half-life. There is some value, however in a qualitative use of performance requirements in comparisons with half-life estimates (i.e., to establish the factor of safety remaining at 50% degradation).

SUMMARY AND CONCLUSIONS

Geosyntec's literature review of approximately 40 documents yielded few sources of UV degradation data for exposed HDPE grass blades. Relevant data that was found included the field test data from the New River, AZ testing facility provided by Watershed (2014) and one data point from Atlas-MTS. The Atlas-MTS data point indicated that HDPE grass blades in average European climatic conditions would retain approximately 90% of its original strength after 20 years of field exposure. Taking into account the differences in temperature and UV irradiance between New River, AZ and European averages, the data point is consistent with the New River, AZ test data in the 7 to 10 year range.

Following the method presented in Richgels (2015a, 2015b) for HDPE grass blades, Geosyntec calculated an upper bound half-life of 277 years compared with Richgels 247 years using the Arrhenius (semi-log) extrapolations to site temperatures and ratio of laboratory lamp to field irradiance. Geosyntec calculated a lower bound half-life based on linear temperature extrapolations, as suggested by Koerner *et al.* (2015), of 214 years compared with 176 years obtained by Richgels (2015b). The differences between Geosyntec and Richgels calculations were attributed to rounding. As shown in Figure 7, the field data from New River, AZ suggests a half-life of 216 years when considering only the last three data points (i.e., polymer oxidation stage).

Another prediction of HDPE grass blade degradation is included in Watershed (2014) using the same (New River, AZ) field data. That prediction of retained tensile strength at 100 years of service life is 65%.

Therefore, it appears that the half-life of the HDPE grass blades will be on the order of 100 years based on the existing field data set and extrapolation methods found in the literature and presented herein. The results are promising; however additional field test data is needed to improve the half-life prediction, particularly since the half-life predictions for exposed HDPE geomembranes are also approximately 100 years (Koerner, 2015). Half-life predictions presented herein will also need to be revisited when additional labratory data is released from the GSI testing program.

Geosyntec attempted to calculate the service life of the HDPE grass blades using 12.5% of retained strength, rather than an arbitrarily assigned half-life. However, the calculation resulted in unreasonably long service life. This result is likely due to uncertainties in extrapolating the laboratory data released from GSI down to the 12.5% retained strength level. The data release has degraded to 78%, 66% and 86% for the 80 ^{o}C, 70 ^{o}C, and 60 ^{o}C test temperatures. Therefore, extrapolations to 50% may be warranted while extrapolations to 12.5% may not be until additional lab data is available. That being said, it should be recognized that half-life, or 50% of retained strength, has a factor of safety of 2.8 to 4.0 when considering the tensile capacity performance requirements of HDPE grass blades.

With regard to the unexposed elements of the ClosureTurf® system, Watershed (2014) indicates that the retained tensile strength of the PP geotextile backing prior to the addition of UV inhibitors is 65% after 100 years. This estimate is based on exhumed samples of the geotextile from the LaSalle-Grant Landfill in Louisiana. According to Watershed (2014), the addition of proprietary UV inhibitors to the PP geotextile backing has led to an improvement in UV resistance by a factor of 14. The final geosynthetic in the ClosureTurf® system is the covered HDPE geomembrane. Koerner (2011) estimates that the half-life of a covered HDPE geomembrane is 446 years at 20C, and 265 years at 25C. Furthermore, the degradation of the unexposed elements of the ClosureTurf® system invoke the half-life criteria. As discussed with regard the exposed HPDE grass blades, actual performance requirements should ideally be used to determine system longevity. However, the existing testing programs need to be allowed to degrade further before projections to lower values are made.

It is worth reiterating that applications of ClosureTurf® in areas of the United States where the UV irradiance and the temperatures are lower will result in longer half-life predictions than discussed above. In some cases (e.g., the Northeastern States), the differences will likely be quite large when compared with Arizona.

Finally, once UV degradation of the most susceptible component of ClosureTurf® (i.e., the exposed HDPE grass blades) does result in a tensile break, replacement of the HDPE grass and PP geotextile backing can be performed.

CLOSING

Geosyntec appreciates the opportunity to assist Watershed in the development of its ClosureTurf® products. Questions and comments may be directed to either of the undersigned at 678-202-9500.

Sincerely,

Will Tanner, P.E.
Project Engineer

Ming Zhu, Ph.D., P.E.
Senior Engineer

Attachments: References
Tables
Figures

Copies to: Bill Gaffigan (Geosyntec)
Mike Ayers (Watershed)

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TABLES

Table 1. Selected Sites where ClosureTurf® has been Installed.

Select ClosureTurf® Installations				
Installation	**Type**	**Acres**	**State**	**Year**
Progressive - Weatherford	Public – MSW	8.5	Texas	2010
Progressive - Timberland	Public - MSW	4	Louisiana	2011
Crazy Horse (Salinas SWA – Monterey)	City – MSW	65	California	2012
Saufley Landfill (Escambia)	Public – C&D	22.5	Florida	2012
Georgia Pacific	Independent	70	Georgia	2013
Berkeley County Landfill	City - MSW	12	South Carolina	2013
Lanchester Landfill (Chester)	City - MSW	7	Pennsylvania	2013
Tangipahoa Parish	City – MSW	22	Louisiana	2013
Sandtown – (Berkeley County)	City – MSW	4	Delaware	2013
Si-County Landfill	EPA – Region 6	5	Texas	2014
Holcim Cement Landfill (Kiln Dust)	Independent	46	New York	2015

Table 2. HDPE Grass Blade Upper Bound Half-Life Calculations (Geosyntec)

Month	UV Lamp On[1] (hrs/day)	Peak Turf Temp[2] (C)	Peak Turf Temp (K)	Peak Turf Temp (1/K)	Reaction Rate[3]	Lab Half-Life[4] (lamp hrs)	Field Equivalent[5] (days)	Field Equivalent[6] (months)	Half Life Loss per Month[7]
January	4.00	27.99	301.14	0.0033	-15.67	6385286	1596322	51494	1.94196E-05
February	4.94	27.96	301.11	0.0033	-15.67	6401982	1296604	46307	2.15949E-05
March	6.13	33.94	307.09	0.0033	-15.11	3632197	593012	19129	5.22755E-05
April	6.94	40.58	313.73	0.0032	-14.50	1983742	285945	9531	0.000104915
May	7.25	51.21	324.36	0.0031	-13.58	792646	109330	3527	0.000283544
June	7.31	61.52	334.67	0.0030	-12.75	344593	47124	1571	0.00063662
July	6.94	66.82	339.97	0.0029	-12.34	228887	32993	1064	0.000939599
August	7.00	64.80	337.95	0.0030	-12.50	267230	38176	1273	0.000785841
September	6.94	59.43	332.58	0.0030	-12.91	406208	58553	1889	0.000529439
October	5.88	47.74	320.89	0.0031	-13.88	1062504	180852	5834	0.000171411
November	4.56	36.38	309.53	0.0032	-14.88	2899472	635501	21183	4.72069E-05
December	3.69	24.68	297.83	0.0034	-15.99	8826208	2393548	77211	1.29515E-05
Lab	20							**Yearly Half-life Loss[8]**	0.003604818
								Half-life[9] (years)	277.41

Notes:

(1) UV Lamp On (hours per day) is given in Richgels (2015a, 2015b).
(2) Peak Turf Temps for New River, AZ given in Richgels (2015a, 2015b).
(3) Reaction Rate is calculated from the regression curve shown in Figure 4 for the upper bound (logarithmic) case.
(4) Lab half-life in hours is equal to 1/e^(Reaction Rate).
(5) Field equivalent (days) is calculated by dividing the lab half-life in hours by the UV lamp on hours per day.
(6) Field equivalent in days is converted to months using the given days in that particular month.
(7) Half-life loss per month is the inverse of the corresponding field equivalent in months.
(8) The yearly half-life loss is the sum of each individual months half-life loss.
(9) The half-life in years is the inverse of the yearly half-life loss.

Table 3. HDPE Grass Blade Lower Bound Half-Life Calculations (Geosyntec)

Month	UV Lamp On[(1)] (hours/day)	Months @ 80 C[(2)]	Months @ 70 C[(2)]	Months @ 60 C[(2)]	Peak Turf Temp[(3)] (C.)	Half-life Months (from Regression)	Half-life Loss per month
January	4.00	692	1507	3078	27.99	6948	0.000143933
February	4.94	620	1352	2761	27.96	6256	0.000159849
March	6.13	452	984	2010	33.94	4059	0.00024637
April	6.94	412	898	1834	40.58	3213	0.000311281
May	7.25	382	832	1698	51.21	2248	0.000444747
June	7.31	391	852	1740	61.52	1580	0.000633027
July	6.94	399	869	1775	66.82	1237	0.00080834
August	7.00	395	861	1759	64.80	1371	0.000729293
September	6.94	412	898	1834	59.43	1826	0.000547629
October	5.88	471	1026	2095	47.74	3070	0.000325779
November	4.56	627	1365	2788	36.38	5321	0.000187929
December	3.69	750	1635	3339	24.68	7945	0.000125871
Lab	20					**Yearly Half-life Loss**	0.00466405
						Half-life (years)	214.41

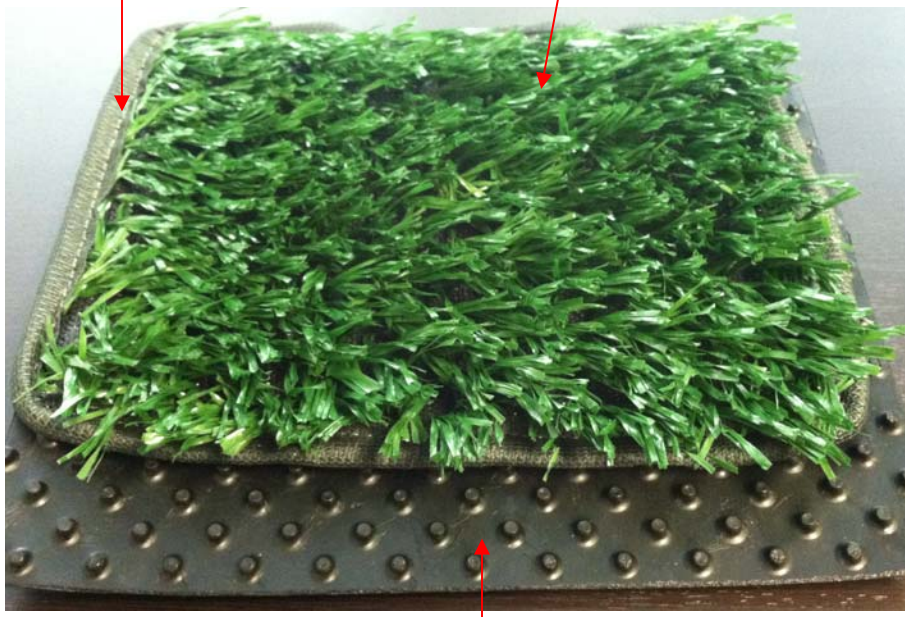
Notes:

(1) UV Lamp On (hours per day) is given in Richgels (2015a, 2015b).

(2) The months required at each temperature is calculated using the regressions from Figure 4 for each temperature, projected down to half-life, then dividing the lamp-hours at half-life by the UV lamp on hours per day for a given month. Once this calculation is done for 80, 70 and 60 C, a linear regression (as shown in Figure 5) is used to obtain the half-life months at the corresponding peak turf temp.

(3) Peak turf temperatures given in Richgels (2015a, 2015b).

FIGURES





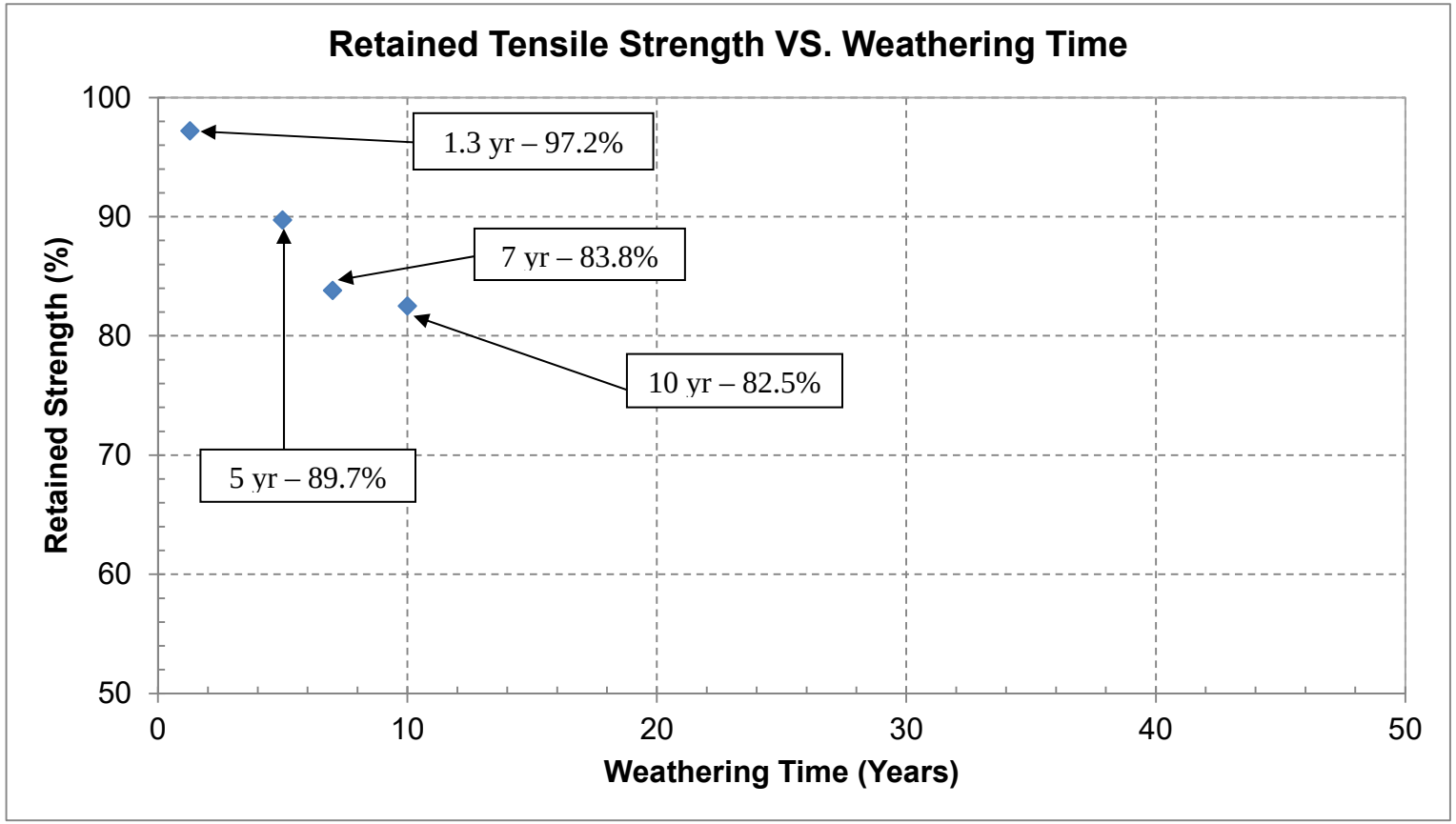
Note: The sand ballast infill is not shown in the sample photo on the left, but is shown in a field application photo on the right.

ClosureTurf®Components
Watershed Geosynthetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure **1**

Kennesaw, GA | 23-April-2015



Notes:

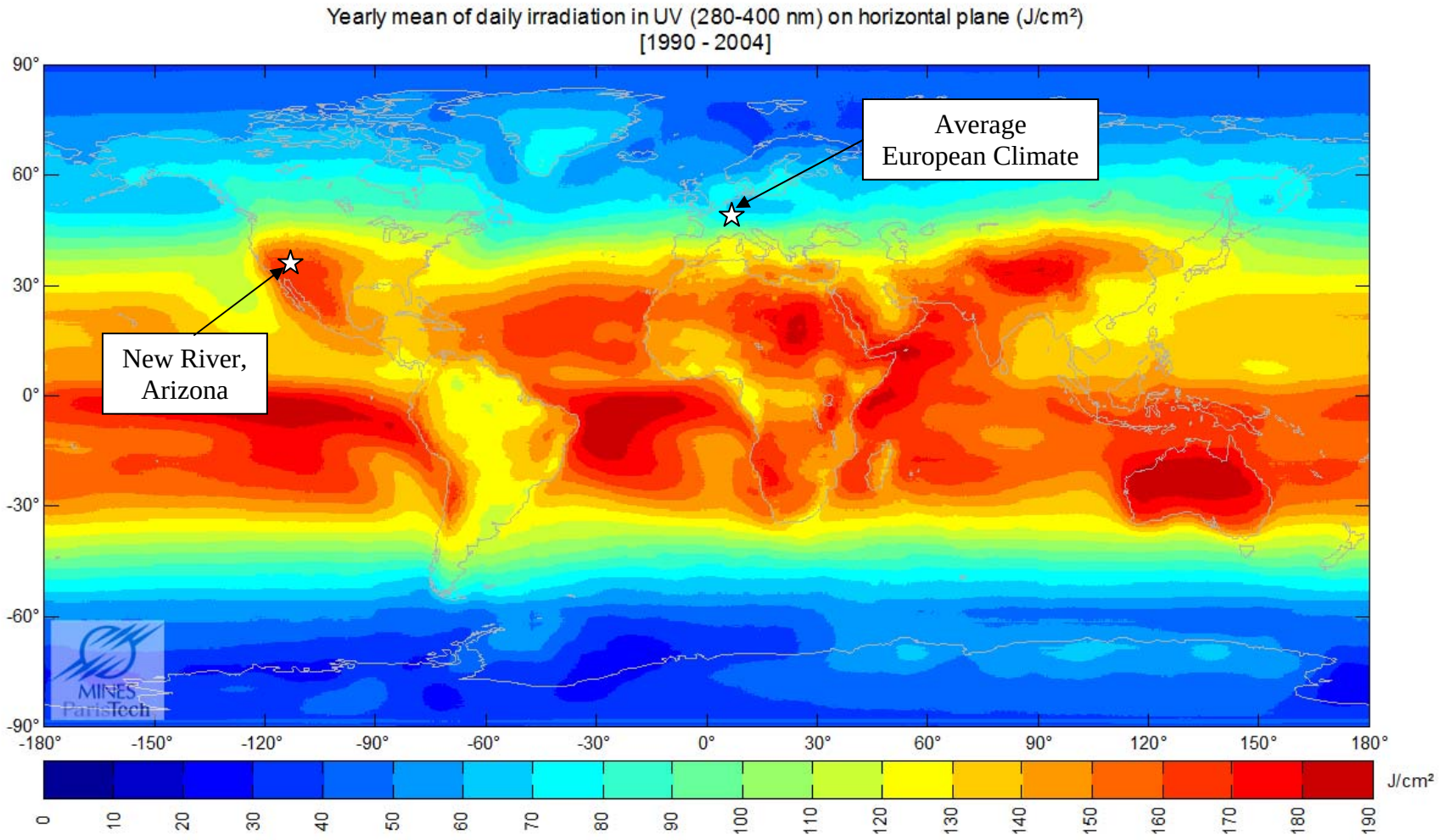
1. The first data point at Weathering Time of 1.3 years is considered to be within the initial stage of UV degradation (i.e., anti-oxidant depletion), rather than polymer oxidation which is represented by the final three data points.
2. Each data point represents the average result of 20 tensile break tests.

Field Test Data (Watershed, 2014)
New River, AZ Atlas Testing Facility
Watershed Geosynthetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure **2**

Kennesaw, GA | 25-April-2015



1 J/cm^2 = 4.755 ft-lbs/in^2

Yearly Irradiation in the Ultraviolet Range

Watershed Geosynthetics – ClosureTurf® UV Assessment

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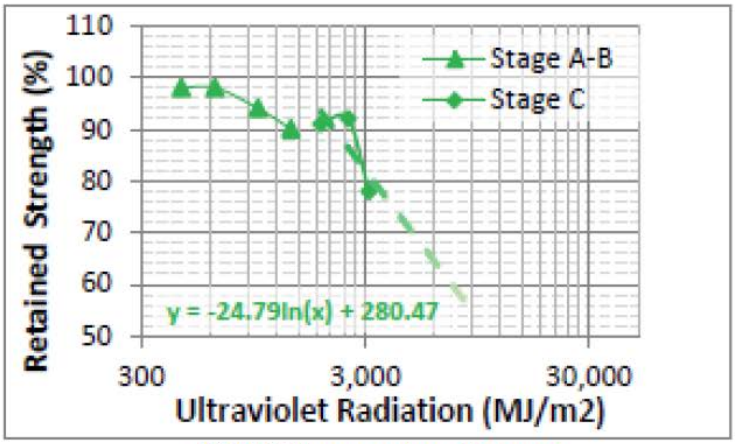
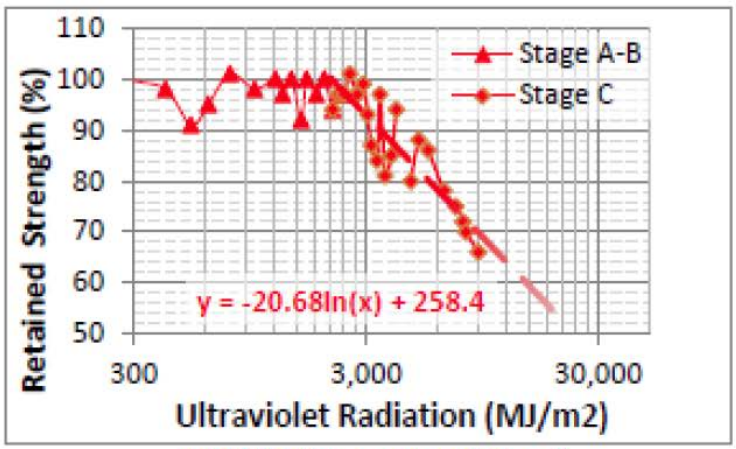
Figure 3

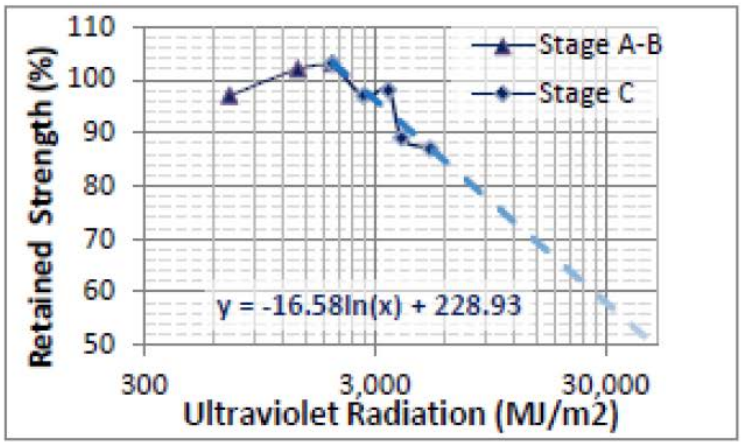
Kennesaw, GA | 23-April-2015



a) 80°C Temperature Dataset



b) 70°C Temperature Dataset



c) 60°C Temperature Dataset

GSI Data Release - Three Stage Oxidation of HDPE for Different Temperatures

Watershed Geosynthetics – ClosureTurf® UV Assessment

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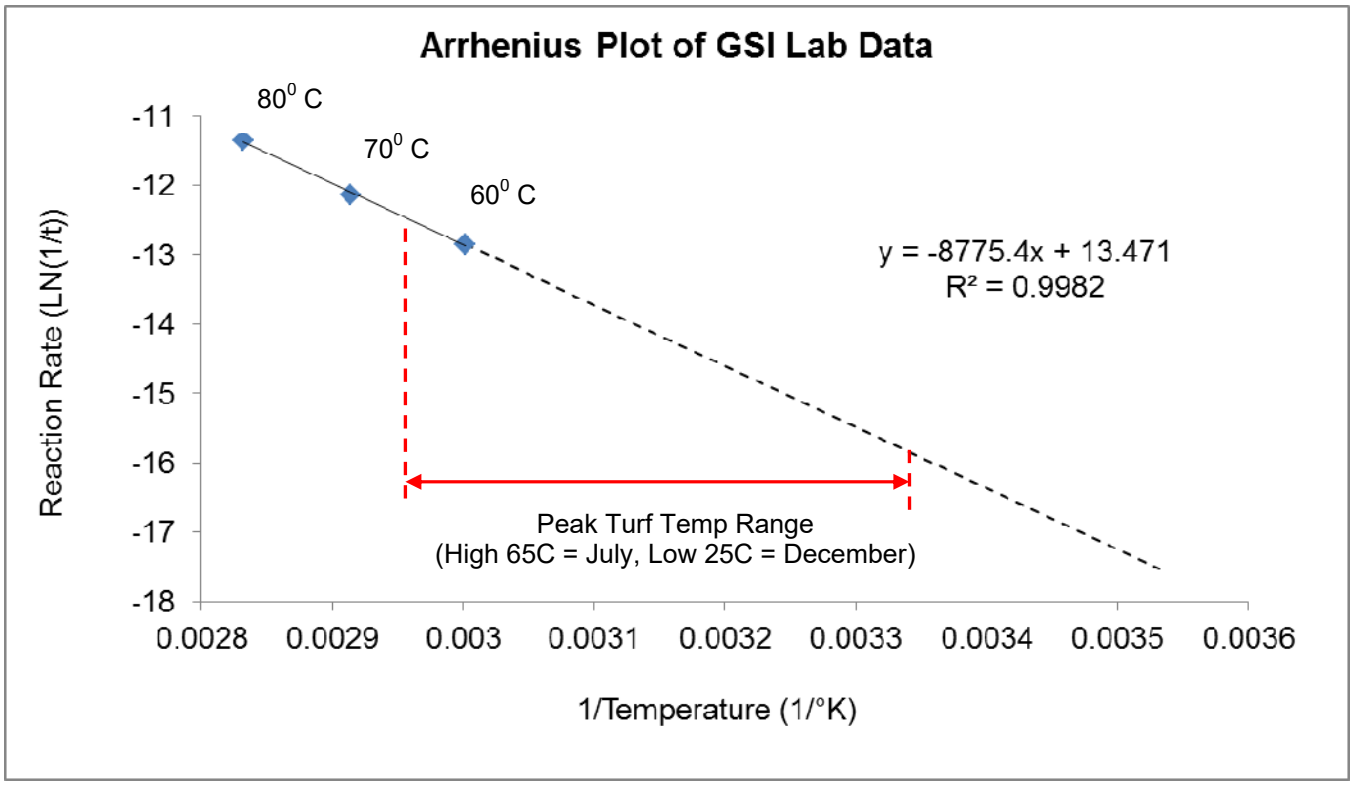
Figure 4

Kennesaw, GA | 23-April-2015



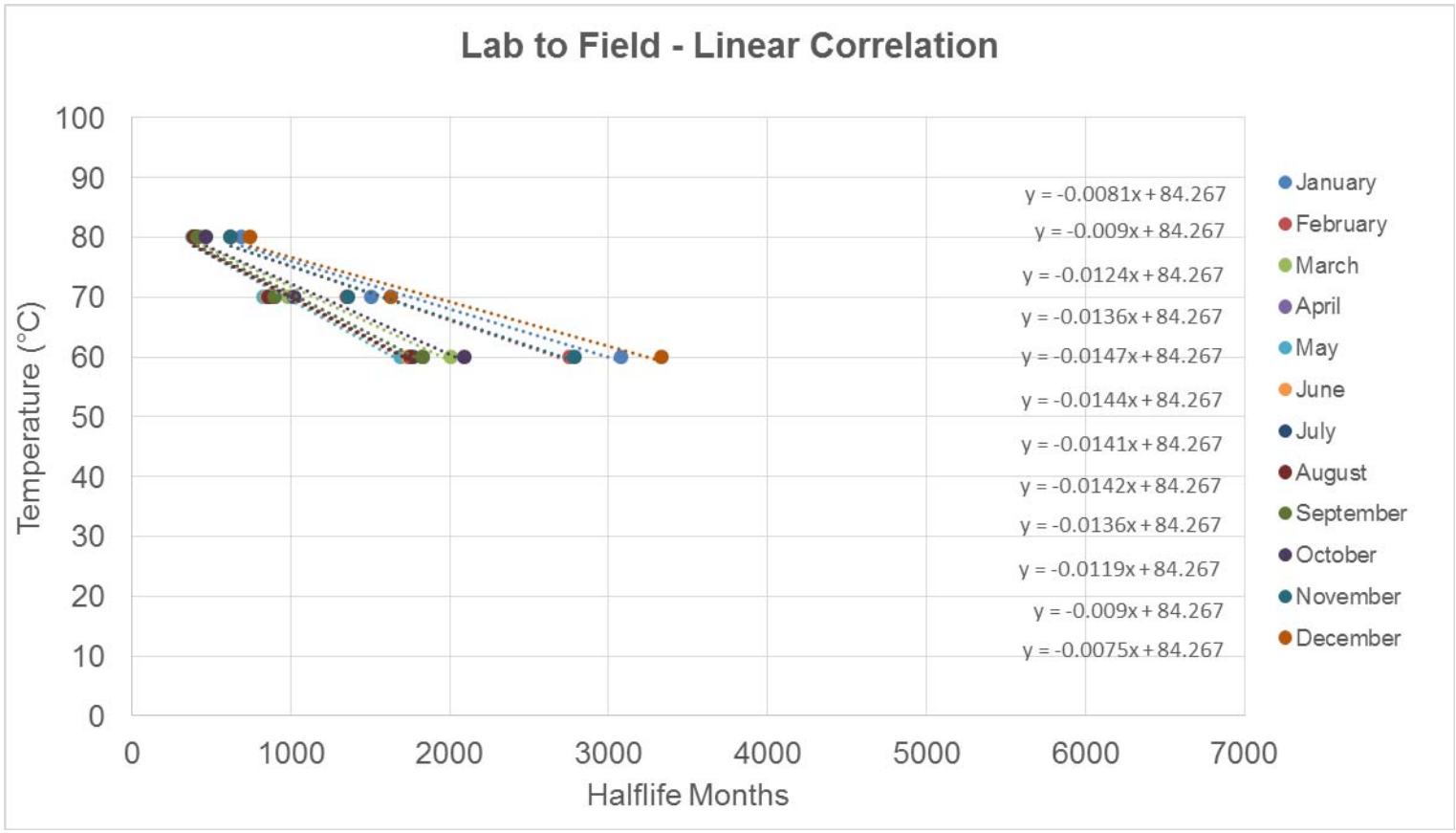
Note: Richgels (2015b) mentions that the use of peak turf temperature is conservative since it only occurs for approximately one hour per day.

Arrhenius Plot of Lab Data
Watershed Geosynthetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure 5

Kennesaw, GA | 23-April-2015



Note: Each month was projected down to the peak turf temperature given in Table 3 to get the half-life months. The inverse of half-life months is half-life loss per month. The sum of all the half-life losses for each month in a year is the yearly half-life loss, the inverse of which is the half-life.

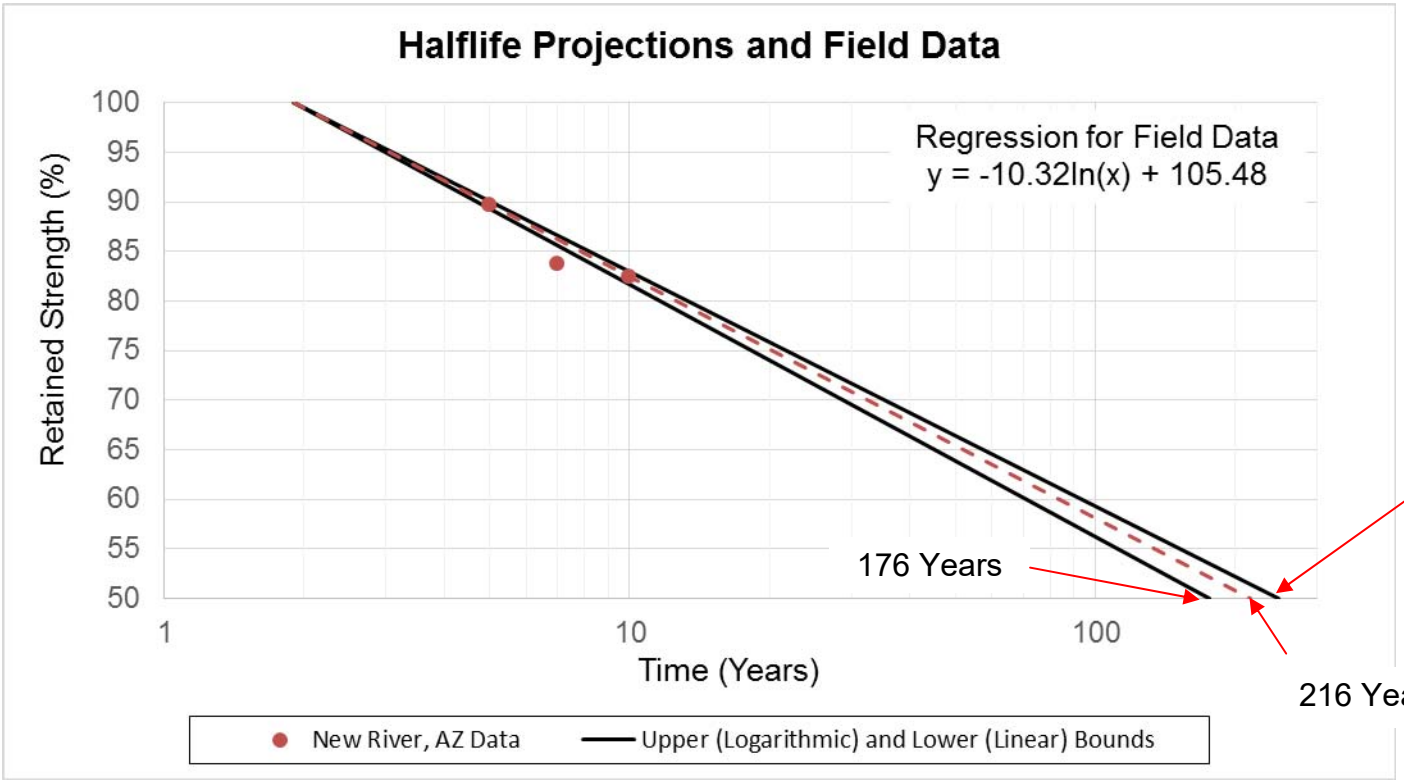
Linear Extrapolations for Half-life Months

Watershed Geosythetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure **6**

Kennesaw, GA | 23-April-2015



Note: Geosyntec calculated an upper bound half-life of 277 years and a lower bound half-life of 214 years using the same data and method. Difference between Geosyntec and Richgels calculations are attributed to rounding.

Halflife Projections (Richgels, 2015a, 2015b)
Upper and Lower Bound Estimates
Watershed Geosythetics – ClosureTurf® UV Assessment

Geosyntec consultants

Figure **7**

Kennesaw, GA | 23-March-2015

See page 20 Sub D

January 4, 2013

SUBJECT: CLOSURE TURF INFILTRATION EQUIVALENCE CALCULATION

The infiltration equivalence of Closure Turf to the Texas final cover prescriptive standard can be estimated by several methods. One method was described by J.P. Giroud et.al.[1] for assumed circular defects in geomembranes. Estimates of infiltration, Q (m^3/sec) can be found from the following equation:

$$Q = 0.976\, C_{qo} \left[1 + 0.1 \left(\frac{h}{t_{UM}} \right)^{0.95} \right] d^{0.2}\, h^{0.9}\, k_{UM}^{0.74} \qquad [1]$$

Where, h = hydraulic head over the liner (m)
t_{UM} = thickness of the infiltration layer (m)
d = diameter of defect (m)
k_{UM} = permeability of infiltration layer (m/sec)

The contact coefficient C_{qo} is either 0.21 or 1.15 to account for good or poor contact conditions between the geomembrane and the infiltration layer soil. With typical CQA procedures controlling installation, the contact coefficient would be 0.21. This equation is only valid for infiltration soil permeability's less than the so-called Giroud permeability, k_G. Higher permeability values result in Bernoulli type orifice flow through the defects. The upper permeability limit is found from:

$$k_G = \left\{ \frac{0.3891\, d^{1.8}}{C_{qo} \left[1 + 0.1 \left(\frac{h}{t_{UM}} \right)^{0.95} \right] h^{0.4}} \right\}^{1/0.74} \qquad [2]$$

The infiltration potential of the Closure Turf final cover system is compared to the Texas prescriptive standard using Equation 1. The final cover profiles analyzed are as follows:

---

[1] *Rate Of Liquid Migration Through Defects In A Geomembrane Placed On A Semi-Permeable Medium*, J.P. Giroud, T.D. King, T.R. Sanglerat, T. Hadj-Hamou and M.V. Khire, Geosynthetics International 1997, Vol. 4, Nos. 3-4

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379 •
Fax 843 546-0516

Texas Final Cover Prescriptive Standard	Closure Turf Final Cover System
1 foot of Topsoil[2]	½" sand ballast (minimum thickness)
Geomembrane[3]	Artificial HDPE grass turf tufted into a polypropylene double-layered woven geotextile
	50-mil LLDPE Supergripnet (SGN) geomembrane
18-inch infiltration layer (k = 1x10-5 cm/sec)	12" minimum infiltration layer

The results of the Giroud analysis are shown on Table 1 below. Two scenarios for the soil layer beneath the Closure Turf system were compared against the prescriptive standard;

a. A silty sandy soil with permeability higher than the prescriptive standard for a infiltration layer, and

b. A silty, clayey sand with permeability at the prescribed level of the prescriptive standard.

It should be noted the required permeability value of $1x10^{-5}$ cm/sec in the infiltration layer is quite achievable with typical soils. Lower permeability soils require significant clay content (typically greater than 50% passing the #200 sieve). This permeability specification is basically common soil.

As can be seen on Table 1, the estimated infiltration of the Closure Turf final cover system is well below the estimated infiltration rates for the prescriptive standard final cover system for both assumed subgrade soil conditions. The assumed permeabilities of the subgrade soils are below the upper limit as calculated by Equation 2, so use of Equation 1 in performing these calculations is valid.

These results are primarily due to the much lower hydraulic head capacity of the Closure Turf system with only a ½" topsoil layer in a saturated ballast sand.

---

[2] The prescriptive standard only calls for 6-inches, but that is too difficult to place without damaging the liner.

[3] A drainage media (typ. Geocomposite) is also required for stability

Table 1

Landfill Final Cover Infiltration Equivalency Calculation

Soil Type: Silty-sandy soil

	Prescriptive Cover		Closure Turf	
Topsoil (h)	12 in	0.3048 m	0.5 in	0.0127 m
Infiltration Layer (t_{UM})	18 in	0.4572 m	18 in	0.4572 m
Diameter of Hole (d)	1 cm	0.01 m	1 cm	0.01 m
Area of Hole	0.79 cm^2	7.85E-05 m^2	0.79 cm^2	7.85E-05 m^2
C_{qo}		0.21		0.21
Infiltration Layer k, k_{UM}	1.00E-05 cm/sec	1.00E-07 m/sec	1.00E-04 cm/sec	1.00E-06 m/sec
Upper Permeability Limit, k_G		5.46E-05 m/sec		3.31E-04 m/sec
Flow		1.98E-07 m^3/sec		5.84E-08 m^3/sec
Estimated Infiltration, Q		**4.51 Ga/day**		**1.33 Ga/day**

Soil Type: Silty-sandy soil some clay

	Prescriptive Cover		Closure Turf	
Topsoil (h)	12 in	0.3048 m	0.5 in	0.0127 m
Infiltration Layer (t_{UM})	18 in	0.4572 m	18 in	0.4572 m
Diameter of Hole (d)	1 cm	0.01 m	1 cm	0.01 m
Area of Hole	0.79 cm^2	7.85E-05 m^2	0.79 cm^2	7.85E-05 m^2
C_{qo}		0.21		0.21
Infiltration Layer k, k_{UM}	1.00E-05 cm/sec	1.00E-07 m/sec	1.00E-05 cm/sec	1.00E-07 m/sec
Upper Permeability Limit, k_G		5.46E-05 m/sec		3.31E-04 m/sec
Flow		1.98E-07 m^3/sec		1.06E-08 m^3/sec
Estimated Infiltration, Q		**4.51 Ga/day**		**0.24 Ga/day**

The Closure Turf Final Cover System provides equivalent or better infiltration protection than the prescriptive standard for construction of landfill final closure systems.

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379 •
Fax 843 546-0516

If you have any questions regarding this matter, please call the undersigned at (916) 218-8375.

Very Truly Yours,

AGRU-America, Inc.
Christopher M. Richgels, PE
Western Region Engineer

Cc: Michael Ayers, Closure Turf, LLC
Jose Urrutia, Closure Turf LLC
Joe Viecelli, IESI- Progressive Waste Solutions
Jeff Palutis, IESI Progressive Waste Solutions
Joe Miller, IESI – Progressive Waste Solutions
Joey Miller, IESI – Progressive Waste Solutions
Nevzat Turan, Weaver Boos Consultants
Anne Steacy, Agru-America, Inc.

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                   DEVELOPED BY ENVIRONMENTAL LABORATORY          **
**                     USAE WATERWAYS EXPERIMENT STATION            **
**              FOR USEPA RISK REDUCTION ENGINEERING LABORATORY      **
**                                                                  **
**                                                                  **
**********************************************************************
**********************************************************************

PRECIPITATION DATA FILE:     C:\ZHELP3W\DALLAS.D4
TEMPERATURE DATA FILE:       C:\zhELP3w\DALLAS.D7
SOLAR RADIATION DATA FILE:   C:\zhELP3w\DALLAS.D13
EVAPOTRANSPIRATION DATA:     C:\zHELP3w\DALLAS.D11
SOIL AND DESIGN DATA FILE:   C:\zhELP3w\DLS-SOIL.D10
OUTPUT DATA FILE:            C:\zheLP3w\DLS-soil.OUT

TIME:  11:27     DATE:   8/ 6/2013

**********************************************************************

     TITLE:  Subtitle D with Soil Cap : Dallas, Texas

**********************************************************************

     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
            COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                     MATERIAL TEXTURE NUMBER   6
          THICKNESS                     =     24.00   INCHES
          POROSITY                      =      0.4530 VOL/VOL
          FIELD CAPACITY                =      0.1900 VOL/VOL
          WILTING POINT                 =      0.0850 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.1968 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.720000011000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

                                LAYER  2
                                --------

                  TYPE 2 - LATERAL DRAINAGE LAYER
                     MATERIAL TEXTURE NUMBER   0
          THICKNESS                     =      0.20   INCHES
          POROSITY                      =      0.8500 VOL/VOL
          FIELD CAPACITY                =      0.0100 VOL/VOL
          WILTING POINT                 =      0.0050 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.8500 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.199999996000E-12 CM/SEC
          SLOPE                         =      7.00   PERCENT
          DRAINAGE LENGTH               =    100.0    FEET

Subtitle D with Soil Cap
Page- 1 -
```

2' vegetated Cover
geocomposite Drainage
40 mil geomembrane

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

40mil Liner

THICKNESS	=	0.04	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 4

18" 1.7×10^{-5} cm/sec

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 15

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4750	VOL/VOL
FIELD CAPACITY	=	0.3780	VOL/VOL
WILTING POINT	=	0.2650	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4750	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.170000003000E-04	CM/SEC

LAYER 5

WASTE

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	600.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 6

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 3

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.0830	VOL/VOL
WILTING POINT	=	0.0330	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4570	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.310000009000E-02	CM/SEC

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL

WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0103	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	2.00000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	100.0	FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	1.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 9

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	85.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	1.212	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	4.530	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.850	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	204.378	INCHES
TOTAL INITIAL WATER	=	204.378	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
DALLAS TEXAS

STATION LATITUDE	=	32.85	DEGREES
MAXIMUM LEAF AREA INDEX	=	4.50	
START OF GROWING SEASON (JULIAN DATE)	=	63	
END OF GROWING SEASON (JULIAN DATE)	=	329	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	10.80	MPH

AVERAGE 1ST QUARTER RELATIVE HUMIDITY = 66.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 63.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 66.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.65	1.93	2.42	3.63	4.27	2.59
2.00	1.76	3.31	2.47	1.76	1.67

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
44.00	48.50	56.10	65.90	73.70	82.00
86.30	85.50	78.60	67.90	55.60	47.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS
AND STATION LATITUDE = 32.85 DEGREES

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.66	1.23	0.77	0.36	1.86	0.86
	0.41	3.84	2.04	0.96	1.04	2.67
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.001	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.506	0.866	1.221	0.464	1.953	1.078
	0.411	3.519	2.018	0.566	1.420	1.469
LATERAL DRAINAGE COLLECTED	0.2423	0.1579	0.1263	0.0885	0.0671	0.0464
FROM LAYER 2	0.0342	0.0614	0.0908	0.0669	0.0458	0.1173
PERCOLATION/LEAKAGE THROUGH	0.0048	0.0033	0.0028	0.0021	0.0017	0.0013
LAYER 4	0.0011	0.0016	0.0021	0.0017	0.0013	0.0025
PERCOLATION/LEAKAGE THROUGH	0.0048	0.0033	0.0028	0.0021	0.0017	0.0013
LAYER 6	0.0011	0.0016	0.0021	0.0017	0.0013	0.0025
LATERAL DRAINAGE COLLECTED	0.0048	0.0033	0.0028	0.0021	0.0017	0.0013
FROM LAYER 7	0.0011	0.0016	0.0021	0.0017	0.0013	0.0025
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	2.949	2.183	1.632	1.237	0.961	0.744
	0.587	0.897	1.265	0.959	0.737	1.530
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.276	0.180	0.144	0.095	0.075	0.053
	0.039	0.546	0.104	0.077	0.062	1.337
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.70	60621.004	100.00
RUNOFF	0.001	2.868	0.00
EVAPOTRANSPIRATION	15.491	56232.602	92.76
DRAINAGE COLLECTED FROM LAYER 2	1.1449	4155.898	6.86
PERC./LEAKAGE THROUGH LAYER 4	0.026333	95.589	0.16
AVG. HEAD ON TOP OF LAYER 3	1.3069		
PERC./LEAKAGE THROUGH LAYER 6	0.026332	95.586	0.16
AVG. HEAD ON TOP OF LAYER 6	0.0000		
DRAINAGE COLLECTED FROM LAYER 7	0.0263	95.572	0.16
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.037	134.042	0.22
SOIL WATER AT START OF YEAR	204.378	741893.000	
SOIL WATER AT END OF YEAR	204.415	742027.062	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.013	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 2

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.43	2.38	5.84	3.33	3.03	2.24
	0.62	4.38	3.34	1.61	1.74	1.55
RUNOFF	0.000	0.000	0.133	0.095	0.177	0.000
	0.000	0.155	0.402	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.806	1.144	3.837	2.210	3.190	1.873
	1.455	3.717	1.633	2.087	1.273	1.263
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.2486	0.1567	0.5465	0.6917	0.6174	0.5250
	0.3880	0.2852	0.4867	0.3856	0.2696	0.1979
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0049	0.0032	0.0097	0.0120	0.0109	0.0093
	0.0072	0.0055	0.0087	0.0071	0.0052	0.0040
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0049	0.0033	0.0096	0.0120	0.0109	0.0094
	0.0072	0.0055	0.0087	0.0071	0.0052	0.0040
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0049	0.0033	0.0094	0.0120	0.0109	0.0094
	0.0072	0.0055	0.0087	0.0072	0.0052	0.0040
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	3.020	2.169	6.400	8.309	7.204	6.355
	4.602	3.436	5.906	4.574	3.360	2.445
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.280	0.550	2.012	0.638	0.604	0.590
	0.441	0.520	0.796	0.438	0.303	0.321
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.49	110678.703	100.00
RUNOFF	0.963	3497.404	3.16
EVAPOTRANSPIRATION	24.489	88893.891	80.32
DRAINAGE COLLECTED FROM LAYER 2	4.7988	17419.822	15.74

PERC./LEAKAGE THROUGH LAYER 4	0.087669	318.238	0.29
AVG. HEAD ON TOP OF LAYER 3	4.8150		
PERC./LEAKAGE THROUGH LAYER 6	0.087682	318.285	0.29
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.0877	318.345	0.29
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	0.151	549.241	0.50
SOIL WATER AT START OF YEAR	204.415	742027.062	
SOIL WATER AT END OF YEAR	204.566	742576.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.003	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 3

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.77	0.45	5.08	2.18	2.07	3.94
	2.38	2.75	2.65	0.35	0.55	0.47
RUNOFF	0.000	0.000	0.176	0.007	0.000	0.192
	0.049	0.001	0.082	0.000	0.000	0.000
EVAPOTRANSPIRATION	1.486	0.221	2.166	2.050	2.191	1.452
	3.160	2.879	2.302	0.350	0.501	0.262
LATERAL DRAINAGE COLLECTED	0.1906	0.1281	0.5788	0.7582	0.5605	0.3959
FROM LAYER 2	0.6416	0.4579	0.3741	0.3130	0.2163	0.1596
PERCOLATION/LEAKAGE THROUGH	0.0039	0.0028	0.0101	0.0131	0.0099	0.0073
LAYER 4	0.0112	0.0083	0.0069	0.0059	0.0043	0.0034
PERCOLATION/LEAKAGE THROUGH	0.0039	0.0028	0.0100	0.0131	0.0100	0.0072
LAYER 6	0.0113	0.0083	0.0069	0.0060	0.0043	0.0034
LATERAL DRAINAGE COLLECTED	0.0039	0.0028	0.0098	0.0131	0.0100	0.0072
FROM LAYER 7	0.0113	0.0083	0.0069	0.0060	0.0043	0.0034
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	2.363	1.809	6.766	9.088	6.559	4.841
TOP OF LAYER 3	7.479	5.395	4.586	3.751	2.736	2.011

STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.147 0.685	0.146 0.520	4.663 0.379	0.857 0.356	0.636 0.246	0.795 0.182
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	23.64	85813.195	100.00
RUNOFF	0.506	1837.062	2.14
EVAPOTRANSPIRATION	19.019	69037.484	80.45
DRAINAGE COLLECTED FROM LAYER 2	4.7747	17332.043	20.20
PERC./LEAKAGE THROUGH LAYER 4	0.087030	315.920	0.37
AVG. HEAD ON TOP OF LAYER 3	4.7820		
PERC./LEAKAGE THROUGH LAYER 6	0.087039	315.953	0.37
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.0870	315.990	0.37
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	-0.746	-2709.373	-3.16
SOIL WATER AT START OF YEAR	204.566	742576.250	
SOIL WATER AT END OF YEAR	203.820	739866.875	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.018	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 4

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.60	3.00	1.38	9.19	5.02	1.33

	0.78	1.25	5.07	0.11	1.42	1.67
RUNOFF	0.059	0.000	0.000	1.843	0.285	0.000
	0.000	0.000	0.271	0.000	0.000	0.012
EVAPOTRANSPIRATION	1.236	2.327	1.879	3.216	3.865	2.250
	0.780	1.250	2.749	1.358	1.196	1.386
LATERAL DRAINAGE COLLECTED	0.2078	0.3033	0.4371	0.7708	1.0921	0.9268
FROM LAYER 2	0.6858	0.4874	0.3470	0.4706	0.3368	0.2873
PERCOLATION/LEAKAGE THROUGH	0.0042	0.0057	0.0080	0.0132	0.0184	0.0157
LAYER 4	0.0119	0.0088	0.0065	0.0085	0.0063	0.0055
PERCOLATION/LEAKAGE THROUGH	0.0041	0.0057	0.0080	0.0131	0.0184	0.0157
LAYER 6	0.0120	0.0088	0.0064	0.0085	0.0063	0.0055
LATERAL DRAINAGE COLLECTED	0.0041	0.0057	0.0080	0.0129	0.0184	0.0158
FROM LAYER 7	0.0120	0.0088	0.0064	0.0085	0.0063	0.0055
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	2.557	3.879	5.159	9.236	12.590	11.066
TOP OF LAYER 3	7.981	5.730	4.268	5.539	4.148	3.459
STD. DEVIATION OF DAILY	0.931	0.737	0.463	3.536	1.113	1.026
HEAD ON TOP OF LAYER 3	0.778	0.554	0.654	0.468	0.295	0.142
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.82	119136.609	100.00
RUNOFF	2.470	8965.638	7.53
EVAPOTRANSPIRATION	23.492	85277.633	71.58
DRAINAGE COLLECTED FROM LAYER 2	6.3529	23060.910	19.36
PERC./LEAKAGE THROUGH LAYER 4	0.112597	408.726	0.34
AVG. HEAD ON TOP OF LAYER 3	6.3010		
PERC./LEAKAGE THROUGH LAYER 6	0.112576	408.652	0.34
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1125	408.531	0.34

PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	0.392	1423.895	1.20
SOIL WATER AT START OF YEAR	203.820	739866.875	
SOIL WATER AT END OF YEAR	204.212	741290.812	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.003	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.48	1.36	1.65	3.43	4.48	3.16
	1.52	1.72	1.94	3.11	0.73	0.81
RUNOFF	0.000	0.000	0.000	0.000	0.059	0.120
	0.000	0.001	0.005	0.010	0.000	0.000
EVAPOTRANSPIRATION	0.823	1.825	1.914	3.551	4.313	2.957
	1.520	0.895	2.759	2.021	0.719	0.652
LATERAL DRAINAGE COLLECTED	0.2396	0.1561	0.1248	0.0865	0.0687	0.0596
FROM LAYER 2	0.0833	0.0591	0.0407	0.2071	0.2396	0.1768
PERCOLATION/LEAKAGE THROUGH	0.0047	0.0032	0.0028	0.0021	0.0017	0.0016
LAYER 4	0.0020	0.0016	0.0012	0.0041	0.0047	0.0037
PERCOLATION/LEAKAGE THROUGH	0.0047	0.0032	0.0028	0.0021	0.0018	0.0016
LAYER 6	0.0020	0.0016	0.0012	0.0041	0.0047	0.0037
LATERAL DRAINAGE COLLECTED	0.0047	0.0033	0.0028	0.0021	0.0018	0.0015
FROM LAYER 7	0.0020	0.0016	0.0012	0.0040	0.0047	0.0037
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	2.918	2.161	1.616	1.214	0.980	0.899
TOP OF LAYER 3	1.145	0.870	0.677	2.549	3.009	2.206
STD. DEVIATION OF DAILY	0.273	0.178	0.142	0.100	0.069	0.279
HEAD ON TOP OF LAYER 3	0.095	0.068	0.047	1.577	0.273	0.201
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	25.39	92165.703	100.00
RUNOFF	0.194	705.830	0.77
EVAPOTRANSPIRATION	23.952	86945.367	94.34
DRAINAGE COLLECTED FROM LAYER 2	1.5420	5597.336	6.07
PERC./LEAKAGE THROUGH LAYER 4	0.033307	120.904	0.13
AVG. HEAD ON TOP OF LAYER 3	1.6871		
PERC./LEAKAGE THROUGH LAYER 6	0.033325	120.971	0.13
AVG. HEAD ON TOP OF LAYER 6	0.0000		
DRAINAGE COLLECTED FROM LAYER 7	0.0334	121.062	0.13
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.332	-1203.833	-1.31
SOIL WATER AT START OF YEAR	204.212	741290.812	
SOIL WATER AT END OF YEAR	203.881	740086.937	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.062	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 6

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.37	3.76	3.22	6.02	3.62	2.45
	1.15	1.39	2.97	5.98	3.52	0.94
RUNOFF	0.000	0.020	0.183	0.377	0.206	0.075
	0.000	0.002	0.011	0.750	0.192	0.000
EVAPOTRANSPIRATION	0.413	1.630	2.969	3.494	2.916	2.323
	1.142	1.386	1.925	2.641	1.220	1.645
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1255	0.1568	0.6489	0.6020	1.0939	0.7862
	0.5924	0.4218	0.2929	1.0431	0.9448	0.9854

PERCOLATION/LEAKAGE THROUGH	0.0028	0.0032	0.0113	0.0106	0.0184	0.0135
LAYER 4	0.0105	0.0077	0.0056	0.0175	0.0160	0.0167
PERCOLATION/LEAKAGE THROUGH	0.0028	0.0031	0.0113	0.0106	0.0184	0.0135
LAYER 6	0.0105	0.0077	0.0056	0.0174	0.0160	0.0167
LATERAL DRAINAGE COLLECTED	0.0028	0.0030	0.0113	0.0105	0.0183	0.0136
FROM LAYER 7	0.0105	0.0078	0.0056	0.0173	0.0160	0.0168
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	1.624	2.170	7.562	7.257	12.611	9.417
TOP OF LAYER 3	6.921	4.985	3.634	12.034	11.276	11.379
STD. DEVIATION OF DAILY	0.143	1.906	1.159	1.064	1.263	0.824
HEAD ON TOP OF LAYER 3	0.662	0.477	0.324	3.824	1.018	1.023
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	35.39	128465.695	100.00
RUNOFF	1.816	6591.679	5.13
EVAPOTRANSPIRATION	23.704	86045.531	66.98
DRAINAGE COLLECTED FROM LAYER 2	7.6937	27928.172	21.74
PERC./LEAKAGE THROUGH LAYER 4	0.133678	485.252	0.38
AVG. HEAD ON TOP OF LAYER 3	7.5724		
PERC./LEAKAGE THROUGH LAYER 6	0.133588	484.925	0.38
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1335	484.431	0.38
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0002		
CHANGE IN WATER STORAGE	2.043	7415.866	5.77
SOIL WATER AT START OF YEAR	203.881	740086.937	

SOIL WATER AT END OF YEAR	205.924	747502.812	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.012	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 7

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.97	2.08	1.13	0.84	1.93	4.80
	2.60	3.16	2.86	5.59	2.28	2.33
RUNOFF	0.000	0.019	0.000	0.000	0.000	0.102
	0.000	0.062	0.001	0.194	0.000	0.015
EVAPOTRANSPIRATION	2.026	1.910	0.801	1.337	1.394	4.049
	1.420	3.447	2.444	2.730	1.558	2.012
LATERAL DRAINAGE COLLECTED	0.7078	0.4755	0.4211	0.2911	0.2155	0.4339
FROM LAYER 2	0.3636	0.3964	0.3331	0.5846	0.6950	0.9266
PERCOLATION/LEAKAGE THROUGH	0.0123	0.0085	0.0077	0.0055	0.0043	0.0079
LAYER 4	0.0068	0.0073	0.0062	0.0103	0.0121	0.0157
PERCOLATION/LEAKAGE THROUGH	0.0123	0.0085	0.0077	0.0056	0.0043	0.0078
LAYER 6	0.0068	0.0073	0.0063	0.0103	0.0120	0.0157
LATERAL DRAINAGE COLLECTED	0.0124	0.0085	0.0077	0.0056	0.0043	0.0078
FROM LAYER 7	0.0068	0.0073	0.0063	0.0102	0.0120	0.0157
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	8.230	6.173	4.978	3.612	2.645	5.287
TOP OF LAYER 3	4.325	4.697	4.105	6.832	8.347	10.713
STD. DEVIATION OF DAILY	0.796	0.344	0.478	0.331	0.238	1.247
HEAD ON TOP OF LAYER 3	0.413	1.009	0.379	1.855	0.283	1.233
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	31.57	114599.102	100.00
RUNOFF	0.394	1428.910	1.25
EVAPOTRANSPIRATION	25.129	91219.961	79.60
DRAINAGE COLLECTED FROM LAYER 2	5.8441	21214.211	18.51
PERC./LEAKAGE THROUGH LAYER 4	0.104593	379.673	0.33
AVG. HEAD ON TOP OF LAYER 3	5.8286		
PERC./LEAKAGE THROUGH LAYER 6	0.104584	379.640	0.33
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1046	379.582	0.33
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	0.098	356.375	0.31
SOIL WATER AT START OF YEAR	205.924	747502.812	
SOIL WATER AT END OF YEAR	206.022	747859.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.053	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 8

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.03	2.16	0.77	5.84	1.59	2.91
	5.26	1.42	1.24	0.93	0.61	0.69
RUNOFF	0.000	0.030	0.000	0.202	0.000	0.088
	1.539	0.021	0.001	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.506	1.790	1.344	4.261	1.727	2.423
	2.282	1.391	1.063	1.106	0.375	0.431
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.7656	0.5155	0.4590	0.4551	0.5732	0.4222
	0.7889	0.6198	0.4299	0.3174	0.2193	0.1619
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0132	0.0092	0.0083	0.0082	0.0101	0.0077
	0.0136	0.0109	0.0078	0.0060	0.0044	0.0034

PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0132	0.0092	0.0083	0.0082	0.0102	0.0077
	0.0135	0.0109	0.0078	0.0060	0.0044	0.0034
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0133	0.0092	0.0083	0.0081	0.0102	0.0077
	0.0135	0.0110	0.0079	0.0060	0.0044	0.0034
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	8.886	6.452	5.407	5.536	6.703	5.149
	9.150	7.232	5.239	3.801	2.771	2.036
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.869	0.565	0.464	1.579	0.651	0.492
	1.639	0.692	0.489	0.361	0.250	0.184
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	24.45	88753.508	100.00
RUNOFF	1.881	6827.652	7.69
EVAPOTRANSPIRATION	18.698	67872.141	76.47
DRAINAGE COLLECTED FROM LAYER 2	5.7277	20791.623	23.43
PERC./LEAKAGE THROUGH LAYER 4	0.102747	372.971	0.42
AVG. HEAD ON TOP OF LAYER 3	5.6968		
PERC./LEAKAGE THROUGH LAYER 6	0.102848	373.337	0.42
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1030	373.872	0.42
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0001		
CHANGE IN WATER STORAGE	-1.959	-7111.778	-8.01
SOIL WATER AT START OF YEAR	206.022	747859.187	
SOIL WATER AT END OF YEAR	204.063	740747.437	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	-0.009	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 9

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.12	2.45	3.05	4.91	6.34	2.02
	5.46	0.00	5.50	1.44	5.10	2.21
RUNOFF	0.000	0.036	0.000	0.713	0.123	0.000
	1.046	0.000	0.679	0.016	0.365	0.000
EVAPOTRANSPIRATION	0.637	2.077	2.993	2.436	4.495	3.038
	2.158	0.000	3.448	0.949	1.599	1.675
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1103	0.2923	0.3317	0.4248	0.6486	0.6619
	1.0356	0.8331	0.7930	0.7117	1.1294	1.0724
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0025	0.0055	0.0062	0.0077	0.0113	0.0115
	0.0175	0.0143	0.0136	0.0124	0.0189	0.0180
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0025	0.0054	0.0062	0.0076	0.0114	0.0115
	0.0174	0.0143	0.0136	0.0124	0.0188	0.0181
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0025	0.0054	0.0062	0.0076	0.0114	0.0116
	0.0173	0.0144	0.0136	0.0124	0.0187	0.0181
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	1.452	3.871	3.963	5.180	7.558	7.959
	11.949	9.652	9.496	8.274	13.441	12.367
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.284	1.271	0.323	2.253	0.534	0.708
	2.626	0.945	0.745	0.808	3.828	1.047
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT

PRECIPITATION	39.60	143748.016	100.00
RUNOFF	2.978	10811.631	7.52
EVAPOTRANSPIRATION	25.504	92579.203	64.40
DRAINAGE COLLECTED FROM LAYER 2	8.0447	29202.187	20.31
PERC./LEAKAGE THROUGH LAYER 4	0.139413	506.068	0.35
AVG. HEAD ON TOP OF LAYER 3	7.9301		
PERC./LEAKAGE THROUGH LAYER 6	0.139306	505.682	0.35
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1391	505.101	0.35
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0002		
CHANGE IN WATER STORAGE	2.934	10649.832	7.41
SOIL WATER AT START OF YEAR	204.063	740747.437	
SOIL WATER AT END OF YEAR	206.996	751397.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.048	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.69	1.43	2.01	1.22	7.68	0.24
	0.56	3.59	5.49	3.60	0.48	4.86
RUNOFF	0.000	0.000	0.008	0.000	1.533	0.000
	0.000	0.094	0.186	0.000	0.000	0.008
EVAPOTRANSPIRATION	1.537	0.809	1.890	1.831	2.293	1.404
	0.560	1.693	3.912	3.299	1.501	1.539
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.8165	0.5336	0.4281	0.3582	0.5681	0.8365
	0.6236	0.4432	0.6766	0.7812	0.5807	0.6325
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0140	0.0094	0.0078	0.0067	0.0100	0.0143
	0.0110	0.0081	0.0117	0.0135	0.0102	0.0111
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.0140	0.0094	0.0078	0.0067	0.0099	0.0143
	0.0110	0.0081	0.0117	0.0134	0.0103	0.0110
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0141	0.0095	0.0078	0.0067	0.0098	0.0143
	0.0110	0.0081	0.0117	0.0134	0.0103	0.0109
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	9.464	6.902	5.056	4.399	6.645	10.006
	7.275	5.228	8.132	9.062	7.008	7.376
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.898	0.607	0.521	0.391	3.343	0.858
	0.708	0.503	1.159	0.514	0.659	2.079
AVERAGE DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	31.85	115615.500	100.00
RUNOFF	1.829	6637.895	5.74
EVAPOTRANSPIRATION	22.269	80835.562	69.92
DRAINAGE COLLECTED FROM LAYER 2	7.2787	26421.648	22.85
PERC./LEAKAGE THROUGH LAYER 4	0.127702	463.558	0.40
AVG. HEAD ON TOP OF LAYER 3	7.2128		
PERC./LEAKAGE THROUGH LAYER 6	0.127702	463.558	0.40
AVG. HEAD ON TOP OF LAYER 6	0.0001		
DRAINAGE COLLECTED FROM LAYER 7	0.1277	463.553	0.40
PERC./LEAKAGE THROUGH LAYER 9	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0002		
CHANGE IN WATER STORAGE	0.346	1256.841	1.09
SOIL WATER AT START OF YEAR	206.996	751397.250	
SOIL WATER AT END OF YEAR	207.343	752654.125	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.005	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.11	2.03	2.49	3.73	3.76	2.39
	2.07	2.35	3.31	2.37	1.75	1.82
STD. DEVIATIONS	0.72	0.95	1.79	2.78	2.09	1.39
	1.89	1.40	1.53	2.11	1.51	1.31
RUNOFF						
TOTALS	0.006	0.010	0.050	0.324	0.238	0.058
	0.263	0.034	0.164	0.097	0.056	0.003
STD. DEVIATIONS	0.019	0.014	0.080	0.582	0.466	0.068
	0.555	0.054	0.228	0.237	0.124	0.006
EVAPOTRANSPIRATION						
TOTALS	0.997	1.460	2.102	2.485	2.834	2.285
	1.489	2.018	2.425	1.711	1.136	1.234
STD. DEVIATIONS	0.544	0.668	0.927	1.152	1.102	0.898
	0.851	1.280	0.843	0.994	0.446	0.584
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	0.3655	0.2876	0.4102	0.4527	0.5505	0.5094
	0.5237	0.4065	0.3865	0.4881	0.4677	0.4718
STD. DEVIATIONS	0.2796	0.1639	0.1750	0.2531	0.3623	0.3026
	0.3100	0.2340	0.2313	0.2944	0.3561	0.3905
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0067	0.0054	0.0075	0.0081	0.0097	0.0090
	0.0093	0.0074	0.0070	0.0087	0.0083	0.0084
STD. DEVIATIONS	0.0045	0.0027	0.0029	0.0041	0.0059	0.0049
	0.0051	0.0039	0.0038	0.0048	0.0057	0.0063
PERCOLATION/LEAKAGE THROUGH LAYER 6						
TOTALS	0.0067	0.0054	0.0075	0.0081	0.0097	0.0090
	0.0093	0.0074	0.0070	0.0087	0.0083	0.0084
STD. DEVIATIONS	0.0046	0.0027	0.0028	0.0041	0.0059	0.0050
	0.0051	0.0039	0.0038	0.0047	0.0057	0.0063
LATERAL DRAINAGE COLLECTED FROM LAYER 7						
TOTALS	0.0068	0.0054	0.0074	0.0081	0.0097	0.0090
	0.0093	0.0074	0.0070	0.0087	0.0083	0.0084
STD. DEVIATIONS	0.0046	0.0027	0.0028	0.0041	0.0059	0.0050
	0.0050	0.0039	0.0038	0.0047	0.0057	0.0063
PERCOLATION/LEAKAGE THROUGH LAYER 9						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	4.3463	3.7767	4.8540	5.5069	6.4456	6.1722
	6.1415	4.8120	4.7309	5.7377	5.6833	5.5523
STD. DEVIATIONS	3.1720	2.0241	1.9858	2.9670	4.1109	3.5476
	3.5170	2.6549	2.7120	3.3402	4.1746	4.4304

DAILY AVERAGE HEAD ON TOP OF LAYER 6

AVERAGES	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
	0.0001	0.0000	0.0000	0.0001	0.0001	0.0001

DAILY AVERAGE HEAD ON TOP OF LAYER 8

AVERAGES	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
STD. DEVIATIONS	0.0001	0.0000	0.0000	0.0001	0.0001	0.0001
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	29.19 (6.651)	105959.7	100.00
RUNOFF	1.303 (1.0298)	4730.66	4.465
EVAPOTRANSPIRATION	22.175 (3.3189)	80493.94	75.967
LATERAL DRAINAGE COLLECTED FROM LAYER 2	5.32022 (2.37292)	19312.385	18.22616
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.09551 (0.03892)	346.690	0.32719
AVERAGE HEAD ON TOP OF LAYER 3	5.313 (2.277)		
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.09550 (0.03890)	346.659	0.32716
AVERAGE HEAD ON TOP OF LAYER 6	0.000 (0.000)		
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.09548 (0.03886)	346.604	0.32711
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (0.00000)	0.009	0.00001
AVERAGE HEAD ON TOP OF LAYER 8	0.000 (0.000)		
CHANGE IN WATER STORAGE	0.296 (1.3628)	1076.11	1.016

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 10

	(INCHES)	(CU. FT.)
PRECIPITATION	4.45	16153.499
RUNOFF	1.539	5585.1455
DRAINAGE COLLECTED FROM LAYER 2	0.04825	175.15550
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000797	2.89409
AVERAGE HEAD ON TOP OF LAYER 3	17.169	
MAXIMUM HEAD ON TOP OF LAYER 3	23.111	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	32.4 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.000795	2.88516
AVERAGE HEAD ON TOP OF LAYER 6	0.000	
DRAINAGE COLLECTED FROM LAYER 7	0.00079	2.88322
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000000	0.00003
AVERAGE HEAD ON TOP OF LAYER 8	0.000	
MAXIMUM HEAD ON TOP OF LAYER 8	0.002	
LOCATION OF MAXIMUM HEAD IN LAYER 7 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	1.00	3631.1433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3590
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0850

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

FINAL WATER STORAGE AT END OF YEAR 10

LAYER	(INCHES)	(VOL/VOL)
1	7.6884	0.3204
2	0.1700	0.8500
3	0.0000	0.0000
4	8.5500	0.4750
5	175.2001	0.2920
6	5.4840	0.4570
7	0.0022	0.0110
8	0.0000	0.0000
9	10.2480	0.4270

SNOW WATER 0.000

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**                                                                  **
**                                                                  **
**                HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE     **
**                  HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)      **
**                    DEVELOPED BY ENVIRONMENTAL LABORATORY         **
**                      USAE WATERWAYS EXPERIMENT STATION           **
**               FOR USEPA RISK REDUCTION ENGINEERING LABORATORY     **
**                                                                  **
**                                                                  **
**********************************************************************
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PRECIPITATION DATA FILE:     C:\ZHELP3W\DALLAS.D4
TEMPERATURE DATA FILE:       C:\zhELP3w\DALLAS.D7
SOLAR RADIATION DATA FILE:   C:\zhELP3w\DALLAS.D13
EVAPOTRANSPIRATION DATA:     C:\zHELP3w\DALLAS.D11
SOIL AND DESIGN DATA FILE:   C:\zhELP3w\CT-DAL.D10
OUTPUT DATA FILE:            C:\zheLP3w\DLS-CT.OUT

TIME:  13:24     DATE:   8/ 6/2013

**********************************************************************

     TITLE:  Closure Turf Equivalency Dallas Texas

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER   0
          THICKNESS                    =      0.60   INCHES
          POROSITY                     =      0.4170 VOL/VOL
          FIELD CAPACITY               =      0.0450 VOL/VOL
          WILTING POINT                =      0.0180 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.0173 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.999999978000E-02 CM/SEC


                                LAYER  2
                                --------

                TYPE 2 - LATERAL DRAINAGE LAYER
                    MATERIAL TEXTURE NUMBER   0
          THICKNESS                    =      0.20   INCHES
          POROSITY                     =      0.8500 VOL/VOL
          FIELD CAPACITY               =      0.0100 VOL/VOL
          WILTING POINT                =      0.0050 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.0072 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.199999996000E-12 CM/SEC
          SLOPE                        =      7.00   PERCENT
          DRAINAGE LENGTH              =    100.0    FEET
```

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.05 INCHES
POROSITY	=	0.0000 VOL/VOL
FIELD CAPACITY	=	0.0000 VOL/VOL
WILTING POINT	=	0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY	=	1.00 HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00 HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD

LAYER 4

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 15

THICKNESS	=	18.00 INCHES
POROSITY	=	0.4750 VOL/VOL
FIELD CAPACITY	=	0.3780 VOL/VOL
WILTING POINT	=	0.2650 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4750 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.170000003000E-04 CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	600.00 INCHES
POROSITY	=	0.6710 VOL/VOL
FIELD CAPACITY	=	0.2920 VOL/VOL
WILTING POINT	=	0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02 CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 3

THICKNESS	=	12.00 INCHES
POROSITY	=	0.4570 VOL/VOL
FIELD CAPACITY	=	0.0830 VOL/VOL
WILTING POINT	=	0.0330 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0830 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.310000009000E-02 CM/SEC

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.20 INCHES
POROSITY	=	0.8500 VOL/VOL
FIELD CAPACITY	=	0.0100 VOL/VOL

WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	2.00000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	100.0	FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	1.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	95.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.8	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.012	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.420	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.012	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	184.760	INCHES
TOTAL INITIAL WATER	=	184.760	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
DALLAS TEXAS

STATION LATITUDE	=	32.85 DEGREES
MAXIMUM LEAF AREA INDEX	=	4.50
START OF GROWING SEASON (JULIAN DATE)	=	63
END OF GROWING SEASON (JULIAN DATE)	=	329
EVAPORATIVE ZONE DEPTH	=	0.8 INCHES
AVERAGE ANNUAL WIND SPEED	=	10.80 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	63.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	66.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.65	1.93	2.42	3.63	4.27	2.59

2.00	1.76	3.31	2.47	1.76	1.67

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
44.00	48.50	56.10	65.90	73.70	82.00
86.30	85.50	78.60	67.90	55.60	47.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR DALLAS TEXAS
AND STATION LATITUDE = 32.85 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.66	1.23	0.77	0.36	1.86	0.86
	0.41	3.84	2.04	0.96	1.04	2.67
RUNOFF	0.144	0.331	0.080	0.004	0.180	0.251
	0.015	1.097	0.316	0.010	0.377	1.432
EVAPOTRANSPIRATION	0.128	0.699	0.723	0.206	1.760	0.733
	0.395	2.672	1.687	0.911	0.606	1.013
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0710	0.2673	0.0501	0.0027	0.0911	0.0177
	0.0000	0.0706	0.0243	0.0512	0.0393	0.2427
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0001	0.0005	0.0002	0.0001	0.0002	0.0000
	0.0000	0.0002	0.0001	0.0002	0.0001	0.0004
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0001	0.0005	0.0002	0.0001	0.0002	0.0000
	0.0000	0.0001	0.0001	0.0001	0.0001	0.0004

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.088	0.438	0.128	0.037	0.170	0.032
	0.002	0.111	0.045	0.110	0.065	0.323
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.221	0.160	0.156	0.062	0.196	0.107
	0.007	0.204	0.125	0.166	0.156	0.311
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000

TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.70	60621.004	100.00
RUNOFF	4.237	15378.880	25.37
EVAPOTRANSPIRATION	11.533	41865.586	69.06
DRAINAGE COLLECTED FROM LAYER 2	0.9281	3368.875	5.56
PERC./LEAKAGE THROUGH LAYER 4	0.002109	7.656	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1290		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.096	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.001807	6.560	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.000	0.000	0.00
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	184.762	670685.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.006	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 2

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.43	2.38	5.84	3.33	3.03	2.24
	0.62	4.38	3.34	1.61	1.74	1.55
RUNOFF	0.019	1.043	3.582	1.662	1.746	0.588
	0.265	1.319	2.081	0.462	0.769	0.965
EVAPOTRANSPIRATION	0.355	1.013	2.188	1.121	1.620	1.284
	0.658	3.011	0.846	1.431	0.703	0.717

LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0562	0.1933	0.2005	0.1376	0.0724	0.0338
	0.0297	0.0267	0.0278	0.1253	0.0636	0.0720
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0002	0.0004	0.0004	0.0003	0.0002	0.0001
	0.0001	0.0001	0.0001	0.0003	0.0002	0.0003
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0002	0.0003	0.0003	0.0002	0.0001	0.0001
	0.0000	0.0001	0.0000	0.0002	0.0002	0.0002

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.133	0.296	0.275	0.207	0.108	0.051
	0.041	0.050	0.041	0.188	0.133	0.176
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.164	0.279	0.280	0.245	0.189	0.150
	0.145	0.125	0.121	0.239	0.180	0.171
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.49	110678.703	100.00
RUNOFF	14.500	52633.648	47.56
EVAPOTRANSPIRATION	14.949	54264.781	49.03
DRAINAGE COLLECTED FROM LAYER 2	1.0391	3771.816	3.41
PERC./LEAKAGE THROUGH LAYER 4	0.002330	8.459	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1416		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.154	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002012	7.305	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.000	0.000	0.00
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	184.762	670685.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 3

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.77	0.45	5.08	2.18	2.07	3.94
	2.38	2.75	2.65	0.35	0.55	0.47
RUNOFF	0.128	0.000	3.719	1.094	0.662	2.605
	0.758	0.421	1.460	0.001	0.092	0.000
EVAPOTRANSPIRATION	0.595	0.203	1.339	0.902	1.474	1.213
	1.596	2.373	1.156	0.349	0.408	0.183
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0398	0.0677	0.2085	0.0616	0.0550	0.0659
	0.0224	0.0152	0.0349	0.0003	0.0498	0.0467
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0001	0.0002	0.0004	0.0001	0.0002	0.0001
	0.0000	0.0001	0.0001	0.0000	0.0002	0.0001
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0001	0.0002	0.0003	0.0001	0.0001	0.0001
	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.080	0.165	0.288	0.091	0.107	0.095
	0.035	0.040	0.061	0.008	0.109	0.079
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.159	0.164	0.285	0.189	0.168	0.202
	0.110	0.097	0.155	0.027	0.168	0.160
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	23.64	85813.195	100.00
RUNOFF	10.939	39709.516	46.27
EVAPOTRANSPIRATION	11.791	42801.902	49.88
DRAINAGE COLLECTED FROM LAYER 2	0.6678	2424.128	2.82
PERC./LEAKAGE THROUGH LAYER 4	0.001604	5.824	0.01

AVG. HEAD ON TOP OF LAYER 3	0.0966		
DRAINAGE COLLECTED FROM LAYER 7	0.0002	0.767	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.001393	5.057	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.240	871.829	1.02
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	185.002	671557.062	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.001	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 4

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.60	3.00	1.38	9.19	5.02	1.33
	0.78	1.25	5.07	0.11	1.42	1.67
RUNOFF	1.590	0.946	0.324	6.913	2.352	0.116
	0.080	0.104	2.252	0.000	0.812	1.038
EVAPOTRANSPIRATION	1.072	1.840	0.883	2.227	2.347	1.449
	0.700	1.143	2.327	0.498	0.403	0.635
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1537	0.1988	0.0990	0.1628	0.0665	0.0194
	0.0004	0.0027	0.0823	0.0201	0.1407	0.0605
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0003	0.0004	0.0003	0.0003	0.0002	0.0001
	0.0000	0.0000	0.0002	0.0000	0.0004	0.0001
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0003	0.0003	0.0002	0.0003	0.0001	0.0001
	0.0000	0.0000	0.0002	0.0000	0.0003	0.0001

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.246	0.304	0.193	0.237	0.109	0.049
	0.007	0.015	0.135	0.031	0.267	0.103
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.238	0.277	0.191	0.268	0.177	0.114
	0.028	0.047	0.203	0.121	0.216	0.185
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.82	119136.609	100.00
RUNOFF	16.526	59987.578	50.35
EVAPOTRANSPIRATION	15.525	56357.316	47.30
DRAINAGE COLLECTED FROM LAYER 2	1.0069	3655.061	3.07
PERC./LEAKAGE THROUGH LAYER 4	0.002335	8.477	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1414		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.175	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002012	7.302	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.240	-871.829	-0.73
SOIL WATER AT START OF YEAR	185.002	671557.062	
SOIL WATER AT END OF YEAR	184.762	670685.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.011	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.48	1.36	1.65	3.43	4.48	3.16
	1.52	1.72	1.94	3.11	0.73	0.81
RUNOFF	0.210	0.275	0.348	1.435	1.985	1.105
	0.092	0.375	0.487	1.690	0.002	0.104
EVAPOTRANSPIRATION	0.814	1.333	1.105	2.028	2.338	2.071
	1.428	0.934	1.823	1.214	0.483	0.696
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0895	0.1183	0.0677	0.0959	0.1052	0.0365
	0.0000	0.0029	0.0387	0.1078	0.0911	0.0817
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0002	0.0003	0.0002	0.0002	0.0002	0.0001
	0.0000	0.0000	0.0001	0.0002	0.0003	0.0002
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001
	0.0000	0.0000	0.0001	0.0002	0.0003	0.0002

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.165	0.214	0.140	0.170	0.153	0.070
	0.008	0.009	0.076	0.140	0.204	0.158
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.213	0.230	0.180	0.204	0.213	0.141
	0.023	0.029	0.148	0.251	0.166	0.194
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	25.39	92165.703	100.00
RUNOFF	8.107	29428.990	31.93
EVAPOTRANSPIRATION	16.266	59044.137	64.06
DRAINAGE COLLECTED FROM LAYER 2	0.8354	3032.486	3.29
PERC./LEAKAGE THROUGH LAYER 4	0.002088	7.579	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1256		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	0.954	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.001825	6.625	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.180	652.543	0.71
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	184.942	671337.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.029	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 6

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.37	3.76	3.22	6.02	3.62	2.45

	1.15	1.39	2.97	5.98	3.52	0.94
RUNOFF	0.001	1.963	1.489	3.266	2.327	0.941
	0.316	0.367	1.259	4.716	2.059	0.118
EVAPOTRANSPIRATION	0.386	1.642	1.601	2.345	1.529	1.482
	0.832	1.009	1.371	1.412	1.109	0.749
LATERAL DRAINAGE COLLECTED	0.0851	0.2319	0.0974	0.1543	0.0508	0.0264
FROM LAYER 2	0.0025	0.0147	0.0605	0.1314	0.1604	0.0597
PERCOLATION/LEAKAGE THROUGH	0.0003	0.0005	0.0002	0.0003	0.0001	0.0001
LAYER 4	0.0000	0.0000	0.0001	0.0003	0.0003	0.0002
LATERAL DRAINAGE COLLECTED	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
FROM LAYER 7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0003	0.0004	0.0002	0.0003	0.0001	0.0001
LAYER 8	0.0000	0.0000	0.0001	0.0002	0.0003	0.0002

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.222	0.372	0.153	0.242	0.076	0.049
TOP OF LAYER 3	0.010	0.029	0.087	0.186	0.245	0.128
STD. DEVIATION OF DAILY	0.139	0.240	0.214	0.251	0.180	0.125
HEAD ON TOP OF LAYER 3	0.042	0.096	0.180	0.250	0.258	0.176
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	35.39	128465.695	100.00
RUNOFF	18.821	68318.906	53.18
EVAPOTRANSPIRATION	15.466	56143.152	43.70
DRAINAGE COLLECTED FROM LAYER 2	1.0752	3903.036	3.04
PERC./LEAKAGE THROUGH LAYER 4	0.002453	8.903	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1499		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.212	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002115	7.677	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.025	91.725	0.07
SOIL WATER AT START OF YEAR	184.942	671337.750	
SOIL WATER AT END OF YEAR	184.967	671429.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	-0.010	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 7

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.97	2.08	1.13	0.84	1.93	4.80
	2.60	3.16	2.86	5.59	2.28	2.33
RUNOFF	0.505	0.975	0.066	0.025	0.738	2.436
	0.695	1.603	0.852	3.917	0.726	1.051
EVAPOTRANSPIRATION	1.368	1.085	0.661	1.065	0.756	2.671
	1.550	1.768	1.890	1.314	1.481	1.347
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.2171	0.1045	0.1120	0.0416	0.0410	0.0880
	0.0422	0.0553	0.0664	0.1097	0.1749	0.1770
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0005	0.0003	0.0003	0.0001	0.0001	0.0002
	0.0001	0.0001	0.0001	0.0002	0.0004	0.0004
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0004	0.0002	0.0003	0.0001	0.0001	0.0002
	0.0001	0.0001	0.0001	0.0001	0.0003	0.0003

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.330	0.200	0.208	0.104	0.062	0.135
	0.059	0.081	0.109	0.144	0.268	0.267
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.241	0.224	0.202	0.147	0.159	0.224
	0.167	0.172	0.198	0.246	0.262	0.245
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	31.57	114599.102	100.00
RUNOFF	13.588	49323.684	43.04
EVAPOTRANSPIRATION	16.955	61546.156	53.71
DRAINAGE COLLECTED FROM LAYER 2	1.2297	4463.698	3.90

PERC./LEAKAGE THROUGH LAYER 4	0.002701	9.806	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1640		
DRAINAGE COLLECTED FROM LAYER 7	0.0004	1.366	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002329	8.453	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.205	-744.267	-0.65
SOIL WATER AT START OF YEAR	184.967	671429.500	
SOIL WATER AT END OF YEAR	184.762	670685.187	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.007	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 8

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.03	2.16	0.77	5.84	1.59	2.91
	5.26	1.42	1.24	0.93	0.61	0.69
RUNOFF	0.190	1.115	0.113	3.178	0.126	1.684
	3.843	0.652	0.371	0.026	0.000	0.080
EVAPOTRANSPIRATION	0.322	1.221	0.498	2.703	1.384	1.219
	1.439	0.741	0.687	1.041	0.331	0.377
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1093	0.1918	0.0688	0.0895	0.0172	0.0237
	0.0240	0.0261	0.0214	0.0239	0.0552	0.1518
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0003	0.0004	0.0002	0.0003	0.0001	0.0000
	0.0001	0.0001	0.0000	0.0001	0.0002	0.0004
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0002	0.0003	0.0002	0.0002	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0001	0.0002	0.0003

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.190	0.299	0.150	0.180	0.035	0.037
	0.039	0.037	0.035	0.058	0.162	0.277
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.212	0.257	0.178	0.180	0.108	0.116
	0.114	0.122	0.119	0.120	0.134	0.205
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	24.45	88753.508	100.00
RUNOFF	11.377	41300.168	46.53
EVAPOTRANSPIRATION	11.963	43425.516	48.93
DRAINAGE COLLECTED FROM LAYER 2	0.8028	2914.215	3.28
PERC./LEAKAGE THROUGH LAYER 4	0.002093	7.597	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1249		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	0.946	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.001801	6.536	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.305	1106.126	1.25
SOIL WATER AT START OF YEAR	184.762	670685.187	
SOIL WATER AT END OF YEAR	185.066	671791.312	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.004	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 9

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.12	2.45	3.05	4.91	6.34	2.02
	5.46	0.00	5.50	1.44	5.10	2.21
RUNOFF	0.159	0.844	1.398	3.463	2.347	0.465
	4.318	0.000	3.379	0.746	3.375	0.612
EVAPOTRANSPIRATION	1.035	1.524	1.538	1.325	3.684	1.686
	1.088	0.000	2.058	0.653	1.487	1.258
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.2203	0.0916	0.1141	0.1199	0.1341	0.0454
	0.0538	0.0000	0.0624	0.0389	0.2394	0.1491
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0005	0.0002	0.0002	0.0002	0.0003	0.0001
	0.0001	0.0000	0.0001	0.0001	0.0005	0.0004

LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0004	0.0002	0.0002	0.0002	0.0003	0.0001
	0.0001	0.0000	0.0001	0.0001	0.0004	0.0003

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.328	0.178	0.174	0.162	0.207	0.078
	0.071	0.000	0.103	0.057	0.349	0.263
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.230	0.201	0.228	0.270	0.216	0.165
	0.178	0.000	0.175	0.153	0.249	0.207
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.60	143748.016	100.00
RUNOFF	21.106	76613.125	53.30
EVAPOTRANSPIRATION	17.337	62933.484	43.78
DRAINAGE COLLECTED FROM LAYER 2	1.2689	4606.098	3.20
PERC./LEAKAGE THROUGH LAYER 4	0.002692	9.772	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1641		
DRAINAGE COLLECTED FROM LAYER 7	0.0004	1.405	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002333	8.469	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.114	-414.590	-0.29
SOIL WATER AT START OF YEAR	185.066	671791.312	
SOIL WATER AT END OF YEAR	184.952	671376.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.014	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.69	1.43	2.01	1.22	7.68	0.24
	0.56	3.59	5.49	3.60	0.48	4.86
RUNOFF	0.000	0.632	0.779	0.280	6.094	0.000
	0.054	1.682	3.357	0.914	0.032	2.838
EVAPOTRANSPIRATION	0.702	0.783	1.222	0.882	1.121	0.635
	0.505	1.480	2.009	2.560	0.712	1.420
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0303	0.0772	0.0962	0.0581	0.0560	0.0138
	0.0002	0.0452	0.0986	0.1555	0.0984	0.3793
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0002	0.0002	0.0003	0.0001	0.0001	0.0000
	0.0000	0.0001	0.0002	0.0003	0.0003	0.0006
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0002	0.0002	0.0002	0.0001	0.0001	0.0000
	0.0000	0.0001	0.0002	0.0003	0.0002	0.0005

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.112	0.151	0.195	0.084	0.077	0.023
	0.006	0.067	0.140	0.248	0.201	0.469
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.116	0.228	0.179	0.192	0.188	0.100
	0.025	0.171	0.225	0.223	0.197	0.279
AVERAGE DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	31.85	115615.500	100.00
RUNOFF	16.661	60480.215	52.31
EVAPOTRANSPIRATION	14.030	50928.250	44.05
DRAINAGE COLLECTED FROM LAYER 2	1.1087	4024.438	3.48
PERC./LEAKAGE THROUGH LAYER 4	0.002450	8.893	0.01
AVG. HEAD ON TOP OF LAYER 3	0.1479		
DRAINAGE COLLECTED FROM LAYER 7	0.0003	1.225	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.002090	7.585	0.01
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.048	173.812	0.15
SOIL WATER AT START OF YEAR	184.952	671376.750	

SOIL WATER AT END OF YEAR	185.000	671550.562	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.024	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.11	2.03	2.49	3.73	3.76	2.39
	2.07	2.35	3.31	2.37	1.75	1.82
STD. DEVIATIONS	0.72	0.95	1.79	2.78	2.09	1.39
	1.89	1.40	1.53	2.11	1.51	1.31
RUNOFF						
TOTALS	0.294	0.812	1.190	2.132	1.856	1.019
	1.044	0.762	1.581	1.248	0.824	0.824
STD. DEVIATIONS	0.478	0.550	1.396	2.139	1.738	0.938
	1.625	0.617	1.155	1.715	1.093	0.872
EVAPOTRANSPIRATION						
TOTALS	0.678	1.134	1.176	1.480	1.801	1.444
	1.019	1.513	1.585	1.138	0.772	0.840
STD. DEVIATIONS	0.395	0.489	0.515	0.799	0.822	0.601
	0.457	0.943	0.547	0.628	0.436	0.412
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	0.1072	0.1542	0.1114	0.0924	0.0689	0.0371
	0.0175	0.0259	0.0517	0.0764	0.1113	0.1421
STD. DEVIATIONS	0.0685	0.0706	0.0531	0.0520	0.0337	0.0236
	0.0199	0.0241	0.0263	0.0553	0.0656	0.1048
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0003	0.0003	0.0003	0.0002	0.0002	0.0001
	0.0000	0.0001	0.0001	0.0002	0.0003	0.0003
STD. DEVIATIONS	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002
LATERAL DRAINAGE COLLECTED FROM LAYER 7						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 8

TOTALS	0.0002	0.0003	0.0002	0.0002	0.0001	0.0001
	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003
STD. DEVIATIONS	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.1893	0.2617	0.1904	0.1515	0.1106	0.0617
	0.0278	0.0437	0.0832	0.1171	0.2004	0.2244
STD. DEVIATIONS	0.0914	0.0955	0.0547	0.0696	0.0526	0.0337
	0.0246	0.0344	0.0382	0.0779	0.0854	0.1191

DAILY AVERAGE HEAD ON TOP OF LAYER 8

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 10

	INCHES		CU. FEET	PERCENT
PRECIPITATION	29.19	(6.651)	105959.7	100.00
RUNOFF	13.586	(5.0792)	49317.47	46.544
EVAPOTRANSPIRATION	14.582	(2.1631)	52931.03	49.954
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.99625	(0.19016)	3616.385	3.41298
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00229	(0.00033)	8.296	0.00783
AVERAGE HEAD ON TOP OF LAYER 3	0.138	(0.020)		
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.00031	(0.00005)	1.130	0.00107
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00197	(0.00028)	7.157	0.00675
AVERAGE HEAD ON TOP OF LAYER 8	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.024	(0.1804)	86.53	0.082

PEAK DAILY VALUES FOR YEARS 1 THROUGH 10

	(INCHES)	(CU. FT.)

PRECIPITATION	4.45	16153.499
RUNOFF	3.802	13800.3623
DRAINAGE COLLECTED FROM LAYER 2	0.02369	86.01117
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000034	0.12353
AVERAGE HEAD ON TOP OF LAYER 3	0.800	
MAXIMUM HEAD ON TOP OF LAYER 3	1.507	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	5.3 FEET	
DRAINAGE COLLECTED FROM LAYER 7	0.00001	0.03083
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000037	0.13489
AVERAGE HEAD ON TOP OF LAYER 8	0.000	
MAXIMUM HEAD ON TOP OF LAYER 8	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 7 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	1.00	3631.1433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.5253
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0148

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 10

LAYER	(INCHES)	(VOL/VOL)
1	0.0946	0.1576
2	0.1556	0.7778
3	0.0000	0.0000
4	8.5500	0.4750
5	175.2000	0.2920
6	0.9960	0.0830
7	0.0020	0.0100
8	0.0000	0.0000
SNOW WATER	0.000	

****
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APPENDIX E

SEISMIC HAZARDS ASSESSMENT AND STABILITY ANALYSIS

FINAL COVER STABILITY ANALYSIS
UKIAH LANDFILL CLOSURE

WASTE MASS SLOPE STABILITY

A stability and seismic hazards analysis has been performed for the final closure of the Ukiah Landfill and is presented in the JTD Final Closure Plan (EBA, 2008). A summary of the static stability and seismic response of the final landfill waste mass configuration presented in the JTD is as follows:

- A seismic hazards analysis concluded that the design earthquake is a Maximum Credible Earthquake (MCE) with an estimated magnitude 7.1Mw occurring on the Maacama Fault, resulting in an average peak bedrock acceleration of 0.66g derived from multiple attenuation relationships.

- Slope stability of the entire waste mass was modeled by evaluating failure mechanisms passing through refuse and the base of the landfill and indicate a static factor of safety greater than 1.7 for failure through the base of the landfill.

- Pseudo-static analyses performed to determine the yield acceleration (Ky) and evaluate the stability of the waste mass under seismic conditions was also performed. The yield acceleration calculated for the entire waste mass was 0.13g.

- Seismic displacement analyses using the program YSLIP_PM (Matasovic, 1997) indicate that permanent seismically induced displacements will be less than 8 inches for failure through the base of the landfill.

SEISMIC HAZARDS ASSESSMENT

Title 27 of the California Code of Regulations (27 CCR), Section 20370 requires that Class III waste management units be designed to withstand the Maximum Probable Earthquake (MPE) without damage to the foundation or to the structures which control leachate, surface drainage, erosion, or landfill gas. The MPE is defined in 27 CCR 20164 as the maximum earthquake that is likely to occur during a 100-year interval. Using a 70% chance of non-exceedence as the definition "likely", the recurrence interval for the MPE is approximately 280 years. 27 CCR 21750 outlines requirements for the preparation of a slope stability report for a Class III landfill which includes the use of the MPE to determine the maximum expected horizontal acceleration in rock at the site.

Federal Regulations contained in 40 CFR Part 258.14 (Subtitle D) require owners and operators of waste management units located within seismic hazard zones to design the unit to resist the maximum horizontal acceleration in lithified material for the site. Seismic hazard zones are defined as areas having a 10 percent or greater probability that the maximum expected horizontal acceleration in lithified earth material will exceed 0.10g in 250 years. The project site is located

in a seismic hazard zone, as is most of the western United States. Therefore, Subtitle D regulations require that the maximum horizontal acceleration in bedrock be determined either from seismic probability maps prepared by the USGS, or from a detailed site-specific analysis. A site-specific analysis was performed for the project site.

As noted previously, in California, site-specific analyses for municipal solid waste sites are performed using the MPE. Landfills that accept hazardous or designated wastes are required to be designed to the more strict Maximum Credible Earthquake (MCE). The MCE is defined in 27 CCR 20164 as the maximum earthquake that appears capable of occurring under the presently known geologic framework and is considered the upper bound earthquake for a given seismic source. The California Division of Mines and Geology (CDMG) provides additional guidance for deriving MPE and MCE estimates (CDMG, 1975).

A deterministic seismic hazards assessment was performed to estimate the peak bedrock acceleration to be used in the final closure design. The site is located in a region characterized by moderate to high seismicity. In this region, earthquakes occur on northwest-southeast trending strike-slip and oblique faults in response to sudden releases of dextral shear stress that dominates the North Coast Ranges Geomorphic Province. Seismic sources located within 100 km of the site were compiled by EBA and evaluated for this report in order to determine the peak bedrock acceleration for the site. The Maacama Fault, with an estimated MCE of 7.1 (CDMG, 1996) is located 0.6 miles (1.0 km) west of the site and is expected to generate the highest peak bedrock acceleration. An average peak bedrock acceleration of 0.66g was calculated for a magnitude 7.1 earthquake on the Maacama Fault using attenuation relationships developed by Abrahamson & Silva (1997); Campbell (1997); Idriss (1991); and Geomatrix (1991).

Far-field sources such as the San Andreas fault located 30 miles (48 km) southwest of the site, may also be capable of generating moderate ground shaking motions at the site. The combination of long period (low frequency) ground motion (which may correspond to the landfill's fundamental period) and longer duration ground shaking associated with a large, far-field event suggest that such an event, even though characterized by a smaller peak ground acceleration than near-field sources, could represent a significant seismic event for the site.

The target spectrum developed for a far-field seismic event (MCE) on the San Andreas Fault suggests that the period of ground motion is in the range of 0.15 to 0.30 seconds which is lower than the fundamental period of the landfill (0.3 to 0.4 seconds) and not significantly higher than the period of ground motion generated by the Maacama Fault (0.15 to 0.25 seconds). Therefore, due to its close proximity, the Maacama Fault represents the most significant seismic source.

As discussed above, 27 CCR requires that, at a minimum, Class III landfills be designed to withstand strong ground motions associated with the MPE. However, the final closure configuration for the Ukiah Municipal Solid Waste Disposal Site has been designed using the higher bedrock acceleration (0.66g) associated with the larger MCE occurring on the Maacama Fault. The estimated recurrence interval for the Maacama Fault and other potential seismic sources in the region is approximately 220 years (Table 1). This is comparable to the recurrence interval of approximately 280 years calculated for the MPE. Since earthquakes comparable in size to the MCE are absent from the historic seismic record for the region, the use of the more

stringent MCE as the design earthquake provides a more realistic and conservative estimate of the maximum expected horizontal bedrock acceleration at the site.

Table 1
Potential Seismic Sources

Source	Distance (km)	(1) MCE	(2) Recurrence Interval (years)	(3) Fundamental Period (seconds)	(4) PGA (g)
Maacama	1 - 78	7.1	220	0.15 - 0.25	0.66
San Andreas	48 - 100+	7.9	210	0.15 - 0.30	0.14
Bartlett Springs	21 - 48	7.1	218	0.15 - 0.30	0.21
Healdsburg-Rodgers Creek	48 - 100+	7.0	222	0.15 - 0.25	0.07

Notes:

(1) MCE=Maximum Credible Earthquake (CDMG, 1996) as moment magnitude.
(2) CDMG, 1996.
(3) Based on attenuation relationships (Abrahamson & Silva, 1997; Geomatrix, 1991; Idriss, 1991; Campbell, 1997).
(4) PGA=Peak Ground Acceleration based on attenuation relationships.

FINAL COVER SYSTEM SLOPE STABILITY

The shear strength of the various interfaces present in the proposed alternative final cover system were evaluated and the resulting static and psuedo-static slope stability analyzed. The design characteristics of the current proposed alternative final cover system includes the following components (in descending order):

- An engineered synthetic turf cover with sand infill ballast.
- A linear low-density polyethylene structured geomembrane liner
- A landfill gas pressure relief layer consisting of strip drains, pressure relief values, and associated collection piping components; and
- A 12-inch-thick (minimum) foundation layer moisture conditioned and compacted to 90 percent relative compaction.

Shear Strength Properties

Geosynthetic material interfaces, whether between two geosynthetic materials or between a geosynthetic and native or compacted soil material are typically the weakest interfaces in a final

cover system, causing block-type or wedge failures to occur. Table 1 presents the shear strength properties use in the slope stability analysis

Table 1
Slope Stability Properties and Stability Results

INTERFACE[1]	FRICTION ANGLE (Φ°)	COHESION/ADHESION (PSF)	STATIC (FS)[4,5]	PSEUDO-STATIC (FS)[4,5]	SEISMIC PERMANENT DISPLACEMENT (Inch)
Foundation Soil/LLDPE	32°[2]/28°[3]	3[2]/3[3]	2.8[3]	1.0[3]	<1
Internal shear strength[6]	35°[3]	3°[3]	3.3[3]	1.2[3]	<1

Notes:

(1) LLDPE = linear low-density polyethylene geomembrane;
(2) Peak shear strength
(3) Post-peak shear strength (large displacement)
(4) Factor of Safety
(5) For maximum sideslope of 2:1 (26.5°)
(6) Interface of combined geosynthetic components (LLDPE/turf/sand ballast)

Stability Analysis

Slope stability of the proposed final cover system was modeled using the infinite slope method. This method provides a conservative approach to the evaluation of the stability of shallow failures of constant thickness along a defined interface. This method assumes the failure block is infinitely long and neglects resisting forces at the toe and along the sides. Analyses were performed for a LLDPE geomembrane/artificial turf with sand infill ballast cover system using a critical slope angle of 26.5 degrees (2H:1V).

The stability analysis was performed using a spreadsheet based on the principles and equations of the infinite slope stability analysis. Results of the infinite slope stability analysis indicate a minimum static factor of safety of 2.8 for failure at the LLDPE/subgrade interface and a minimum static factor of safety of 3.3 for failure above the LLDPE geomembrane (see Table 1). Spreadsheet files and equations used in the analysis are appended to this technical memorandum.

A pseudo-static analysis was performed to determine the yield acceleration (K_y) for the cover. The yield acceleration was determined using a trial and error procedure in which the seismic coefficient was varied until a factor of safety of 1.0 was obtained. The lowest yield acceleration calculated for the LLDPE geomembrane/artificial turf cover system was 0.70g. Because the maximum horizontal acceleration of 0.66g predicted by the site response analysis does not exceed the calculated yield acceleration, permanent seismic displacements of the LLDPE geomembrane/artificial turf cover system are highly unlikely. The stability of slopes subject to seismic loading conditions can be further evaluated in terms of permanent displacements (deformations) that are expected to occur. The Newmark Method (1965) is commonly used to

evaluate slopes under seismic loading conditions. The method evaluates the stability of slopes in terms of permanent deformations that result when seismically induced ground accelerations exceed the yield acceleration of the slope mass. The total amount of slope deformation is estimated by summing only the down-slope displacements that occur during each brief period of time when the yield acceleration of the slope mass is exceeded. As stated above, a pseudo-static analysis of the site determined that the yield acceleration is not exceeded by seismically induced strong ground motions, therefore no permanent displacements of the final cover system are predicted by the Newmark Method.

CONCLUSIONS

Results of the slope stability analysis using the infinite slope method indicate a minimum factor of safety of 2.8 for failure of the cover system utilizing a LLDPE geomembrane/artificial turf engineered alternative cover system constructed on maximum 2H:1V slopes under static conditions. These results suggest that the final landfill configuration will be stable throughout the postclosure maintenance period following closure in accordance with the Final Closure Plan Drawings and Technical Specifications.

The yield acceleration calculated for failure of the cover system is greater than the PGA predicted by the site response analysis, indicating that permanent seismic displacements of the LLDPE geomembrane/artificial turf cap are highly unlikely.

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Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
Subgrade Soil Against LLDPE Microspike
Static Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	110.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	28.0 °	tan ø =	**0.5317**
seismic coeff.	K_h =	0.00		
driving stress	τ =	**1.7570** PSF		
normal stress	σ =	**3.5240** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**3.5240** PSF		
resisting stress	S =	**4.8737** PSF		

Factor of Safety FS = 2.77

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
Subgrade Soil Against LLDPE Microspike
Pseudo-static Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	110.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	28.0 °	tan ø =	**0.5317**
seismic coeff.	K_h =	0.66		
driving stress	τ =	**4.0828** PSF		
normal stress	σ =	**2.3644** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**2.3644** PSF		
resisting stress	S =	**4.2572** PSF		

Factor of Safety FS = 1.04

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
LLDPE Microspike Against Turf
Static Saturated Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	100.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	35.0 °	tan ø =	**0.7002**
seismic coeff.	K_h =	0.00		
driving stress	τ =	**1.5973** PSF		
normal stress	σ =	**3.2036** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**3.2036** PSF		
resisting stress	S =	**5.2432** PSF		

Factor of Safety FS = 3.28

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
LLDPE Microspike Against Turf
Pseudo-static Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	100.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	35.0 °	tan ø =	**0.7002**
seismic coeff.	K_h =	0.66		
driving stress	τ =	**3.7117** PSF		
normal stress	σ =	**2.1494** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**2.1494** PSF		
resisting stress	S =	**4.5050** PSF		

Factor of Safety FS = 1.21

APPENDIX F

DRAINAGE ANALYSIS

DRAINAGE ANALYSIS
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

I. INTRODUCTION

The City of Ukiah Landfill is located in Mendocino County approximately 2.5 miles east of the City of Ukiah near the end of Vichy Springs Road. The site address is 3100 Vichy Springs Road, Ukiah, CA 95482.

Title 27 of the California Code of Regulations (27CCR), §20260(c) requires that the final closure to be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency. The potential for inundation and washout from the 100-year flood event was evaluated by examination of the 100-year floodplain shown on the Flood Insurance Rate Map (FIRM) prepared for the Mendocino County by the Federal Emergency Management Agency (FEMA), Map Number 06045C1516F, 2011. The FIRM map indicates the landfill is located within OTHER AREAS (outside the 500-year flood boundary) and outside the 100-year flood hazards area.

All on-site drainage control facilities will be designed to prevent inundation of landfill or impairment of environmental control systems resulting from a 100-year storm event in accordance with 27CCR, §20320(e) that outlines construction standards for Class III landfills.

II. HYDROLOGY/HYDRAULIC ANALYSIS

A surface water hydrology analysis was conducted in accordance with 27CCR, §21150 for determining design parameters for the final closure drainage facilities.

A. CONFIGURATION

Figure F-1 shows watersheds “A” through “M”, used to model surface water runoff for the landfill and its facilities. Watersheds “A” and “K” will capture storm water from a portion of the landfill and drain towards the east into an existing sedimentation basin before outletting into an unnamed tributary to the Russian River. Watersheds “B” through “F” will capture storm water from their respective areas of the landfill and outlet through existing locations into the unnamed tributary. These outlets will be reconstructed in order to reduce the potential for erosion to the unnamed tributary. Watershed “G” will capture storm water and outlet into an existing sedimentation basin located on the northwestern edge of the landfill. Watersheds “I”, “J”, and “L” will capture storm water off the adjacent areas of the landfill and route the water around the landfill into their current drainage patterns. Watershed “M” will capture storm water from the borrow area and route the waters through an existing sedimentation pond. The existing sedimentation basins outlets will be upgraded with new outlet structures to reduce the potential erosion to the unnamed tributary.

B. METHODOLOGY

The storm water control system is designed to accommodate peak surface water flows for 100-year, 24-hour precipitation in accordance with 27CCR, §20365, and occurring during the most critical stage of site development when runoff is anticipated to be a maximum.

The surface water hydrology analysis was conducted using the rational method as outlined in the County of Mendocino Road and Development Standards. Rainfall intensity for design of the drainage facilities was calculated from the 100-year recurrence interval rainfall intensity-duration chart for Mendocino County, Ukiah-Lake Mendocino Dam (Standard D11G). A runoff coefficient of 0.90 was used for areas of the landfill receiving closure and 0.45 was used for areas outside of the landfill as average slopes at the site exceed 25% (Standard D12). A minimum value of 1.0 was used for the K-factor and an initial time of concentration of 15 minutes was used. Watershed areas, hydraulic distances, and slopes were measured from Figure F-1. Discharges were calculated at the points of concentration shown on Figure F-1. Channel velocities were calculated using the computer program Hydraflow Extensions.

C. RESULTS

Surface water hydrology calculations for 100-year storm flows are presented in Tables F-1 and F-2. Hydraulic results for the proposed ditches and storm drains are presented in Tables F-3 and F-4. Results show that the proposed improvements are sized adequately to handle the 100 year storm event.

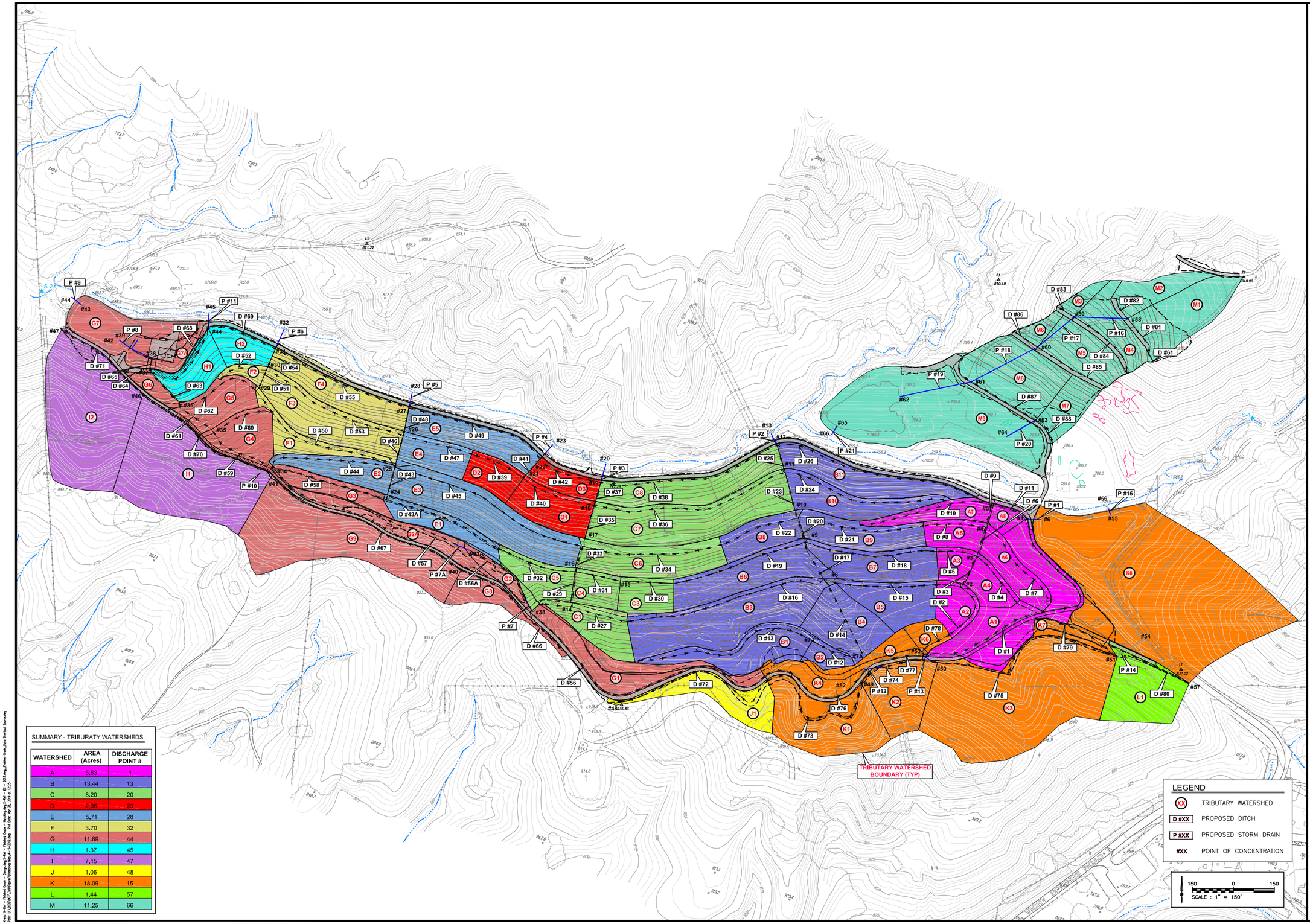
ATTACHMENTS

Figures

F-1: Hydrology Map
F-2: FEMA Firm Map
F-3: Rainfall Intensity-Duration-Frequency Chart
F-4: Runoff Coefficients

Tables

Table F-1: Storm Drain Hydrology Calculations
Table F-2: Ditch Hydrology Calculations
Table F-3: Storm Drain Hydraulic Calculations
Table F-4: Ditch Hydraulic Calculations
Tables F-5.1 through F-5.11: Time of Concentration Calculations



SUMMARY - TRIBURATY WATERSHEDS

WATERSHED	AREA (Acres)	DISCHARGE POINT #
A	5.83	1
B	13.44	13
C	8.20	20
D	2.05	23
E	5.71	28
F	3.70	32
G	11.69	44
H	1.37	45
I	7.15	47
J	1.06	48
K	18.09	15
L	1.44	57
M	11.25	66

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825 SONOMA AVENUE
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TEL: (707) 544-0784

HYDROLOGY MAP

UKIAH LANDFILL
3100 VICHY SPRINGS ROAD
UKIAH, CA

Submittal / Revision:

1	
2	
3	
4	
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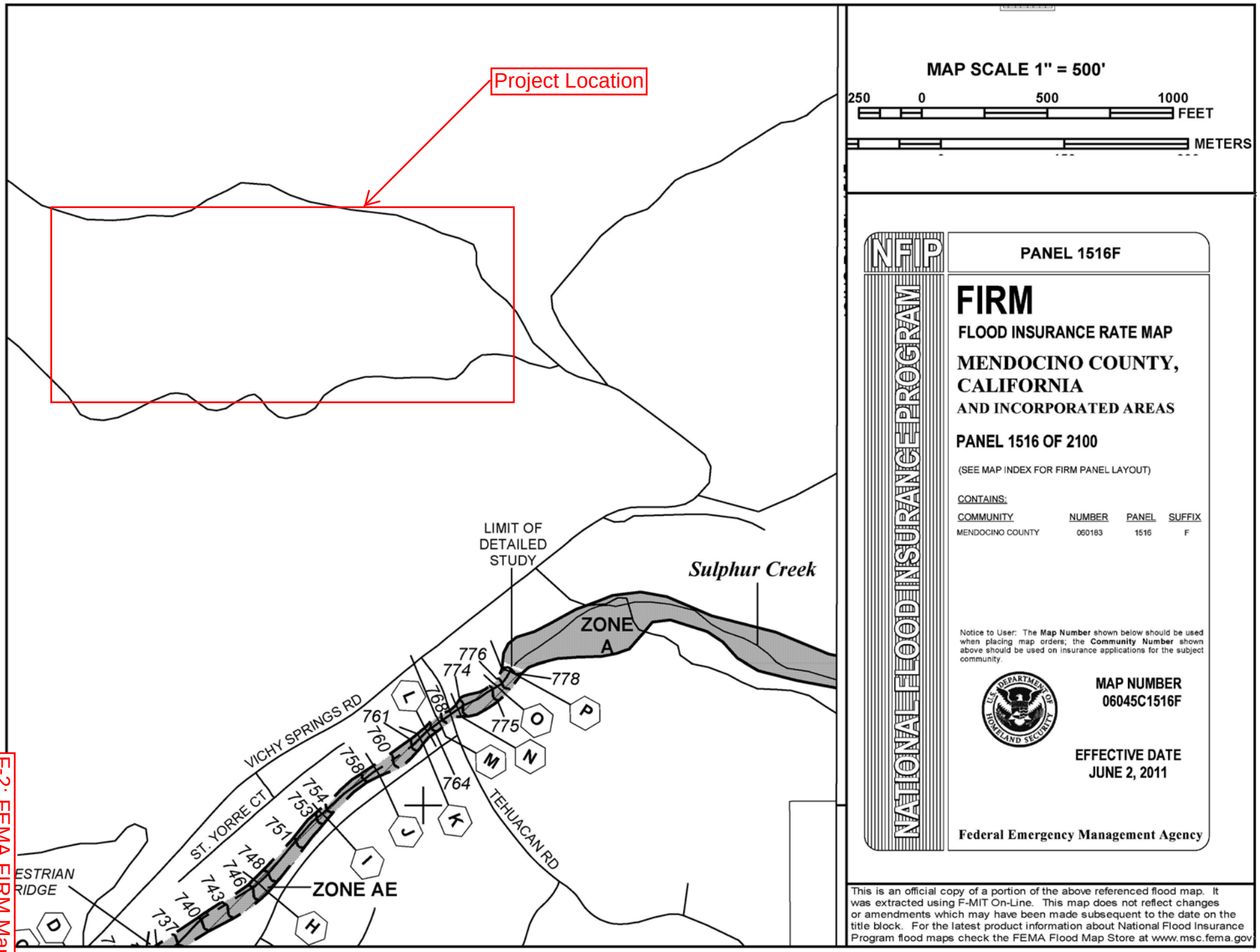
Job No:	02-907
Drawn By:	KDH
Checked By:	DFB
Date:	2019-04-30

Sheet Number

F-1



F-2: FEMA FIRM Map

Table F-1: Storm Drain Hydrology Calculations
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Total Time (min) *	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
P #1											
1	A1,A2,A3, A4,A5,A6, A7,A8	18.1	1.98	0.90	5.83	5.83	1.00	5.24	5.24	10.4	Design Flow for Storm Drain P #1
P #2											
12	B4,B5,B6, B7,B8, B9,B10,B1 1	18.6	1.95	0.90	13.44	13.44	1.00	12.10	12.10	23.6	Design Flow for Storm Drain P #2
P #3											
19	C1,C2,C3, C4,C5,C6, C7, C8	16.2	2.10	0.90	8.20	8.20	1.00	7.38	7.38	15.5	Design Flow for Storm Drain P #3
P #4											
22	D1,D2,D3	15.3	2.16	0.90	2.05	2.05	1.00	1.84	1.84	4.0	Design Flow for Storm Drain P #4
P #5											
27	E1,E2,E3, E4,E5	15.7	2.13	0.90	5.71	5.71	1.00	5.13	5.13	10.9	Design Flow for Storm Drain P #5
P #6											
31	F1,F2,F3,F4	15.5	2.15	0.90	3.70	3.70	1.00	3.33	3.33	7.1	Design Flow for Storm Drain P #6
P #7											
33	G1	15.0	2.18	0.90	1.71	1.71	1.00	1.54	1.54	3.4	Design Flow for Storm Drain P #7
P #7A											
33A	G1,G2	15.0	2.18	0.90	2.04	2.04	1.00	1.83	1.83	4.0	Design Flow for Storm Drain P #7
P #8											
38	G1,G2,G2A ,G3, G4,G5,G6, G7A	19.5	1.91	0.79	6.00	6.00	1.00	4.74	4.74	9.0	Design Flow for Storm Drain P #8
P #9											
43	G1,G2,G2A ,G3, G4,G5,G6, G7,G7A,G8 ,G9	19.8	1.89	0.66	11.69	11.69	1.00	7.72	7.72	14.6	Design Flow for Storm Drain P #9
P #10											
41	G8,G9	15.0	2.18	0.45	2.04	2.04	1.00	0.92	0.92	2.0	Design Flow for Storm Drain P #10
P #11											
44	H1,H2	15.0	2.18	0.90	1.37	1.37	1.00	1.23	1.23	2.7	Design Flow for Storm Drain P #11
P #12											
52	K4	15.0	2.18	0.90	0.62	0.62	1.00	0.56	0.56	1.2	Design Flow for Storm Drain P #12
P #13											
53	K5,K6	15.0	2.18	0.90	0.87	0.87	1.00	0.79	0.79	1.7	Design Flow for Storm Drain P #13
P #14											
51	K1,K2,K3, K4,K5,K6, K7	17.1	2.04	0.52	10.06	10.06	1.00	5.23	5.23	10.7	Design Flow for Storm Drain P #14
P #15											
55	K1-K8, A1-A8	18.3	1.97	0.49	23.92	23.92	1.00	11.72	11.72	23.1	Design Flow for Storm Drain P #15
P #16											
58	M1,M2	15.0	2.18	0.45	2.09	2.09	1.00	0.94	0.94	2.1	Design Flow for Storm Drain P #16
P #17											
59	M1,M2,M3 M4	15.2	2.17	0.45	3.19	3.19	1.00	1.43	1.43	3.1	Design Flow for Storm Drain P #17
P #18											
60	M1,M2,M3 M4,M5,M6	15.3	2.16	0.45	4.50	4.50	1.00	2.02	2.02	4.4	Design Flow for Storm Drain P #18
P #19											
61	M1,M2,M3 M4,M5,M6 ,M8	15.3	2.16	0.45	6.28	6.28	1.00	2.82	2.82	6.1	Design Flow for Storm Drain P #19
P #20											
63	M7	15.0	2.18	0.45	0.45	0.36	1.00	0.20	0.20	0.4	Design Flow for Storm Drain P #20
P #21											
65	M1,M2,M3 M4,M5,M6 M7,M8,M9	15.8	2.13	0.45	11.25	11.25	1.00	5.06	5.06	10.8	Design Flow for Storm Drain P #21

* See Tables F-5.1 - F-5.11 for t_c calculations (minimum t_c=15 min.)
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.
Flow depths,velocities & top widths determined using Hydraflow Express

Table F-2: Ditch Hydrology Calculations
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Total Time (min)*	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
D #1											
	A1	15.0	2.18	0.90	2.27	2.27	1.00	2.04	2.04	4.5	Design Flow for Ditch D #1
D #2											
	A2	15.0	2.18	0.90	0.54	0.54	1.00	0.49	0.49	1.1	Design Flow for Ditch D #2
D #3											
	A2	15.0	2.18	0.90	0.54	0.54	1.00	0.49	0.49	1.1	Design Flow for Ditch D #3
D #4											
	A4	15.0	2.18	0.90	0.50	0.50	1.00	0.45	0.45	1.0	Design Flow for Ditch D #4
D #5											
	A3	15.0	2.18	0.90	0.37	0.37	1.00	0.34	0.34	0.7	Design Flow for Ditch D #5
D #6											
	A2,A3,A4	15.9	2.12	0.90	1.42	1.42	1.00	1.27	1.27	2.7	Design Flow for Ditch D #6
D #7											
	A6	15.0	2.18	0.90	0.72	0.72	1.00	0.65	0.65	1.4	Design Flow for Ditch D #7
D #8											
	A5	15.0	2.18	0.90	0.52	0.52	1.00	0.47	0.47	1.0	Design Flow for Ditch D #8
D #9											
	A2,A3,A4, A5,A6	16.0	2.11	0.90	2.65	2.65	1.00	2.39	2.39	5.0	Design Flow for Ditch D #9
D #10											
	A7	15.0	2.18	0.90	0.64	0.64	1.00	0.58	0.58	1.3	Design Flow for Ditch D #10
D #11											
	A2,A3,A4, A5,A6,A7, A8	18.1	1.98	0.90	3.56	3.56	1.00	3.20	3.20	6.3	Design Flow for Ditch D #11
D #12											
	B1,B2	15.0	2.18	0.90	1.56	1.56	1.00	1.40	1.40	3.1	Design Flow for Ditch D #12
D #13											
	B1	15.0	2.18	0.90	1.26	1.26	1.00	1.14	1.14	2.5	Design Flow for Ditch D #13
D #14											
	B1,B2,B4	17.4	2.02	0.90	2.75	2.75	1.00	2.47	2.47	5.0	Design Flow for Ditch D #14
D #15											
	B5	15.0	2.18	0.90	1.04	1.04	1.00	0.93	0.93	2.0	Design Flow for Ditch D #15
D #16											
	B3	15.0	2.18	0.90	2.53	2.53	1.00	2.28	2.28	5.0	Design Flow for Ditch D #16
D #17											
	B1,B2,B3, B4, B5	18.1	1.98	0.90	6.31	6.31	1.00	5.68	5.68	11.3	Design Flow for Ditch D #17
D #18											
	B7	15.0	2.18	0.90	1.18	1.18	1.00	1.06	1.06	2.3	Design Flow for Ditch D #18
D #19											
	B6	15.0	2.18	0.90	1.54	1.54	1.00	1.39	1.39	3.0	Design Flow for Ditch D #19
D #20											
	B1,B2,B3, B4,B5,B6 B7	18.3	1.97	0.90	8.81	8.81	1.00	7.93	7.93	15.6	Design Flow for Ditch D #20
D #21											
	B9	15.0	2.18	0.90	1.02	1.02	1.00	0.92	0.92	2.0	Design Flow for Ditch D #21
D #22											
	B8	15.0	2.18	0.90	0.77	0.77	1.00	0.69	0.69	1.5	Design Flow for Ditch D #22
D #23											
	B1,B2,B3, B4,B5,B6 B7,B8,B9	18.5	1.96	0.90	10.83	10.83	1.00	9.74	9.74	19.1	Design Flow for Ditch D #23
D #24											
	B10	15.0	2.18	0.90	1.09	1.09	1.00	0.98	0.98	2.1	Design Flow for Ditch D #24
D #25											
	B1,B2,B3, B4,B5,B6 B7,B8,B9 B10	18.6	1.95	0.90	11.92	11.92	1.00	10.72	10.72	20.9	Design Flow for Ditch D #25
D #26											
	B11	15.0	2.18	0.90	1.52	1.52	1.00	1.37	1.37	3.0	Design Flow for Ditch D #26
D #27											
	C1	15.0	2.18	0.90	0.87	0.87	1.00	0.78	0.78	1.7	Design Flow for Ditch D #27
D #28											
	C1	15.0	2.18	0.90	0.87	0.87	1.00	0.78	0.78	1.7	Design Flow for Ditch D #28
D #29											
	-	15.3	2.16	0.90	0.00	0.00	1.00	0.00	0.00	0.0	Design Flow for Ditch D #29
D #30											
	C3	15.0	2.18	0.90	0.58	0.58	1.00	0.53	0.53	1.1	Design Flow for Ditch D #30

* See Tables F-5.1 - F-5.11 for t_c calculations (minimum t_c=15 min.)

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

Table F-2: Ditch Hydrology Calculations
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Total Time (min)*	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
D #31											
	C3 C4	15.7	2.13	0.90	1.08	1.08	1.00	0.97	0.97	2.1	Design Flow for Ditch D #31
D #32											
	C5	15.0	2.18	0.90	0.77	0.77	1.00	0.70	0.70	1.5	Design Flow for Ditch D #32
D #33											
	C1,C3 C4,C5	16.0	2.11	0.90	2.72	2.72	1.00	2.45	2.45	5.2	Design Flow for Ditch D #33
D #34											
	C6	15.0	2.18	0.90	1.40	1.40	1.00	1.26	1.26	2.8	Design Flow for Ditch D #34
D #35											
	C1,C3 C4,C5,C6	16.1	2.11	0.90	4.12	4.12	1.00	3.71	3.71	7.8	Design Flow for Ditch D #35
D #36											
	C7	15.0	2.18	0.90	2.42	2.42	1.00	2.18	2.18	4.7	Design Flow for Ditch D #36
D #37											
	C1,C3 C4,C5,C6 C7	16.2	2.10	0.90	6.54	6.54	1.00	5.88	5.88	12.4	Design Flow for Ditch D #37
D #38											
	C8	15.0	2.18	0.90	1.67	1.67	1.00	1.50	1.50	3.3	Design Flow for Ditch D #38
D #39											
	D2	15.0	2.18	0.90	0.55	0.55	1.00	0.50	0.50	1.1	Design Flow for Ditch D #39
D #40											
	D1	15.0	2.18	0.90	0.92	0.92	1.00	0.83	0.83	1.8	Design Flow for Ditch D #40
D #41											
	D1,D2	15.2	2.17	0.90	1.48	1.48	1.00	1.33	1.33	2.9	Design Flow for Ditch D #41
D #42											
	D3	15.0	2.18	0.90	0.57	0.57	1.00	0.51	0.51	1.1	Design Flow for Ditch D #42
D #43											
	E1	15.0	2.18	0.90	0.72	0.72	1.00	0.65	0.65	1.4	Design Flow for Ditch D #43
D #44											
	E2	15.0	2.18	0.90	0.80	0.80	1.00	0.72	0.72	1.6	Design Flow for Ditch D #44
D #45											
	E3	15.0	2.18	0.90	2.24	2.24	1.00	2.02	2.02	4.4	Design Flow for Ditch D #45
D #46											
	E1,E2,E3	15.6	2.14	0.90	3.76	3.76	1.00	3.38	3.38	7.2	Design Flow for Ditch D #46
D #47											
	E4	15.0	2.18	0.90	0.68	0.68	1.00	0.61	0.61	1.3	Design Flow for Ditch D #47
D #48											
	E1,E2,E3,E4	15.7	2.13	0.90	4.44	4.44	1.00	3.99	3.99	8.5	Design Flow for Ditch D #48
D #49											
	E5	15.0	2.18	0.90	1.27	1.27	1.00	1.14	1.14	2.5	Design Flow for Ditch D #49
D #50											
	F1	15.0	2.18	0.90	0.63	0.63	1.00	0.56	0.56	1.2	Design Flow for Ditch D #50
D #51											
	F1	15.0	2.18	0.90	0.63	0.63	1.00	0.56	0.56	1.2	Design Flow for Ditch D #51
D #52											
	F2	15.0	2.18	0.90	0.18	0.18	1.00	0.16	0.16	0.4	Design Flow for Ditch D #52
D #53											
	F3	15.0	2.18	0.90	1.59	1.59	1.00	1.43	1.43	3.1	Design Flow for Ditch D #53
D #54											
	F1,F2,F3	15.5	2.15	0.90	2.40	2.40	1.00	2.16	2.16	4.6	Design Flow for Ditch D #54
D #55											
	F4	15.0	2.18	0.90	1.30	1.30	1.00	1.17	1.17	2.6	Design Flow for Ditch D #55
D #56											
	G1	15.0	2.18	0.90	1.71	1.71	1.00	1.54	1.54	3.4	Design Flow for Ditch D #56
D #56A											
	G1,G2	15.0	2.18	0.90	2.04	2.04	1.00	1.83	1.83	4.0	Design Flow for Ditch D #56A
D #57											
	G1,G2,G2A	16.1	2.10	0.90	2.93	2.93	1.00	2.64	2.64	5.5	Design Flow for Ditch D #57
D #58											
	G3	15.0	2.18	0.90	0.65	0.65	1.00	0.59	0.59	1.3	Design Flow for Ditch D #58
D #59											
	G1,G2,G3	17.8	2.00	0.90	3.59	3.59	1.00	3.23	3.23	6.4	Design Flow for Ditch D #59
D #60											
	G4	15.0	2.18	0.90	0.92	0.92	1.00	0.83	0.83	1.8	Design Flow for Ditch D #60
D #61											
	G1,G2,G3 G4	18.9	1.94	0.90	4.50	4.50	1.00	4.05	4.05	7.9	Design Flow for Ditch D #61
D #62											
	G5	15.0	2.18	0.90	0.87	0.87	1.00	0.78	0.78	1.7	Design Flow for Ditch D #62

* See Tables F-5.1 - F-5.11 for t_c calculations (minimum t_c=15 min.)

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

Table F-2: Ditch Hydrology Calculations
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Total Time (min)*	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
D #63											
	G1,G2,G3 G4,G5	19.1	1.92	0.90	5.37	5.37	1.00	4.83	4.83	9.3	Design Flow for Ditch D #63
D #64											
	G6	15.0	2.18	0.90	0.33	0.33	1.00	0.30	0.30	0.7	Design Flow for Ditch D #64
D #65											
	G1,G2,G3 G4,G5,G6	19.2	1.92	0.90	5.70	5.70	1.00	5.13	5.13	9.9	Design Flow for Ditch D #65
D #66											
	G8	15.0	2.18	0.45	0.66	0.66	1.00	0.30	0.30	0.7	Design Flow for Ditch D #66
D #67											
	G8,G9	15.0	2.18	0.45	4.12	4.12	1.00	1.86	1.86	4.1	Design Flow for Ditch D #67
D #68											
	H1	15.0	2.18	0.90	0.74	0.74	1.00	0.67	0.67	1.5	Design Flow for Ditch D #68
D #69											
	H2	15.0	2.18	0.90	0.63	0.63	1.00	0.56	0.56	1.2	Design Flow for Ditch D #69
D #70											
	I1	15.0	2.18	0.45	3.61	3.61	1.00	1.62	1.62	3.5	Design Flow for Ditch D #70
D #71											
	I1,I2	15.7	2.13	0.45	7.15	7.15	1.00	3.22	3.22	6.9	Design Flow for Ditch D #71
D #72											
	J1	15.0	2.18	0.45	1.06	1.06	1.00	0.48	0.48	1.0	Design Flow for Ditch D #72
D #73											
	K1	15.0	2.18	0.45	1.98	1.98	1.00	0.89	0.89	1.9	Design Flow for Ditch D #73
D #74											
	K1,K2,K4	15.8	2.13	0.45	3.81	3.81	1.00	1.71	1.71	3.6	Design Flow for Ditch D #74
D #75											
	K1,K2,K3 K4,K5,K6	17.1	2.04	0.50	9.70	9.70	1.00	4.85	4.85	9.9	Design Flow for Ditch D #75
D #76											
	K4	15.0	2.18	0.90	0.62	0.62	1.00	0.56	0.56	1.2	Design Flow for Ditch D #76
D #77											
	K5	15.0	2.18	0.90	0.57	0.57	1.00	0.52	0.52	1.1	Design Flow for Ditch D #77
D #78											
	K6	15.0	2.18	0.90	0.30	0.30	1.00	0.27	0.27	0.6	Design Flow for Ditch D #78
D #79											
	K7	15.0	2.18	0.45	0.36	0.36	1.00	0.16	0.16	0.4	Design Flow for Ditch D #79
D #80											
	L1	15.0	2.18	0.45	1.44	1.44	1.00	0.65	0.65	1.4	Design Flow for Ditch D #80
D #81											
	M1	15.0	2.18	0.45	1.42	1.42	1.00	0.64	0.64	1.4	Design Flow for Ditch D #81
D #82											
	M2	15.0	2.18	0.45	0.67	0.67	1.00	0.30	0.30	0.7	Design Flow for Ditch D #82
D #83											
	M3	15.0	2.18	0.45	0.22	0.22	1.00	0.10	0.10	0.2	Design Flow for Ditch D #83
D #84											
	M4	15.0	2.18	0.45	0.88	0.88	1.00	0.39	0.39	0.9	Design Flow for Ditch D #84
D #85											
	M5	15.0	2.18	0.45	1.06	1.06	1.00	0.48	0.48	1.0	Design Flow for Ditch D #85
D #86											
	M6	15.0	2.18	0.45	0.25	0.25	1.00	0.11	0.11	0.2	Design Flow for Ditch D #86
D #87											
	M7	15.0	2.18	0.45	0.66	0.66	1.00	0.30	0.30	0.7	Design Flow for Ditch D #87
D #88											
	M8	15.0	2.18	0.45	1.78	1.78	1.00	0.80	0.80	1.7	Design Flow for Ditch D #88

* See Tables F-5.1 - F-5.11 for t_c calculations (minimum t_c=15 min.)

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

Table F-3: Storm Drain Hydraulic Calculations
100-Year Storm Event

Point of Conc. (POC)	Pipe	Q_{100} (cfs)	Slope	Diameter (in)	Manning's "n"	Velocity (ft/s)	Flow Depth (ft)
#1	**Storm Drain P #1**						
		10.4	0.0402	18	0.014	11.14	0.78
#12	**Storm Drain P #2**						
		23.6	0.1828	18	0.014	24.13	0.81
#19	**Storm Drain P #3**						
		15.5	0.1166	18	0.014	18.38	0.72
#22	**Storm Drain P #4**						
		4.0	0.1408	18	0.014	13.21	0.34
#27	**Storm Drain P #5**						
		10.9	0.2176	18	0.014	20.97	0.50
#31	**Storm Drain P #6**						
		7.1	0.1753	18	0.014	16.96	0.43
#33	**Storm Drain P #7**						
		3.4	0.1372	18	0.014	12.16	0.32
#33A	**Storm Drain P #7A**						
		4.0	0.0223	18	0.014	6.95	0.54
#38	**Storm Drain P #8**						
		9.0	0.0500	18	0.014	11.51	0.68
#43	**Storm Drain P #9**						
		14.6	0.0200 (min)	24	0.024	6.16	1.41
#44	**Storm Drain P #10**						
		2.0	0.2292	18	0.014	12.26	0.22
#45	**Storm Drain P #11**						
		2.7	0.0200 (min)	18	0.024	4.09	0.60
#52	**Storm Drain P #12**						
		1.2	0.0117	18	0.024	3.67	0.45
#53	**Storm Drain P #13**						
		1.7	0.0100	18	0.024	4.60	0.57
#51	**Storm Drain P #14**						
		10.7	0.0200 (min)	24	0.024	7.64	0.91
#55	**Storm Drain P #15**						
		23.1	0.0500 (min)	2-18"	0.024	8.11	1.13
#58	**Storm Drain P #16**						
		2.1	0.0500 (min)	18	0.024	5.31	0.41
#59	**Storm Drain P #17**						
		3.1	0.0500 (min)	18	0.024	5.80	0.51
#60	**Storm Drain P #18**						
		4.4	0.0500 (min)	18	0.024	6.50	0.61
#61	**Storm Drain P #19**						
		6.1	0.1340	18	0.024	12.34	0.88
#63	**Storm Drain P #20**						
		0.4	0.0446	18	0.024	3.49	0.23
#65	**Storm Drain P #21**						
		10.8	0.0500 (min)	18	0.024	7.06	0.75

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

Mannings "n" value CMP - 0.024

HDPE- 0.014

Table F-4: Ditch Hydraulic Calculations
100-Year Storm Event

Ditch	Q_{100} (cfs)	Slope	Left Side Slope	Right Side Slope	Bottom Width (ft)	Manning's "n" erosion mat 0.020 / riprap 0.035 / liner 0.020	Maximum Top Width (ft)	Maximum Velocity (ft/s)	Design Depth (ft)	Maximum Flow Depth (ft)
D #1										
	4.5	.1494 max.	2:1 max.	10:1 max.	0	0.020	4.32	5.79	1.2	0.38
D #2										
	1.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	2.88	3.47	1.2	0.31
D #3										
	1.1	0.3243	1.5:1 max.	1.5:1 max.	5	0.020	5.18	3.80	1.0	0.06
D #4										
	1.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.12	2.47	1.2	0.26
D #5										
	0.7	0.02 min.	2:1 max.	10:1 max.	0	0.020	2.76	2.21	1.2	0.23
D #6										
	2.7	0.3571	1.5:1 max.	1.5:1 max.	5	0.020	5.27	5.19	1.0	0.09
D #7										
	1.4	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.48	2.77	1.2	0.29
D #8										
	1.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.12	2.47	1.2	0.26
D #9										
	5.0	0.3846	1.5:1 max.	1.5:1 max.	5	0.020	5.30	7.40	1.0	0.13
D #10										
	1.3	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.36	2.76	1.2	0.28
D #11										
	6.3	0.0250	2:1 max.	2:1 max.	0	0.035	3.72	3.64	1.5	0.93
D #12										
	3.1	0.0900	2:1 max.	10:1 max.	0	0.020	4.08	4.47	1.2	0.34
D #13										
	2.5	0.0723	2:1 max.	10:1 max.	0	0.020	3.96	3.83	1.2	0.33
D #14										
	5.0	0.2080	1.5:1 max.	1.5:1 max.	46	0.020	46.18	2.30	1.0	0.04
D #15										
	2.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.32	3.22	1.2	0.36
D #16										
	5.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	5.76	3.91	1.2	0.48
D #17										
	11.3	0.1666	1.5:1 max.	1.5:1 max.	27	0.020	27.40	4.05	1.0	0.11
D #18										
	2.3	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.32	3.09	1.2	0.36
D #19										
	3.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.68	3.29	1.2	0.39
D #20										
	15.6	0.2719	1.5:1 max.	1.5:1 max.	5	0.020	5.90	10.28	1.0	0.30
D #21										
	2.0	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.96	3.06	1.2	0.33
D #22										
	1.5	0.1486	2:1 max.	10:1 max.	0	0.020	2.88	4.34	1.2	0.24
D #23										
	19.1	0.1783	1.5:1 max.	1.5:1 max.	5	0.020	6.11	9.78	1.0	0.37
D #24										
	2.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.08	3.03	1.2	0.34
D #25										
	20.9	0.3605	1.5:1 max.	1.5:1 max.	5	0.020	5.96	12.60	1.0	0.32
D #26										
	3.0	0.01 min.	2:1 max.	2:1 max.	0	0.035	6.36	4.88	1.2	0.58
D #27										
	1.7	0.0250	2:1 max.	10:1 max.	0	0.020	4.20	2.31	1.2	0.35
D #28										
	-	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.60	2.78	1.2	0.30
D #29										
	1.7	0.3909	1.5:1 max.	1.5:1 max.	5	0.020	5.21	4.76	1.0	0.07
D #30										
	1.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.511.91	1.2	0.31

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

n value - .020-liner per Manufacturer

-.020 - erosion mat

- .035 - rock riprap

ump Calculator used to check

https://www.omnicalculator.com/physics/hydraulic-jump#calculating-the-hydraulic-jump-properties

Omni Calculator

Table F-4: Ditch Hydraulic Calculations
100-Year Storm Event

Ditch	Q_{100} (cfs)	Slope	Left Side Slope	Right Side Slope	Bottom Width (ft)	Manning's "n" erosion mat 0.020 riprap 0.035 liner 0.020	Maximum Top Width (ft)	Maximum Velocity (ft/s)	Design Depth (ft)	Maximum Flow Depth (ft)
D #31										
	2.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.77	1.2	0.34
D #32										
	1.5	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.77	1.2	0.30
D #33										
	5.2	0.3636	1.5:1 max.	1.5:1 max.	5	0.020	5.36	9.81	1.0	0.12
D #34										
	2.8	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.56	3.23	1.2	0.38
D #35										
	7.8	0.3050	1.5:1 max.	1.5:1 max.	5	0.020	5.45	11.10	1.0	0.15
D #36										
	4.7	0.02 min.	2:1 max.	10:1 max.	0	0.020	5.52	3.78	1.2	0.46
D #37										
	12.4	0.3286	1.5:1 max.	1.5:1 max.	5	0.020	5.69	10.01	1.2	0.23
D #38										
	3.3	0.0150	2:1 max.	2:1 max.	0	0.035	3.44	5.26	1.2	0.86
D #39										
	1.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.24	2.51	1.2	0.27
D #40										
	1.8	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.84	2.93	1.2	0.32
D #41										
	2.9	0.4505	1.5:1 max.	1.5:1 max.	5	0.020	5.27	6.28	1.0	0.09
D #42										
	1.1	0.01 min.	2:1 max.	2:1 max.	0	0.035	2.28	1.69	1.2	0.57
D #43A										
	1.4	0.0225	2:1 max.	10:1 max.	0	0.020	4.32	2.19	1.0	0.36
D #43										
	1.4	0.3704	1.5:1 max.	1.5:1 max.	5	0.020	5.18	5.57	1.0	0.06
D #44										
	1.6	0.02 min.	2:1 max.	10:1 max.	0	0.020	2.20	2.64	1.2	0.55
D #45										
	4.4	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.20	3.44	1.2	0.80
D #46										
	7.2	0.5000	1.5:1 max.	1.5:1 max.	5	0.020	5.42	10.42	1.0	0.14
D #47										
	1.3	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.36	2.76	1.2	0.28
D #48										
	8.5	0.5111	1.5:1 max.	1.5:1 max.	5	0.020	5.51	9.85	1.0	0.17
D #49										
	2.5	0.0172	2:1 max.	2:1 max.	0	0.035	2.64	4.81	1.2	0.66
D #50										
	1.2	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.36	2.55	1.2	0.28
D #51										
	1.2	0.2500	1.5:1 max.	1.5:1 max.	5	0.020	5.15	4.73	1.0	0.05
D #52										
	0.4	0.02 min.	2:1 max.	10:1 max.	0	0.020	2.16	2.06	1.2	0.18
D #53										
	3.1	0.02 min.	2:1 max.	10:1 max.	0	0.020	4.68	3.40	1.2	0.39
D #54										
	4.6	0.3108	1.5:1 max.	1.5:1 max.	5	0.020	5.33	8.10	1.0	0.11
D #55										
	2.6	.0136.	2:1 max.	2:1 max.	0	0.035	5.76	1.88	1.2	0.53
D #56										
	3.4	0.0500	2:1 max.	2:1 max.	0	0.035	4.92	3.37	1.2	0.41
D #56A										
	4.0	0.0223	2:1 max.	2:1 max.	0	0.020	4.92	3.37	1.2	0.41
D #57										
	5.5	.0223 min	2:1 max.	2:1 max.	0	0.020	3.32	10.62*	1.0	0.83
D #58										
	1.3	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.48	2.77	1.2	0.29
D #59										
	6.4	0.1811	1.5:1 max.	1.5:1 max.	5	0.020	5.57	6.07	1.0	0.19
D #60										
	1.8	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.96	1.2	0.31
D #61										
	7.9	0.1571	1.5:1 max.	1.5:1 max.	5	0.020	5.66	6.48	1.0	0.22

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

* Max Slope 35%

n value - .020-liner

- .035 - rock riprap

-.020 - erosion mat

Table F-4: Ditch Hydraulic Calculations
100-Year Storm Event

Ditch	Q_{100} (cfs)	Slope	Left Side Slope	Right Side Slope	Bottom Width (ft)	Manning's "n" erosion mat 0.020 / riprap 0.035 / liner 0.020	Maximum Top Width (ft)	Maximum Velocity (ft/s)	Design Depth (ft)	Maximum Flow Depth (ft)
D #62										
	1.7	0.02 min.	2:1 max.	10:1 max.	0	0.020	3.72	2.77	1.2	0.31
D #63										
	9.3	0.1026	1.5:1 max.	1.5:1 max.	5	0.020	5.63	7.71	1.0	0.21
D #64										
	0.7	0.0300	2:1 max.	2:1 max.	0	0.035	3.12	2.21	1.0	0.26
D #65										
	9.9	0.4237	1.5:1 max.	1.5:1 max.	5	0.020	6.20	9.39	1.2	0.30
D #66										
	0.7	0.0968	2:1 max.	2:1 max.	0	0.035	1.32	3.67	1.0	0.33
D #67										
	4.1	0.0684	2:1 max.	2:1 max.	0	0.035	2.64	4.82	1.0	0.66
D #68										
	1.5	0.0176	2:1 max.	2:1 max.	0	0.035	2.32	2.23	1.0	0.58
D #69										
	1.2	0.0200	2:1 max.	2:1 max.	0	0.035	2.08	2.22	1.0	0.52
D #70										
	3.5	0.1504	2:1 max.	2:1 max.	0	0.035	2.16	6.34	1.0	0.54
D #71										
	6.9	0.1065	2:1 max.	2:1 max.	0	0.035	2.28	2.55	1.0	0.57
D #72										
	1.0	0.0380	2:1 max.	2:1 max.	0	0.035	1.72	2.70	1.0	0.43
D #73										
	1.9	0.0399	2:1 max.	2:1 max.	0	0.035	2.20	3.31	1.0	0.55
D #74										
	3.6	0.0954	2:1 max.	2:1 max.	0	0.035	2.36	5.17	1.0	0.59
D #75										
	9.9	0.0140	2:1 max.	2:1 max.	0	0.035	3.48	5.19	1.5	1.25
D #76										
	1.2	0.0525	2:1 max.	2:1 max.	0	0.035	2.04	3.57	1.0	0.51
D #77										
	1.1	0.0543	2:1 max.	2:1 max.	0	0.020	1.60	3.44	1.0	0.40
D #78										
	0.6	0.0260	2:1 max.	10:1 max.	0	0.020	2.88	2.50	1.0	0.38
D #79										
	0.4	0.0699	2:1 max.	10:1 max.	0	0.020	2.04	2.31	1.0	0.17
D #80										
	1.4	0.0500	2:1 max.	2:1 max.	0	0.020	1.76	3.62	1.0	0.44
D #81										
	1.4	0.01 min.	2:1 max.	10:1 max.	0	0.020	4.92	1.39	1.0	0.41
D #82										
	0.7	0.01 min.	2:1 max.	10:1 max.	0	0.020	3.84	1.14	1.0	0.32
D #83										
	0.2	0.01 min.	2:1 max.	10:1 max.	0	0.035	2.40	0.83	1.0	0.20
D #84										
	0.9	0.01 min.	2:1 max.	10:1 max.	0	0.020	4.20	1.22	1.0	0.35
D #85										
	1.0	0.01 min.	2:1 max.	10:1 max.	0	0.020	4.32	1.29	1.0	0.36
D #86										
	0.2	0.01 min.	2:1 max.	10:1 max.	0	0.020	2.40	0.83	1.0	0.20
D #87										
	0.7	0.01 min.	2:1 max.	2:1 max.	0	0.020	1.84	1.42	1.0	0.46
D #88										
	1.7	0.01 min.	2:1 max.	2:1 max.	0	0.020	2.68	1.89	1.0	0.67

Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)

Slopes are mearsured as Vertical/Horizontal.

Flow depths,velocities & top widths determined using Hydraflow Express

n value - .030-liner .025-erosion mat

- .035 - rock riprap
riprap
hydraulic jump
erosion mat

Table F-5.1: Time of Concentration Calculations for Tributary A
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary A															
2	A2					15.0	2.18	0.90	0.54	0.54	1.00	0.49	0.49	1.06	t_c @ POC #2, Initial Area
		143	0.3243	3.80	0.6	15.6									D #3
3	A2,A3,A4					15.6	2.14	0.90	0.88	1.42	1.00	0.79	1.27	2.72	t_c @ POC #3, Add A3,A4
		112	0.3571	6.83	0.3	15.9									D #6
4	A2,A3,A4 A5,A6					15.9	2.12	0.90	1.24	2.65	1.00	1.11	2.39	5.06	t_c @ POC #4, Add A5,A6
		68	0.3846	9.24	0.1	16.0									D #9
5	A2,A3,A4 A5,A6,A7,A8					16.0	2.11	0.90	0.90	3.56	1.00	0.81	3.20	6.75	t_c @ POC #5, Add A7,A8
		136	0.0300	1.07	2.1	18.1									D #11
1	A1,A2,A3,A4 A5,A6,A7,A8					18.1	1.98	0.90	2.27	5.83	1.00	2.04	5.24	10.37	t_c @ POC #1, Add A1
		58	0.0402	11.04	0.1	18.2									P #1

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.2: Time of Concentration Calculations for Tributary B
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary B															
7	B1					15.0	2.18	0.90	1.26	1.26	1.00	1.14	1.14	2.48	t_c @ POC #7, Initial Area, Add B1
		175	0.0500	3.58	0.8	15.8									D #12
7A	B1,B2					15.8	2.12	0.90	0.29	0.29	1.00	0.26	0.26	0.56	t_c @ POC #7A, Add B2
		315	0.2000	3.29	1.6	17.4									D #14
8	B1,B2,B3 B4,B5					17.4	2.02	0.90	4.76	6.02	1.00	4.28	5.42	10.95	t_c @ POC #8, Add B3,B4,B5
		164	0.1666	4.05	0.7	18.1									D #17
9	B1,B2,B3,B4, B5,B6,B7					18.1	1.98	0.90	2.72	8.74	1.00	2.45	7.87	15.60	t_c @ POC #9, Add B6,B7
		102	0.2719	10.28	0.2	18.3									D #20
10	B1,B2,B3,B4, B5,B6,B7,B8, B9					18.3	1.97	0.90	1.79	10.53	1.00	1.61	9.48	18.70	t_c @ POC #10, Add B8,B9
		157	0.1783	9.78	0.3	18.5									D #23
11	B1,B2,B3,B4, B5,B6,B7,B8, B9,B10					18.5	1.96	0.90	1.09	11.62	1.00	0.98	10.46	20.48	t_c @ POC #11, Add B10
		81	0.3605	12.60	0.1	18.6									D #25
12	B1,B2,B3,B4, B5,B6,B7,B8, B9,B10,B11					18.6	1.95	0.90	1.52	13.15	1.00	1.37	11.83	23.10	t_c @ POC #12, Add B11
		50	0.1828	24.31	0.0	18.7									P #2
13						18.7									t_c @ POC #13

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.3: Time of Concentration Calculations for Tributary C
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary C															
14	C1					15.0	2.18	0.90	0.87	0.87	1.00	0.78	0.78	1.70	t_c @ POC #14, Initial Area
		127	0.3909	7.47	0.3	15.3									D #29
16	C1,C3,C4,C5					15.3	2.16	0.90	1.85	2.72	1.00	1.67	2.45	5.29	t_c @ POC #16, Add C3,C4,C5
		111	0.3636	4.12	0.4	15.7									D #33
17	C1,C3,C4,C5, C6					15.7	2.13	0.90	1.40	4.12	1.00	1.26	3.71	7.90	t_c @ POC #17, Add C6
		141	0.3050	9.89	0.2	16.0									D #35
18	C1,C3,C4,C5, C6,C7					16.0	2.11	0.90	2.42	6.54	1.00	2.18	5.88	12.43	t_c @ POC #18, Add C7
		72	0.3286	10.46	0.1	16.1									D #37
19	C1,C3,C4,C5, C6,C7,C8					16.1	2.11	0.90	1.67	8.20	1.00	1.50	7.38	15.55	t_c @ POC #19, Add C8
		71	0.3286	13.23	0.1	16.2									P #3
20						16.2									t_c @ POC #20

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.4: Time of Concentration Calculations for Tributary D
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary D															
21	D1,D2					15.0	2.18	0.90	1.48	1.48	1.00	1.33	1.33	2.90	t_c @ POC #21, Initial Area
		93	0.4505	7.01	0.2	15.2									D #41
22	D3					15.2	2.17	0.90	0.57	2.05	1.00	0.51	1.84	3.99	t_c @ POC #22, Add D3
		66	0.1408	13.21	0.1	15.3									P #4
23						15.3									t_c @ POC #23

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.5: Time of Concentration Calculations for Tributary E
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary E															
24	E1					15.0	2.18	0.90	0.72	0.72	1.00	0.65	0.65	1.41	t_c @ POC #24, Initial Area
		123	0.3704	5.60	0.4	15.4									D #43
25	E1,E2,E3					15.4	2.16	0.90	3.04	3.76	1.00	2.74	3.38	7.29	t_c @ POC #25, Add E2,E3
		134	0.5000	10.47	0.2	15.6									D #46
26	E1,E2,E3,E4					15.6	2.14	0.90	0.68	4.44	1.00	0.61	3.99	8.55	t_c @ POC #26, Add E4
		90	0.5111	13.15	0.1	15.7									D #48
27	E1,E2,E3,E4, E5					15.7	2.13	0.90	1.27	5.71	1.00	1.14	5.13	10.95	t_c @ POC #27, Add E5
		58	0.2176	20.97	0.0	15.7									P #5
28						15.7									t_c @ POC #28

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.6: Time of Concentration Calculations for Tributary F
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary F															
29	F1					15.0	2.18	0.90	0.63	0.63	1.00	0.56	0.56	1.23	t_c @ POC #29, Initial Area
		100	0.2500	4.81	0.3	15.3									D #51
30	F1,F2,F3					15.3	2.16	0.90	1.77	2.40	1.00	1.59	2.16	4.66	t_c @ POC #30, Add F2,F3
		69	0.3108	8.10	0.1	15.5									D #54
31	F1,F2,F3,F4					15.5	2.15	0.90	1.30	3.70	1.00	1.17	3.33	7.14	t_c @ POC #31, Add F4
		79	0.1753	16.96	0.1	15.5									P #6
32						15.5									t_c @ POC #32

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.7: Time of Concentration Calculations for Tributary G
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary G															
33	G1					15.0	2.18	0.90	1.71	1.71	1.00	1.54	1.54	3.36	t_c @ POC #33, Initial Area
		53	0.1372	12.16	0.1	15.1									P #7
		280	0.0567	4.34	1.1	16.1									D #56A
33A	G1,G2					16.1	2.10	0.90	0.33	2.04	1.00	0.29	1.83	3.85	t_c @ POC #33A, Add G2
		59	0.0223	6.95	0.1	16.3									P #7A
		742	0.0223	8.09	1.5	17.8									D #57
34	G1,G2,G2A, G3					17.8	2.00	0.90	1.55	3.59	1.00	1.39	3.23	6.45	t_c @ POC #34, Add G2A,G3
		280	0.1811	6.07	0.8	18.6									D #59
35	G1,G2,G3,G4					18.6	1.95	0.90	0.92	4.50	1.00	0.83	2.66	5.20	t_c @ POC #35, Add G4
		140	0.1571	8.12	0.3	18.9									D #61
36	G1,G2,G3,G4 ,G5					18.9	1.94	0.90	0.87	5.37	1.00	0.78	3.44	6.67	t_c @ POC #36, Add G5
		218	0.1026	13.49	0.3	19.1									D #63
37	G1,G2,G3,G4 ,G5,G6					19.1	1.92	0.90	0.33	5.70	1.00	0.30	3.74	7.20	t_c @ POC #37, Add G6
		38	0.4237	9.39	0.1	19.2									D #65
38	G1,G2,G3,G4 ,G5,G6,G7A					19.2	1.92	0.90	0.30	6.00	1.00	0.27	4.01	7.70	t_c @ POC #38, Add G7A
		214	0.0500	11.81	0.3	19.5									P #8
39	G1,G2,G3,G4 ,G5,G6,G7					19.5	1.91	0.90	1.57	7.57	1.00	1.41	5.42	10.32	t_c @ POC #39, Add G7
		135	0.0311	10.19	0.2	19.7									
43	G1,G2,G3,G4 ,G5,G6,G7,G 8,G9					19.7	1.89	0.66	4.12	11.69	1.00	2.72	6.46	12.24	t_c @ POC #43, Add G8,G9
		44	0.0100	7.16	0.1	19.8									P #9
						19.8									t_c @ POC #44

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.8: Time of Concentration Calculations for Tributary H
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary H															
	H1,H2					15.0	2.18	0.90	1.37	1.37	1.00	1.23	1.23	2.69	t_c @ POC #44, Initial Area
		56	0.2292	13.39	0.1	15.1									P #11
						15.1									t_c @ POC #45

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.9: Time of Concentration Calculations for Tributary I
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary I															
46	I1,I2					15.0	2.18	0.45	7.15	7.15	1.00	3.22	3.22	7.02	t_c @ POC #46, Initial Area
		388	0.1065	9.41	0.7	15.7									D #71
47						15.7									t_c @ POC #47

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.10: Time of Concentration Calculations for Tributary K
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary K															
49	K1					15.0	2.18	0.45	1.98	1.98	1.00	0.89	0.89	1.94	t_c @ POC #49, Initial Area
		307	0.0954	6.75	0.8	15.8									D #74
50	K1,K2,K4, K5,K6					15.8	2.13	0.70	2.71	4.68	1.00	1.89	2.78	5.92	t_c @ POC #50, Add K2,K4,K5,K6
		753	0.0779	9.22	1.4	17.1									D #75
51	K1,K2,K3, K4,K5,K6					17.1	2.04	0.45	5.02	9.70	1.00	2.26	5.04	10.28	t_c @ POC #51, Add K3
	K1,K2,K3, K4,K5,K6, K7					17.1	2.04	0.45	0.36	10.06	1.00	0.16	5.21	10.61	Add K7
		110	0.1909	19.60	0.1	17.2									P #14
54						17.2									t_c @ POC #54
		480	0.0833	7.11	1.1	18.3									Overland
55	K1,K2,K3, K4,K5,K6, K7,K8					18.3	1.97	0.45	8.03	18.09	1.00	3.61	8.82	17.35	t_c @ POC #55, Add K8
		50	0.0100	7.42	0.1	18.5									t_c @ POC #56

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

Table F-5.11: Time of Concentration Calculations for Tributary M
100-Year Storm Event

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Tributary M															
58	M1,M2					15.0	2.18	0.45	2.09	2.09	1.00	0.94	0.94	2.05	t_c @ POC #58, Initial Area
		194	0.0500	16.90	0.2	15.2									P #16
59	M1,M2,M3, M4					15.2	2.17	0.45	1.10	3.19	1.00	0.49	1.43	3.11	t_c @ POC #59, Add M3,M4
		172	0.5000	19.06	0.2	15.3									P #17
60	M1,M2,M3, M4,M5,M6					15.3	2.16	0.45	1.31	4.50	1.00	0.59	2.02	4.37	t_c @ POC #60, Add M5,M6
		193	0.5000	21.25	0.2	15.5									P #18
61															
		268													
62															
		269	0.1340	13.36	0.3	15.8									P #19
65	M1,M2,M3, M4,M5,M6, M7					15.8	2.12	0.45	6.09	10.58	1.00	2.74	4.76	10.11	t_c @ POC #62, Add M8,M9
		37	0.0500	10.52	0.1	15.9									P #21
						15.9									t_c @ POC #66

NOTES:
Flow depths,velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are mearsured as Vertical/Horizontal.

APPENDIX G

APRIL 2019
UPDATED DESIGN PLAN FOR LANDFILL GAS COLLECTION AND CONTROL SYSTEM
(EBA, 2019)

UPDATED DESIGN PLAN
FOR
LANDFILL GAS COLLECTION AND CONTROL SYSTEM

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

October 2015
Revised May 2016
Revised April 2019

Prepared For:

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EBA ENGINEERING

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SECTION 1

INTRODUCTION

This Updated Design Plan (Updated Plan) presents background information, design criteria, and a landfill gas (LFG) collection and control system design for the City of Ukiah Landfill (Landfill), in Ukiah, California. The design and installation of a LFG collection and control system is being required to comply with the *Methane Emissions from Municipal Solid Waste Landfill* requirements associated with Title 17 of the California Code of Regulations (17CCR), Subchapter 10, Article 4, Subarticle 6, also identified as Assembly Bill 32 (AB32). Specifically, this submittal has been prepared to address the design plan requirements stipulated in 17CCR, §95464(a)(1) for the design and installation of a LFG collection and control system. Compliance with these requirements was prompted by the detection of methane emissions from the waste management unit (WMU) surface exceeding the 200 parts per million by volume (ppmv) threshold criteria as determined during a field monitoring event conducted on August 8, 2013 (EBA Engineering [EBA], 2013b).

In response to aforementioned emissions findings, the Mendocino County Air Quality Management District (MCAQMD) originally requested in a letter dated August 23, 2013 that the City of Ukiah, Department of Public Works (City) prepare a Design Plan for a LFG collection and control system to comply with AB32 regulations. A Design Plan (EBA, 2013c) was subsequently prepared and submitted to the MCAQMD in October 2013 and included a target completion date for having the LFG collection and control system installed and operational by December 31, 2014. The installation was to be integrated with the final closure construction project for the Landfill, which was scheduled for implementation in the spring and summer of 2014.

Since submittal of the original Design Plan as described above, the Landfill's final closure construction project has been delayed on multiple occasions due to changes to the final cover system design and associated negotiations with California Regional Water Quality Control Board, North Coast Region (RWQCB), California Department of Resources Recycling and Recovery (CalRecycle), and Mendocino County Health & Human Services Agency (Local Enforcement Agency (LEA), as well as the City's decision to prepare an Environmental Impact Report (EIR) as a mechanism to support the project. As part of these efforts, two updated versions of the Design Plan were submitted in August 2015 (EBA, 2015) and May 2016 (EBA, 2016) at different stages of the final cover redesign in order to bring the Design Plan current. Neither of those versions included substantive changes to the original LFG system design.

This version of the Design Plan has been prepared to account for modifications to the Landfill's final cover system that influenced the previous LFG system design. Overall, the revisions presented herein are primarily limited to modifications to the routing and/or locations of collection system piping and condensate drop-outs to compensate for changes in grade breaks and drainage channel configurations. Aside of these changes, the remaining LFG system design components, sizing,

construction materials, monitoring and reporting, proposed alternatives, and temporary mitigation measures are the same as previously outlined in the prior Design Plan versions.

SECTION 2

BACKGROUND INFORMATION

The purpose of this section is to summarize background information used in the development and design of the LFG collection and control system. The primary topics discussed in this section include general site characteristics and findings from previous LFG investigations. Each of these topics is discussed separately in the following subsections.

2.1 SITE LOCATION AND DESCRIPTION

The Landfill is located at 3100 Vichy Springs Road, approximately three miles east of Ukiah in Mendocino County, California. A site location map showing the location of the Landfill is presented as Figure 1 (Appendix A). The Landfill's WMU occupies approximately 40 acres of permitted landfill area on a 283.5-acre parcel having a maximum width of approximately 1,000 feet in the north-south direction and a maximum length of about 3,500 feet in the east-west direction. Existing ground surface elevations for the WMU range from approximately 710 feet above mean sea level (MSL) near the western footprint, to about 970 feet MSL along the southeast footprint. The WMU has been graded to form a series of flat terraces stepping down from south to north. The WMU surface is covered with seasonal grasses. A site plan illustrating the WMU topography and adjoining areas is presented as Figure 2 (Appendix A).

Land adjacent to the Landfill property is zoned primarily as rangeland and is used for grazing. Dwellings within 1,000 feet of the landfill property include a group of structures owned by the Vichy Springs Investment Group that are located within 500 feet of the Landfill's south property line and a single-family residence located approximately 900 feet west of the Landfill's western property boundary. A rural residential development is located approximately ¼-mile west of the Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000 feet southward of the Landfill property boundary and is separated from the Landfill by an intervening ridge.

It should be noted that the City owns an approximate 97-acre parcel that adjoins a portion of the Landfill's southern property boundary. This property, which has been previously identified as the "Gun Club Parcel", was purchased as a buffer zone to limit future development adjacent to the Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the Landfill property.

2.2 LANDFILL HISTORY AND DEVELOPMENT

Waste disposal operations at the Landfill began in 1955 at the eastern end of the WMU footprint and progressed upslope and westward. Prior to 1971, the Landfill was operated as a burn dump, with most of the burn-dump activities reportedly occurring in areas east of the power lines. After 1971, the method of operation transitioned to a fill and cover approach in a canyon/gully terrain. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the WMU to separate the waste from the realigned creek channel. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing Ukiah and the surrounding area. The Landfill ceased operations in September 2001.

2.3 PREVIOUS LANDFILL GAS (LFG) INVESTIGATIONS

2.3.1 Perimeter LFG Monitoring

The Landfill has been equipped with a perimeter LFG monitoring system since September 1994. The original system consisted of five LFG monitoring points (GAS-1 through GAS-5), followed by the installation of five additional LFG monitoring (GAS-6 through GAS-10) in September 1996. The locations of the LFG monitoring points are shown on Figure 2 (Appendix A). Each of the LFG monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter polyvinyl chloride (PVC) casing and capped with labcock valves. The monitoring probes range in depth from approximately 9 to 250 feet below ground surface (BGS).

The LFG monitoring points are monitored on a quarterly basis to fulfill monitoring requirements set forth in Title 27 of the California Code of Regulations (27CCR), §20921. Historical findings from this monitoring initially identified LFG migration in the area of GAS-3 and GAS-4, which prompted the installation of a partial perimeter LFG collection system in 1997 (see following subsection). Following its installation, methane was only detected sporadically in GAS-3 and/or GAS-4, mostly during periods when the partial perimeter LFG collection system was experiencing mechanical or operational issues. However, since the spring of 2017, elevated methane has been consistently detected in GAS-4. The only other historical perimeter methane detections corresponds to GAS-6 (sporadic) and GAS-10 (consistent). However, these detections have been determined to represent gas of natural thermogenic origin and are not related to the Landfill (Lawrence & Associates [L&A], 1998).

2.3.2 Partial Perimeter LFG Collection

As outlined in the previous subsection, subsurface LFG migration was identified along the southwestern edge of the WMU in the area of perimeter LFG monitoring points GAS-3 and GAS-4 following installation of the perimeter LFG monitoring system. Methane concentrations measured in these perimeter LFG monitoring points consistently exceeded the regulatory threshold for methane of 5 percent by volume (%vol). In response to these conditions, a partial perimeter LFG collection system was installed between the southwestern edge of the WMU and the property line in the summer and fall of 1997 (see Figure 2, Appendix A). In general, the system consists of 17 vertical

extraction points installed in native geologic materials and completed at depths ranging from 35 to 133 feet BGS. The extraction points are connected to a buried 6-inch diameter, high-density polyethylene (HDPE) header pipe that leads to a vacuum blower located at the western end of the WMU. The vacuum blower creates a vacuum in the header pipe that draws the LFG from the soil through the extraction points and header pipe, whereupon the collected LFG (diluted) is vented to the atmosphere via a 4-foot tall, 4-inch diameter stack. The system, which was designed by L&A, works on the premise that the extraction well field creates a barrier against migration while simultaneously mixing the collected LFG with "clean" soil pore gas that dilutes the LFG to concentrations that can be discharged directly to the atmosphere.

2.3.3 New Source Performance Standards (NSPS) Monitoring

In July 1999, a Tier 2 sampling program was implemented at the Landfill by EBA to comply with NSPS regulations. The program entailed the advancement of 26 soil borings to depths of five feet BGS along existing benches within the WMU and the collection of LFG samples for chemical analysis. The LFG samples were composited in the laboratory at a 3:1 ratio and analyzed for non-methane organic compounds (NMOCs) using United States Environmental Protection Agency (US EPA) Method 25C. The corresponding results revealed NMOC concentrations ranging from 290 to 2,900 ppmv. Field monitoring for methane from the soil borings revealed concentrations ranging from nondetect to 59 %vol, with an average concentration of approximately 40 %vol. Hydrogen sulfide was also monitored in the field and revealed concentrations ranging from nondetect to greater than 200 ppmv, with an average concentration of approximately 12 ppmv.

The overall purpose of the Tier 2 sampling program was to determine a site-specific NMOC concentration that could be used to calculate the total NMOC emission rate for the Landfill. The corresponding results revealed a total NMOC emission rate of approximately 6 megagrams per year (Mg/yr)(EBA, 1999). As this concentration was well below the regulatory action limit of 50 Mg/yr, installation of a LFG collection and control system was not required under the NSPS regulations.

2.3.4 Assembly Bill 32 (AB32) Emissions Monitoring

AB32 methane emissions monitoring was performed at the Landfill by EBA on August 8, 2013 to comply with 17CCR, §95463(b)(2)(B) and to establish if methane emissions of 200 ppmv or greater are currently being emitted from the WMU surface. The field work was performed using the instantaneous surface monitoring procedures specified in 17CCR, §95471(c)(1) and §95471(c)(2). The corresponding results from this monitoring identified a total of nine locations in which methane was detected above the 200 ppmv threshold. The concentrations detected ranged from 277 to 89,000 ppmv (8.9 %vol) and were primarily located in the southernmost portion of the WMU. Average readings for the remainder of the WMU ranged from approximately 10 to 20 ppmv (EBA, 2013b).

SECTION 3

LFG COLLECTION AND CONTROL SYSTEM DESIGN CRITERIA

Design of a LFG collection and control system is contingent upon a number of parameters ranging from the quantity, composition, and age of the refuse, as well as site-specific subsurface characteristics. Since a substantial portion of LFG parameters can be highly variable and difficult to quantitate, the criteria used for design purposes were based primarily on characteristics observed during previous site investigations and the use of theoretical parameters/models in which reasonable assumptions and calculations could be made based on existing data, available literature, and relative experience. Parameters used to develop design criteria included: refuse composition and quantity; LFG generation rates; LFG quality; LFG condensate generation; and LFG migration characteristics. Further details regarding these parameters are summarized in the following subsections.

3.1 REFUSE COMPOSITION AND QUANTITY

The Landfill was in operation from 1955 to September 2001 and operated as a nonhazardous Class III solid waste disposal site. Composition of the waste reportedly received at the Landfill included paper products, food wastes, glass, metal, wood, plastic, cloth, rubber, synthetics and inert waste such as soil, ashes, rock, etc. No high liquid content wastes, designated wastes, or hazardous wastes were accepted for disposal. Previous estimates of the waste stream by category identified approximately 27 percent of the waste as residential, 32 percent commercial, 14 percent industrial, and 27 percent self-haul (City, 1999). As previously outlined in Subsection 2.2 (*Landfill History and Development*) of this Updated Plan, the Landfill was operated as a burn dump prior to 1971. Thus, it is possible that the bulk of the waste in the WMU prior to 1971 is primarily inert.

Several previous estimates have been reported with regard to the quantity of waste in-place at the Landfill. In a technical memorandum prepared by Pacific Waste Services, Inc. (PWS) for the City in December 2009, the in-place tonnage was estimated at 1,499,300 tons (PWS, 2009). This estimate was not based on any weigh scale records and assumed a constant 550-ton increase per year of waste placement over the period of 1955 through 2001. In June 2013, the City generated a revised estimate as part of the *Landfill Heat Input Capacity Report* that was prepared to comply with AB32 reporting requirements. As part of the City's revised estimate, actual tonnage data was compiled for the period 1990 through 2001. For years prior to 1990, the City reduced the annual waste placement tonnage by 550 tons per year (same incremental rate assumed by PWS) through 1955. The corresponding total in-place tonnage resulting from this revised calculation equated to 1,039,116 tons (City, 2013).

3.2 LFG GENERATION AND RECOVERY ESTIMATES

Several LFG generation models were evaluated to establish LFG generation estimates for the Landfill and to develop design parameters for the LFG collection and control system. These models included the first-order decay model from the 2006 Intergovernmental Panel on Climate Change (IPCC) as required by 17CCR, §95464(a)(1)(F), as well as miscellaneous first order generation models developed by SCS Engineers (1998) for the Solid Waste Association of North America (SWANA). Multiple models and scenarios were employed to evaluate the range of generation rates calculated by the respective models, which in turn was factored into the determination of potential turndown ratios for the flare design. This use of multiple models is considered appropriate to compensate for the number of variables that are difficult to define with any certainty (i.e., historical disposal rates, historical waste composition, waste moisture content, etc.).

As part of the aforementioned models, the two (2) variables that most strongly influence the corresponding results are the methane generation potential (Lo) and/or the methane generation rate constant (k). Lo represents the total amount of methane that a unit mass of refuse will produce if given enough time to fully decompose. The k constant, in turn, corresponds to the fraction of refuse that decays and generates methane in a given year. Based on the average rainfall in the Ukiah area (approximately 38 inches per year), Lo and k values of 1.6 cubic feet per pound of refuse (ft^3/lb) and 0.038/year (IPCC default value for areas with average rainfall between 20 and 40 inches per year), respectively, were selected for modeling LFG generation rates for the Landfill.

Using the resources and information described herein, LFG generation modeling was performed for four (4) different scenarios. These scenarios included the following:

- *Scenario 1:* A total refuse tonnage of 1,499,300 tons placed between 1955 and 2001 as estimated by PWS.

- *Scenario 2:* A total refuse tonnage of 1,039,116 tons placed between 1955 and 2001 as estimated by the City.

- *Scenario 3:* An adjusted refuse tonnage of 1,125,300 tons based on PWS estimate placed between 1971 and 2001 to account for potential inert refuse resulting from former burn-dump operations.

- *Scenario 4:* An adjusted refuse tonnage of 809,644 tons based on City estimate placed between 1971 and 2001 to account for potential inert refuse resulting from former burn-dump operations.

A summary of the LFG generation modeling results is presented in Table 1. Copies of the corresponding spreadsheets and graphs for the respective model results are presented in Appendices B-1 through B-4, which coincide with Scenarios 1 through 4 described above. Please note that the LFG generation rates presented in Table 1 assume a methane composition of 50 percent by volume. In addition, since the collection and control system cannot capture all of the LFG generated in the WMU due to a variety of factors (i.e., WMU geometry, hydraulic conductivity of the cover, degree

of saturation of the refuse, degree to which air infiltration can be tolerated, etc.), a collection efficiency of 75 percent has been assumed for design purposes. This collection efficiency is consistent with the recovery rate stipulated in the AB32 regulations.

TABLE 1
LFG GENERATION ESTIMATES AND RECOVERY
YEAR 2019

Model	*Lo (ft^3/lb)*	*k (1/year)*	*Methane Generation Rate (SCFM)*	*LFG Generation Rate (1) (SCFM)*	*Potential LFG Recovery (2) (SCFM)*
Scenario 1: PWS Tonnage Estimate for Period 1955 -2001					
IPCC Model	----	0.038	----	----	139
Simple First Order - Median (3)	1.6	0.038	93	186	140
Modified First Order (3)	1.6	0.038	97	194	146
First Order Multi-Phase (3)	1.6	0.038	67	134	101
Scenario 2: City Tonnage Estimate for Period 1955 -2001					
IPCC Model	----	0.038	----	----	98
Simple First Order - Median (3)	1.6	0.038	67	134	101
Modified First Order (3)	1.6	0.038	69	138	104
First Order Multi-Phase (3)	1.6	0.038	48	96	72
Scenario 3: PWS Adjusted Tonnage Estimate for Period 1971 -2001					
IPCC Model	----	0.038	----	----	122
Simple First Order - Median (3)	1.6	0.038	82	164	123
Modified First Order (3)	1.6	0.038	86	172	129
First Order Multi-Phase (3)	1.6	0.038	63	126	95
Scenario 4: City Adjusted Tonnage Estimate for Period 1971 -2001					
IPCC Model	----	0.038	----	----	88
Simple First Order - Median (3)	1.6	0.038	59	118	89
Modified First Order (3)	1.6	0.038	61	122	92
First Order Multi-Phase (3)	1.6	0.038	46	92	69

Lo: Methane Generation Potential
k: Methane Generation Rate Constant
LFG: Landfill Gas
ft^3/lb: Cubic Feet per Pound (of refuse)
SCFM: Standard Cubic Feet per Minute
PWS: Pacific Waste Systems, Inc. (2009)
IPCC: Intergovernmental Panel on Climate Change (2006)
City: City of Ukiah, Department of Public Works (2013)

(1): Assumes an average methane concentration of 50 percent by volume.
(2): Assumes a 75 percent collection efficiency.
(3): SCS Engineers, 1998

The current LFG generation rate for the Landfill based on all the modeling scenarios ranges from 92 to 194 standard cubic feet per minute (SCFM), with potential LFG recoveries ranging from 69 to 146 SCFM. As presented in Table 1, the biggest variable influencing the generation rates is the amount of in-place waste. Scenarios 1 and 3 which assume a higher in-place waste tonnage yield LFG generation rates and recoveries ranging from 126 to 194 SCFM and 95 to 146 SCFM, respectively.

In contrast, the lower in-place tonnage assumed by Scenarios 2 and 4 yield LFG generation rates and recoveries ranging from 92 to 138 SCFM and 69 to 104 SCFM, respectively.

As presented in the various methane/LFG generation graphs presented in Appendix B, the Landfill is on the downward side of the generation curve and will continue along this pattern until the generation potential of the refuse is completely exhausted.

3.3 LFG QUALITY CHARACTERISTICS

Table 3 provides a summary of the estimated LFG quality characteristics at the Landfill. This summary is based on field and laboratory test results on LFG samples collected by EBA on September 12 and 16, 2013. The LFG sampling was performed using two (2) shallow hand-augered boreholes (GP-1 and GP-2) completed at depths of approximately six feet BGS, as well as from existing leachate wells LW-1 and LW-2. Please refer to Figure 2 (Appendix A) for the corresponding locations. Dedicated samples were collected from LW-1 and GP-1, while a two-part composite sample was collected using LW-2 and GP-2. In addition to retaining samples for chemical analysis, the respective locations were monitored in the field for methane, oxygen, carbon dioxide, and hydrogen sulfide using portable meters. These results are also presented in Table 3 below. The laboratory testing was performed by K Prime, Inc. (K Prime), a California State-certified analytical laboratory located in Santa Rosa, California. A copy of the Certified Analytical Report (CAR) prepared by K Prime is enclosed in Appendix C.

TABLE 3
ESTIMATED LANDFILL GAS COMPOSITION

Parameter	*Laboratory Test Results*			*Field Monitoring Results*
	LW-1 (Dedicated)	*GP-1 (Dedicated)*	*LW-2 and GP-2 (Composite)*	
Primary Gases:				
Methane	47.8 % vol	55.2 % vol	57.5 % vol	37 to 67 % vol
Carbon Dioxide	33.2 % vol	35.7 % vol	34.9 % vol	33 to 40 % vol
Oxygen	<1.00 % vol	2.48 % vol	<1.00 % vol	3.4 to 6.7 % vol
Nitrogen	18.3 % vol	6.66 % vol	7.22 % vol	NA
Hydrogen Sulfide	NA	NA	NA	0 to 16 ppmv
VOCs:				
Dichlorodifluoromethane	0.572 ppmv	NA	<1.00 ppmv	NA
Dichlorotetrafluoroethane	0.103 ppmv	NA	<1.00 ppmv	NA
Vinyl Chloride	5.83 ppmv	NA	1.54 ppmv	NA
Methylene Chloride	0.147 ppmv	NA	<1.00 ppmv	NA
cis-1,2-Dichloroethene	2.06 ppmv	NA	<1.00 ppmv	NA
Benzene	0.161 ppmv	NA	<1.00 ppmv	NA
Trichloroethene	0.241 ppmv	NA	<1.00 ppmv	NA
Toluene	0.390 ppmv	NA	7.01 ppmv	NA
Tetrachloroethene	0.819 ppmv	NA	<1.00 ppmv	NA
Chlorobenzene	<0.100 ppmv	NA	1.95 ppmv	NA

(Continued)

TABLE 3 *(Continued)*
ESTIMATED LANDFILL GAS COMPOSITION

Parameter	*Laboratory Test Results*			*Field Monitoring Results*
	LW-1 (Dedicated)	*GP-1 (Dedicated)*	*LW-2 and GP-2 (Composite)*	
VOCs *(continued)*:				
Ethylbenzene	<0.100 ppmv	NA	159 ppmv	NA
Xylene (M+P)	0.409 ppmv	NA	123 ppmv	NA
Xylene (O)	0.144 ppmv	NA	136 ppmv	NA
1,3,5-Trimethylbenzene	<0.100 ppmv	NA	6.02 ppmv	NA
1,2,4-Trimethylbenzene	<0.100 ppmv	NA	6.29 ppmv	NA
Total Volatile Hydrocarbons[(1)]	33.7 ppmv	80.6 ppmv	1,120 ppmv	NA

% vol: Percent by Volume
ppmv: Parts per Million by Volume
NA: Not Analyzed

(1): Total Volatile Hydrocarbons is synonymous to Non-Methane Organic Compounds (NMOCs).

It should be noted that the concentrations presented in Table 3 are considered to be conservative in nature and will likely decrease over time. Since LFG has been generating within the refuse mass for at least 40 years, a surplus of highly concentrated LFG may be currently present within the WMU. However, upon removal of this surplus by the active collection efforts, coupled with the age of the refuse and dilution effects resulting from the influx of atmospheric air, it is estimated that methane concentrations could stabilize somewhere in the 35 to 45 percent by volume range. Carbon dioxide and volatile organic hydrocarbon/NMOC concentrations will also likely exhibit similar reductions, whereas nitrogen concentrations will likely increase. Whereas the length of time it will take for such reductions to occur is unknown, prior experience at similar sites suggest that it could occur within two to six months of system start-up.

3.4 LFG CONDENSATE GENERATION ESTIMATES

Condensate generation was approximated based on temperature and vapor pressure differentials of the LFG. Calculations were performed for flow rates of 53 and 210 SCFM, which correspond to the design flow range for the proposed LFG collection and control system (see Section 4 [*LFG Collection and Control System Design*]). In addition, final inlet LFG temperatures of 36°F and 59°F were also considered to simulate extreme and average temperature conditions indicative of the Ukiah area. Results of the condensate generation calculations are presented below in Table 4. Please refer to Appendix D for copies of individual spreadsheets that summarize the respective calculations.

TABLE 4
CONDENSATE GENERATION CACULATIONS

Flow Rate (SCFM)	*Temperature (°F)*		*Vapor Pressure (psia)*		*Average Vacuum Pressure (psia)*	*Condensate Generation (gpd)*
	Initial	*Final*	*Initial*	*Final*		
53	120	36	1.6927	0.0999	13.797	50 to 52
53	120	59	1.6927	0.2561	13.797	45 to 52
210	120	36	1.6927	0.0999	13.797	199 to 207
210	120	59	1.6927	0.2561	13.797	179 to 207

SCFM: Standard Cubic Feet per Minute
°F: Degrees Fahrenheit
psia: Pounds per Square Inch (Actual)
gpd: Gallons per Day

As summarized in Table 4, the condensate generation rate at the site may range from approximately 45 to 210 gallons per day (GPD) based on the given temperature and flow scenarios. Please note that 36 degrees Fahrenheit (°F) corresponds to the average ambient temperature during the coldest month of the year (December), and therefore represents the period of greatest condensate generation. Since the average ambient temperature over the entire year is 59°F, the average volume of condensate generated over the course of 12 months will be less.

3.5 LFG MIGRATION CHARACTERISTICS

The two primary components of LFG migration correspond to surface emissions and subsurface migration through subgrade soils and rock formations. As a general rule, LFG migration can be expected to follow a path of least resistance in response to pressure differentials. Surface emissions typically occur when vapor pressures within the WMU exceed atmospheric pressure and can vary during the course of the day due to fluctuations in atmospheric conditions. Similarly, increased vapor pressures within the WMU can induce lateral and vertical LFG migration through subsurface soils and rock formations, including preferential migration through permeable zones (i.e., sand and gravel deposits, fractures, etc.). Finally, concentration gradients between LFG within the refuse mass and surrounding soil-pore gas in the vadose zone can result in the diffusion of LFG both laterally and vertically.

It should be noted that the surface of the WMU is currently comprised of interim cover soil. However, a low-permeability final cover system will be installed over the entire WMU as part of the final closure construction operations. Since the final cover system will include a geomembrane component, the new final cover system should serve to reduce potential surface emissions on its own. Conversely, the low-permeability nature of the final cover system could increase vapor pressures within the WMU, thereby increasing the potential for lateral and/or vertical LFG migration through the subsurface soils and/or rock formations, similar to what is currently being observed in

the area of GAS-4. Thus, whereas the LFG collection and control system is being mandated to address fugitive surface emissions, it will also serve the dual purpose of mitigating the area of existing migration (GAS-4) and minimizing the potential for increased subsurface LFG migration elsewhere around the WMU.

SECTION 4

LFG COLLECTION AND CONTROL SYSTEM DESIGN

This section presents the various components of the LFG collection and control system design. The design has been developed to meet the requirements of 17CCR, §95464(b). Based on the current and projected LFG recovery rates presented in Subsection 3.2 (*LFG Generation and Recovery Estimates*), the design flow rate for the system has been established at 53 to 210 SCFM (at 50 percent methane). This range covers the highest anticipated LFG recovery rate based on the most conservative generation model. In addition, the design range can accommodate lower flows to account for future operations as the generation rate continues to decreases over time. Overall, the LFG collection and control system will consist of a series of perimeter and interior LFG extraction wells, associated above ground collection system piping, condensate collection provisions, and a flare station. Further details regarding each of these components are summarized in the following subsections.

Construction drawings illustrating the LFG collection and control system design are enclosed in Appendix E. Sheets 600 through 602 provide plan views of the system layout. Sheets 700 through 706, in turn, provide details of the various system components.

4.1 LFG EXTRACTION WELLS

4.1.1 Well Field Layout and Rationale

Since the WMU is comprised mostly of steep slopes, the well field layout is primarily dictated by the location of benches, which provide access by a truck- or track-mounted drilling rig. With that constraint in play, the well field for LFG extraction has been designed to create a series of perimeter and interior extraction well locations. Sheets 600 through 602 (Appendix E) show the proposed well field configuration. As presented on these sheets, a total of 18 extraction wells (EW-1 through EW-18) will be installed as part of the proposed construction. The rationale for the well field layout is as follows:

- The perimeter extraction wells located near the edges of the WMU will be used for migration control in response to the anticipated increase in lateral and vertical pressures induced by the installation of the final cover system;

- The interior extraction wells will be used to collect methane-rich LFG for the purpose of operating the flare and to deplete the LFG generation source;

- The overall extraction well configuration will serve to provide coverage of the entire WMU as a means of minimizing the potential for fugitive surface emissions, including areas of exceedances identified during the August 8, 2013 emissions monitoring event; and

- LFG extraction well EW-9 is intended to target the LFG migration observed in GAS-4, although other LFG extraction wells may also serve this purpose depending upon the migration pathway responsible for the conditions exhibited in GAS-4.

For design purposes, it is assumed that the operating flow rates for the extraction wells will initially range from approximately 5 to 8 SCFM, which equates to a total flow of 90 to 144 SCFM. This flow range encompasses the estimated maximum 2019 LFG recovery rate of 146 SCFM as presented earlier in Subsection 3.2 (*LFG Generation and Recovery Rates*) of this Updated Plan. It should be noted, however, that the actual flow rates will be contingent upon LFG quality at the respective locations. The aggressiveness upon which the well field is operated will be dictated by the extent of atmospheric air intrusion and the ability to attain flows that will not compromise the safety of site operations (i.e., subsurface fires).

4.1.2 Well Completion Depths

The extraction wells will be completed to depths of approximate 10 to 15 feet above the base of refuse. Based on a previous seismic refraction survey performed at the Landfill in 1993 (Norcal Geophysical Consultants, Inc., 1993), it was estimated that the base of refuse ranges from approximately 700 feet MSL (north) to 880 feet MSL (south), with refuse thicknesses ranging from 40 to 65 feet. However, additional refuse was placed in the southern portion of the WMU following the seismic refraction survey, thereby increasing the refuse thickness in some areas to greater than 80 feet. Based on these characteristics, the proposed extraction well depths will range from 25 to 80 feet BGS as measured from the top of the completed final cover system surface, with an overall average depth of approximately 50 feet BGS. Ideally, a minimum perforation depth (i.e., depth to top of perforated interval) of 15 to 20 feet BGS will be maintained to minimize the potential for atmospheric air intrusion during system operations. In the event shallow auger refusal conditions are encountered that do not allow adherence to this specification, consideration will be given to either reducing the minimum perforation depth or adjusting the corresponding well location.

The extraction wells will be drilled using a truck- or track-mounted drilling rig equipped with 24-inch diameter solid stem augers or bucket auger (see following subsection for further details). A qualified drilling contractor with a current C57 contractor's license will provide the drilling services, under the direct supervision of a California Registered Geologist. The field geologist will be responsible for logging the respective boreholes, making determinations in the field regarding the completion characteristics noted above, and preparing well completion logs. This individual will also perform field monitoring during drilling to evaluate individual borehole conditions and for health and safety purposes. The scope of field monitoring will include selected gases (i.e., methane, oxygen, carbon dioxide, and hydrogen sulfide) and volatile organic compounds (VOCs) using a portable LFG analyzer and photoionization detector (PID), respectively. Refuse spoils generated by the drilling operations will either be temporarily stockpiled on visqueen (and covered) or placed in roll-off bins, whereupon the material will be transported off-site to a permitted solid waste disposal facility.

4.1.3 Well Construction Characteristics

The well casings for the extraction wells will be constructed of 4-inch diameter, Schedule 80 polyvinyl chloride (PVC) pipe. As noted in the previous subsection, the perforated interval for each well will start at 15 to 20 feet BGS and extend downward to the completion depth of the well. The annulus around the well casing will be backfilled with gravel pack material consisting of 1- to 2-inch diameter, non-calcareous washed rock and will extend 12 inches above the perforated casing. The gravel pack, in turn, will be capped with a 3-foot-thick hydrated bentonite seal, followed by soil to a depth of 1 foot below the refuse/final cover interface. A second hydrated bentonite seal (1.5 feet in thickness) will then be placed across this interface, followed by compacted soil to the base of the final cover system's geomembrane. Finally, a PVC well bore seal will be placed beneath and across the geomembrane as a protection provision against atmospheric air intrusion during system operations. Please refer to Sheet 700 (Appendix E) for a typical LFG extraction well construction detail and a tabulated summary of the proposed completion characteristics for the respective extraction wells.

4.1.4 Wellhead Completion

The wellheads for the extraction wells will be completed above ground. The wellheads will be equipped with 1.5-inch diameter PVC gate valves and fittings to regulate and control LFG flow. Each wellhead will also be equipped with a sample port, differential pressure ports, and an orifice plate to allow for the monitoring of LFG quality, temperature, vacuum conditions, and flow. PVC flex hose will be used to connect the wellheads to the collection system piping. Please refer to Sheet 700 (Appendix E) for the wellhead completion characteristics.

4.2 COLLECTION SYSTEM PIPING

4.2.1 Piping Layout and Rationale

Extracted LFG will be conveyed to the flare station via above ground collection system piping (i.e., laterals and headers). The proposed layout of the collection system piping is shown on Sheets 600 through 602 (Appendix E). As shown on these sheets, most of the collection system piping is aligned along the outside edges of the benches to allow for future operation and maintenance access. Other design features and considerations include the following:

- The layout has a modified "loop" configuration that allows for a more even distribution of flow throughout the system.

- The system is segmented and equipped with valve assemblies that will allow for portions of the system to be isolated for repair and maintenance while the remainder of the system remains operational.

- The system has been designed for the removal of LFG condensate at various locations within the well field by promoting gravity drainage of the condensate towards low points within the

collection system piping, whereupon the condensate is drained via dedicated drainage lines that convey the collected condensate to an existing leachate drain located along the northern toe of the WMU.

4.2.2 Sizing of Primary Header Pipe

Head loss calculations were performed using the Darcy Formula to determine sizing requirements for the primary header pipe. A copy of the corresponding head loss calculations is presented in Appendix F. Based on a proposed blower vacuum rating of 35 inches of water column ("wc), a desired wellhead vacuum inducement of 10"wc at the extraction wells furthest from the flare station (EW-17 and EW-18), and a maximum flow rate of 210 SCFM, the corresponding head loss for a 8-inch diameter header pipe is approximately 2.2"wc. This translates to an available residual vacuum of 22.8"wc, which should be more than sufficient to compensate for any unforeseen performance losses related to potential surging effects or flow reversals (i.e., LFG versus condensate flow).

4.2.3 Construction of Collection System Piping

The collection system piping will be constructed of Schedule 40 PVC pipe ranging in size from 4 to 8 inches in diameter. The PVC piping and fitting components will be joined using solvent welding methods and painted to provide ultra-violet (UV) light protection. As outlined in the previous subsection, 8-inch diameter pipe is proposed for the primary header pipe to accommodate anticipated flows and promote condensate drainage. Six-inch and 4-inch diameter piping is proposed for selected header and LFG extraction well lateral segments, respectively. Other pertinent components of the collection system piping will include the following:

- Isolation valves will be installed at major junctions and other strategic points within the primary header (see Sheets 600 through 602, Appendix E) to provide for greater flexibility from an operations and maintenance standpoint. This provision will allow sections of the primary header to be isolated while the remaining sections remain operational.

- Flexible couplings will be installed within the header segments to accommodate thermal expansion and contraction of the pipe due to ambient temperature fluctuations.

- Pipe anchors will be installed within the header segments to secure and restrict pipe movement at pertinent points within the system. The majority of the proposed pipe anchor locations will correspond to header-to-header and lateral-to-header connections and condensate drainage lines.

- Pipe supports for selected above ground PVC piping segments will be installed to allow for the passage of surface water drainage beneath the pipe and to adjust pipe slopes where needed.

4.3 CONDENSATE COLLECTION PROVISIONS

LFG condensate generated with the LFG collection and control system will be collected and removed at various points within the collection system piping. Condensate will also be removed at the flare station at a point just prior to the blowers. The locations and type of equipment to be used to remove the condensate can be summarized as follows:

- *Condensate Drop-Outs:* Condensate drop-outs will be installed at various locations within the well field area (see Sheets 600 through 602, Appendix E). The condensate drop-outs are located at various low points within the collection system piping. The condensate drop-outs are designed to collect and convey condensate by gravity flow via dedicated drainage lines to the existing leachate drain located along the northern toe of the WMU. The condensate drainage lines will be comprised of HDPE pipe and will include U-traps to isolate the drainage lines from the LFG stream. The removal of condensate from these areas is necessary to avoid potential problems related to LFG flow blockages and surging effects.

- *Gas-Liquid Separator:* A gas-liquid separator will be installed at the flare station directly upflow from the blowers. The purpose of this component is to remove moisture from the LFG air stream prior to entering the blowers and flare. Removal of the moisture is achieved by centrifugal force created within the gas-liquid separator.

Condensate removed by the drop-outs and discharged to the existing leachate drain will be managed in the same manner that the leachate currently is managed; i.e., the leachate drain discharges to a vault located near the west end of the WMU, whereupon the leachate is pumped to an existing leachate above ground storage tank (AST) for subsequent disposal at the City's publicly-owned treatment works (POTW) facility. Condensate collected by the gas-liquid separator will also be handled in a similar manner. This condensate will either be gravity fed to the aforementioned vault or pumped directly to the existing leachate AST. Provisions will be made to line the vault with a solids epoxy resin-based coating to provide waterproofing, sealing, and corrosion protection.

4.4 FLARE STATION

The major components of the flare station are the blowers and the flare. Other pertinent equipment and features include: a gas-liquid separator for removing condensate and particulates from the LFG stream; LFG flow control and miscellaneous monitoring mechanisms to evaluate flare performance and compliance; and automatic safety control features. Further details regarding each of these components are summarized in the following subsections.

It should be noted that the flare station will be comprised of a skid-mounted packaged combustion system. In general, a packaged combustion system consists of a pre-piped and pre-wired unit in which all the system components (i.e., gas-liquid separator, blowers, flare, control panel, etc.) are mounted on two separate skids. This type of system is proposed as a mechanism to reduce field installation costs. In addition, the packaged combustion system can be trouble-shooted and tested at the factory following fabrication to ensure proper operation.

4.4.1 Gas-Liquid Separator

The gas-liquid separator is designed to remove moisture for the LFG stream prior to entering the blowers and flare. Removal of the moisture is achieved by centrifugal force created within the gas-liquid separator. Free liquids generated by this process are collected at the base of the unit and will be discharged to either the leachate vault or leachate AST as described in the previous subsection. This unit will be located on the packaged combustion system at a point upstream of the blower inlet.

4.4.2 Blowers

The function of the blowers is to induce a vacuum in the LFG extraction wells and collection system piping and convey the LFG generated from these sources to the flare. The desired vacuum for the LFG collection and control system is set at 35"wc. This vacuum will be sufficient to induce a minimum vacuum of 10"wc in the LFG extraction wells furthest from the blower, extract LFG intercepted by the final cover system's gas relief component, and to overcome associated head losses in the collection system piping. As outlined in Subsection 4.2.2 (*Sizing of Primary Header Pipe*) of this report, a residual vacuum of 22.8"wc will be available in the primary header system under the aforementioned conditions. The design flow rates for the entire LFG collection and control system are 53 to 210 SCFM. Two blowers will be installed at the flare, with the second blower intended for secondary standby requirements or to allow for alternating use of the blowers.

The blowers will consist of centrifugal-type blowers equipped with 7.5 horsepower, 3-phase, totally-enclosed fan cooled (TEFC) motors. Flexible connections will be installed on both inlet and outlet sides of the blowers to absorb vibrations during operation. A summary of the blower performance parameters is presented in Table 5.

TABLE 5
BLOWER PERFORMANCE SPECIFICATIONS

Parameter	*Specification*
Fuel	Landfill Gas
Fuel Specific Gravity	0.97 pounds per cubic foot
Fuel Temperature (Range)	100ºF to ambient
Design Flow Rate (Range)	53 to 210 standard cubic feet per minute
Blower Turndown Ratio	4:1
Inlet Vacuum Pressure	35 inches of water column
Discharge Positive Pressure	10 inches of water column

°F: Degrees Fahrenheit

4.4.3 Totally-Enclosed Vertical Ground Flare

A totally-enclosed vertical ground flare (flare) will be utilized for the thermal destruction of LFG collected by the LFG collection and control system. In general, LFG extracted from the LFG extraction wells is diverted to the flare station where it is combusted in the presence of oxygen to carbon monoxide, sulfur dioxide, oxides of nitrogen (NOx), and other related gases. The flare will be specified to meet all requirements of the MCAQMD and AB32 regulations, and will be equipped with a series of operational mechanisms, safety controls and monitoring devices (see following subsections). Table 6 below provides a summary of applicable performance standards for the flare.

TABLE 6
FLARE PERFORMANCE STANDARDS

Parameter	*Specification*
Fuel	Landfill Gas
Fuel Composition (estimated)	Methane (30 to 55 percent) Carbon Dioxide (20 to 45 percent) Nitrogen (5 to 12 percent) Oxygen (0 to 3 percent) Hydrogen (0 to 1 percent) Trace Compounds (<1 percent)
Fuel Specific Gravity	0.97 pounds per cubic foot
Fuel Temperature Range	100ºF to ambient
Design Flow Rate (range at 50 percent methane)	53 to 210 standard cubic feet per minute
Pilot Fuel	Propane
Fuel Pressure to Flare	10 inches of water column
Minimum/Maximum LFG Heating Value	269 to 492 BTU/scf
Minimum/Maximum LFG Heat Release	0.9 to 6.2 MMBTU/hr
Flare Turndown Ratio	4:1
Minimum LFG Retention Time	0.7 seconds
Minimum Combustion Temperature	1,400ºF
Design Operating Temperature	1,400ºF to 1,800ºF
Destruction Efficiency	Overall = >98 percent by weight Oxides of Nitrogen (NOx) = 0.06 lbs/MMBTU Carbon Monoxide (CO) = 0.20 lbs/MMBTU

°F: Degrees Fahrenheit
BTU/scf: British Thermal Units per Standard Cubic Foot
MMBTU/hr: Million British Thermal Units per Hour
lbs/MMBTU: Pounds per Million British Thermal Units

4.4.4 LFG Flow Control and Monitoring Mechanisms

The flare will be equipped with automatic flow control capabilities and miscellaneous monitoring devices. The two primary components of the LFG flow equipment are the flame switch assembly and an actuated LFG inlet valve. The flame switch assembly is the source mechanism for activating the LFG inlet valve and includes such equipment as a UV flame detector and miscellaneous electronic relay components. The LFG inlet valve, in turn, shuts down flow to the flare in case of a system failure or emergency and is controlled by an electric or pneumatic actuator.

The flare station will also be equipped with a variety of sensors and gauges to monitor system parameters, with the most prominent parameters being flow and temperature. Flow will be measured using a differential pressure or thermal mass flow meter. Temperature within the flare will be monitored using thermocouple transducers and temperature sensors. These devices are wired to a flame temperature controller unit that will be capable of regulating flare temperatures (through activation of an automatic damper[s]) and/or shutting down the flare station in cases of minimum/excessive temperatures.

4.4.5 Automatic Safety Control Systems

In addition to the aforementioned safety control measures, the flare will be equipped with a flame arrestor and miscellaneous automatic shutdown devices. The flame arrestor is a safety mechanism designed to stop propagation of the flame. This device is equipped with an internal multi-plate bank assembly that absorbs and dissipates the heat from the LFG, which in turn lowers the temperature of the LFG below its ignition point, thereby quenching the flame. The flame arrestor will be installed in the inlet pipeline, just prior to entering the flare. The automatic shutdown devices, in turn, provide oversight of system operations and terminate operations if pre-set conditions are not satisfied. Conditions to be programmed for automatic shutdown will include, but not necessarily limited to, the following: pilot light failure; low/high temperature conditions; flame-out conditions; high condensate level in gas-liquid separator; and power outage.

4.4.6 Control Station Assembly

The overall collection and control system will be operated by a programmable logic control (PLC) housed inside a self-supporting, weatherproof control panel. The PLC will be responsible for overall system operation and control. In addition to the PLC, the control panel will contain the following control/safety components and features:

- Automatic start/re-start control system
- Pilot gas control system
- Modules for low/high temperature shut-down and automatic temperature controls integrated with the flare's damper system
- Motor starter panels, including variable frequency drive (VFD) provisions
- Power transformer and miscellaneous relay mechanisms
- Indicating lights showing system operation and status
- A continuous chart recorder for temperature and flow

- Autodialer alarm system

The control station assembly will be mounted directly onto the packaged combustor system unit. All electrical components for the control station assembly and flare station will be Underwriters Laboratory (UL) approved.

4.5 PERMITTING

Permitting of the proposed LFG collection and control system will entail the acquisition of an Authority to Construct (ATC)/Permit to Operate (PTO) from the MCAQMD. The ATC/PTO process will be coordinated by EBA with the MCAQMD. Upon issuance of the ATC by the MCAQMD and subsequent installation of the LFG collection and control system, provisions will be made to coordinate a final system inspection with MCAQMD and perform any source testing that may be required to satisfy applicable PTO requirements.

Other local permits that may be required as part of the installation process include a drilling permit for installation of the LFG extraction wells, as well as building and electrical permits. The acquisition of these types of permits (as applicable), and any other local permits that may be required, will be obtained by the construction contractor selected to implement the final closure construction project.

SECTION 5

MONITORING AND REPORTING

The LFG collection and control system will be monitored throughout the course of operation to evaluate the performance and effectiveness of system operations. The proposed scope and frequency of monitoring activities are designed to maintain system efficiency and safety, and to comply with federal, state, and local regulatory requirements, including AB32 regulations. Details regarding the proposed monitoring and reporting provisions are summarized in the following subsections.

5.1 FLARE STATION

Upon commencement of system operations, the flare station will be monitored initially on a daily basis to assure safe and efficient system operations, and to confirm compliance with applicable regulatory performance standards. Since the flare station is responsible for inducing sufficient vacuum pressures for the entire WMU and subsequent combustion of the LFG, it is imperative that the equipment components are operating at optimal efficiency at all times. Upon stabilization of system operations, the frequency of monitoring will be adjusted accordingly. In order to monitor system performance and identify potential hazards, the following parameters will be monitored and recorded:

- Ambient temperature
- Blower inlet vacuum pressure and differential pressure
- Blower operating hours
- LFG inlet temperature and pressure
- LFG flow rate
- LFG quality (methane, carbon dioxide, oxygen and balance [nitrogen] concentrations)
- Flare temperature
- Flame arrestor pressure and differential pressure

The parameters outlined herein will be recorded on an entry log. All completed entry logs will be maintained on file at the City's office and will be made available to the MCAQMD, CalRecycle, and LEA upon either verbal or written request.

5.2 WELL FIELD

LFG parameters will be monitored at each of the wellheads. Data compiled at these locations provide the greatest source of information regarding LFG collection and control system performance. Parameters to be included in the data collection will be as follows:

- *LFG Quality*: Monitoring of the four primary LFG components (methane, carbon dioxide, oxygen and nitrogen) and the associated ratios of these compounds plays an important role with regard to operation of the LFG collection and control system. Methane concentrations provide an indication of the overall decomposition rate of the refuse and the overall health of the methogenic (anaerobic) organisms. Nitrogen and oxygen concentrations, in turn, provide indications of excessive flows and the influx of atmospheric air. The influx of atmospheric air into the WMU can be detrimental to anaerobic decomposition (thereby eliminating methane production), and can also increase the potential for subsurface fires. Individual extraction wells will be adjusted accordingly to maintain the highest methane content as practical, while still maintaining adequate migration and emissions control.

- *LFG Temperature:* Excessive LFG temperatures provide an indication of potential subsurface fires. LFG temperatures typically range from ambient to approximately 130°F. Temperatures approaching the high end of this range will be used as a precautionary warning of potentially adverse operating conditions.

- *LFG Flow:* Flow rates provide an indication of the performance of the respective LFG extraction wells. In addition, individual flow data can be useful in diagnosing problem areas in cases where decreases in overall flow rates are observed at the flare station. Finally, flow data can be used to monitor whether the well field is operating within the LFG generation design parameters.

- *LFG Pressure:* Pressure data is used to evaluate whether an individual LFG extraction well is maintaining a negative pressure (vacuum). In some cases, excessive negative pressure conditions may also provide an indication that the well is clogged or damaged.

Data compiled from the aforementioned monitoring will be used to evaluate conditions in proximity of each source location, and to make necessary flow adjustments at the respective wellheads. The monitoring of LFG extraction wells will be conducted initially on a weekly basis (minimum) until system operations stabilize, whereupon the monitoring frequency will be reduced to either bimonthly or monthly, as appropriate. Consistent with the recording procedures outlined above for the flare station, all data will be recorded on an entry log and maintained on file at the City's office. The corresponding entry logs will be made available to the MCAQMD, CalRecyle and LEA upon either verbal or written request.

5.3 TITLE 27 PERIMETER LFG MONITORING

Monitoring of the perimeter LFG monitoring points will be conducted on a quarterly basis in accordance with 27CCR, §20921 and the Landfill's Final Postclosure Maintenance Plan. In addition to fulfilling the aforementioned regulatory requirements, the monitoring of perimeter probes will provide pertinent information regarding the overall performance of the LFG collection and control system. As previously noted in Subsection 4.1.1 (*Well Field Layout and Rationale*), installation of the final cover system could increase lateral and vertical pressures within the WMU, thereby potentially inducing subsurface migration of LFG. Thus, the perimeter monitoring will assist in

determining whether the LFG collection and control system is providing adequate subsurface migration control, including whether ongoing operation of the existing partial perimeter LFG collection system is necessary if the historical LFG migration in that area can be abated by the new system. In accordance with 27CCR, §20934, the results of the monitoring will be reported within 90 days from when the monitoring was performed and submitted to the LEA, MCAQMD, and RWQCB.

5.4 AB32 MONITORING

5.4.1 Monitoring

The LFG collection and control system and WMU surface will be monitored to comply with AB32 requirements in accordance with 17CCR, §95469. The scope of monitoring will include the following:

- Instantaneous surface monitoring will be conducted on a quarterly basis to determine if surface emissions of 500 ppmv or greater, other than non-repeatable, momentary readings, are present at any location on the WMU surface. The monitoring will be accomplished using a portable gas detector while walking in a designated 25-foot spacing interval pattern where practical (see Section 6 [*Proposed Alternatives*] of this Updated Plan for noted exceptions). As required by the regulations, the WMU surface will be separated into grids approximately 50,000 square feet in size to delineate individual monitoring areas. Please refer to Appendix G for an illustration of the designated grid pattern.

- Integrated surface monitoring will be conducted on a quarterly basis to determine if the average methane concentration within the individual grids exceeds 25 ppmv. The instrumentation and walking pattern will be consistent with those described above for the instantaneous surface monitoring.

- Any components of the LFG control and collection system that are under positive pressure will be monitored on a quarterly basis to determine if any leaks are present at methane concentrations exceeding 500 ppmv. The only components under pressure will correspond to the conveyance piping between the blower and flare, as well as the flame arrestor and automatic block valve. There will be no components under pressure in the well field. The monitoring will be performed using a portable gas detector.

- The wellhead for each extraction well will be monitored on a monthly basis to determine whether the extraction well is being operated under vacuum conditions (i.e., negative pressure). The monitoring will be performed using a Magnehelic pressure gauge. This monitoring requirement is redundant to that previously described in Subsection 5.2 (*Well Field*) of this Updated Plan.

- The flare will be monitored for temperature and flow rate using dedicated instrumentation and the corresponding data documented using a continuous recorder. In addition, the flare will be source tested on an annual basis to verify compliance with emissions and destruction efficiency criteria.

The test methods and procedures employed to perform the respective monitoring provisions outlined above will be in accordance with the applicable subsections of 17CCR, §95471. This includes portable gas meter instrumentation and calibration, emissions monitoring procedures, wind speed data collection, and precipitation documentation (i.e., no measurable precipitation 72 hours prior to emissions monitoring). In addition, in the event that an emissions and/or operating threshold is identified, corresponding corrective actions will be implemented within the time frames specified in the AB32 regulations.

In accordance with 17CCR, §95469(a)(1)(C) and §95469(a)(2)(C), if no exceedances of the 500 ppmv (instantaneous) and 25 ppmv (integrated) emission thresholds are encountered for four consecutive quarters, the quarterly emissions monitoring frequency specified herein will be extended to annually. In addition, if the flare remains in compliance after three consecutive source tests, the annual source test frequency specified herein will be extended to every three years per 17CCR, §95464(b)(4)(A).

5.4.2 Recordkeeping

Records will be maintained for the respective monitoring activities and will be made available for regulatory review at the City's office. The types of records to be maintained will comply with 17CCR, §95470(a) and include the following (as applicable):

- All LFG collection and control system downtime exceeding five calendar days, including individual well shutdown and disconnection times, and the reason for the downtime.

- All LFG collection and control system downtime in excess of one hour, the reason for the downtime, and the length of time the system was shutdown.

- Expected LFG generation flow rate for the applicable calendar year.

- Records of all instantaneous surface readings of 200 ppmv or greater associated with the LFG collection and control system and surface emissions monitoring, including specific details of the findings, corrective actions, and subsequent re-monitoring.

- Records of any positive wellhead gauge pressure measurements, the date of the measurement, the well identification number, and the corrective action taken.

- Results of flare source tests.

- Records describing the mitigation measures taken to prevent the release of methane or other emissions into the atmosphere during periods of shutdown or repair of the LFG collection and control system.

- Records of any construction activities, including description of reason and associated details of the construction and mitigation measures taken to minimize methane emissions and other potential air quality impacts.

- Records of the equipment operating parameters for the flare, including all 3-hour periods of operation during which the average temperature difference was more than 50°F below the average combustion temperature during the most recent source test, as well any other parameter boundaries that were exceeded.

The aforementioned monitoring records will be maintained and be made available for regulatory review for a minimum of five years. In addition, the following records will be maintained for the life of the flare: vendor specifications; expected gas generation flow rate; and percent reduction of methane achieved by the flare.

5.4.3 Reporting

An annual report will be prepared and submitted to the MCAQMD and/or the California Air Resources Board (CARB) by March 15 of each calendar year. The report will cover the period of January 1 through December 31 of the previous calendar year. The contents of the report will include all the information stipulated in 17CCR, §95470(b)(3), including much of the records information outlined in the previous subsection (as applicable).

SECTION 6

PROPOSED ALTERNATIVES

Alternative compliance options to the various requirements stipulated in the AB32 regulations are allowed for consideration under 17CCR, §95468. In this regard, the following sections outline three options as part of this Updated Plan to account for site-specific topographic features and design characteristics of the final cover system.

6.1 ALTERNATIVE WALKING PATTERN

As previously discussed in Subsection 5.4 (*AB32 Monitoring*) of this Updated Plan, 17CCR, §95471(c)(1)(B) requires that the walking pattern for emissions monitoring be no more than a 25-foot spacing interval within each 50,000-square foot monitoring grid. Whereas the uppermost (southern) portions of the WMU surface readily allow for the implementation of this procedure, the majority of the WMU surface is comprised of steep slopes that present safety issues. A formal written request for authorization of an alternate walking pattern was submitted to the MCAQMD on July 18, 2013 (EBA, 2013a). A copy of this request is enclosed in Appendix G of this Updated Plan. As presented in Appendix G, several of the concerns originally raised corresponded to logistical and safety issues associated with the vegetative cover (i.e., need for cutting of vegetation to facilitate emissions monitoring and potential safety hazards related to rattlesnake harborage). These concerns no longer apply based on the nature of the revised final cover system (i.e., synthetic closure turf in lieu of a vegetative cover). However, the safety issue of slip and fall hazards remain due to the steepness of the slopes. The majority of the landfill surface is at a slope of approximately 2.5:1 (horizontal to vertical). Slopes of this magnitude covered by a synthetic surface can be slippery when trying to traverse by foot, regardless if the synthetic surface is wet or dry. This potential hazard is further heightened when considering the sampler is carrying a 30- to 40-pound instrument on his or her back/shoulder and holding the detector probe in one hand, while simultaneously trying to focus on both the monitoring device and the ground surface.

As part of the previous exemption request presented in Appendix G, it was recommended that only those grids with flat or shallow slope conditions (i.e., grids G6, G7, G10, G11, G14, G18, G19, G26, G27, G38 and G39 [see Appendix G]) be subject to the 25-foot spacing interval walking pattern, while surface emissions monitoring for the primary slope areas would target the respective benches. Under this approach, both the inside and outside edges of each bench would be monitored in accordance with the instantaneous surface emissions monitoring procedures described in the regulations. This approach was considered to offer a means of monitoring for surface emissions within the primary slope areas as a whole while promoting a safe monitoring procedure for the individuals responsible for implementing the program in the field. This overall walking pattern was verbally approved by the MCAQMD on July 31, 2013.

Once the LFG collection and control system is installed and operational, it is recommended that the same alternative walking pattern as described above and approved by the MCAQMD be implemented as part of subsequent surface emissions monitoring. While the previous request focused on instantaneous surface emissions monitoring, the same walking pattern is also proposed for the integrated surface emissions monitoring.

Please note that whereas the final WMU grades will be adjusted nominally as part of the final cover system construction, the bench locations and slope angles will generally mimic the existing configurations. Thus, the number, orientation and pattern of the existing grids as presented in the previous submittal (Appendix G) will not change appreciably and is still valid.

6.2 WELLHEAD GAUGE PRESSURE

17CCR, §95464(c) requires that each wellhead must be operated under a vacuum (negative pressure), unless the final cover system is constructed with a geomembrane or synthetic cover. Under this circumstance, an acceptable pressure limit for the wellheads must be specified in the design plan. Since the final cover system for the WMU will include a geomembrane component, the Landfill qualifies for an alternative wellhead gauge pressure limit. In this regard, it is proposed that the maximum wellhead gauge pressure limit be set at +2.0 inches of water column (positive pressure).

Please be advised that the wellhead gauge pressure is indicative of pressure conditions at depth, not at the near surface. Just because a positive pressure exists at a wellhead, it does not necessarily mean that surface emissions will be the result of such conditions. Ideally, the wellhead gauge pressure should be dictated by the LFG quality as inducing too much vacuum can cause in the inducement of atmospheric air into the refuse mass and increase the potential for subsurface fires. Thus, in the absence of surface emissions within proximity of an extraction well, no adjustment to the vacuum is recommended regardless of the wellhead gauge pressure conditions, provided the maximum LFG quality conditions have been attained at that particular extraction well. In fact, it would be better to disconnect and cap the extraction well as opposed to risking a subsurface fire for the sole purpose of maintaining a negative wellhead gauge pressure. Under this scenario, replacement of the disconnected extraction well is not recommended unless surface emissions exceeding the regulatory thresholds are detected, whereupon a new extraction well(s) should be installed within the time frames stipulated in 17CCR, §95469(c).

6.3 PROVISIONAL GAS RELIEF COMPONENT VENTING

The gas relief component associated with the final cover system will be connected to the LFG collection and control system and maintained under vacuum to eliminate the potential build-up of LFG pressure beneath the geomembrane. This provision is important as excessive LFG pressures beneath the geomembrane could compromise the structural integrity of the geomembrane. Whereas the LFG collection and control system is designed to operate on a continuous basis, there may be unforeseen instances where the system shuts down due to equipment failure or power outages. If

such shutdowns last for an extended period of time, temporary mitigation measures will be necessary to avoid excessive pressure build-up beneath the geomembrane. In this regard, the gas relief component will be equipped with pressure relief valves to allow for temporarily venting to the atmosphere LFG that may collect beneath the geomembrane during shutdown periods. The valves will be pressure activated if appreciable pressures buildup beneath the geomembrane. While such conditions may result in point source emissions exceeding the AB32 regulatory threshold of 500 ppmv, such emissions would only be temporary in nature and would cease upon reinstatement of LFG collection and control system operations.

SECTION 7

TEMPORARY MITIGATION MEASURES

Per 17CCR, §95464(a)(1)(D), the design plan must include temporary mitigation measures to prevent the release of methane or other pollutants into the atmosphere during the installation or preparation of extraction wells, piping, or other equipment; during repairs or the temporary shutdown of LFG collection and control system components; or when solid waste is excavated and moved. The following provides a summary of the temporary mitigation measures that will be employed to meet these objectives:

- New LFG extraction wells will be required to be drilled and installed in a single day. Installation must include placement of casing, gravel pack, and surface seal (including lower and upper hydrated bentonite seals). The top of the casing will be capped. Partially drilled or partially installed extraction wells will not be allowed to remain open overnight.

- During the installation or repair of collection system piping, the ends of piping that could be susceptible to emitting LFG will be capped when not actively being worked on. No pipe ends will be allowed to remain open overnight.

- As outlined in Subsection 4.2.1 (*Piping Layout and Rationale*) of this Updated Plan, the collection system piping is segmented and equipped with valve assemblies that will allow for portions of the system to be isolated for repair and maintenance while the remainder of the system remains operational. This provision will minimize the size of areas subject to potential fugitive surface emissions during repairs.

- When practical, any planned shutdowns of the LFG collection and control system will be scheduled for the morning hours when barometric pressure conditions are typically high, thereby minimizing the potential for fugitive surface emissions.

- Other than solid waste excavated during the drilling of LFG extraction wells, the only excavation of solid waste may take place during construction of the final cover system since the Landfill is closed. Under this scenario, any exposed in-place waste will be required to be covered with soil as soon as practical, or at the end of each work day, whichever occurs first. In regards to the solid waste that has been excavated (during final closure construction or drilling), this material will be stockpiled and covered, or placed in a truck or roll-off bin and covered, as soon as practical. No excavated waste will allowed to remain uncovered overnight and will be covered during transport off-site.

SECTION 8

SCHEDULE

Installation of the LFG collection and control system will be conducted as part of the Landfill's final closure construction project that is scheduled to commence in the spring of 2020. The target completion date for having the LFG collection and control system installed and operational is December 2020.

SECTION 9

REFERENCES

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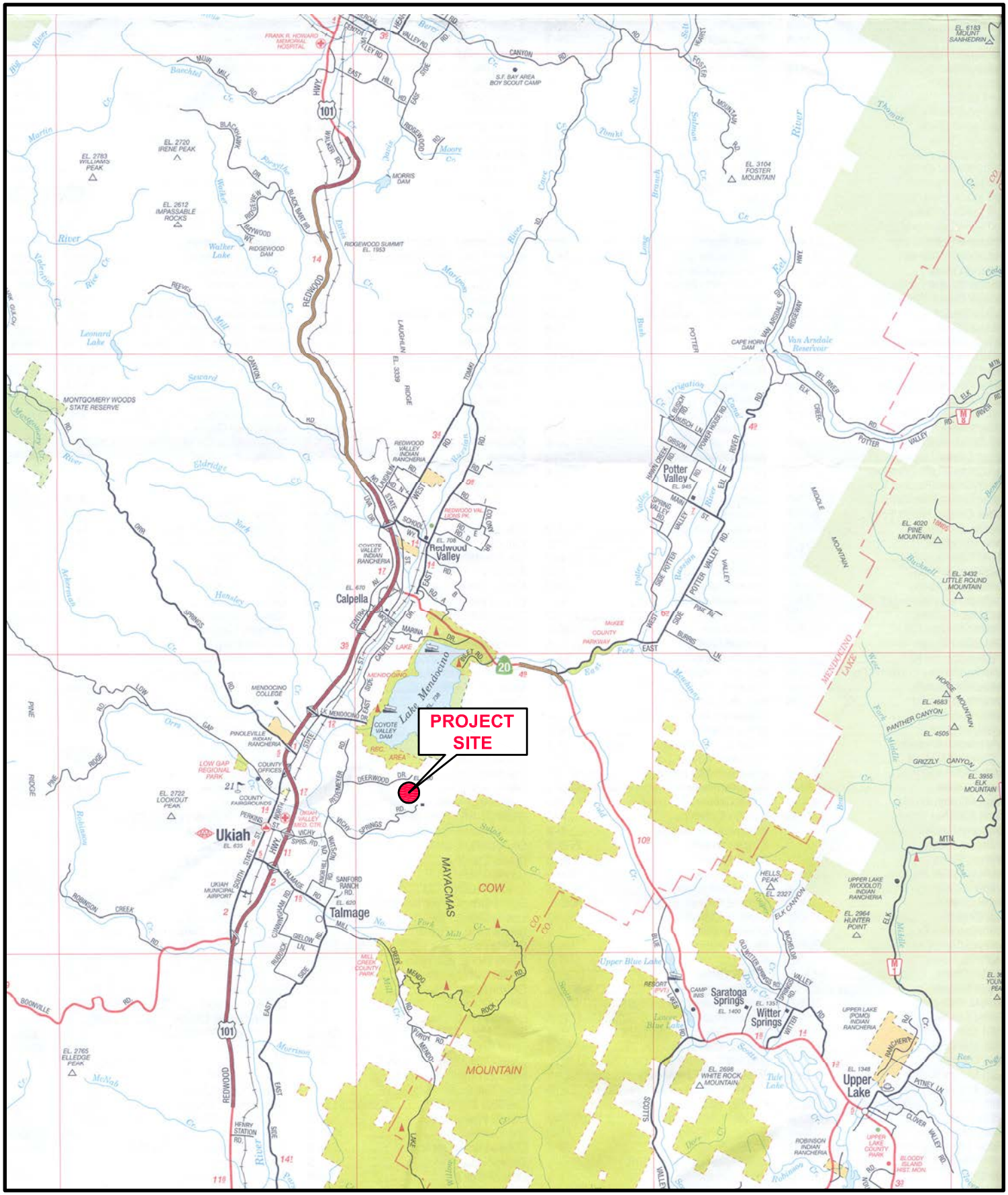
APPENDIX A

FIGURES



EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

LOCATION MAP

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

FIGURE
1
02–907

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LEGEND

GP-1 — LANDFILL GAS SAMPLE BOREHOLE (SEPTEMBER 16, 2013)

GAS-1 — PERIMETER LANDFILL GAS MONITORING POINT

PERIMETER LANDFILL GAS EXTRACTION POINT

LW-1 — LEACHATE WELL

DATE OF AERIAL PHOTOGRAPHY: JUNE 28, 2013

GAS-1
GAS-2
GAS-3
GAS-4
GAS-5
GAS-6
GAS-7
GAS-8
GAS-9
GAS-10
LW-1
LW-2
LW-3
GP-1
GP-2
WASTE MANAGEMENT UNIT
SITE ENTRANCE
LIMITS OF REFUSE
VICHY SPRINGS ROAD

400 0 400
SCALE : 1" = 400'

FIGURE 2 02-907

SITE PLAN

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

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APPENDIX B

LFG GENERATION MODELING RESULTS

APPENDIX B-1

SCENARIO 1

IPCC MODEL

Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1900		
1901		
1902		
1903		
1904		
1905		
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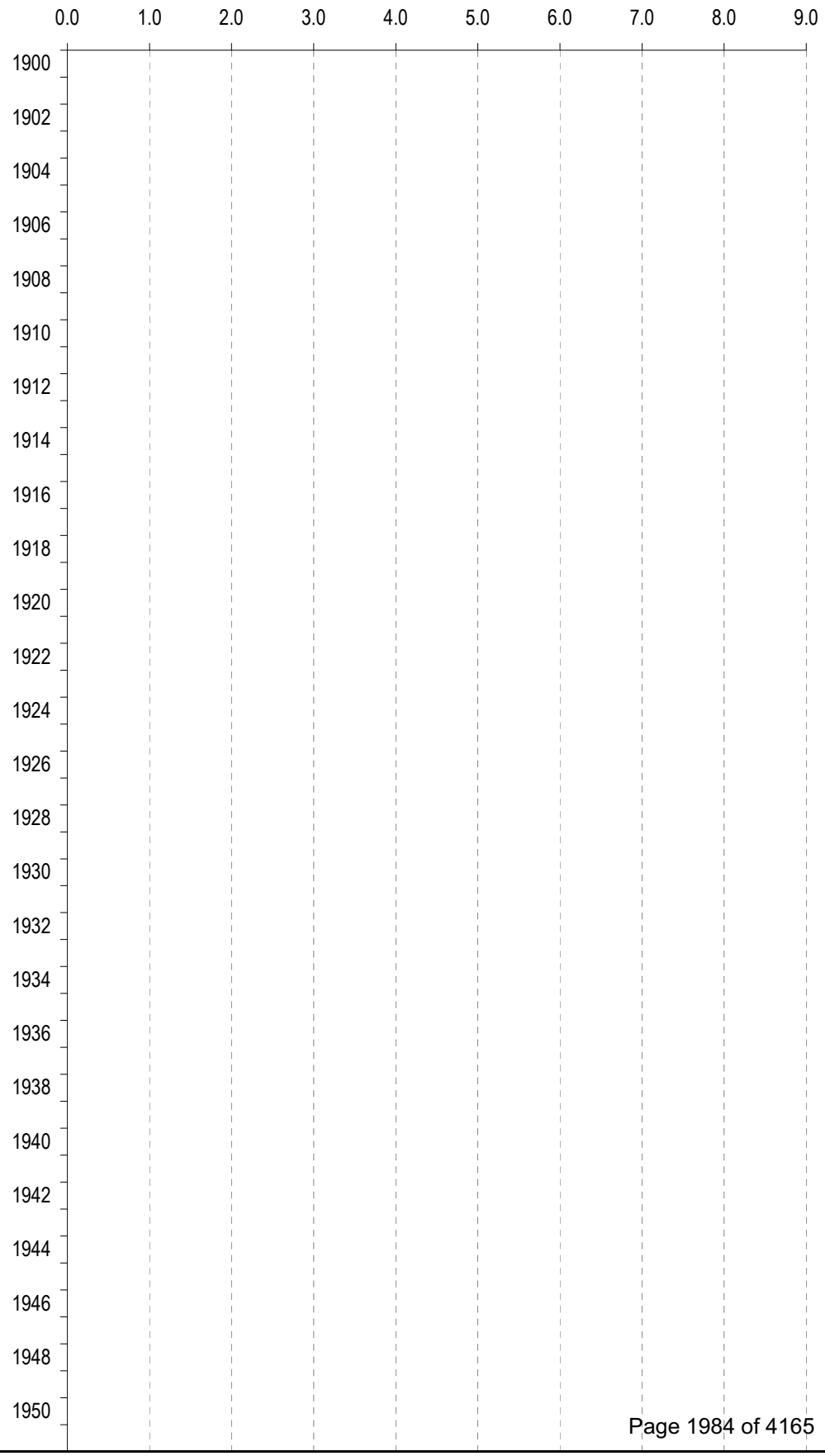
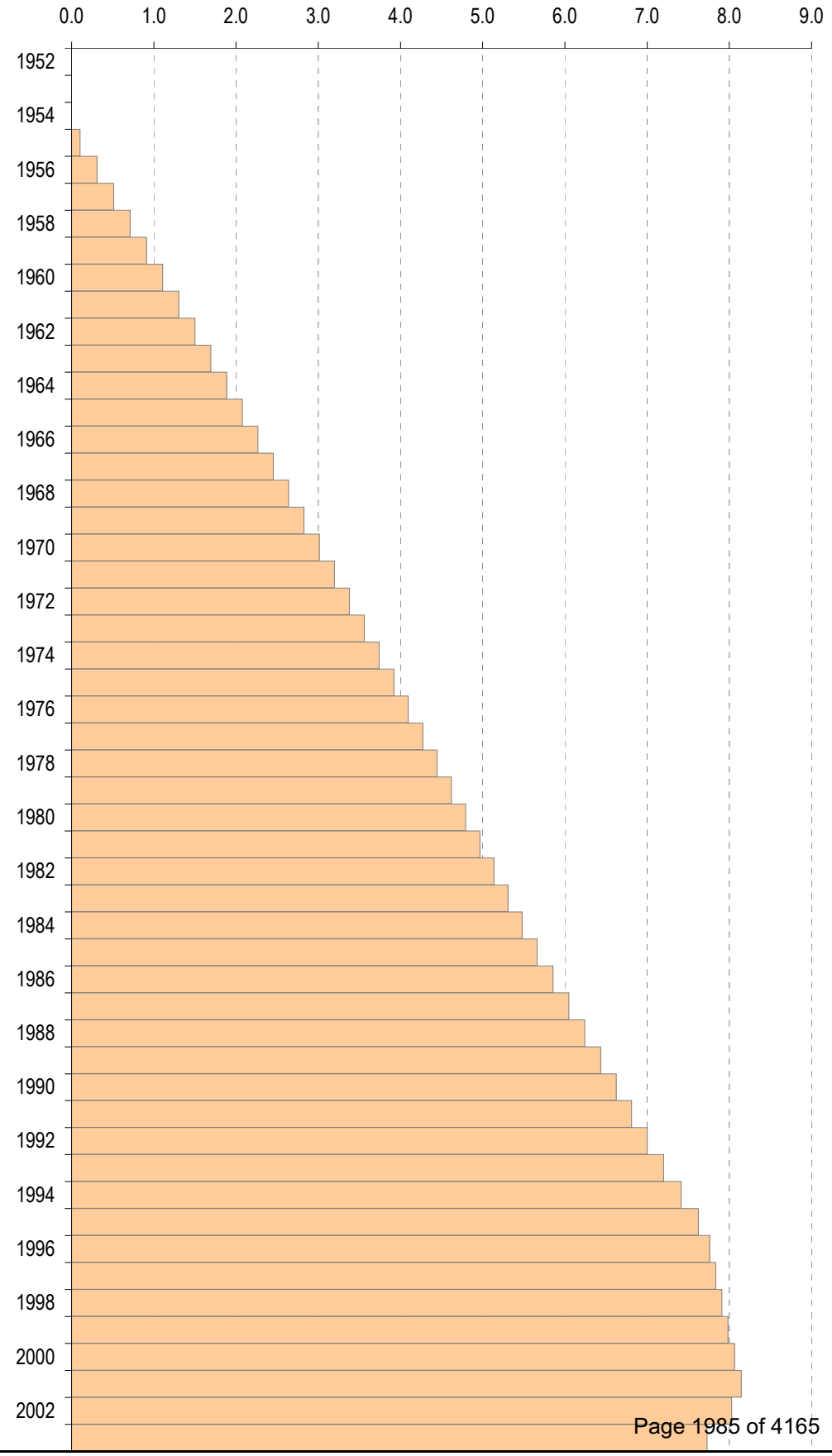


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1952		
1953		
1954		
1955	3	0.1
1956	10	0.3
1957	17	0.5
1958	23	0.7
1959	30	0.9
1960	37	1.1
1961	43	1.3
1962	49	1.5
1963	56	1.7
1964	62	1.9
1965	68	2.1
1966	75	2.3
1967	81	2.5
1968	87	2.6
1969	93	2.8
1970	99	3.0
1971	105	3.2
1972	111	3.4
1973	117	3.6
1974	123	3.7
1975	129	3.9
1976	135	4.1
1977	141	4.3
1978	146	4.4
1979	152	4.6
1980	158	4.8
1981	164	5.0
1982	169	5.1
1983	175	5.3
1984	180	5.5
1985	187	5.7
1986	193	5.9
1987	199	6.0
1988	206	6.2
1989	212	6.4
1990	218	6.6
1991	224	6.8
1992	231	7.0
1993	237	7.2
1994	244	7.4
1995	251	7.6
1996	256	7.8
1997	258	7.8
1998	260	7.9
1999	263	8.0
2000	266	8.1
2001	268	8.1
2002	264	8.0
2003	255	7.7

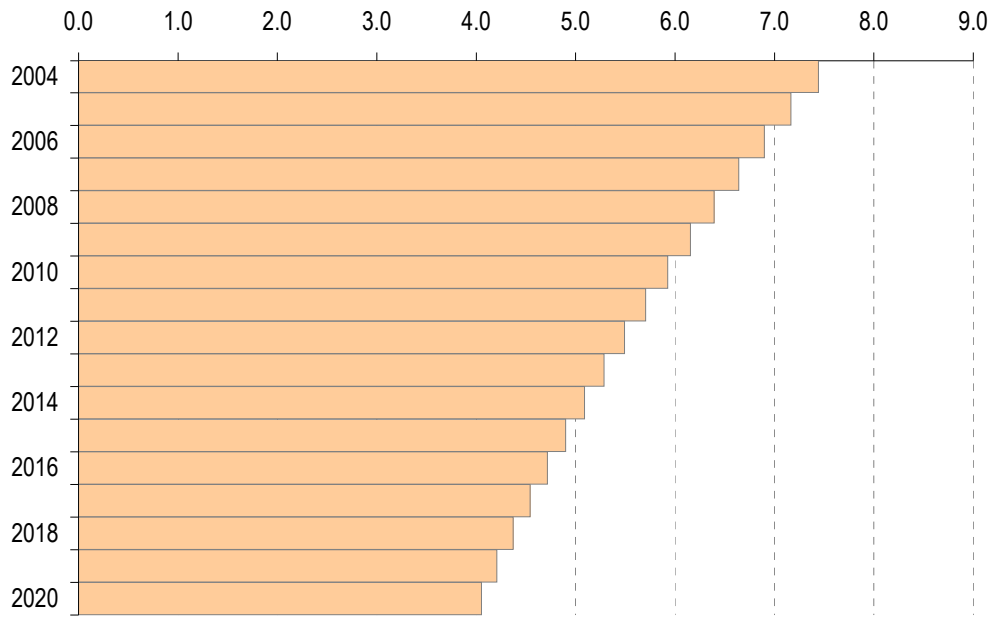


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
2004	245	7.4
2005	236	7.2
2006	227	6.9
2007	219	6.6
2008	211	6.4
2009	203	6.2
2010	195	5.9
2011	188	5.7
2012	181	5.5
2013	174	5.3
2014	168	5.1
2015	161	4.9
2016	155	4.7
2017	150	4.5
2018	144	4.4
2019	139	4.2
2020	133	4.1



SIMPLE FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 2: Parameters
Simple First Order

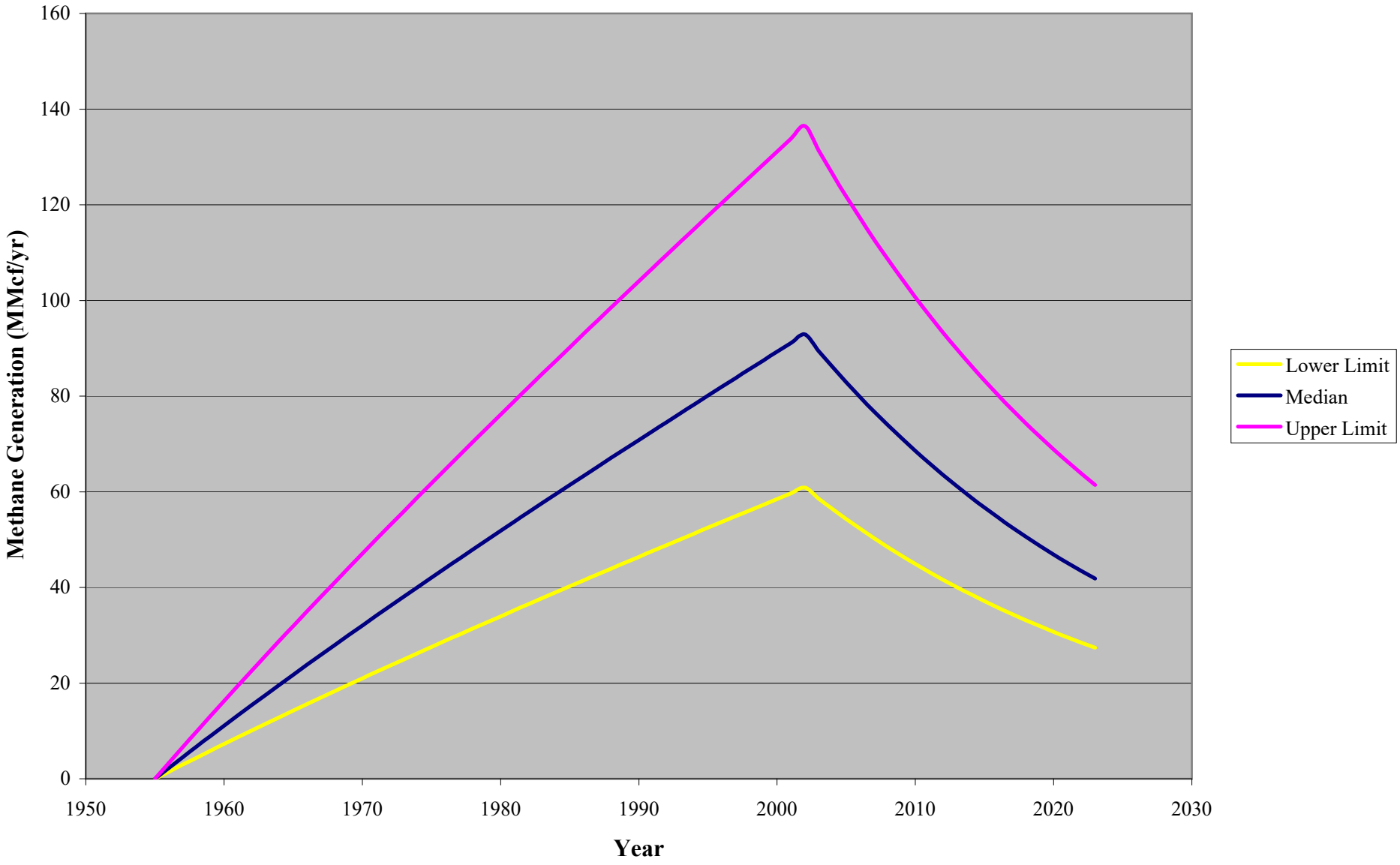
Lo: **3,200** cubic feet Methane/ton refuse
k: **0.038** /year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year) Lower Limit	Median	Upper Limit
1955	**19,250**	0	0	0
1956	**19,800**	1	2	3
1957	**20,350**	3	4	7
1958	**20,900**	4	7	10
1959	**21,450**	6	9	13
1960	**22,000**	7	11	16
1961	**22,550**	9	13	19
1962	**23,100**	10	15	23
1963	**23,650**	11	18	26
1964	**24,200**	13	20	29
1965	**24,750**	14	22	32
1966	**25,300**	16	24	35
1967	**25,850**	17	26	38
1968	**26,400**	18	28	41
1969	**26,950**	20	30	44
1970	**27,500**	21	32	47
1971	**28,050**	22	34	50
1972	**28,600**	24	36	53
1973	**29,150**	25	38	56
1974	**29,700**	26	40	59
1975	**30,250**	28	42	62
1976	**30,800**	29	44	65
1977	**31,350**	30	46	68
1978	**31,900**	31	48	70
1979	**32,450**	33	50	73
1980	**33,000**	34	52	76
1981	**33,550**	35	54	79
1982	**34,100**	36	56	82
1983	**34,650**	38	58	85
1984	**35,200**	39	60	87
1985	**35,750**	40	61	90
1986	**36,300**	41	63	93
1987	**36,850**	43	65	96
1988	**37,400**	44	67	99
1989	**37,950**	45	69	101
1990	**38,500**	46	71	104
1991	**39,050**	48	73	107
1992	**39,600**	49	75	109
1993	**40,150**	50	76	112
1994	**40,700**	51	78	115
1995	**41,250**	52	80	118
1996	**41,800**	54	82	120
1997	**42,350**	55	84	123
1998	**42,900**	56	86	126
1999	**43,450**	57	87	128
2000	**44,000**	58	89	131
2001	**44,550**	60	91	134
2002	**0**	61	93	136
2003	**0**	59	89	131
2004	**0**	56	86	126
2005	**0**	54	83	122
2006	**0**	52	80	117
2007	**0**	50	77	113
2008	**0**	48	74	109
2009	**0**	47	71	105
2010	**0**	45	69	101
2011	**0**	43	66	97
2012	**0**	42	64	93
2013	**0**	40	61	90
2014	**0**	39	59	86
2015	**0**	37	57	83
2016	**0**	36	55	80
2017	**0**	34	53	77
2018	**0**	33	51	74
2019	**0**	32	49	72
2020	**0**	31	47	69
2021	**0**	30	45	66
2022	**0**	28	43	64
2023	**0**	27	42	61

SIMPLE FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATES



MODIFIED FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 3: Parameters
Modified First Order

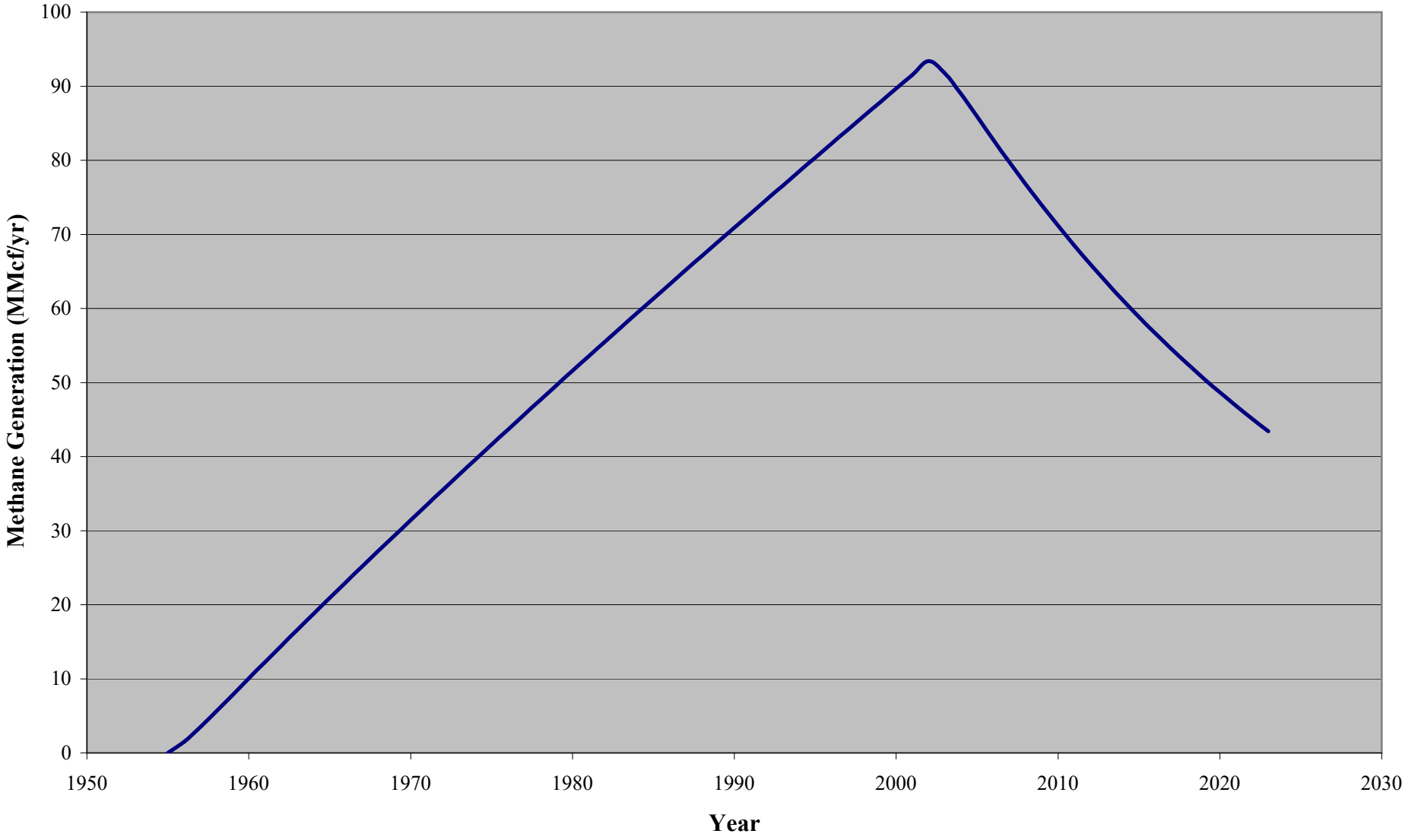
s:	1.00	
Lo:	3,200	cubic feet Methane/ton refuse
k:	0.038	/year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	19,250	0
1956	19,800	1
1957	20,350	3
1958	20,900	6
1959	21,450	8
1960	22,000	10
1961	22,550	12
1962	23,100	14
1963	23,650	17
1964	24,200	19
1965	24,750	21
1966	25,300	23
1967	25,850	25
1968	26,400	27
1969	26,950	29
1970	27,500	31
1971	28,050	33
1972	28,600	36
1973	29,150	38
1974	29,700	40
1975	30,250	42
1976	30,800	44
1977	31,350	46
1978	31,900	48
1979	32,450	50
1980	33,000	52
1981	33,550	54
1982	34,100	56
1983	34,650	57
1984	35,200	59
1985	35,750	61
1986	36,300	63
1987	36,850	65
1988	37,400	67
1989	37,950	69
1990	38,500	71
1991	39,050	73
1992	39,600	75
1993	40,150	77
1994	40,700	78
1995	41,250	80
1996	41,800	82
1997	42,350	84
1998	42,900	86
1999	43,450	88
2000	44,000	90
2001	44,550	92
2002	0	93
2003	0	92
2004	0	89
2005	0	86
2006	0	83
2007	0	80
2008	0	77
2009	0	74
2010	0	71
2011	0	69
2012	0	66
2013	0	63
2014	0	61
2015	0	59
2016	0	57
2017	0	55
2018	0	53
2019	0	51
2020	0	49
2021	0	47
2022	0	45
2023	0	43

MODIFIED FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



FIRST ORDER MULTI-PHASE MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 4: Parameters
First Order Multi-Phase

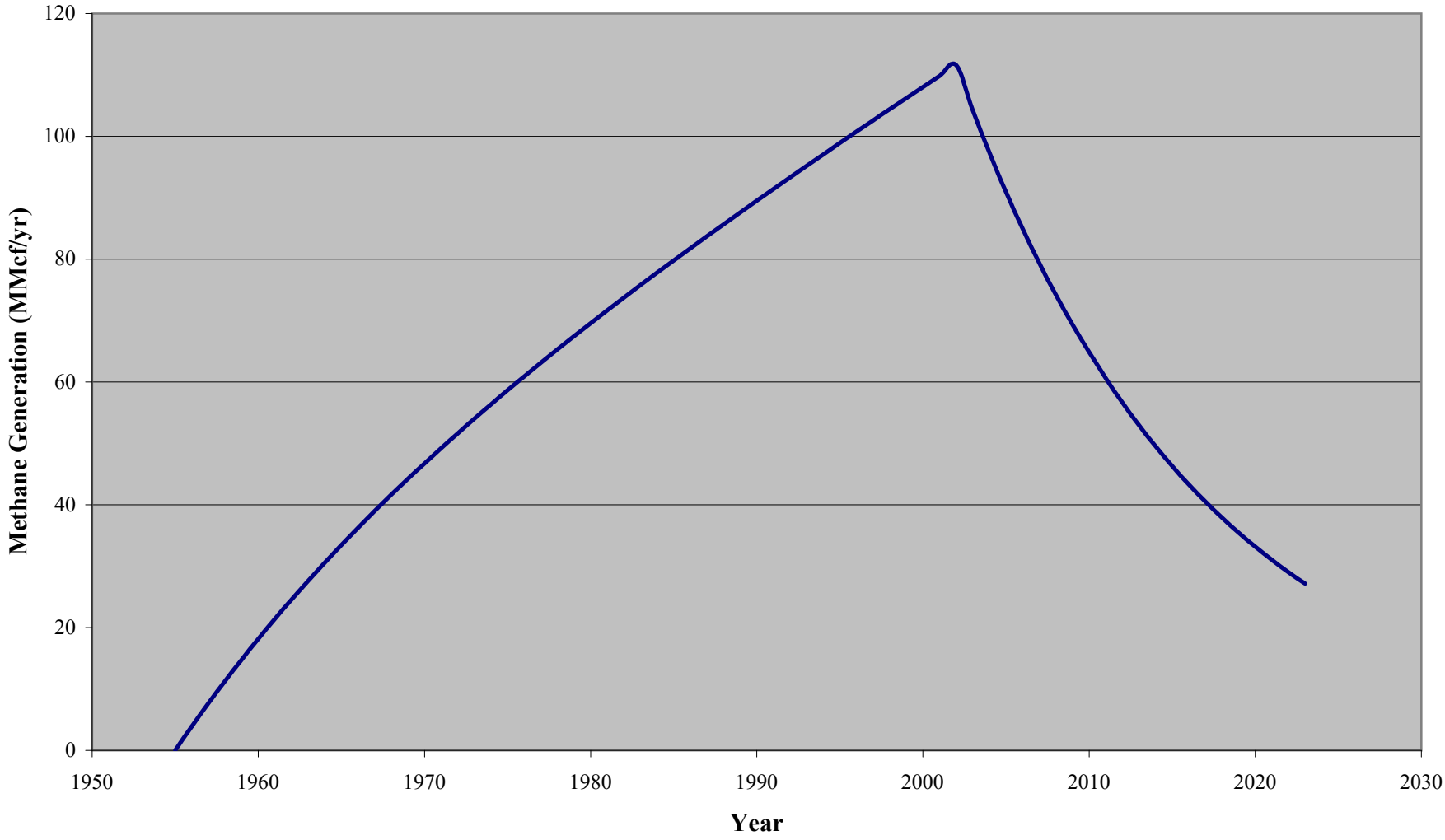
k-Constant (for rapid)	0.08	Decay Rate of Rapidly Decomposables
k-Constant (for slow)	0.06	Decay Rate of Slowly Decomposables
Fraction rapid decomposing	40%	Fraction of Rapidly Decomposing Waste
Fraction slow decomposing	60%	Fraction of Slowly Decomposing Waste
Lo-Constant	3,200	cubic feet Methane/ton refuse

Lag time between initial placement of refuse and start of generation
is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	19,250	0
1956	19,800	4
1957	20,350	8
1958	20,900	11
1959	21,450	15
1960	22,000	18
1961	22,550	21
1962	23,100	25
1963	23,650	28
1964	24,200	31
1965	24,750	33
1966	25,300	36
1967	25,850	39
1968	26,400	42
1969	26,950	44
1970	27,500	47
1971	28,050	49
1972	28,600	52
1973	29,150	54
1974	29,700	56
1975	30,250	59
1976	30,800	61
1977	31,350	63
1978	31,900	65
1979	32,450	67
1980	33,000	70
1981	33,550	72
1982	34,100	74
1983	34,650	76
1984	35,200	78
1985	35,750	80
1986	36,300	82
1987	36,850	84
1988	37,400	86
1989	37,950	88
1990	38,500	90
1991	39,050	91
1992	39,600	93
1993	40,150	95
1994	40,700	97
1995	41,250	99
1996	41,800	101
1997	42,350	103
1998	42,900	104
1999	43,450	106
2000	44,000	108
2001	44,550	110
2002	0	112
2003	0	104
2004	0	97
2005	0	91
2006	0	85
2007	0	79
2008	0	74
2009	0	69
2010	0	65
2011	0	61
2012	0	57
2013	0	53
2014	0	50
2015	0	46
2016	0	43
2017	0	41
2018	0	38
2019	0	35
2020	0	33
2021	0	31
2022	0	29
2023	0	27

FIRST ORDER MULTI-PHASE (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



APPENDIX B-2

SCENARIO 2

IPCC MODEL

Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1900		
1901		
1902		
1903		
1904		
1905		
1906		
1907		
1908		
1909		
1910		
1911		
1912		
1913		
1914		
1915		
1916		
1917		
1918		
1919		
1920		
1921		
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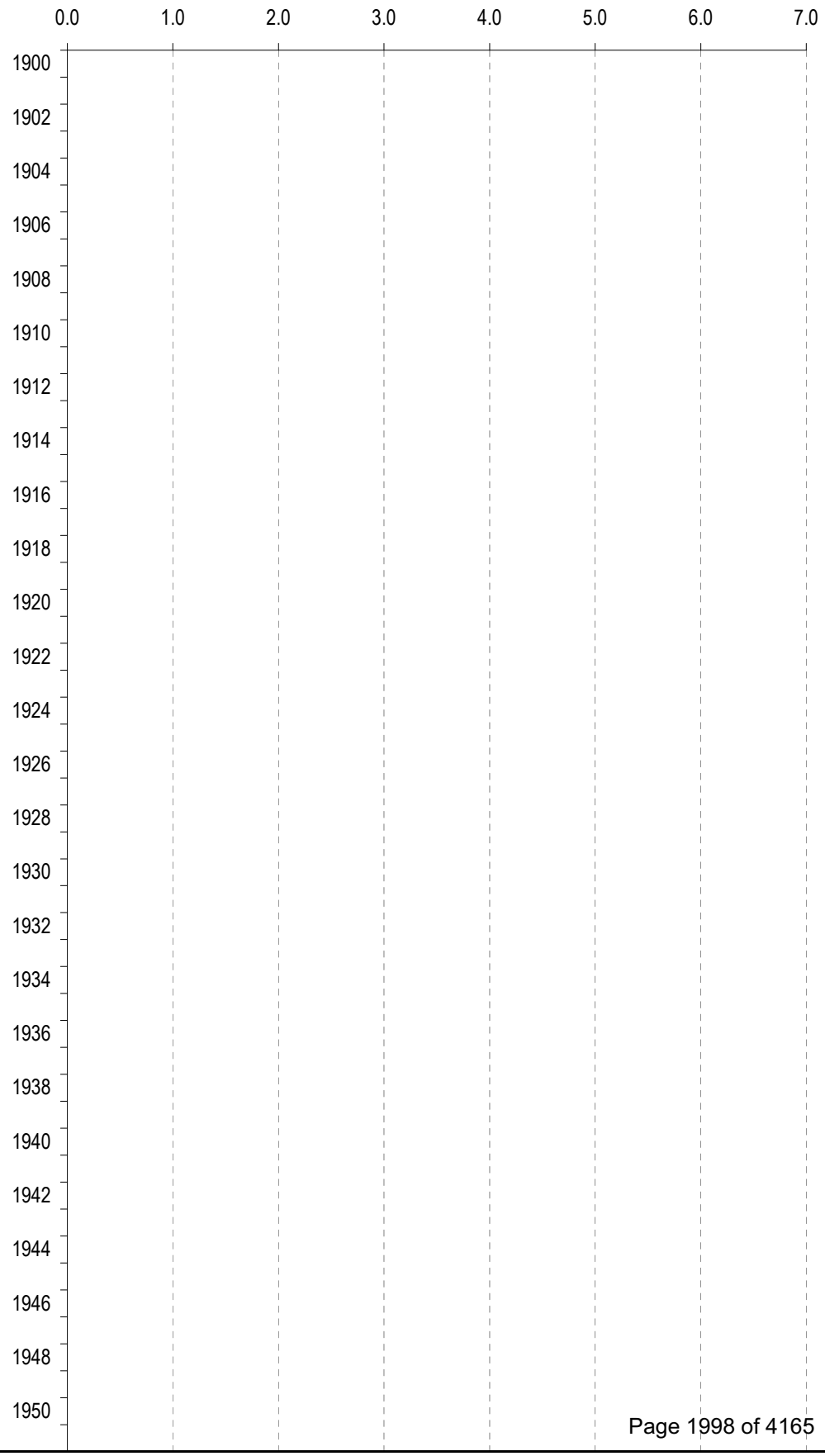
1950		
1951		

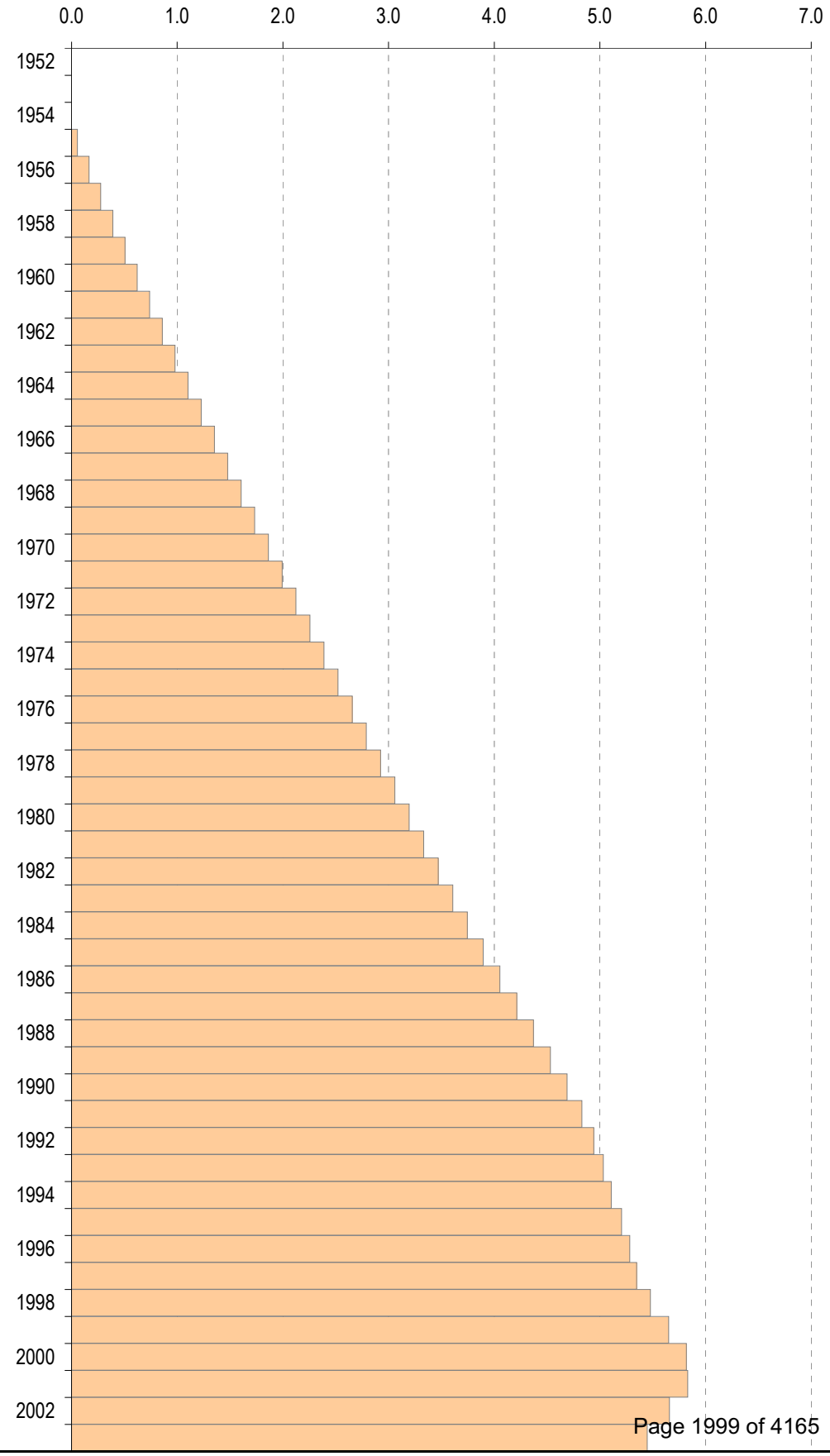


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1952		
1953		
1954		
1955	2	0.1
1956	5	0.2
1957	9	0.3
1958	13	0.4
1959	17	0.5
1960	20	0.6
1961	24	0.7
1962	28	0.9
1963	32	1.0
1964	36	1.1
1965	40	1.2
1966	44	1.4
1967	49	1.5
1968	53	1.6
1969	57	1.7
1970	61	1.9
1971	66	2.0
1972	70	2.1
1973	74	2.3
1974	79	2.4
1975	83	2.5
1976	87	2.7
1977	92	2.8
1978	96	2.9
1979	101	3.1
1980	105	3.2
1981	110	3.3
1982	114	3.5
1983	119	3.6
1984	123	3.7
1985	128	3.9
1986	134	4.1
1987	139	4.2
1988	144	4.4
1989	149	4.5
1990	154	4.7
1991	159	4.8
1992	163	4.9
1993	166	5.0
1994	168	5.1
1995	171	5.2
1996	174	5.3
1997	176	5.3
1998	180	5.5
1999	186	5.7
2000	192	5.8
2001	192	5.8
2002	186	5.7
2003	179	5.4

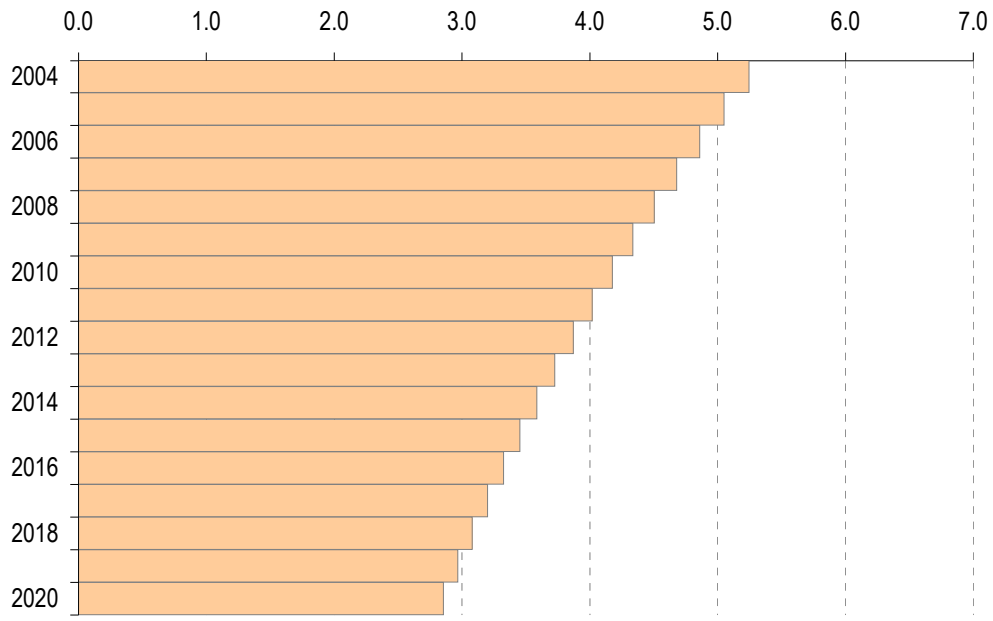


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
2004	173	5.2
2005	166	5.0
2006	160	4.9
2007	154	4.7
2008	148	4.5
2009	143	4.3
2010	138	4.2
2011	132	4.0
2012	127	3.9
2013	123	3.7
2014	118	3.6
2015	114	3.5
2016	109	3.3
2017	105	3.2
2018	101	3.1
2019	98	3.0
2020	94	2.9



SIMPLE FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 2: Parameters
Simple First Order

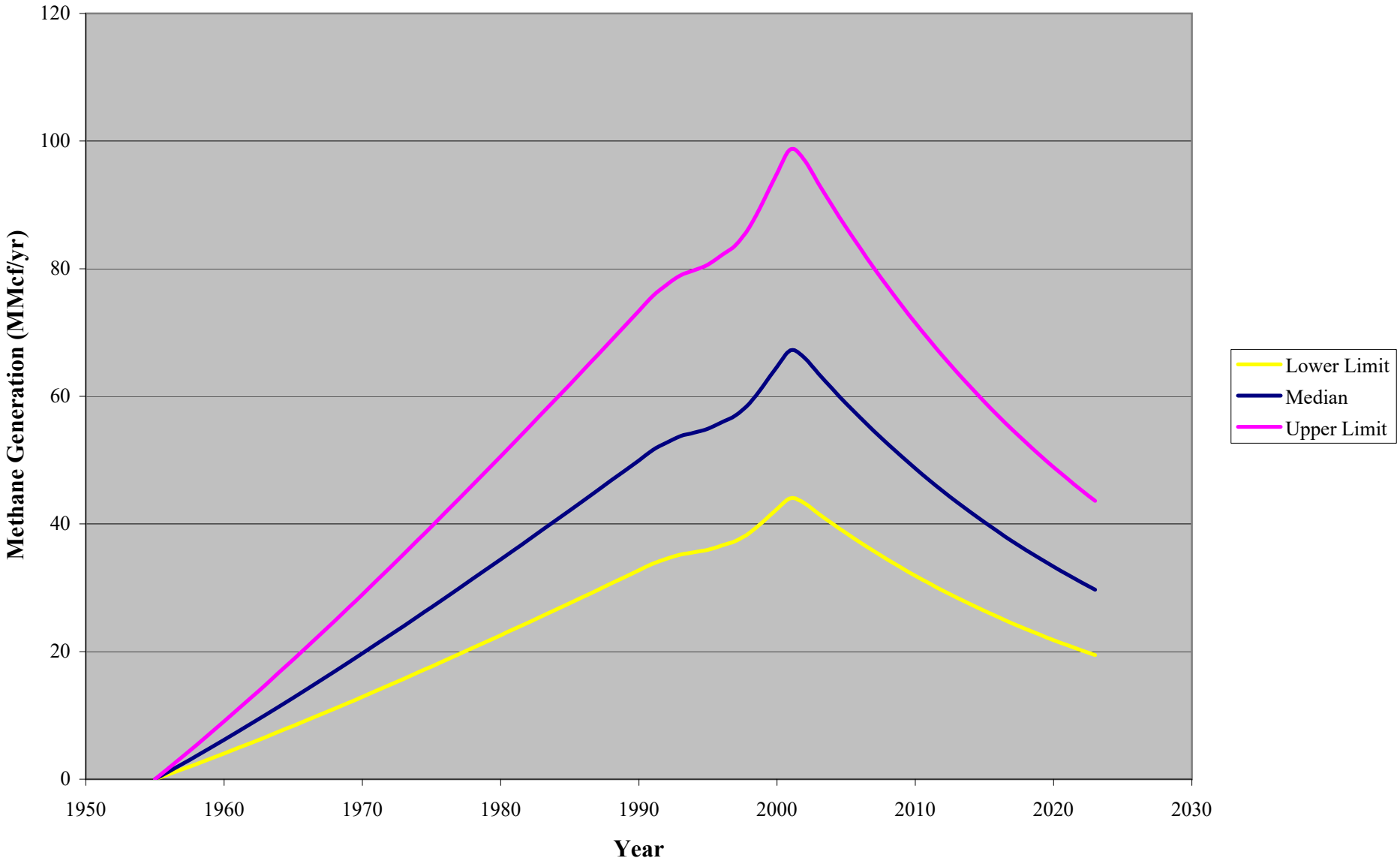
Lo: **3,200** cubic feet Methane/ton refuse
k: **0.038** /year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year) Lower Limit	Median	Upper Limit
1955	**10,217**	0	0	0
1956	**10,767**	1	1	2
1957	**11,317**	2	2	4
1958	**11,867**	2	4	5
1959	**12,417**	3	5	7
1960	**12,967**	4	6	9
1961	**13,517**	5	7	11
1962	**14,067**	6	9	13
1963	**14,617**	7	10	15
1964	**15,167**	7	11	17
1965	**15,717**	8	13	19
1966	**16,267**	9	14	21
1967	**16,817**	10	16	23
1968	**17,367**	11	17	25
1969	**17,917**	12	18	27
1970	**18,467**	13	20	29
1971	**19,017**	14	21	31
1972	**19,567**	15	23	33
1973	**20,117**	16	24	35
1974	**20,667**	17	25	37
1975	**21,217**	18	27	40
1976	**21,767**	19	28	42
1977	**22,317**	20	30	44
1978	**22,867**	21	31	46
1979	**23,417**	22	33	48
1980	**23,967**	23	34	51
1981	**24,517**	24	36	53
1982	**25,067**	25	37	55
1983	**25,617**	26	39	57
1984	**26,167**	27	41	60
1985	**26,717**	28	42	62
1986	**27,267**	29	44	64
1987	**27,817**	30	45	66
1988	**28,367**	31	47	69
1989	**28,917**	32	48	71
1990	**29,467**	33	50	73
1991	**26,540**	34	52	76
1992	**25,444**	35	53	77
1993	**21,986**	35	54	79
1994	**22,255**	36	54	80
1995	**26,330**	36	55	81
1996	**27,001**	37	56	82
1997	**34,184**	37	57	84
1998	**42,489**	39	59	86
1999	**44,995**	40	62	91
2000	**42,856**	42	65	95
2001	**10,724**	44	67	99
2002	**0**	43	66	97
2003	**0**	42	64	93
2004	**0**	40	61	90
2005	**0**	39	59	86
2006	**0**	37	57	83
2007	**0**	36	55	80
2008	**0**	34	53	77
2009	**0**	33	51	74
2010	**0**	32	49	72
2011	**0**	31	47	69
2012	**0**	30	45	66
2013	**0**	28	43	64
2014	**0**	27	42	61
2015	**0**	26	40	59
2016	**0**	25	39	57
2017	**0**	24	37	55
2018	**0**	24	36	53
2019	**0**	23	35	51
2020	**0**	22	33	49
2021	**0**	21	32	47
2022	**0**	20	31	45
2023	**0**	19	30	44

SIMPLE FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATES



MODIFIED FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 3: Parameters
Modified First Order

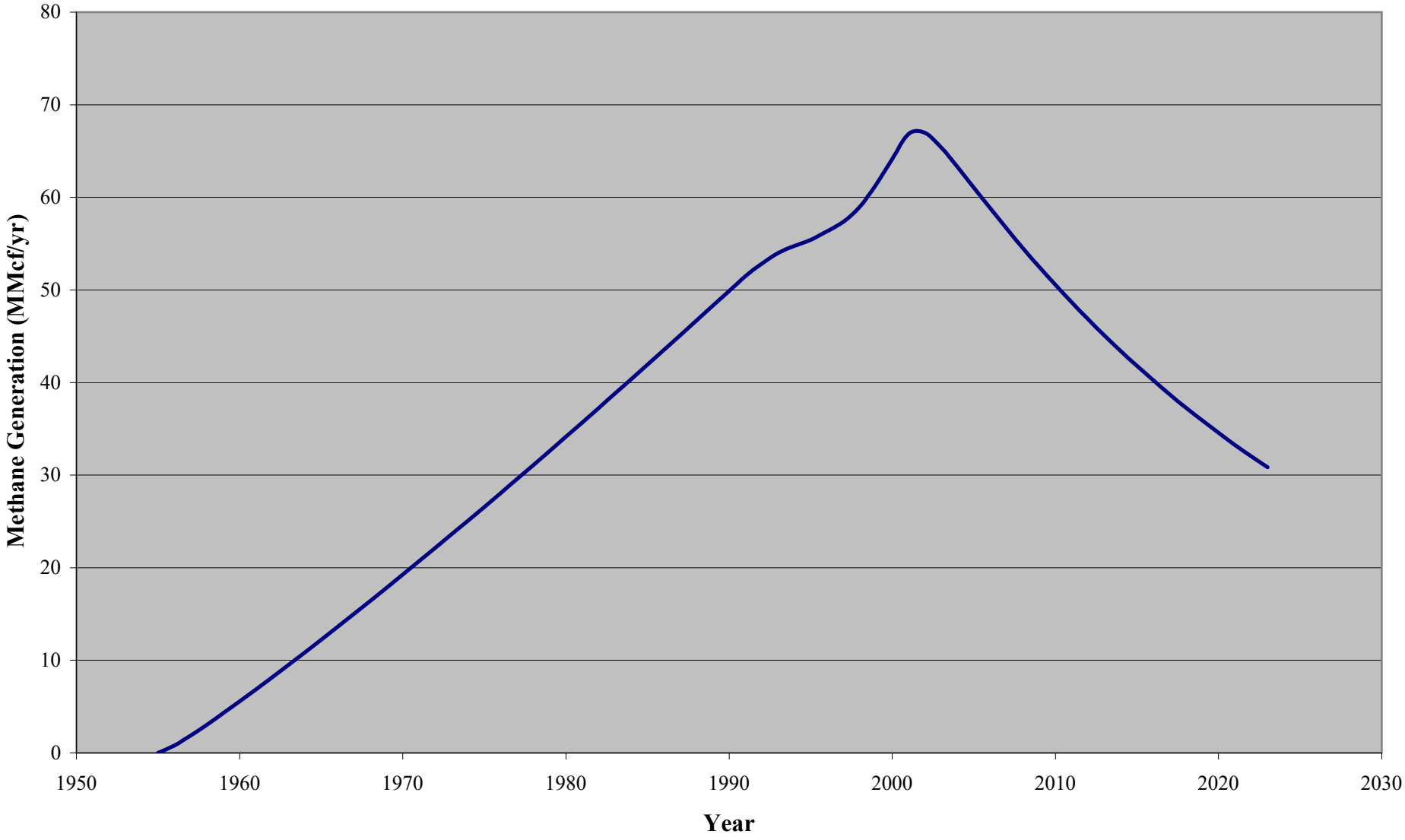
s:	1.00	
Lo:	3,200	cubic feet Methane/ton refuse
k:	0.038	/year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	10,217	0
1956	10,767	1
1957	11,317	2
1958	11,867	3
1959	12,417	4
1960	12,967	6
1961	13,517	7
1962	14,067	8
1963	14,617	10
1964	15,167	11
1965	15,717	12
1966	16,267	14
1967	16,817	15
1968	17,367	16
1969	17,917	18
1970	18,467	19
1971	19,017	21
1972	19,567	22
1973	20,117	24
1974	20,667	25
1975	21,217	27
1976	21,767	28
1977	22,317	30
1978	22,867	31
1979	23,417	33
1980	23,967	34
1981	24,517	36
1982	25,067	37
1983	25,617	39
1984	26,167	40
1985	26,717	42
1986	27,267	44
1987	27,817	45
1988	28,367	47
1989	28,917	48
1990	29,467	50
1991	26,540	51
1992	25,444	53
1993	21,986	54
1994	22,255	55
1995	26,330	55
1996	27,001	56
1997	34,184	57
1998	42,489	59
1999	44,995	61
2000	42,856	64
2001	10,724	67
2002	0	67
2003	0	65
2004	0	63
2005	0	61
2006	0	59
2007	0	57
2008	0	55
2009	0	52
2010	0	51
2011	0	49
2012	0	47
2013	0	45
2014	0	43
2015	0	42
2016	0	40
2017	0	39
2018	0	37
2019	0	36
2020	0	35
2021	0	33
2022	0	32
2023	0	31

MODIFIED FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



FIRST ORDER MULTI-PHASE MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 4: Parameters
First Order Multi-Phase

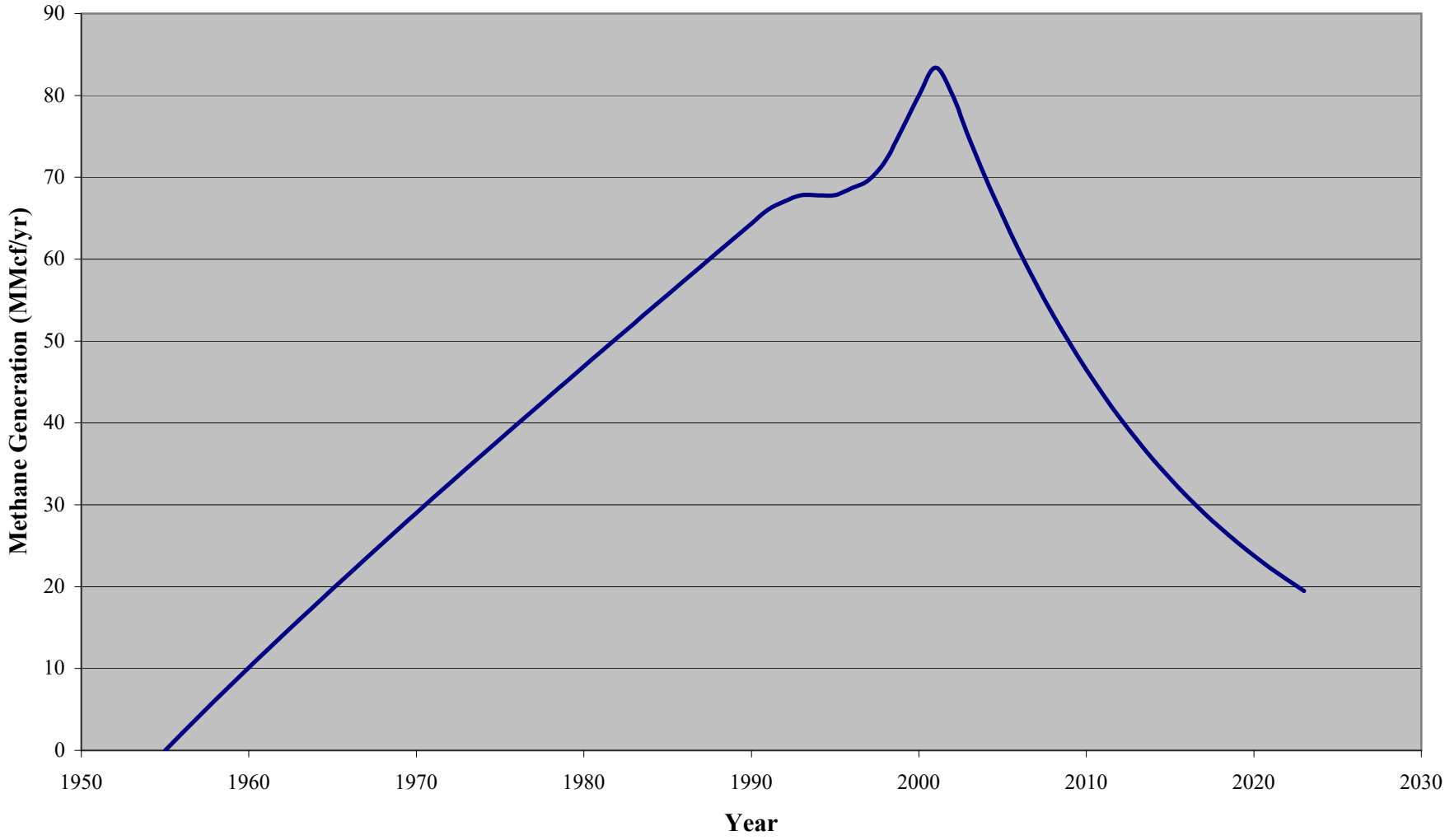
k-Constant (for rapid)	0.08	Decay Rate of Rapidly Decomposables
k-Constant (for slow)	0.06	Decay Rate of Slowly Decomposables
Fraction rapid decomposing	40%	Fraction of Rapidly Decomposing Waste
Fraction slow decomposing	60%	Fraction of Slowly Decomposing Waste
Lo-Constant	3,200	cubic feet Methane/ton refuse

Lag time between initial placement of refuse and start of generation
is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	10,217	0
1956	10,767	2
1957	11,317	4
1958	11,867	6
1959	12,417	8
1960	12,967	10
1961	13,517	12
1962	14,067	14
1963	14,617	16
1964	15,167	18
1965	15,717	20
1966	16,267	22
1967	16,817	23
1968	17,367	25
1969	17,917	27
1970	18,467	29
1971	19,017	31
1972	19,567	33
1973	20,117	34
1974	20,667	36
1975	21,217	38
1976	21,767	40
1977	22,317	42
1978	22,867	43
1979	23,417	45
1980	23,967	47
1981	24,517	49
1982	25,067	50
1983	25,617	52
1984	26,167	54
1985	26,717	56
1986	27,267	57
1987	27,817	59
1988	28,367	61
1989	28,917	63
1990	29,467	64
1991	26,540	66
1992	25,444	67
1993	21,986	68
1994	22,255	68
1995	26,330	68
1996	27,001	69
1997	34,184	70
1998	42,489	72
1999	44,995	76
2000	42,856	80
2001	10,724	83
2002	0	80
2003	0	75
2004	0	70
2005	0	65
2006	0	61
2007	0	57
2008	0	53
2009	0	50
2010	0	47
2011	0	43
2012	0	41
2013	0	38
2014	0	36
2015	0	33
2016	0	31
2017	0	29
2018	0	27
2019	0	25
2020	0	24
2021	0	22
2022	0	21
2023	0	19

FIRST ORDER MULTI-PHASE (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



APPENDIX B-3

SCENARIO 3

IPCC MODEL

Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1900		
1901		
1902		
1903		
1904		
1905		
1906		
1907		
1908		
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1910		
1911		
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1946		
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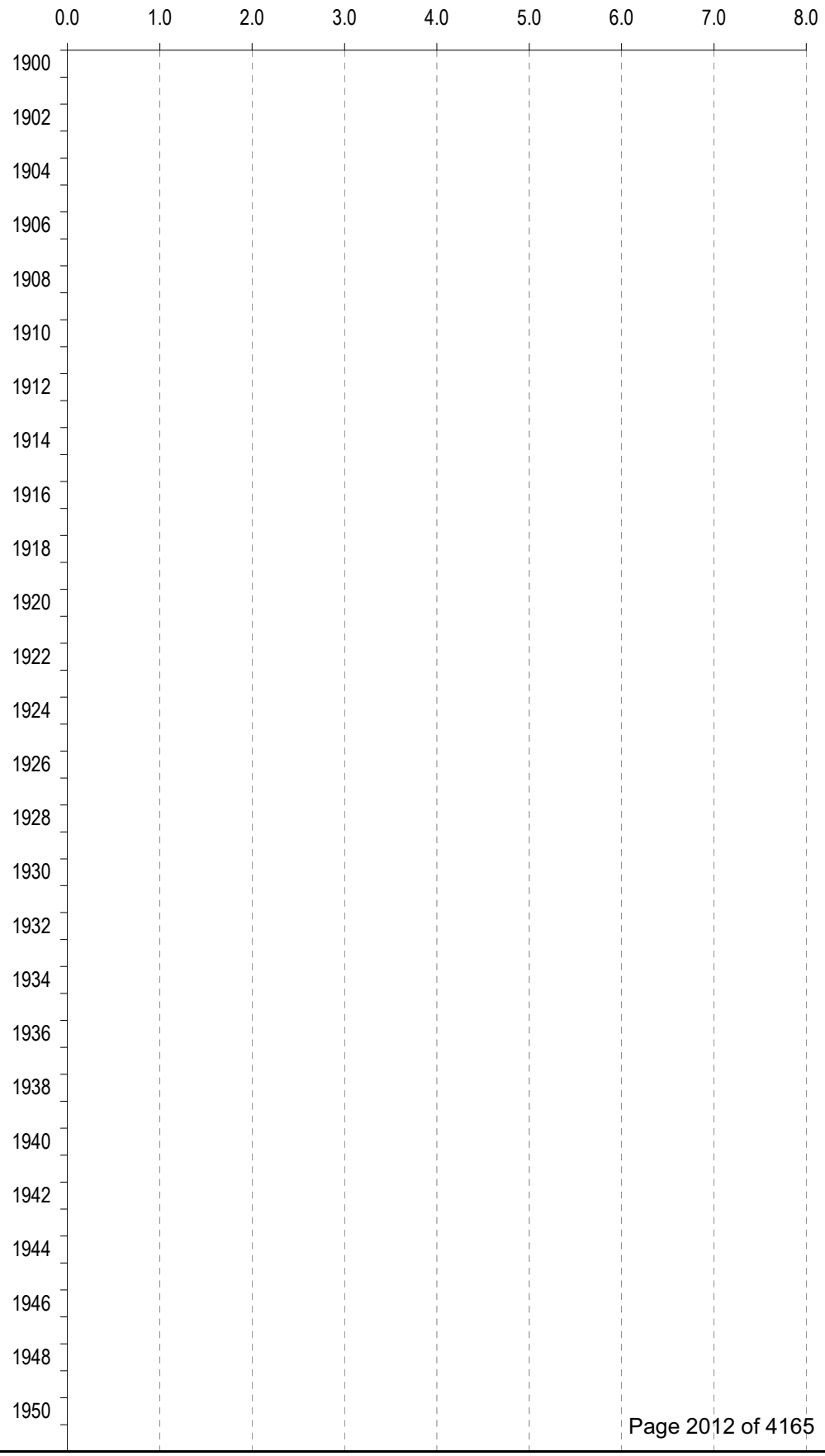
1948		
1949		
1950		
1951		

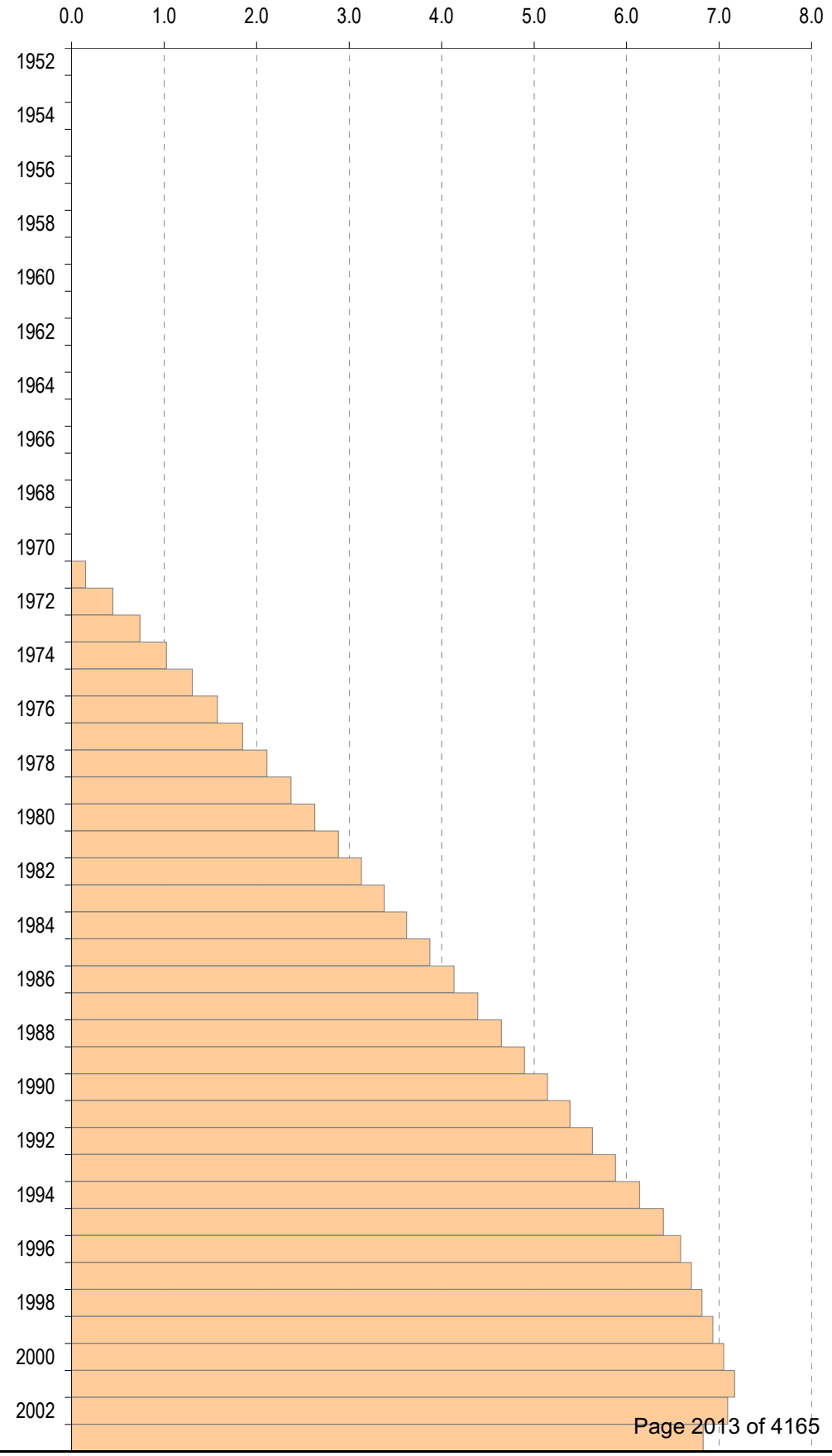


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		
1968		
1969		
1970		
1971	5	0.2
1972	15	0.4
1973	24	0.7
1974	34	1.0
1975	43	1.3
1976	52	1.6
1977	61	1.8
1978	70	2.1
1979	78	2.4
1980	87	2.6
1981	95	2.9
1982	103	3.1
1983	111	3.4
1984	119	3.6
1985	128	3.9
1986	136	4.1
1987	145	4.4
1988	153	4.6
1989	161	4.9
1990	169	5.1
1991	177	5.4
1992	185	5.6
1993	194	5.9
1994	202	6.1
1995	211	6.4
1996	217	6.6
1997	221	6.7
1998	225	6.8
1999	228	6.9
2000	232	7.1
2001	236	7.2
2002	234	7.1
2003	225	6.8

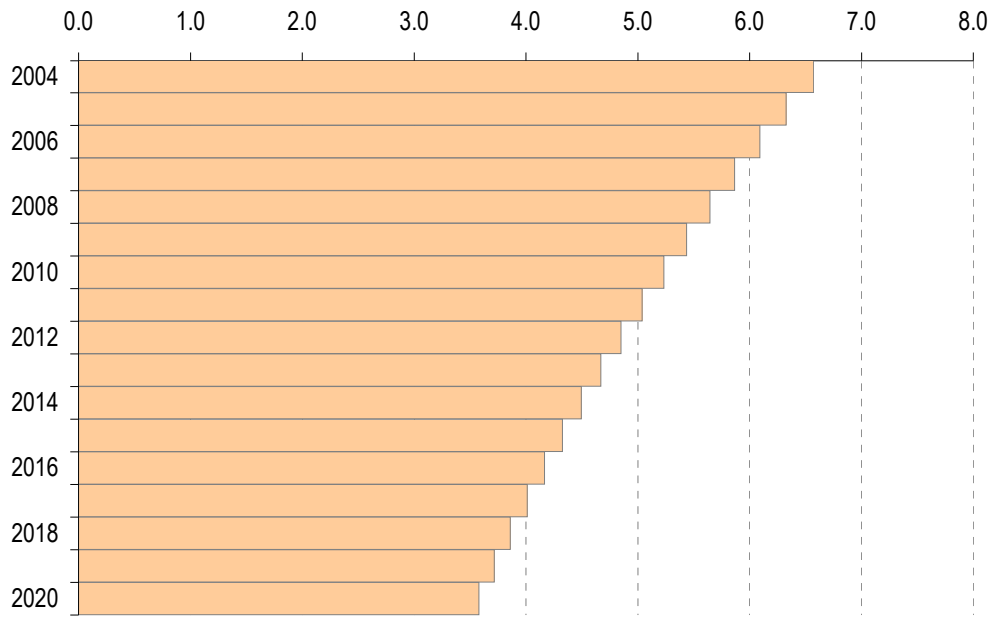


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
2004	216	6.6
2005	208	6.3
2006	201	6.1
2007	193	5.9
2008	186	5.6
2009	179	5.4
2010	172	5.2
2011	166	5.0
2012	160	4.8
2013	154	4.7
2014	148	4.5
2015	143	4.3
2016	137	4.2
2017	132	4.0
2018	127	3.9
2019	122	3.7
2020	118	3.6



SIMPLE FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 2: Parameters
Simple First Order

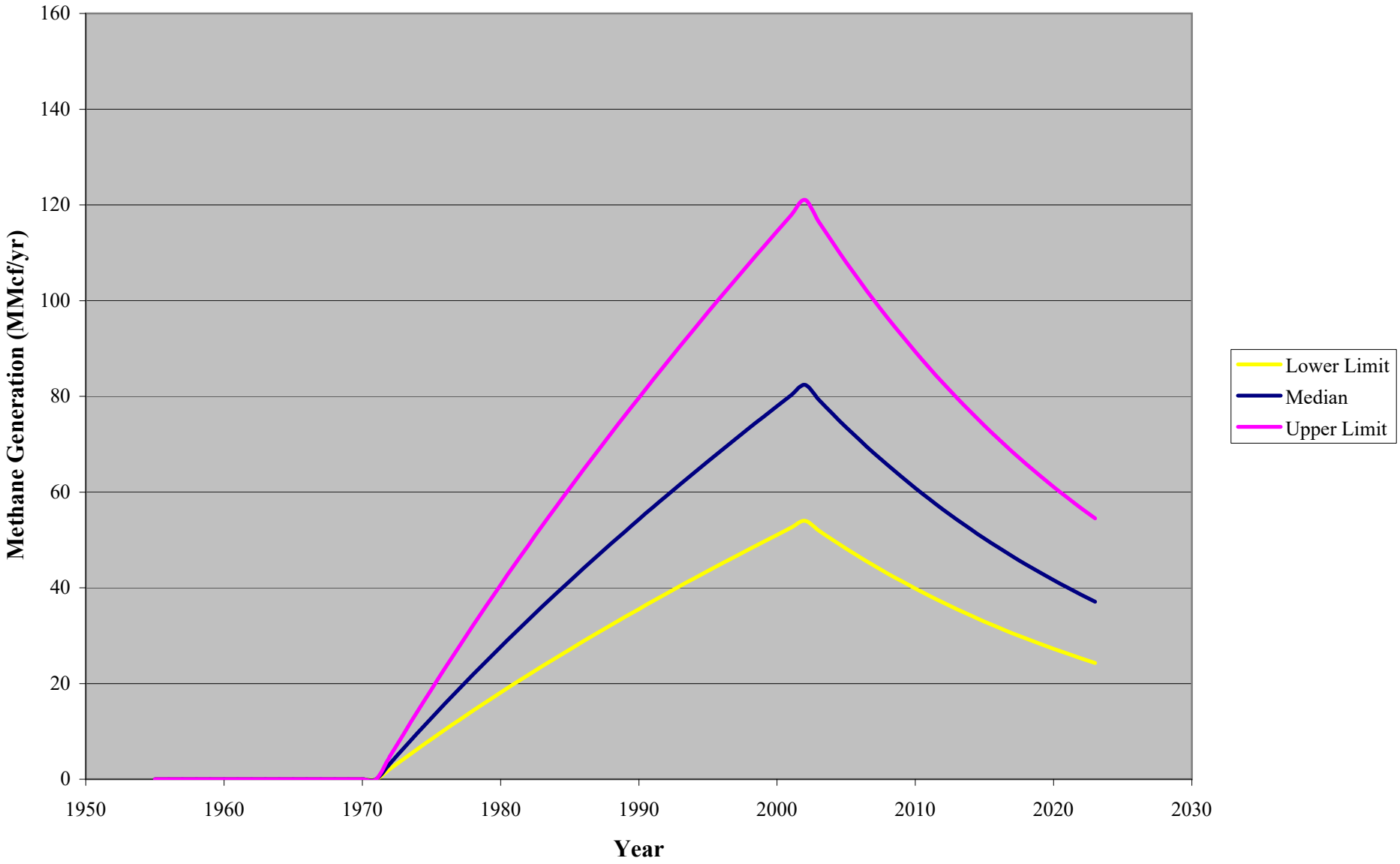
Lo: **3,200** cubic feet Methane/ton refuse
k: **0.038** /year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year) Lower Limit	Median	Upper Limit
1955	**0**	0	0	0
1956	**0**	0	0	0
1957	**0**	0	0	0
1958	**0**	0	0	0
1959	**0**	0	0	0
1960	**0**	0	0	0
1961	**0**	0	0	0
1962	**0**	0	0	0
1963	**0**	0	0	0
1964	**0**	0	0	0
1965	**0**	0	0	0
1966	**0**	0	0	0
1967	**0**	0	0	0
1968	**0**	0	0	0
1969	**0**	0	0	0
1970	**0**	0	0	0
1971	**28,050**	0	0	0
1972	**28,600**	2	3	5
1973	**29,150**	4	7	10
1974	**29,700**	6	10	14
1975	**30,250**	8	13	19
1976	**30,800**	10	16	23
1977	**31,350**	12	19	28
1978	**31,900**	14	22	32
1979	**32,450**	16	25	36
1980	**33,000**	18	28	41
1981	**33,550**	20	30	45
1982	**34,100**	22	33	49
1983	**34,650**	24	36	53
1984	**35,200**	25	39	57
1985	**35,750**	27	41	61
1986	**36,300**	29	44	65
1987	**36,850**	31	47	69
1988	**37,400**	32	49	72
1989	**37,950**	34	52	76
1990	**38,500**	36	54	80
1991	**39,050**	37	57	83
1992	**39,600**	39	59	87
1993	**40,150**	40	62	91
1994	**40,700**	42	64	94
1995	**41,250**	44	66	98
1996	**41,800**	45	69	101
1997	**42,350**	47	71	104
1998	**42,900**	48	73	108
1999	**43,450**	50	76	111
2000	**44,000**	51	78	114
2001	**44,550**	53	80	118
2002	**0**	54	82	121
2003	**0**	52	79	117
2004	**0**	50	76	112
2005	**0**	48	74	108
2006	**0**	46	71	104
2007	**0**	45	68	100
2008	**0**	43	66	96
2009	**0**	41	63	93
2010	**0**	40	61	89
2011	**0**	38	59	86
2012	**0**	37	56	83
2013	**0**	36	54	80
2014	**0**	34	52	77
2015	**0**	33	50	74
2016	**0**	32	48	71
2017	**0**	31	47	68
2018	**0**	29	45	66
2019	**0**	28	43	63
2020	**0**	27	42	61
2021	**0**	26	40	59
2022	**0**	25	39	57
2023	**0**	24	37	55

SIMPLE FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATES



MODIFIED FIRST ORDER MODEL (SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 3: Parameters
Modified First Order

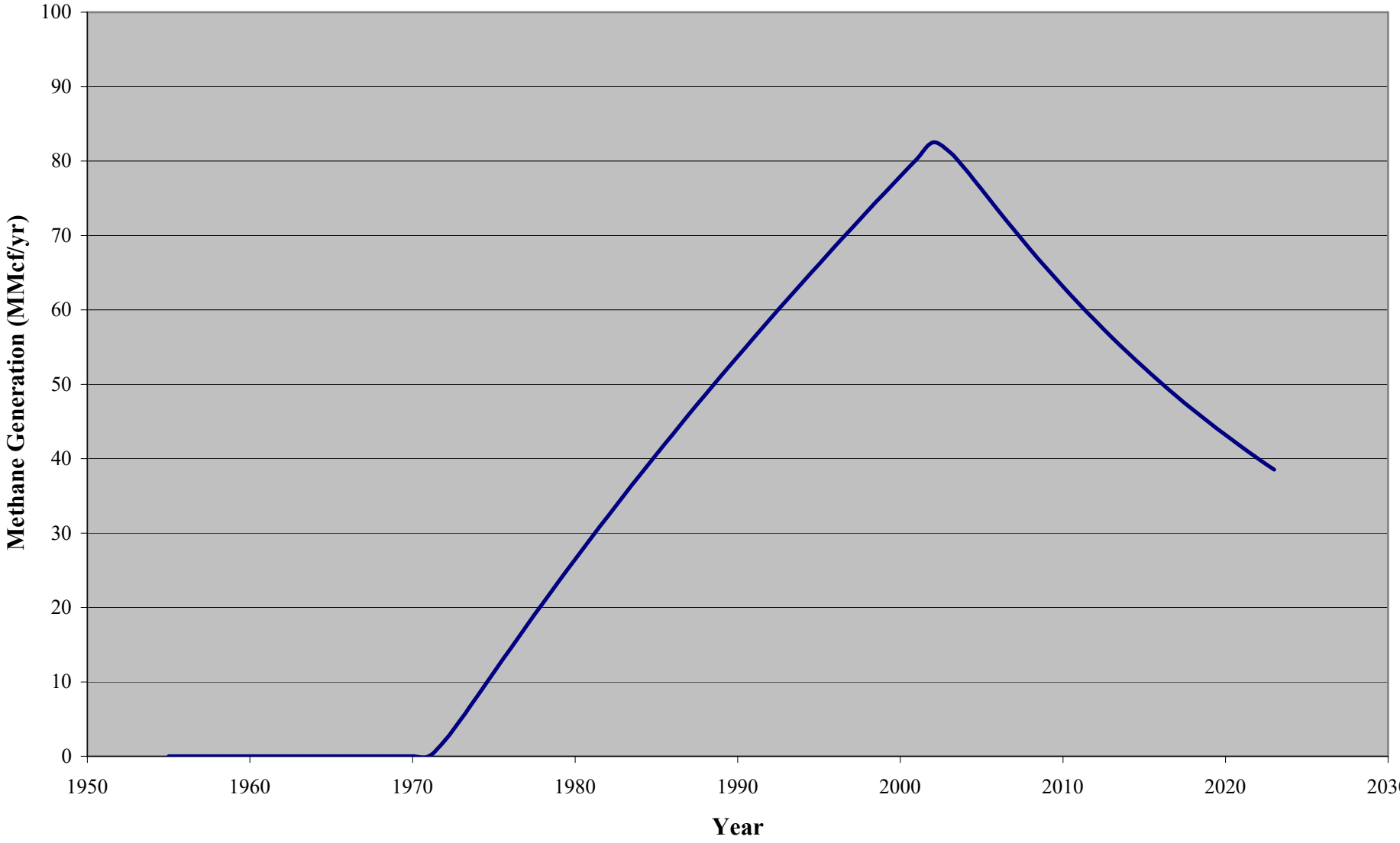
s:	1.00	
Lo:	3,200	cubic feet Methane/ton refuse
k:	0.038	/year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	0	0
1956	0	0
1957	0	0
1958	0	0
1959	0	0
1960	0	0
1961	0	0
1962	0	0
1963	0	0
1964	0	0
1965	0	0
1966	0	0
1967	0	0
1968	0	0
1969	0	0
1970	0	0
1971	28,050	0
1972	28,600	2
1973	29,150	5
1974	29,700	8
1975	30,250	11
1976	30,800	14
1977	31,350	17
1978	31,900	21
1979	32,450	24
1980	33,000	26
1981	33,550	29
1982	34,100	32
1983	34,650	35
1984	35,200	38
1985	35,750	41
1986	36,300	43
1987	36,850	46
1988	37,400	49
1989	37,950	51
1990	38,500	54
1991	39,050	56
1992	39,600	59
1993	40,150	61
1994	40,700	64
1995	41,250	66
1996	41,800	69
1997	42,350	71
1998	42,900	73
1999	43,450	76
2000	44,000	78
2001	44,550	80
2002	0	82
2003	0	81
2004	0	79
2005	0	76
2006	0	73
2007	0	71
2008	0	68
2009	0	66
2010	0	63
2011	0	61
2012	0	59
2013	0	56
2014	0	54
2015	0	52
2016	0	50
2017	0	48
2018	0	47
2019	0	45
2020	0	43
2021	0	42
2022	0	40
2023	0	39

MODIFIED FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



FIRST ORDER MULTI-PHASE MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

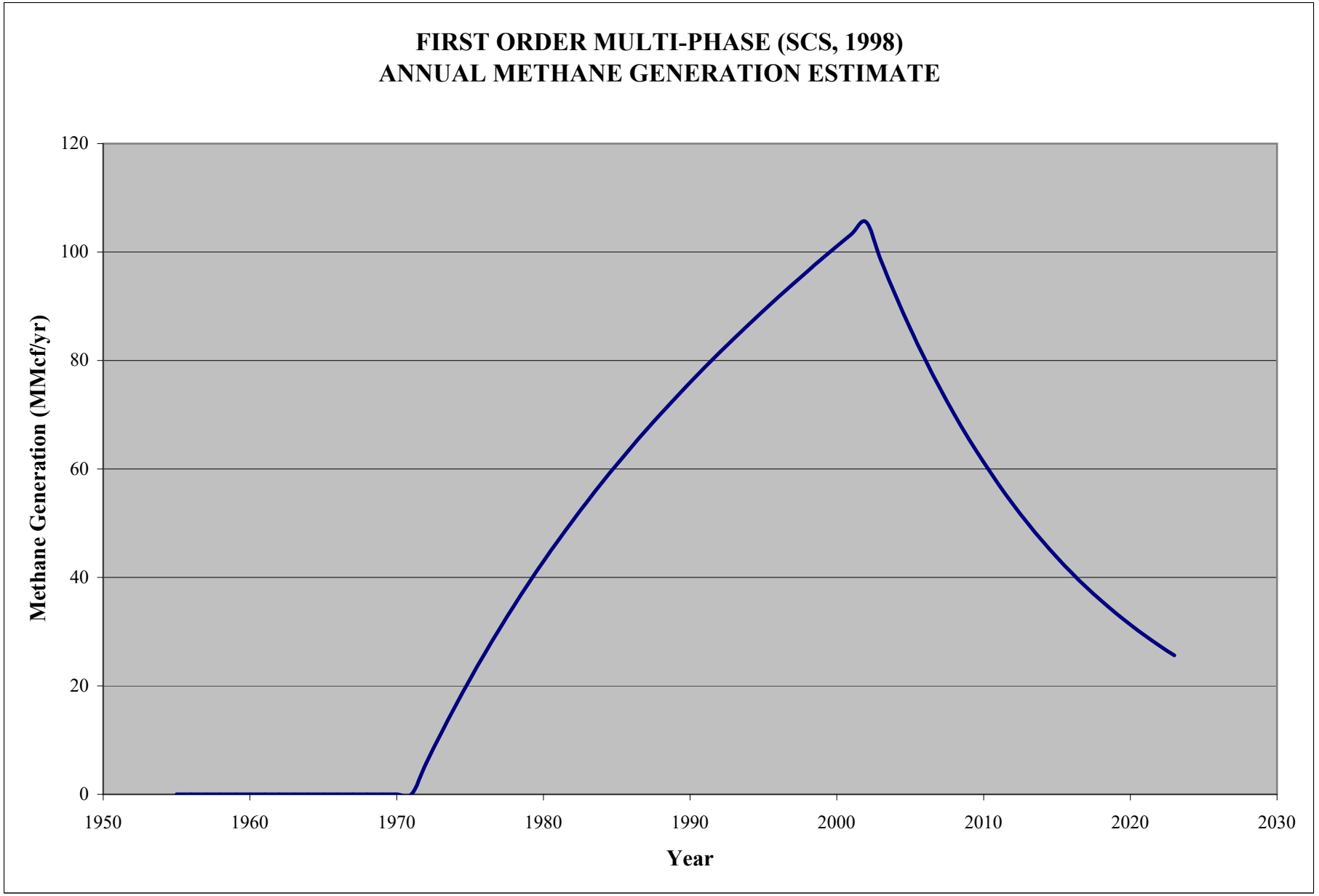
Model 4: Parameters
First Order Multi-Phase

k-Constant (for rapid)	0.08	Decay Rate of Rapidly Decomposables
k-Constant (for slow)	0.06	Decay Rate of Slowly Decomposables
Fraction rapid decomposing	40%	Fraction of Rapidly Decomposing Waste
Fraction slow decomposing	60%	Fraction of Slowly Decomposing Waste
Lo-Constant	3,200	cubic feet Methane/ton refuse

Lag time between initial placement of refuse and start of generation
is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	0	0
1956	0	0
1957	0	0
1958	0	0
1959	0	0
1960	0	0
1961	0	0
1962	0	0
1963	0	0
1964	0	0
1965	0	0
1966	0	0
1967	0	0
1968	0	0
1969	0	0
1970	0	0
1971	28,050	0
1972	28,600	6
1973	29,150	11
1974	29,700	16
1975	30,250	21
1976	30,800	26
1977	31,350	30
1978	31,900	35
1979	32,450	39
1980	33,000	43
1981	33,550	47
1982	34,100	50
1983	34,650	54
1984	35,200	57
1985	35,750	61
1986	36,300	64
1987	36,850	67
1988	37,400	70
1989	37,950	73
1990	38,500	76
1991	39,050	79
1992	39,600	81
1993	40,150	84
1994	40,700	87
1995	41,250	89
1996	41,800	92
1997	42,350	94
1998	42,900	96
1999	43,450	99
2000	44,000	101
2001	44,550	103
2002	0	106
2003	0	99
2004	0	92
2005	0	86
2006	0	80
2007	0	75
2008	0	70
2009	0	66
2010	0	61
2011	0	57
2012	0	53
2013	0	50
2014	0	47
2015	0	44
2016	0	41
2017	0	38
2018	0	36
2019	0	33
2020	0	31
2021	0	29
2022	0	27
2023	0	26


FIRST ORDER MULTI-PHASE (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE
Methane Generation (MMcf/yr)
120
100
80
60
40
20
0
1950
1960
1970
1980
1990
2000
2010
2020
2030
Year

APPENDIX B-4

SCENARIO 4

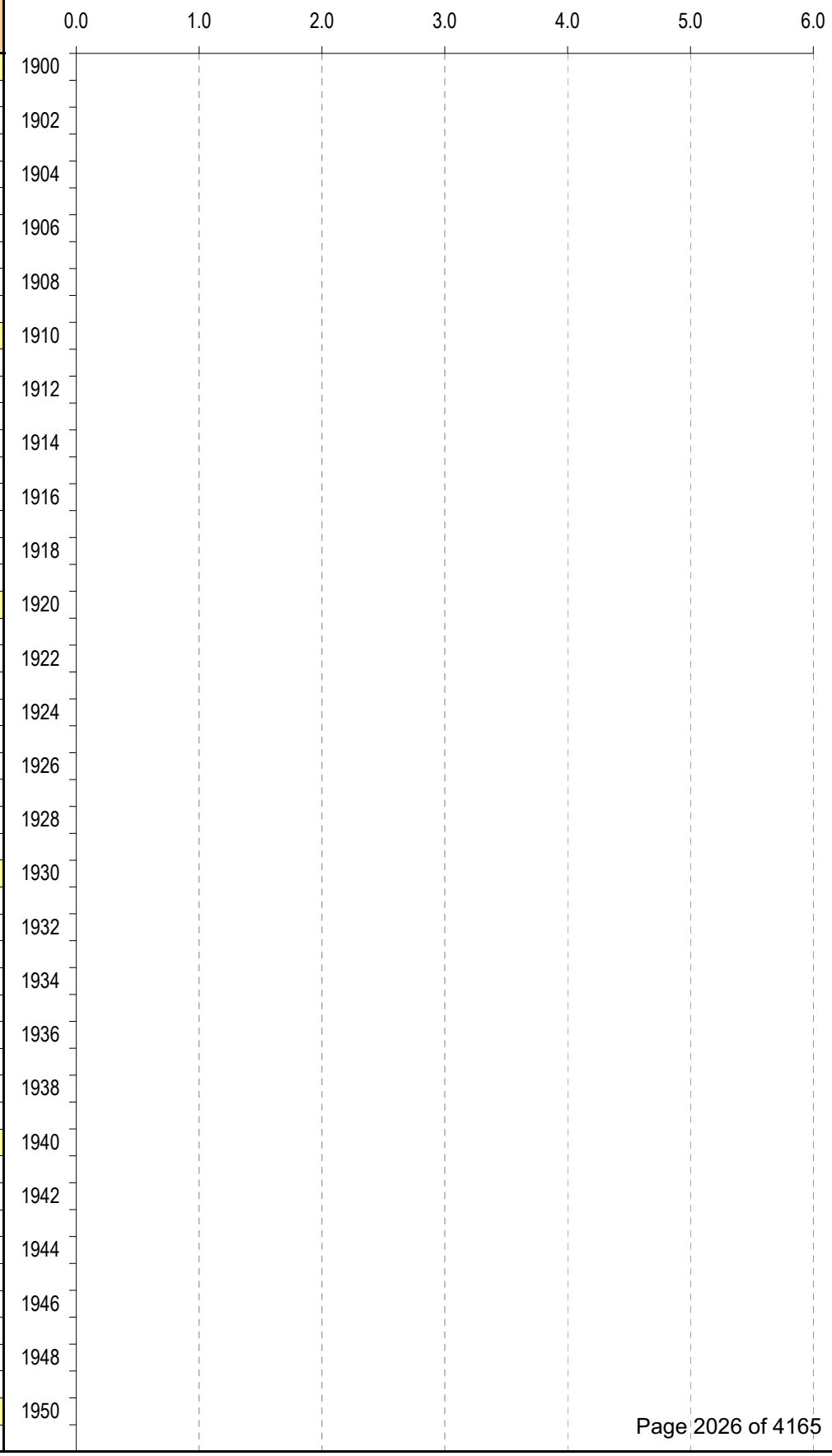
IPCC MODEL

Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1900		
1901		
1902		
1903		
1904		
1905		
1906		
1907		
1908		
1909		
1910		
1911		
1912		
1913		
1914		
1915		
1916		
1917		
1918		
1919		
1920		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		
1929		
1930		
1931		
1932		
1933		
1934		
1935		
1936		
1937		
1938		
1939		
1940		
1941		
1942		
1943		
1944		
1945		
1946		
1947		
1948		
1949		
1950		
1951		

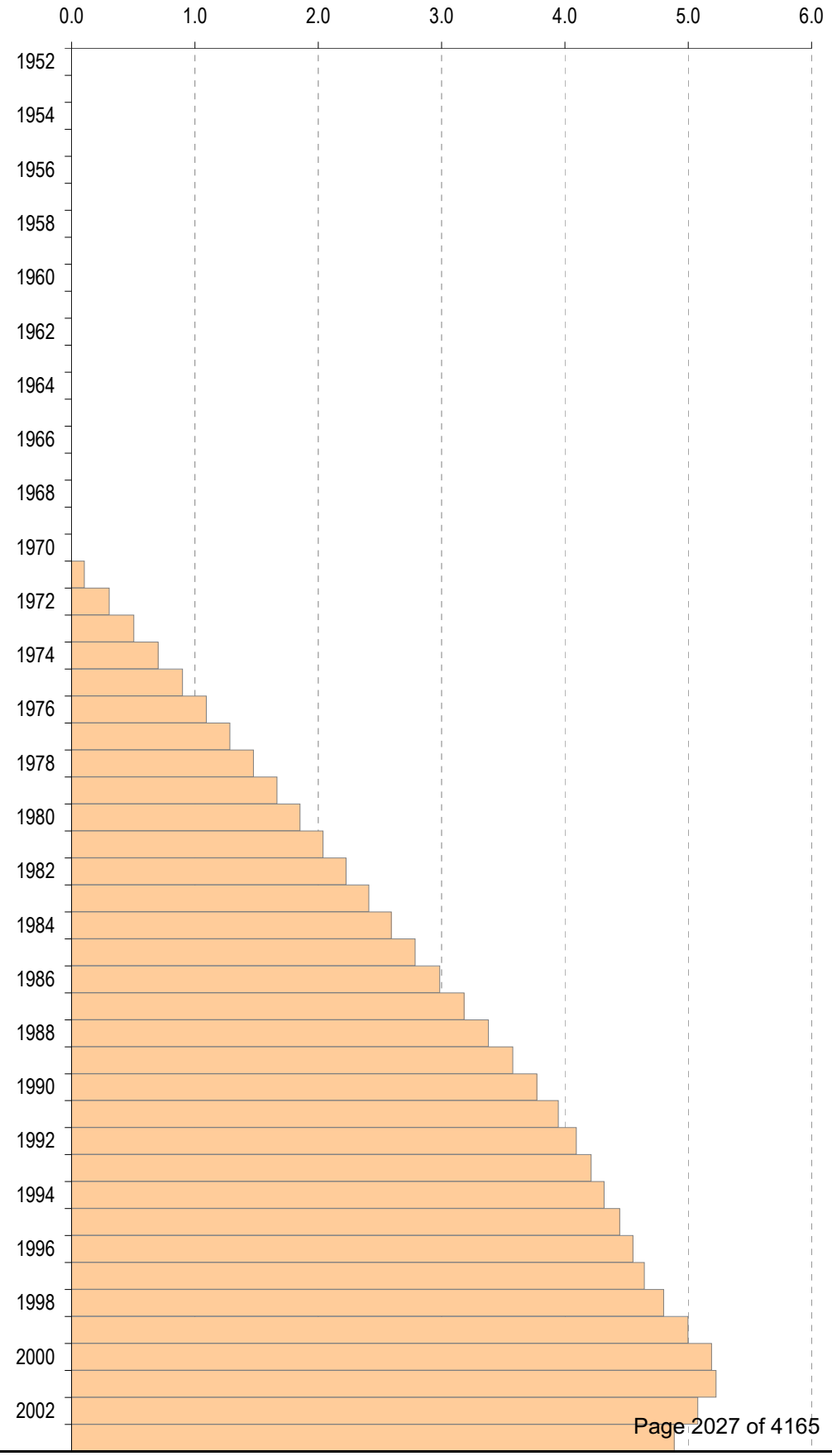


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		
1968		
1969		
1970		
1971	3	0.1
1972	10	0.3
1973	17	0.5
1974	23	0.7
1975	30	0.9
1976	36	1.1
1977	42	1.3
1978	49	1.5
1979	55	1.7
1980	61	1.9
1981	67	2.0
1982	73	2.2
1983	79	2.4
1984	85	2.6
1985	92	2.8
1986	98	3.0
1987	105	3.2
1988	111	3.4
1989	118	3.6
1990	124	3.8
1991	130	3.9
1992	135	4.1
1993	139	4.2
1994	142	4.3
1995	146	4.4
1996	150	4.6
1997	153	4.6
1998	158	4.8
1999	165	5.0
2000	171	5.2
2001	172	5.2
2002	167	5.1
2003	161	4.9

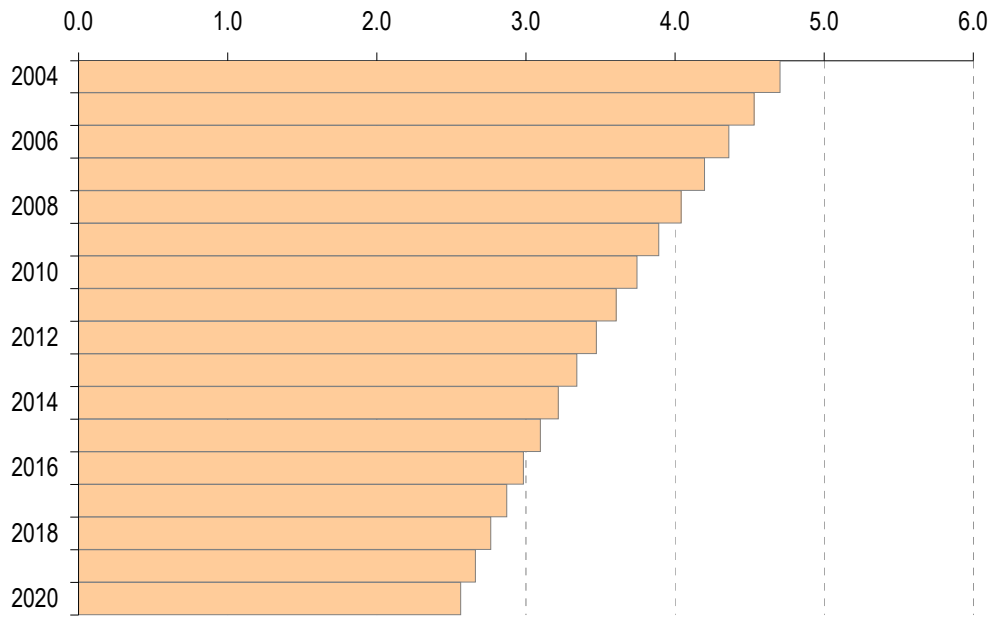


Model Output: Lanfill Characteristics

Landfill Name: Ukiah Landfill
State: CA
City/County: Ukiah/Mendocino
Year Opened: 1955
If Closed, Year: 2001
k Value: 0.038
M Value: 6

Model Output: Landfill Gas Captured and Captured Gas Heat (graph values in MMbtu/hr)

Year	Landfill Gas Captured (scf/min)	Captured Gas Heat (MMbtu/hr)
2004	155	4.7
2005	149	4.5
2006	144	4.4
2007	138	4.2
2008	133	4.0
2009	128	3.9
2010	123	3.7
2011	119	3.6
2012	114	3.5
2013	110	3.3
2014	106	3.2
2015	102	3.1
2016	98	3.0
2017	95	2.9
2018	91	2.8
2019	88	2.7
2020	84	2.6



SIMPLE FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

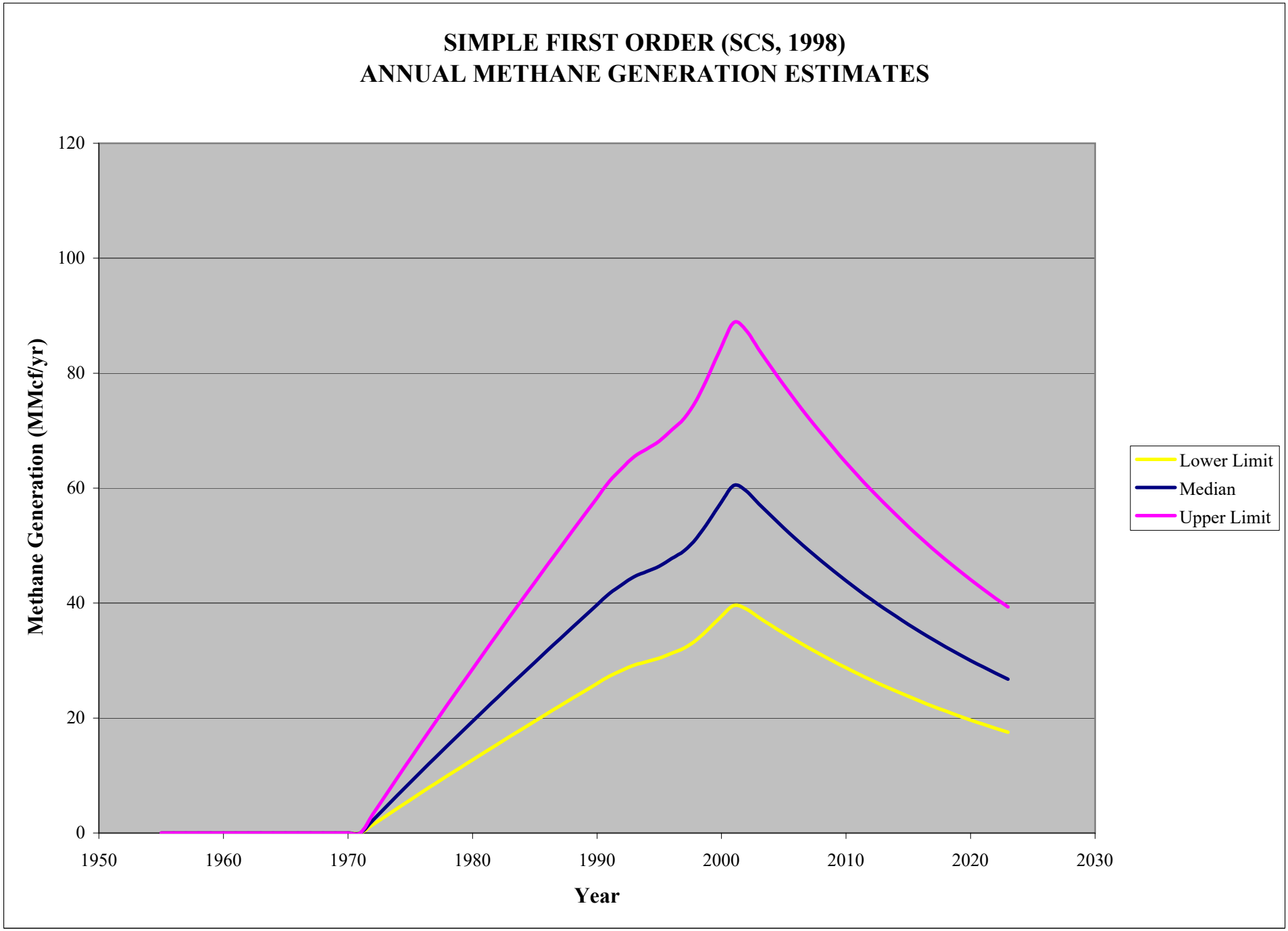
Model 2: Parameters
Simple First Order

Lo: **3,200** cubic feet Methane/ton refuse
k: **0.038** /year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year) Lower Limit	Median	Upper Limit
1955	**0**	0	0	0
1956	**0**	0	0	0
1957	**0**	0	0	0
1958	**0**	0	0	0
1959	**0**	0	0	0
1960	**0**	0	0	0
1961	**0**	0	0	0
1962	**0**	0	0	0
1963	**0**	0	0	0
1964	**0**	0	0	0
1965	**0**	0	0	0
1966	**0**	0	0	0
1967	**0**	0	0	0
1968	**0**	0	0	0
1969	**0**	0	0	0
1970	**0**	0	0	0
1971	**19,017**	0	0	0
1972	**19,567**	1	2	3
1973	**20,117**	3	4	7
1974	**20,667**	4	7	10
1975	**21,217**	6	9	13
1976	**21,767**	7	11	16
1977	**22,317**	9	13	19
1978	**22,867**	10	15	22
1979	**23,417**	11	17	25
1980	**23,967**	13	19	29
1981	**24,517**	14	22	32
1982	**25,067**	15	24	35
1983	**25,617**	17	26	38
1984	**26,167**	18	28	41
1985	**26,717**	19	30	44
1986	**27,267**	21	32	47
1987	**27,817**	22	34	50
1988	**28,367**	23	36	52
1989	**28,917**	25	38	55
1990	**29,467**	26	40	58
1991	**26,540**	27	42	61
1992	**25,444**	28	43	63
1993	**21,986**	29	45	65
1994	**22,255**	30	45	67
1995	**26,330**	30	46	68
1996	**27,001**	31	48	70
1997	**34,184**	32	49	72
1998	**42,489**	34	51	75
1999	**44,995**	36	54	80
2000	**42,856**	38	58	85
2001	**10,724**	40	60	89
2002	**0**	39	59	87
2003	**0**	38	57	84
2004	**0**	36	55	81
2005	**0**	35	53	78
2006	**0**	33	51	75
2007	**0**	32	49	72
2008	**0**	31	47	70
2009	**0**	30	46	67
2010	**0**	29	44	64
2011	**0**	28	42	62
2012	**0**	27	41	60
2013	**0**	26	39	58
2014	**0**	25	38	55
2015	**0**	24	36	53
2016	**0**	23	35	51
2017	**0**	22	34	49
2018	**0**	21	32	48
2019	**0**	20	31	46
2020	**0**	20	30	44
2021	**0**	19	29	42
2022	**0**	18	28	41
2023	**0**	18	27	39


SIMPLE FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATES
Methane Generation (MMcf/yr)
120
100
80
60
40
20
0
1950
1960
1970
1980
1990
2000
2010
2020
2030
Year
Lower Limit
Median
Upper Limit

MODIFIED FIRST ORDER MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

Model 3: Parameters
Modified First Order

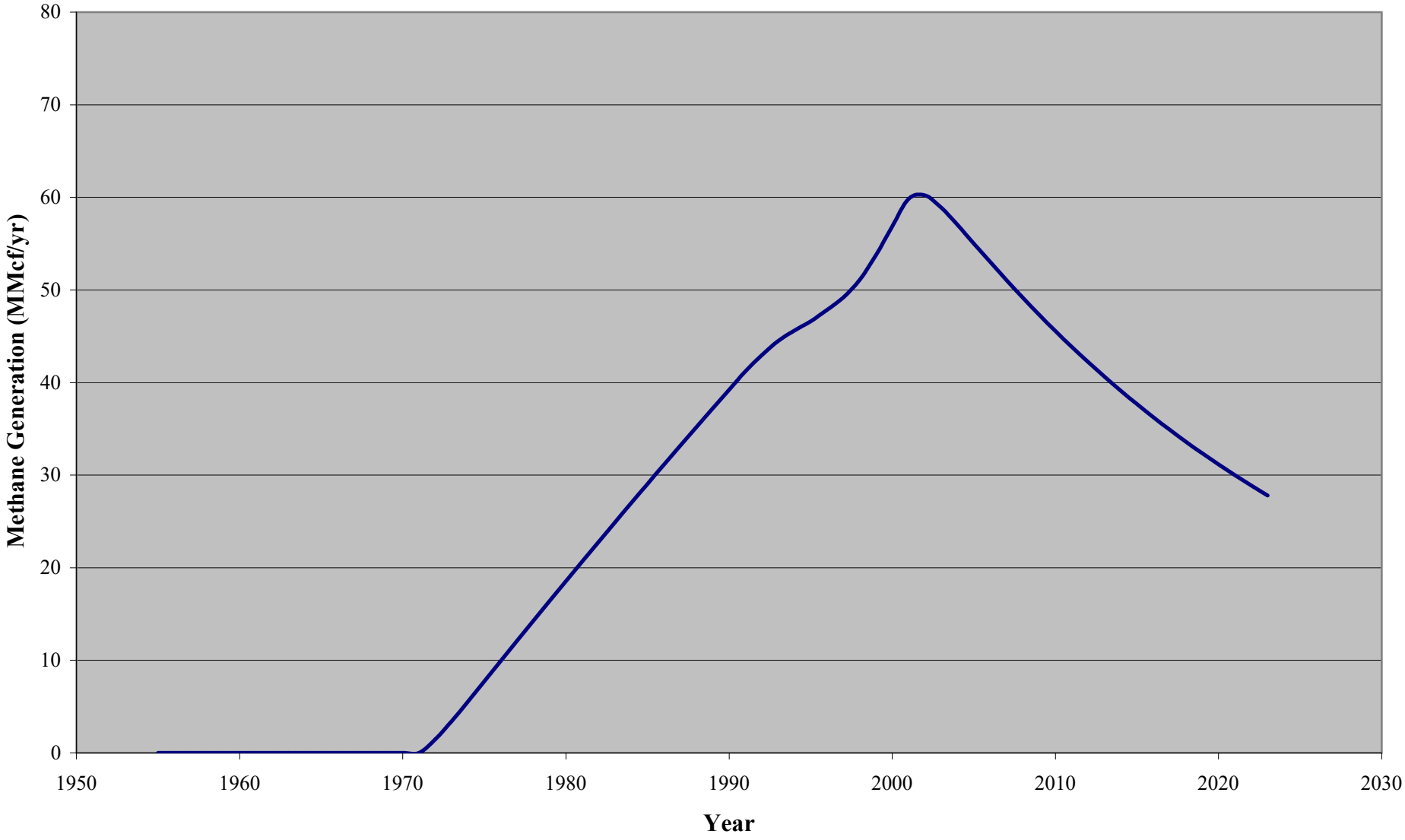
s:	1.00	
Lo:	3,200	cubic feet Methane/ton refuse
k:	0.038	/year

Lag time between initial placement of refuse and start of generation is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	0	0
1956	0	0
1957	0	0
1958	0	0
1959	0	0
1960	0	0
1961	0	0
1962	0	0
1963	0	0
1964	0	0
1965	0	0
1966	0	0
1967	0	0
1968	0	0
1969	0	0
1970	0	0
1971	19,017	0
1972	19,567	1
1973	20,117	3
1974	20,667	6
1975	21,217	8
1976	21,767	10
1977	22,317	12
1978	22,867	14
1979	23,417	16
1980	23,967	19
1981	24,517	21
1982	25,067	23
1983	25,617	25
1984	26,167	27
1985	26,717	29
1986	27,267	31
1987	27,817	33
1988	28,367	35
1989	28,917	37
1990	29,467	39
1991	26,540	41
1992	25,444	43
1993	21,986	44
1994	22,255	46
1995	26,330	47
1996	27,001	48
1997	34,184	49
1998	42,489	51
1999	44,995	54
2000	42,856	57
2001	10,724	60
2002	0	60
2003	0	59
2004	0	57
2005	0	55
2006	0	53
2007	0	51
2008	0	49
2009	0	47
2010	0	46
2011	0	44
2012	0	42
2013	0	41
2014	0	39
2015	0	38
2016	0	36
2017	0	35
2018	0	34
2019	0	32
2020	0	31
2021	0	30
2022	0	29
2023	0	28

MODIFIED FIRST ORDER (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE



FIRST ORDER MULTI-PHASE MODEL
(SCS ENGINEERS, 1998)

CITY OF UKIAH LANDFILL

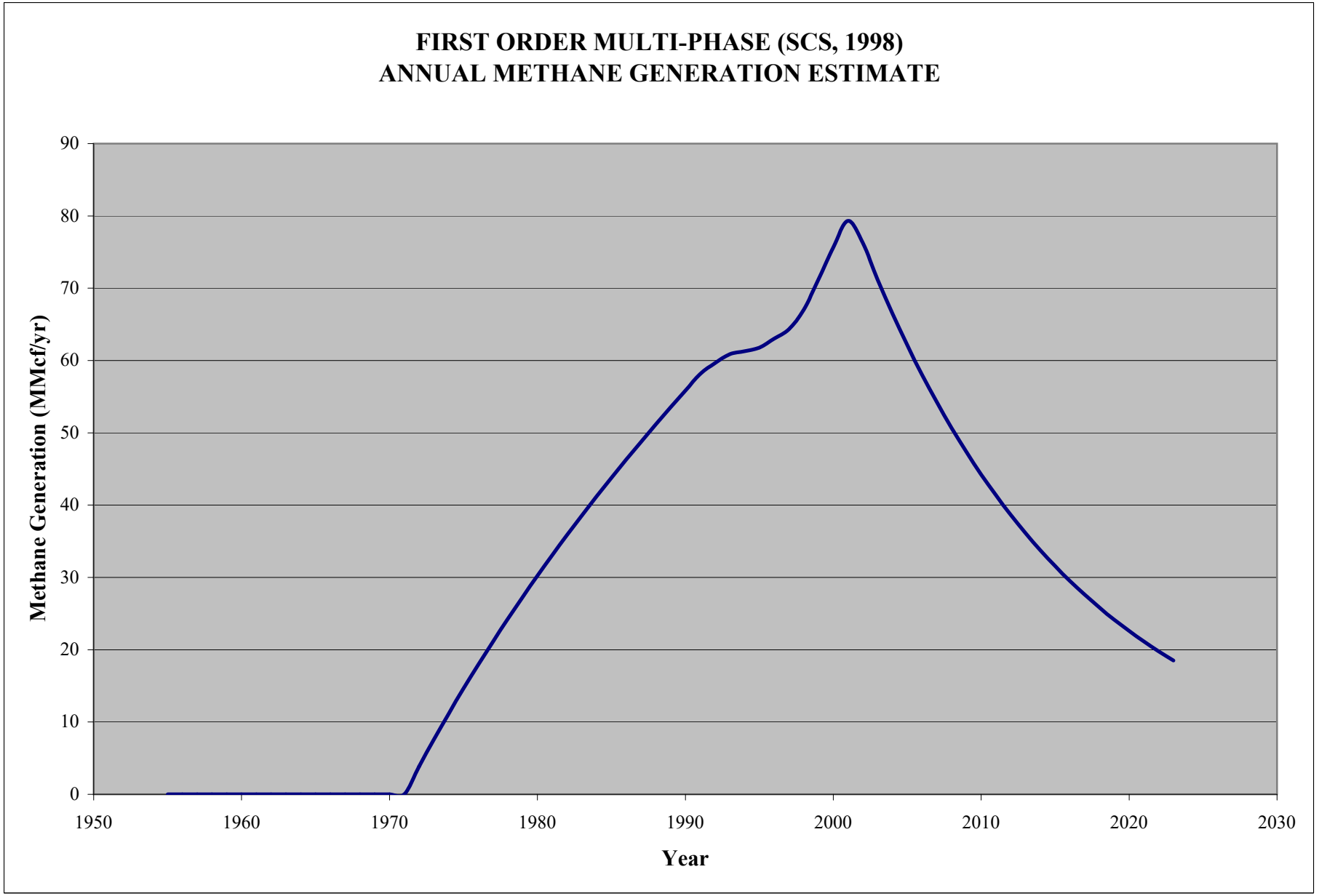
Model 4: Parameters
First Order Multi-Phase

k-Constant (for rapid)	0.08	Decay Rate of Rapidly Decomposables
k-Constant (for slow)	0.06	Decay Rate of Slowly Decomposables
Fraction rapid decomposing	40%	Fraction of Rapidly Decomposing Waste
Fraction slow decomposing	60%	Fraction of Slowly Decomposing Waste
Lo-Constant	3,200	cubic feet Methane/ton refuse

Lag time between initial placement of refuse and start of generation
is assumed to be one year.

Methane Generation

Year	Annual Refuse (Tons)	Methane Generation (Million cubic feet / year)
1955	0	0
1956	0	0
1957	0	0
1958	0	0
1959	0	0
1960	0	0
1961	0	0
1962	0	0
1963	0	0
1964	0	0
1965	0	0
1966	0	0
1967	0	0
1968	0	0
1969	0	0
1970	0	0
1971	19,017	0
1972	19,567	4
1973	20,117	8
1974	20,667	11
1975	21,217	15
1976	21,767	18
1977	22,317	21
1978	22,867	24
1979	23,417	27
1980	23,967	30
1981	24,517	33
1982	25,067	36
1983	25,617	39
1984	26,167	41
1985	26,717	44
1986	27,267	46
1987	27,817	49
1988	28,367	51
1989	28,917	54
1990	29,467	56
1991	26,540	58
1992	25,444	60
1993	21,986	61
1994	22,255	61
1995	26,330	62
1996	27,001	63
1997	34,184	64
1998	42,489	67
1999	44,995	71
2000	42,856	76
2001	10,724	79
2002	0	76
2003	0	71
2004	0	67
2005	0	62
2006	0	58
2007	0	54
2008	0	51
2009	0	47
2010	0	44
2011	0	41
2012	0	39
2013	0	36
2014	0	34
2015	0	32
2016	0	30
2017	0	28
2018	0	26
2019	0	24
2020	0	23
2021	0	21
2022	0	20
2023	0	19


FIRST ORDER MULTI-PHASE (SCS, 1998)
ANNUAL METHANE GENERATION ESTIMATE
Methane Generation (MMcf/yr)
0
10
20
30
40
50
60
70
80
90
1950
1960
1970
1980
1990
2000
2010
2020
2030
Year

APPENDIX C

LFG SAMPLES
CERTIFIED ANALYTICAL REPORT

K PRIME, Inc.

CONSULTING ANALYTICAL CHEMISTS

3621 Westwind Blvd.
Santa Rosa CA 95403
Phone: 707 527 7574
FAX: 707 527 7879

TRANSMITTAL

DATE: 9/24/2013

TO: MR. MIKE DELMANOWSKI
EBA ENGINEERING
825 SONOMA AVENUE
SANTA ROSA, CA 95404

Phone: 707-544-0784
Fax: 707-544-0866
Email: dataeba1@ebagroup.com
mdelmanowski@ebagroup.com

ACCT: 9986
PROJ: 02-907 TASK 8

FROM: Richard A. Kagel, Ph.D. RAK 9/24/2013
Laboratory Director

SUBJECT: LABORATORY RESULTS FOR YOUR PROJECT 02-907 TASK 8

Enclosed please find K Prime's laboratory reports for the following samples:

SAMPLE ID	TYPE	DATE	TIME	KPI LAB #
LFG-LW-1	AIR	9/12/2013	11:32	114282
GP-1	AIR	9/16/2013	14:55	114283
LFG-COMP	AIR	9/16/2013	16:25	114284

The above listed sample group was received on 9/17/2013 and tested as requested on the chain of custody document.

Please call me if you have any questions or need further information.
Thank you for this opportunity to be of service.

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO 15 (GC-MS-SCAN)

SAMPLE ID:	LFG-LW-1
LAB NO:	114282
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/12/2013
TIME SAMPLED:	11:32
BATCH ID:	091713A1
DATE ANALYZED:	09/18/2013

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
DICHLORODIFLUOROMETHANE	75-71-8	100	572	495	2830
DICHLOROTETRAFLUOROETHANE	76-14-2	100	103	699	718
CHLOROMETHANE	74-87-3	100	ND	207	ND
VINYL CHLORIDE	75-01-4	100	5830	256	14900
BROMOMETHANE	74-83-9	100	ND	388	ND
CHLOROETHANE	75-00-3	100	ND	264	ND
TRICHLOROFLUOROMETHANE	75-69-4	100	ND	562	ND
1,1-DICHLOROETHENE	75-35-4	100	ND	397	ND
TRICHLOROTRIFLUOROETHANE	76-13-1	100	ND	766	ND
METHYLENE CHLORIDE	75-09-2	100	147	347	512
1,1-DICHLOROETHANE	75-34-3	100	ND	405	ND
CIS-1,2-DICHLOROETHENE	156-59-2	100	2060	397	8170
CHLOROFORM	67-66-3	100	ND	488	ND
1,1,1-TRICHLOROETHANE	71-55-6	100	ND	546	ND
CARBON TETRACHLORIDE	56-23-5	100	ND	629	ND
1,2-DICHLOROETHANE	107-06-2	100	ND	405	ND
BENZENE	71-43-2	100	161	319	515
TRICHLOROETHENE	79-01-6	100	241	537	1290
1,2-DICHLOROPROPANE	78-87-5	100	ND	462	ND
TRANS-1,3-DICHLOROPROPENE	10061-02-6	100	ND	454	ND
TOLUENE	108-88-3	100	390	377	1470
CIS-1,3-DICHLOROPROPENE	10061-01-5	100	ND	454	ND
1,1,2-TRICHLOROETHANE	79-00-5	100	ND	546	ND
TETRACHLOROETHENE	127-18-4	100	819	678	5560
1,2-DIBROMOETHANE	106-93-4	100	ND	768	ND
CHLOROBENZENE	108-90-7	100	ND	460	ND
ETHYLBENZENE	100-41-4	100	ND	434	ND
XYLENE (M+P)	1330-20-7	100	409	434	1780
XYLENE (O)	95-47-6	100	144	434	626
STYRENE	100-42-5	100	ND	426	ND
1,1,2,2-TETRACHLOROETHANE	79-34-5	100	ND	687	ND
1,3,5-TRIMETHYLBENZENE	108-67-8	100	ND	492	ND
1,2,4-TRIMETHYLBENZENE	95-63-6	100	ND	492	ND
1,3-DICHLOROBENZENE	541-73-1	100	ND	601	ND
1,4-DICHLOROBENZENE	106-46-7	100	ND	601	ND
1,2-DICHLOROBENZENE	95-50-1	100	ND	601	ND
1,2,4-TRICHLOROBENZENE	120-82-1	200	ND	1480	ND
HEXACHLOROBUTADIENE	87-68-3	100	ND	1070	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: RMC
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO 15 (GC-MS-SCAN)

SAMPLE ID:	LFG-COMP
LAB NO:	114284
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/16/2013
TIME SAMPLED:	16:25
BATCH ID:	091713A1
DATE ANALYZED:	09/18/2013

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
DICHLORODIFLUOROMETHANE	75-71-8	1000	ND	4950	ND
DICHLOROTETRAFLUOROETHANE	76-14-2	1000	ND	6990	ND
CHLOROMETHANE	74-87-3	1000	ND	2070	ND
VINYL CHLORIDE	75-01-4	1000	1540	2560	3940
BROMOMETHANE	74-83-9	1000	ND	3880	ND
CHLOROETHANE	75-00-3	1000	ND	2640	ND
TRICHLOROFLUOROMETHANE	75-69-4	1000	ND	5620	ND
1,1-DICHLOROETHENE	75-35-4	1000	ND	3970	ND
TRICHLOROTRIFLUOROETHANE	76-13-1	1000	ND	7660	ND
METHYLENE CHLORIDE	75-09-2	1000	ND	3470	ND
1,1-DICHLOROETHANE	75-34-3	1000	ND	4050	ND
CIS-1,2-DICHLOROETHENE	156-59-2	1000	ND	3970	ND
CHLOROFORM	67-66-3	1000	ND	4880	ND
1,1,1-TRICHLOROETHANE	71-55-6	1000	ND	5460	ND
CARBON TETRACHLORIDE	56-23-5	1000	ND	6290	ND
1,2-DICHLOROETHANE	107-06-2	1000	ND	4050	ND
BENZENE	71-43-2	1000	ND	3190	ND
TRICHLOROETHENE	79-01-6	1000	ND	5370	ND
1,2-DICHLOROPROPANE	78-87-5	1000	ND	4620	ND
TRANS-1,3-DICHLOROPROPENE	10061-02-6	1000	ND	4540	ND
TOLUENE	108-88-3	1000	7010	3770	26400
CIS-1,3-DICHLOROPROPENE	10061-01-5	1000	ND	4540	ND
1,1,2-TRICHLOROETHANE	79-00-5	1000	ND	5460	ND
TETRACHLOROETHENE	127-18-4	1000	ND	6780	ND
1,2-DIBROMOETHANE	106-93-4	1000	ND	7680	ND
CHLOROBENZENE	108-90-7	1000	1950	4600	8960
ETHYLBENZENE	100-41-4	1000	159000	4340	692000
XYLENE (M+P)	1330-20-7	1000	123000	4340	534000
XYLENE (O)	95-47-6	1000	136000	4340	591000
STYRENE	100-42-5	1000	ND	4260	ND
1,1,2,2-TETRACHLOROETHANE	79-34-5	1000	ND	6870	ND
1,3,5-TRIMETHYLBENZENE	108-67-8	1000	6020	4920	29600
1,2,4-TRIMETHYLBENZENE	95-63-6	1000	6290	4920	30900
1,3-DICHLOROBENZENE	541-73-1	1000	ND	6010	ND
1,4-DICHLOROBENZENE	106-46-7	1000	ND	6010	ND
1,2-DICHLOROBENZENE	95-50-1	1000	ND	6010	ND
1,2,4-TRICHLOROBENZENE	120-82-1	2000	ND	14800	ND
HEXACHLOROBUTADIENE	87-68-3	1000	ND	10700	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: PMK
DATE: 9/24/13

K PRIME, INC.

LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: TVH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

UNITS: PPM-V

SAMPLE ID	LAB NO.	SAMPLE TYPE	DATE SAMPLED	BATCH ID	DATE ANALYZED	MRL	SAMPLE CONC
LFG-LW-1	114282	AIR	09/12/2013	091713A1	09/17/2013	5.00	33.7
GP-1	114283	AIR	09/16/2013	091713A1	09/17/2013	5.00	80.6
LFG-COMP	114284	AIR	09/16/2013	091713A1	09/17/2013	5.00	1120

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: _____
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: TVH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

UNITS: UG/M3

SAMPLE ID	LAB NO.	SAMPLE TYPE	DATE SAMPLED	BATCH ID	DATE ANALYZED	MRL	SAMPLE CONC
LFG-LW-1	114282	AIR	09/12/2013	091713A1	09/17/2013	17600	119000
GP-1	114283	AIR	09/16/2013	091713A1	09/17/2013	17600	283000
LFG-COMP	114284	AIR	09/16/2013	091713A1	09/17/2013	17600	3920000

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: MMC
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: METHANE, OXYGEN, NITROGEN
REFERENCE: ASTM D 1946

SAMPLE ID:	LFG-LW-1
LAB NO:	114282
BATCH ID:	091713A3
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/12/2013
TIME SAMPLED:	11:32
DATE RECEIVED:	09/17/2013
DATE ANALYZED:	09/17/2013
UNITS:	%-V

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
METHANE	0.100	47.8
OXYGEN	1.00	ND
NITROGEN(BALANCE)	1.00	18.3

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: RMK
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: METHANE, OXYGEN, NITROGEN
REFERENCE: ASTM D 1946

SAMPLE ID:	GP-1
LAB NO:	114283
BATCH ID:	091713A3
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/16/2013
TIME SAMPLED:	14:55
DATE RECEIVED:	09/17/2013
DATE ANALYZED:	09/17/2013
UNITS:	%-V

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
METHANE	0.100	55.2
OXYGEN	1.00	2.48
NITROGEN(BALANCE)	1.00	6.66

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: RMS
DATE: 9/24/13

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: METHANE, OXYGEN, NITROGEN
REFERENCE: ASTM D 1946

SAMPLE ID:	LFG-COMP
LAB NO:	114284
BATCH ID:	091713A3
SAMPLE TYPE:	AIR
DATE SAMPLED:	09/16/2013
TIME SAMPLED:	16:25
DATE RECEIVED:	09/17/2013
DATE ANALYZED:	09/17/2013
UNITS:	%-V

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
METHANE	0.100	57.5
OXYGEN	1.00	ND
NITROGEN(BALANCE)	1.00	7.22

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: _____
DATE: 9/24/13

K PRIME, INC.

LABORATORY REPORT

K PRIME PROJECT: 9986
CLIENT PROJECT: 02-907 TASK 8

METHOD: CARBON DIOXIDE
REFERENCE: ASTM D 1946

UNITS: %-V

SAMPLE ID	LAB NO.	SAMPLE TYPE	DATE SAMPLED	BATCH ID	DATE ANALYZED	MRL	SAMPLE CONC
LFG-LW-1	114282	AIR	09/12/2013	091713A2	09/17/2013	0.100	33.2
GP-1	114283	AIR	09/16/2013	091713A2	09/17/2013	0.100	35.7
LFG-COMP	114284	AIR	09/16/2013	091713A2	09/17/2013	0.100	34.9

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: _____
DATE: 9/24/13

K PRIME, INC.
LABORATORY METHOD BLANK REPORT

METHOD BLANK ID: B091713A1
SAMPLE TYPE: AIR

BATCH ID: 091713A1
DATE ANALYZED: 09/17/2013

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO 15 (GC-MS-SCAN)

COMPOUND NAME	CAS NO.	PPB (V/V) MRL	PPB (V/V) SAMPLE CONC	µg/cu. m MRL	µg/cu. m SAMPLE CONC
DICHLORODIFLUOROMETHANE	75-71-8	0.500	ND	2.47	ND
DICHLOROTETRAFLUOROETHANE	76-14-2	0.500	ND	3.50	ND
CHLOROMETHANE	74-87-3	0.500	ND	1.03	ND
VINYL CHLORIDE	75-01-4	0.500	ND	1.28	ND
BROMOMETHANE	74-83-9	0.500	ND	1.94	ND
CHLOROETHANE	75-00-3	0.500	ND	1.32	ND
TRICHLOROFLUOROMETHANE	75-69-4	0.500	ND	2.81	ND
1,1-DICHLOROETHENE	75-35-4	0.500	ND	1.98	ND
TRICHLOROTRIFLUOROETHANE	76-13-1	0.500	ND	3.83	ND
METHYLENE CHLORIDE	75-09-2	0.500	ND	1.74	ND
1,1-DICHLOROETHANE	75-34-3	0.500	ND	2.02	ND
CIS-1,2-DICHLOROETHENE	156-59-2	0.500	ND	1.98	ND
CHLOROFORM	67-66-3	0.500	ND	2.44	ND
1,1,1-TRICHLOROETHANE	71-55-6	0.500	ND	2.73	ND
CARBON TETRACHLORIDE	56-23-5	0.500	ND	3.15	ND
1,2-DICHLOROETHANE	107-06-2	0.500	ND	2.02	ND
BENZENE	71-43-2	0.500	ND	1.60	ND
TRICHLOROETHENE	79-01-6	0.500	ND	2.69	ND
1,2-DICHLOROPROPANE	78-87-5	0.500	ND	2.31	ND
TRANS-1,3-DICHLOROPROPENE	10061-02-6	0.500	ND	2.27	ND
TOLUENE	108-88-3	0.500	ND	1.88	ND
CIS-1,3-DICHLOROPROPENE	10061-01-5	0.500	ND	2.27	ND
1,1,2-TRICHLOROETHANE	79-00-5	0.500	ND	2.73	ND
TETRACHLOROETHENE	127-18-4	0.500	ND	3.39	ND
1,2-DIBROMOETHANE	106-93-4	0.500	ND	3.84	ND
CHLOROBENZENE	108-90-7	0.500	ND	2.30	ND
ETHYLBENZENE	100-41-4	0.500	ND	2.17	ND
XYLENE (M+P)	1330-20-7	0.500	ND	2.17	ND
XYLENE (O)	95-47-6	0.500	ND	2.17	ND
STYRENE	100-42-5	0.500	ND	2.13	ND
1,1,2,2-TETRACHLOROETHANE	79-34-5	0.500	ND	3.43	ND
1,3,5-TRIMETHYLBENZENE	108-67-8	0.500	ND	2.46	ND
1,2,4-TRIMETHYLBENZENE	95-63-6	0.500	ND	2.46	ND
1,3-DICHLOROBENZENE	541-73-1	0.500	ND	3.01	ND
1,4-DICHLOROBENZENE	106-46-7	0.500	ND	3.01	ND
1,2-DICHLOROBENZENE	95-50-1	0.500	ND	3.01	ND
1,2,4-TRICHLOROBENZENE	120-82-1	0.500	ND	3.71	ND
HEXACHLOROBUTADIENE	87-68-3	0.500	ND	5.33	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

K PRIME, INC.
LABORATORY QUALITY CONTROL REPORT

LAB CONTROL ID: L091713A1
LAB CONTROL DUPLICATE ID: D091713A1

SAMPLE TYPE: AIR
BATCH ID: 091713A1
DATE ANALYZED: 09/17/2013

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO 15 (GC-MS-SCAN)

COMPOUND NAME	SPIKE ADDED (PPB)	REPORTING LIMIT (PPB)	SAMPLE CONC (PPB)	SPIKE CONC (PPB)	SPIKE REC (%)	REC LIMITS (%)
1,1-DICHLOROETHENE	10.0	0.500	ND	8.64	86	60 - 140
TRICHLOROETHENE	10.0	0.500	ND	9.71	97	60 - 140
BENZENE	10.0	0.500	ND	8.75	88	60 - 140
TOLUENE	10.0	0.500	ND	9.48	95	60 - 140
TETRACHLOROETHENE	10.0	0.500	ND	10.1	101	60 - 140

COMPOUND NAME	SPIKE ADDED (PPB)	SPIKE DUP CONC (PPB)	SPIKE DUP REC (%)	RPD (%)	QC LIMITS RPD (%)	QC LIMITS REC (%)
1,1-DICHLOROETHENE	10.0	8.30	83	4.0	25	60 - 140
TRICHLOROETHENE	10.0	9.29	93	4.4	25	60 - 140
BENZENE	10.0	8.56	86	2.2	25	60 - 140
TOLUENE	10.0	9.28	93	2.1	25	60 - 140
TETRACHLOROETHENE	10.0	10.0	100	0.9	25	60 - 140

NOTES:
NA - NOT APPLICABLE OR AVAILABLE
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT

K PRIME, INC.
LABORATORY QC REPORT

METHOD BLANK ID: B091713A1
LAB CONTROL SAMPLE ID: L091713A1
LAB CONTROL DUPLICATE ID: D091713A1
BATCH ID: 091713A1

METHOD: TVH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

SAMPLE TYPE: AIR
UNITS: PPM-V

METHOD BLANK

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
TVH	2.50	ND

ACCURACY (LAB CONTROL SAMPLE)

COMPOUND NAME	EXPECTED CONC	MEASURED CONC	PERCENT RECOVERY	LIMITS (PERCENT)
TVH	167	159	95	60-140

PRECISION (LAB CONTROL DUPLICATE)

COMPOUND NAME	SAMPLE RESULT	DUPLICATE RESULT	RPD (PERCENT)	LIMITS (PERCENT)
TVH	159	152	4.5	±30

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
TVH - TOTAL VOLATILE HYDROCARBONS

K PRIME, INC.
LABORATORY QC REPORT

METHOD BLANK ID: B091713A1
LAB CONTROL SAMPLE ID: L091713A1
LAB CONTROL DUPLICATE ID: D091713A1
BATCH ID: 091713A1

METHOD: TVH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

SAMPLE TYPE: AIR
UNITS: UG/M3

METHOD BLANK

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
TVH	8790	ND

ACCURACY (LAB CONTROL SAMPLE)

COMPOUND NAME	EXPECTED CONC	MEASURED CONC	PERCENT RECOVERY	LIMITS (PERCENT)
TVH	586000	561000	96	60-140

PRECISION (LAB CONTROL DUPLICATE)

COMPOUND NAME	SAMPLE RESULT	DUPLICATE RESULT	RPD (PERCENT)	LIMITS (PERCENT)
TVH	561000	535000	4.7	±30

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
TVH - TOTAL VOLATILE HYDROCARBONS

K PRIME, INC.
LABORATORY QC REPORT

METHOD: METHANE, OXYGEN, NITROGEN (BALANCE)
REFERENCE: ASTM D 1946

METHOD BLANK ID: B091713A3
SAMPLE ID: L091713A3
DUPLICATE ID: D091713A3
BATCH #: 091713A3
SAMPLE TYPE: AIR
UNITS: %-V

DATE ANALYZED: 09/17/2013

METHOD BLANK

PARAMETER	REPORTING LIMIT	SAMPLE RESULT
METHANE	0.100	ND
OXYGEN	1.00	ND

ACCURACY (MATRIX SPIKE)

PARAMETER	SPIKE ADDED	SAMPLE RESULT	SPIKE RESULT	RECOVERY (%)	LIMITS (%)
METHANE	50.0	ND	48.4	97	90-110
OXYGEN	10.0	ND	9.00	90	90-110
NITROGEN (BALANCE)	40.0	ND	42.6	107	90-110

PRECISION (SPIKE DUPLICATE)

COMPOUND NAME	REPORTING LIMIT	SPIKE RESULT	DUPLICATE RESULT	RPD (%)	LIMITS (%)
METHANE	0.100	48.4	48.9	1.0	±10
OXYGEN	1.00	9.00	9.06	0.7	±10
NITROGEN (BALANCE)	1.00	42.6	42.0	1.3	±10

K PRIME, INC.

LABORATORY QC REPORT

METHOD: CARBON DIOXIDE
REFERENCE: ASTM D 1946

METHOD BLANK ID: B091713A2
SAMPLE ID: L091713A2
DUPLICATE ID: D091713A2
BATCH #: 091713A2
SAMPLE TYPE: AIR
UNITS: %-V

DATE ANALYZED: 09/17/2013

METHOD BLANK

PARAMETER	REPORTING LIMIT	SAMPLE RESULT
CARBON DIOXIDE	0.050	ND

ACCURACY (MATRIX SPIKE)

PARAMETER	SPIKE ADDED	SAMPLE RESULT	SPIKE RESULT	RECOVERY (%)	LIMITS (%)
CARBON DIOXIDE	1.00	ND	1.00	100	70-130

PRECISION (SPIKE DUPLICATE)

COMPOUND NAME	REPORTING LIMIT	SPIKE RESULT	DUPLICATE RESULT	RPD (%)	LIMITS (%)
CARBON DIOXIDE	0.050	1.00	1.00	0.4	±20

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
NA - NOT AVAILABLE OR APPLICABLE

K PRIME, INC.

CHAIN OF CUSTODY RECORD

CONSULTING ANALYTICAL CHEMISTS 3621 Westwind Blvd., Santa Rosa, CA 95403 PHONE: (707) 527-7574 FAX: (707) 527-7879

Client/Project ID	Address/Phone	ANALYSES	KPI Project No.
EBA ENGINEERING	825 SONOMA AVE SANTA ROSA CA		
Project Location	Client Project No.		☐ EDF Log Code:
UKIAH LANDFILL	02-907 TASK 8		Global ID
Contact	Sampler (Signature)		
M. DELMANOWSKI			

Sample Identification No.	Date	Time	Lab Sample No.	Type of Sample	No. of Containers	CH4, O2, CO2, N2 (4946)	TVH - TO-3	TO-14					Expected Turnaround Time	Remarks
LFG-LW-1	9-12-13	1132	114282	AIR	1	X	X	X					5-DAY	NO EDF
GP-1	9-16-13	1455	114283	"	1	X	X							
LFG-COMP	9-16-13	1550, 1625	114284	"	1	X	X	X						

Relinquished by: (Signature)	Received by: (Signature) RW - COOK KPI	Date 9/17/13	Time 10:58
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Disposal Method	White Copy : Accompanies Samples Yellow Copy : Sampler		
Disposed by: (Signature)	Date	Time	

APPENDIX D

LFG CONDENSATE GENERATION CALCULATIONS

CONDENSATE GENERATION CALCULATIONS
LOWEST AVERAGE MONTHLY TEMPERATURE AT MINIMUM FLOW RATE
CITY OF UKIAH LANDFILL

Design Parameters:

LFG Temp. at Initial Point (F):	120	
LFG Temp. at Final Point (F):	36	
Vapor Pressure at Initial Temp.	1.6927	(see attached table)
Vapor Pressure at Final Temp.	0.0999	(see attached table)
Average Vacuum Pressure ("w.c.)	25	
Average Vacuum Pressure (psia)	13.797	
Design Flow Rate (scfm):	53	
Conversion Factor:	0.0057	

Method 1 - Detailed Procedure (LANDTEC, 1994)

Xcond = Pw/Plfg = Vcond/Vlfg

where:

Xcond	=	Fraction of liquid gas condensate (assumed to be primarily aqueous water)
Xw	=	Water vapor fraction
Pwater	=	Partial (vapor) pressure of water at LFG temperature determined (psia)
Plfg	=	Total pressure of LFG (psia) (i.e., average pipeline pressure)
Vcond	=	Volue of LFG condensate
Vlfg	=	Volume of LFG

therefore:

Dropped Out Xcond = Initial Xw - Final Xw
Dropped Out Xcond = 0.115

Condensate (gal) per Design Flow (scf) = Dropped Out Xcond x Flow x Conversion Constant
Condensate (gal) per Design Flow (scf) = 0.035

Gallons of Condensate per day = ***50 gal/day***

Method 2 - Conservative Method (Source: LANDTEC, 1994)

Vcond = 5694 x (10^B/Ps)

where:

Vcond	=	Volume of condensate (water) produced (MMcf)
B	=	6.32 - (3081/T+385) = 0.219
T	=	Maximum (initial) gas temperature (F)
Ps	=	System pressure (psia)

Vcond = 683.326 gal/MMcf

Corrected Vcond for Design Flow = ***52 gal/day***

CONDENSATE GENERATION CALCULATIONS
MEAN TEMPERATURE (ANNUAL) AT MINIMUM FLOW RATE
CITY OF UKIAH LANDFILL

Design Parameters:

LFG Temp. at Initial Point (F):	120	
LFG Temp. at Final Point (F):	59	
Vapor Pressure at Initial Temp.	1.6927	(see attached table)
Vapor Pressure at Final Temp.	0.2561	(see attached table)
Average Vacuum Pressure ("w.c.)	25	
Average Vacuum Pressure (psia)	13.797	
Design Flow Rate (scfm):	53	
Conversion Factor:	0.0057	

Method 1 - Detailed Procedure (LANDTEC, 1994)

Xcond = Pw/Plfg = Vcond/Vlfg

where:

Xcond	=	Fraction of liquid gas condensate (assumed to be primarily aqueous water)
Xw	=	Water vapor fraction
Pwater	=	Partial (vapor) pressure of water at LFG temperature determined (psia)
Plfg	=	Total pressure of LFG (psia) (i.e., average pipeline pressure)
Vcond	=	Volue of LFG condensate
Vlfg	=	Volume of LFG

therefore:

Dropped Out Xcond = Initial Xw - Final Xw
Dropped Out Xcond = 0.104

Condensate (gal) per Design Flow (scf) = Dropped Out Xcond x Flow x Conversion Constant
Condensate (gal) per Design Flow (scf) = 0.031

Gallons of Condensate per day = ***45 gal/day***

Method 2 - Conservative Method (Source: LANDTEC, 1994)

Vcond = 5694 x (10^B/Ps)

where:

Vcond	=	Volume of condensate (water) produced (MMcf)
B	=	6.32 - (3081/T+385) = 0.219
T	=	Maximum (initial) gas temperature (F)
Ps	=	System pressure (psia)

Vcond = 683.326 gal/MMcf

Corrected Vcond for Design Flow = ***52 gal/day***

CONDENSATE GENERATION CALCULATIONS
LOWEST AVERAGE MONTHLY TEMPERATURE AT MAXIMUM FLOW RATE
CITY OF UKIAH LANDFILL

Design Parameters:

LFG Temp. at Initial Point (F):	120	
LFG Temp. at Final Point (F):	36	
Vapor Pressure at Initial Temp.	1.6927	(see attached table)
Vapor Pressure at Final Temp.	0.0999	(see attached table)
Average Vacuum Pressure ("w.c.)	25	
Average Vacuum Pressure (psia)	13.797	
Design Flow Rate (scfm):	210	
Conversion Factor:	0.0057	

Method 1 - Detailed Procedure (LANDTEC, 1994)

Xcond = Pw/Plfg = Vcond/Vlfg

where:

Xcond	=	Fraction of liquid gas condensate (assumed to be primarily aqueous water)
Xw	=	Water vapor fraction
Pwater	=	Partial (vapor) pressure of water at LFG temperature determined (psia)
Plfg	=	Total pressure of LFG (psia) (i.e., average pipeline pressure)
Vcond	=	Volue of LFG condensate
Vlfg	=	Volume of LFG

therefore:

Dropped Out Xcond = Initial Xw - Final Xw
Dropped Out Xcond = 0.115

Condensate (gal) per Design Flow (scf) = Dropped Out Xcond x Flow x Conversion Constant
Condensate (gal) per Design Flow (scf) = 0.138

Gallons of Condensate per day = ***199 gal/day***

Method 2 - Conservative Method (Source: LANDTEC, 1994)

Vcond = 5694 x (10^B/Ps)

where:

Vcond	=	Volume of condensate (water) produced (MMcf)	
B	=	6.32 - (3081/T+385) =	0.219
T	=	Maximum (initial) gas temperature (F)	
Ps	=	System pressure (psia)	

Vcond = 683.326 gal/MMcf

Corrected Vcond for Design Flow = ***207 gal/day***

CONDENSATE GENERATION CALCULATIONS
MEAN TEMPERATURE (ANNUAL) AT MAXIMUM FLOW RATE
CITY OF UKIAH LANDFILL

Design Parameters:

LFG Temp. at Initial Point (F):	120	
LFG Temp. at Final Point (F):	59	
Vapor Pressure at Initial Temp.	1.6927	(see attached table)
Vapor Pressure at Final Temp.	0.2561	(see attached table)
Average Vacuum Pressure ("w.c.)	25	
Average Vacuum Pressure (psia)	13.797	
Design Flow Rate (scfm):	210	
Conversion Factor:	0.0057	

Method 1 - Detailed Procedure (LANDTEC, 1994)

Xcond = Pw/Plfg = Vcond/Vlfg

where:

Xcond	=	Fraction of liquid gas condensate (assumed to be primarily aqueous water)
Xw	=	Water vapor fraction
Pwater	=	Partial (vapor) pressure of water at LFG temperature determined (psia)
Plfg	=	Total pressure of LFG (psia) (i.e., average pipeline pressure)
Vcond	=	Volue of LFG condensate
Vlfg	=	Volume of LFG

therefore:

Dropped Out Xcond = Initial Xw - Final Xw
Dropped Out Xcond = 0.104

Condensate (gal) per Design Flow (scf) = Dropped Out Xcond x Flow x Conversion Constant
Condensate (gal) per Design Flow (scf) = 0.125

Gallons of Condensate per day = ***179 gal/day***

Method 2 - Conservative Method (Source: LANDTEC, 1994)

Vcond = 5694 x (10^B/Ps)

where:

Vcond	=	Volume of condensate (water) produced (MMcf)	
B	=	6.32 - (3081/T+385) =	0.219
T	=	Maximum (initial) gas temperature (F)	
Ps	=	System pressure (psia)	

Vcond = 683.326 gal/MMcf

Corrected Vcond for Design Flow = ***207 gal/day***

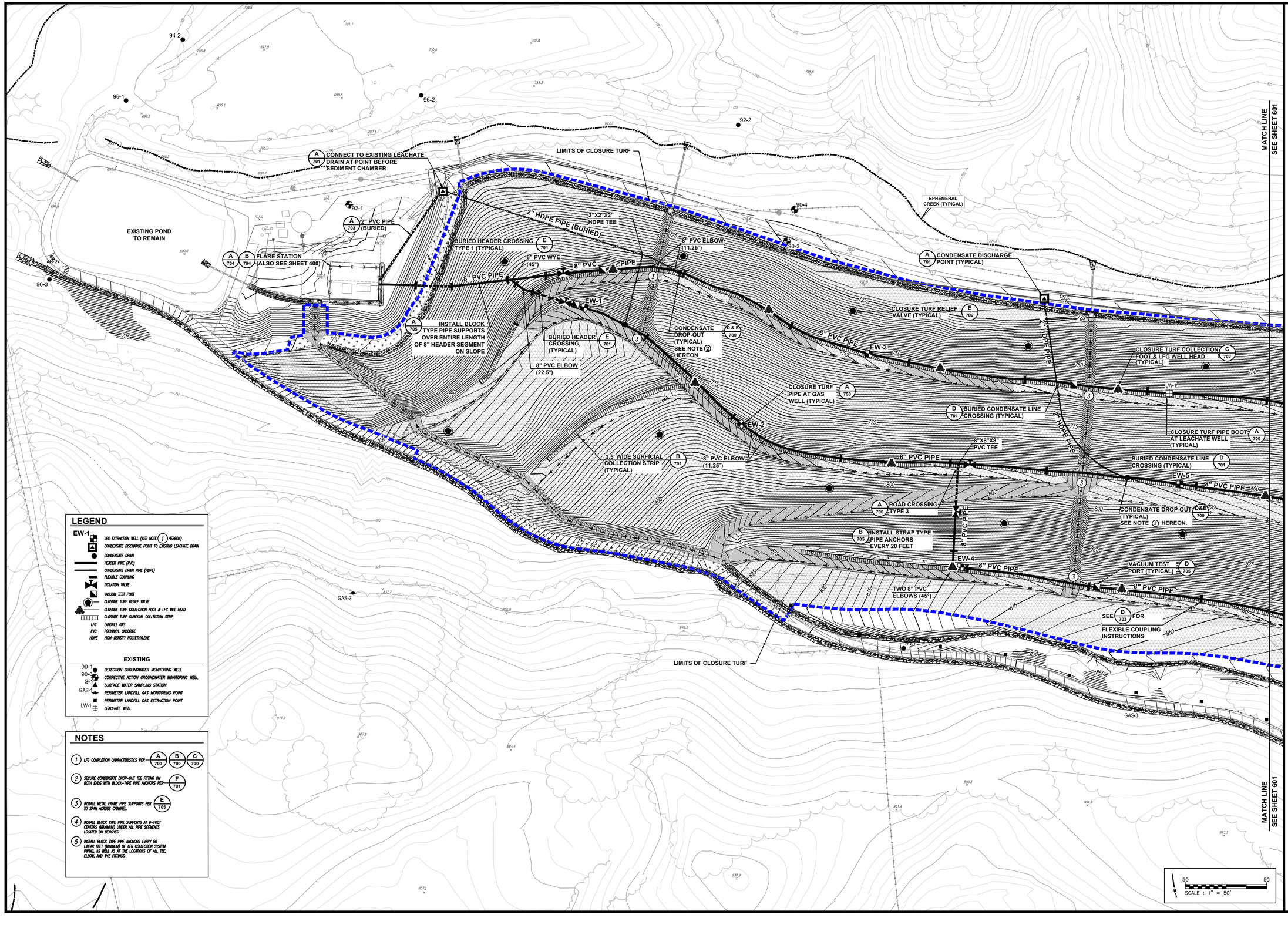
Water Vapor Pressure vs. Temperature Data

Condensate Generation Calculations

Temperature (F)	*Pressure (psia)*
32	0.0886
35	0.0999
40	0.1216
45	0.1474
50	0.1780
60	0.2561
70	0.3629
80	0.5068
90	0.6981
100	0.9492
110	1.2750
120	1.6927
130	2.2230
140	2.8892
150	3.7180
160	4.7410

APPENDIX E

CONSTRUCTION DRAWINGS



LEGEND

EW-1	LFG EXTRACTION WELL (SEE NOTE 1 HEREON)
	CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
	CONDENSATE DRAIN
	HEADER PIPE (PVC)
	CONDENSATE DRAIN PIPE (HDPE)
	FLEXIBLE COUPLING
	ISOLATION VALVE
	VACUUM TEST PORT
	CLOSURE TURF RELIEF VALVE
	CLOSURE TURF COLLECTION FOOT & LFG WILL HEAD
	CLOSURE TURF SURFICIAL COLLECTION STRIP
LFG	LANDFILL GAS
PVC	POLYVINYL CHLORIDE
HDPE	HIGH-DENSITY POLYETHYLENE

EXISTING

90-1	DETECTION GROUNDWATER MONITORING WELL
90-3	CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1	SURFACE WATER SAMPLING STATION
GAS-1	PERIMETER LANDFILL GAS MONITORING POINT
	PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1	LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER A 700, B 700, C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER F 701
3. INSTALL METAL FRAME PIPE SUPPORTS PER E 705 TO SPAN ACROSS CHANNEL.
4. INSTALL BLOCK TYPE PIPE SUPPORTS AT 6-FOOT CENTERS (MAXIMUM) UNDER ALL PIPE SEGMENTS LOCATED ON BENCHES.
5. INSTALL BLOCK TYPE PIPE ANCHORS EVERY 50 LINEAR FEET (MINIMUM) OF LFG COLLECTION SYSTEM PIPING, AS WELL AS AT THE LOCATIONS OF ALL TEE, ELBOW, AND WYE FITTINGS.

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DAMON F. BROWN
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LFG COLLECTION SYSTEM LAYOUT - WEST PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

Sheet Number
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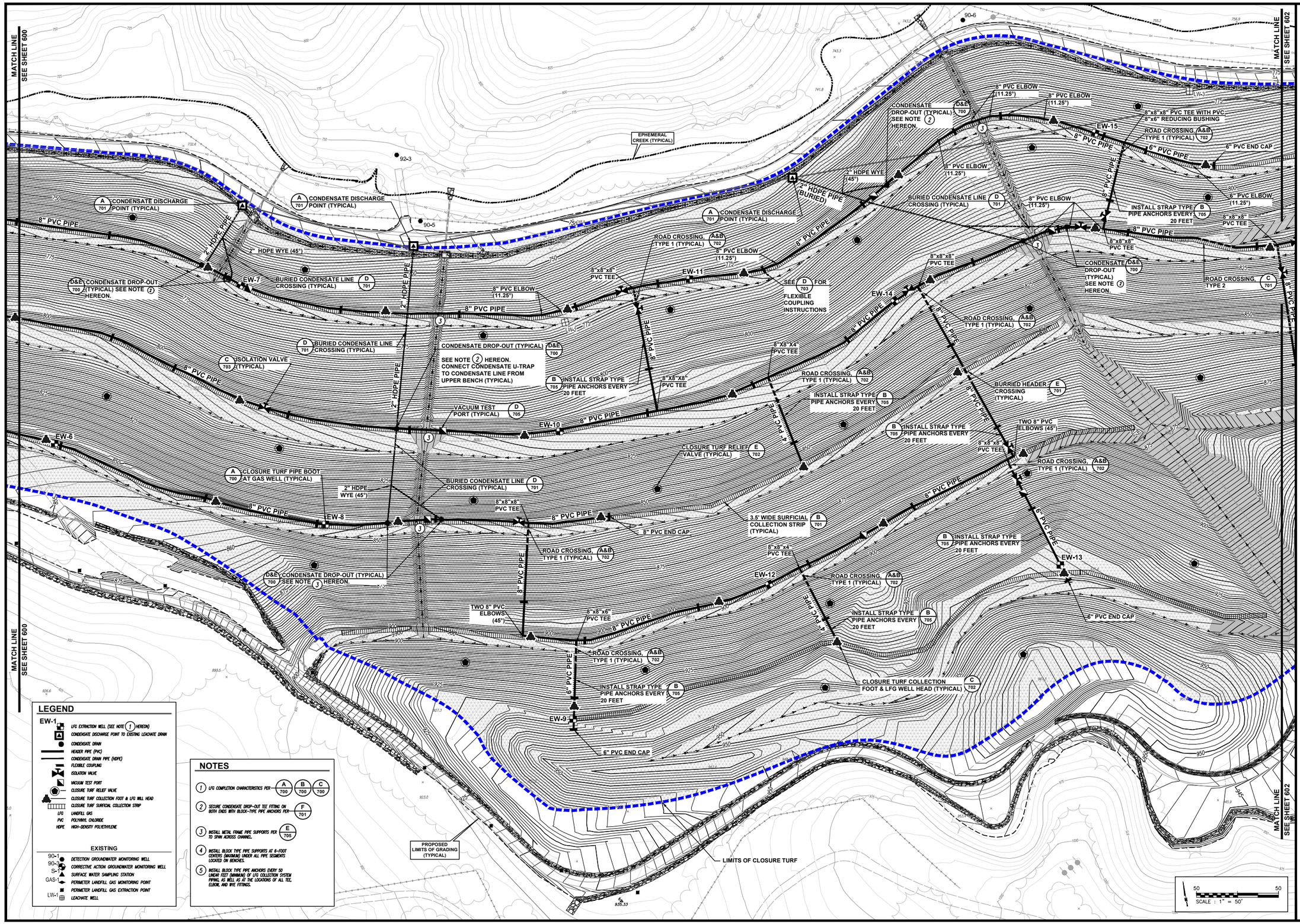

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SYSTEM LAYOUT - CENTRAL PORTION
CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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MATCH LINE
SEE SHEET 601

EW-15
6" PVC PIPE
8" PVC PIPE
8" PVC PIPE
8" PVC PIPE
EW-17
8" X4" PVC REDUCING BUSHING
4" PVC PIPE
4" PVC ELBOW (11.25°)
2" X2" X2" HDPE TEE
D&E 700 CONDENSATE DROP-OUT (TYPICAL) SEE NOTE 2 HEREON.
2" HDPE PIPE (BURIED)
CONDENSATE DROP-OUT (TYPICAL) D&E 700
SEE NOTE 2 HEREON. CONNECT CONDENSATE U-TRAP TO CONDENSATE LINE FROM UPPER BENCH (TYPICAL)
CONDENSATE DISCHARGE POINT (TYPICAL) A 701
LIMITS OF CLOSURE TURF
EPHEMERAL CREEK (TYPICAL)
GAS-10
D 701 BURIED CONDENSATE LINE CROSSING (TYPICAL)
ROAD CROSSING, TYPE 1 (TYPICAL) A&B 702
INSTALL STRAP TYPE PIPE ANCHORS EVERY 20 FEET B 705
CLOSURE TURF PIPE BOOT AT GAS WELL (TYPICAL) A 700
8" PVC ELBOW (22.50°)
8" PVC ELBOW (11.25°)
8" PVC ELBOW (22.50°)
2" HDPE WYE (45°)
SEE D 703 FOR FLEXIBLE COUPLING INSTRUCTIONS
3.5' WIDE SURFICIAL B 701 COLLECTION STRIP (TYPICAL)
4" PVC END CAP
PROPOSED LIMITS OF GRADING (TYPICAL)
EW-18
EW-16
D&E 700 CONDENSATE DROP-OUT (TYPICAL) SEE NOTE 2 HEREON.
TWO 8" PVC ELBOWS (45°)
8" X 4" PVC REDUCING BUSHING
4" PVC ELBOW (30°)
4" PVC ELBOW (11.25°)
4" PVC ELBOW (30°)
4" PVC ELBOW (11.25°)
CLOSURE TURF RELIEF VALVE (TYPICAL) E 702
CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD (TYPICAL) C 702
4" PVC END CAP
4" PVC PIPE
4" PVC PIPE
4" PVC ELBOW (45°)
ROAD CROSSING, TYPE 1 (TYPICAL) A&B 702
INSTALL BLOCK TYPE PIPE SUPPORTS OVER ENTIRE LENGTH OF 4" LATERAL SEGMENT ON SLOPE (TYPICAL) B 705
LW-3
LW-4
GAS-5
GAS-6
90-8
95-1
MATCH LINE
SEE SHEET 601

LEGEND

EW-1 LFG EXTRACTION WELL (SEE NOTE 1 HEREON)
CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
CONDENSATE DRAIN
HEADER PIPE (PVC)
CONDENSATE DRAIN PIPE (HDPE)
FLEXIBLE COUPLING
ISOLATION VALVE
VACUUM TEST PORT
CLOSURE TURF RELIEF VALVE
CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD
CLOSURE TURF SURFICIAL COLLECTION STRIP
LFG LANDFILL GAS
PVC POLYVINYL CHLORIDE
HDPE HIGH-DENSITY POLYETHYLENE

EXISTING

90-1 DETECTION GROUNDWATER MONITORING WELL
90-2 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1 SURFACE WATER SAMPLING STATION
GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1 LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER A 700 B 700 C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER F 701
3. INSTALL METAL FRAME PIPE SUPPORTS PER E 705 TO SPAN ACROSS CHANNEL.
4. INSTALL BLOCK TYPE PIPE SUPPORTS AT 6-FOOT CENTERS (MAXIMUM) UNDER ALL PIPE SEGMENTS LOCATED ON BENCHES.
5. INSTALL BLOCK TYPE PIPE ANCHORS EVERY 50 LINEAR FEET (MINIMUM) OF LFG COLLECTION SYSTEM PIPING, AS WELL AS AT THE LOCATIONS OF ALL TEE, ELBOW, AND WYE FITTINGS.

50 50
SCALE : 1" = 50'

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SYSTEM LAYOUT - EASTERN PORTION
CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:
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Job No: 02-907
Drawn By: WC
Checked By: DFB
Date: 2019-04-30

Sheet Number
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Xrefs: S:\Dwg\Xrefs\Grading\C-Base - Finished Grade - Existing.dwg C-Ref - Finished Grade - Existing.dwg C-Ref - Excavation Layer - Design.dwg C-Ref - Turf - Existing.dwg C-Ref - Title Block.dwg
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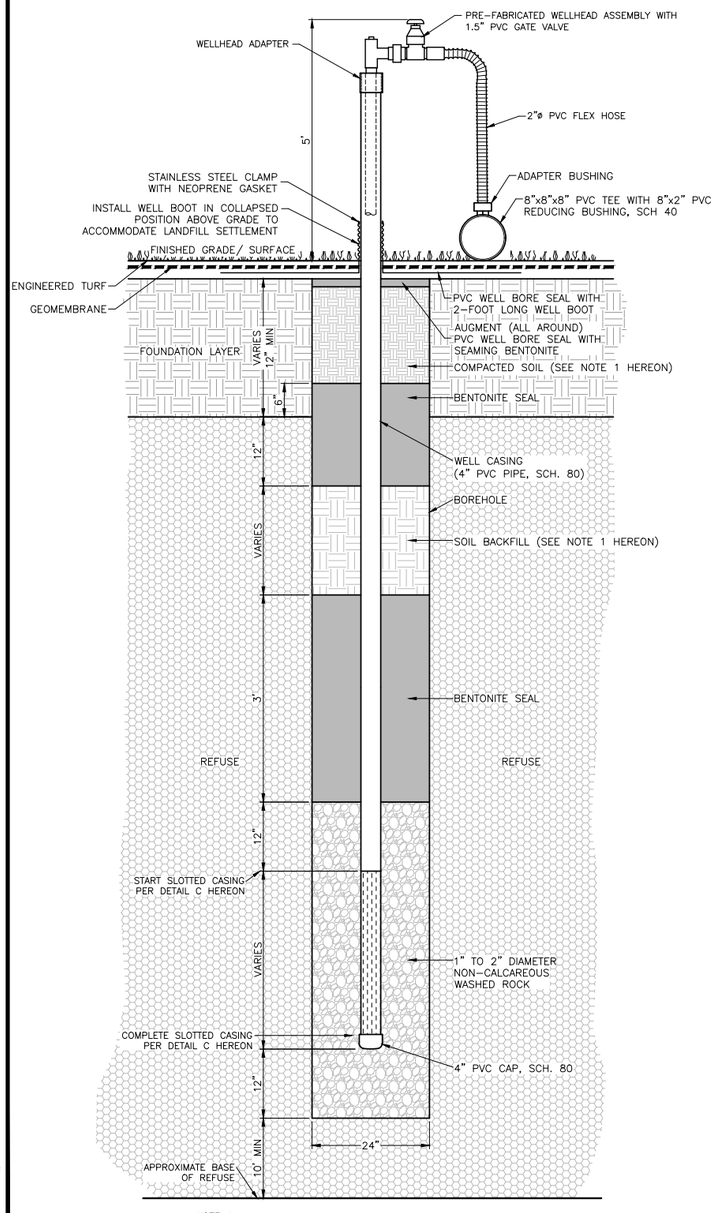
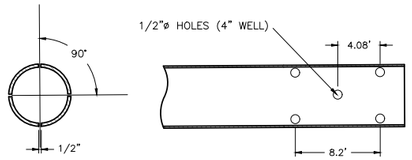


NOTE 1:

SOIL BACKFILL MATERIAL SHALL BE OBTAINED FROM THE BORROW AREA AND MEET THE MATERIAL SPECIFICATIONS FOR ENGINEERED FILL.

A LFG EXTRACTION WELL (TYPICAL)

NOT TO SCALE



B CASING PERFORATIONS FOR LFG EXTRACTION WELLS (TYPICAL)

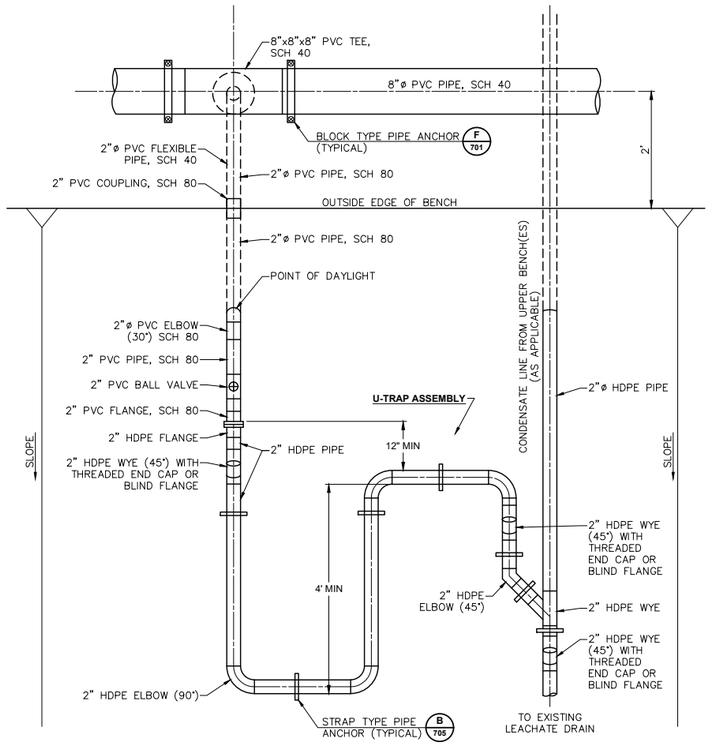
NOT TO SCALE

Extraction Well	Bottom Completion Depth (Feet BGS)	Perforated Interval (Feet BGS)	Gravel Pack Interval (Feet BGS)	Surface Seal Interval (Feet BGS)
EW-1	35	21 - 34	20 - 35	0 - 20
EW-2	45	21 - 44	20 - 45	0 - 20
EW-3	35	21 - 34	20 - 35	0 - 20
EW-4	60	21 - 59	20 - 60	0 - 20
EW-5	70	21 - 69	20 - 70	0 - 20
EW-6	70	21 - 69	20 - 70	0 - 20
EW-7	35	21 - 34	20 - 35	0 - 20
EW-8	70	21 - 69	20 - 70	0 - 20
EW-9	60	21 - 59	20 - 60	0 - 20
EW-10	50	21 - 49	20 - 50	0 - 20
EW-11	25	16 - 25	15 - 25	0 - 15
EW-12	70	21 - 69	20 - 70	0 - 20
EW-13	80	21 - 79	20 - 80	0 - 20
EW-14	45	21 - 44	20 - 45	0 - 20
EW-15	35	21 - 34	20 - 35	0 - 20
EW-16	60	21 - 59	20 - 60	0 - 20
EW-17	35	21 - 34	20 - 35	0 - 20
EW-18	60	21 - 59	20 - 60	0 - 20

BGS: Below Ground Surface (as referenced from top of final grade following placement of final cover system)

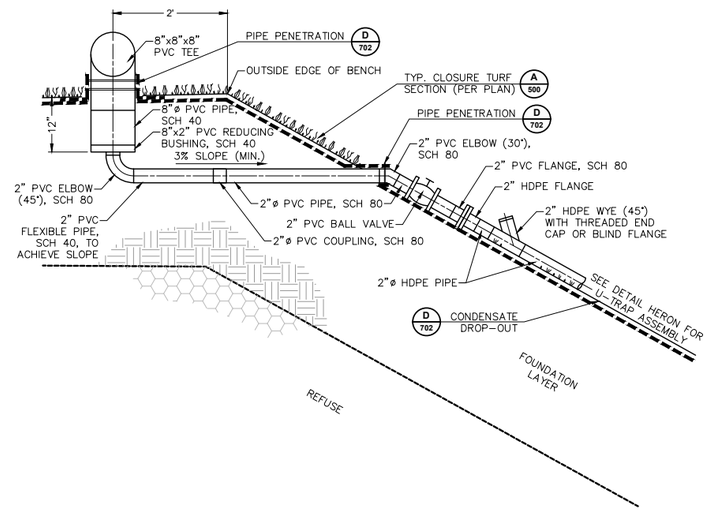
C LFG EXTRACTION WELL COMPLETION CHARACTERISTICS

NOT TO SCALE



D CONDENSATE DROP-OUT - PLAN VIEW (TYPICAL)

NOT TO SCALE



E CONDENSATE DROP-OUT - DETAIL (TYPICAL)

NOT TO SCALE

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No. 2
DAMON F. BROWN
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LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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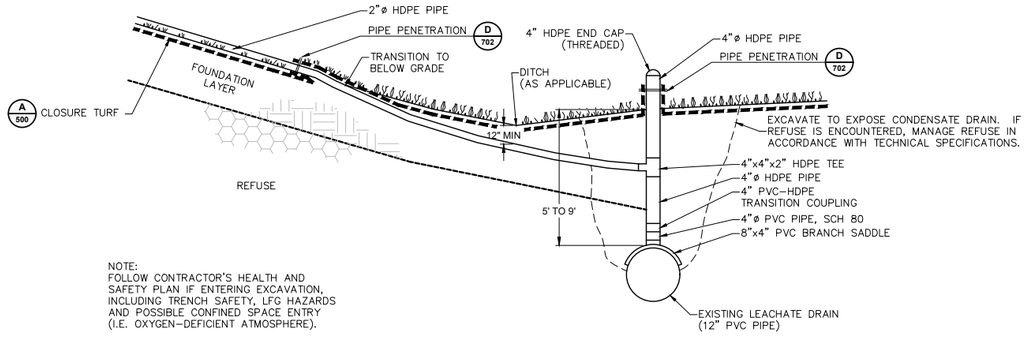
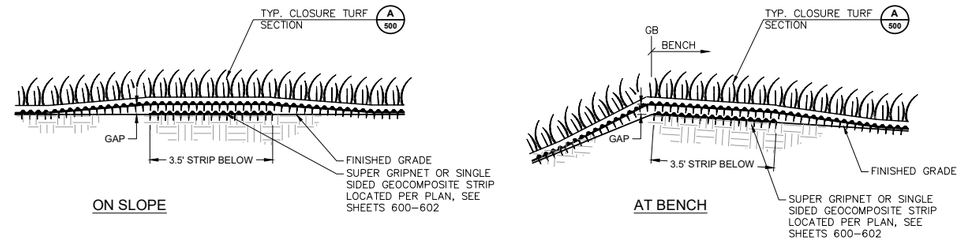


A CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN (TYPICAL)

NOT TO SCALE

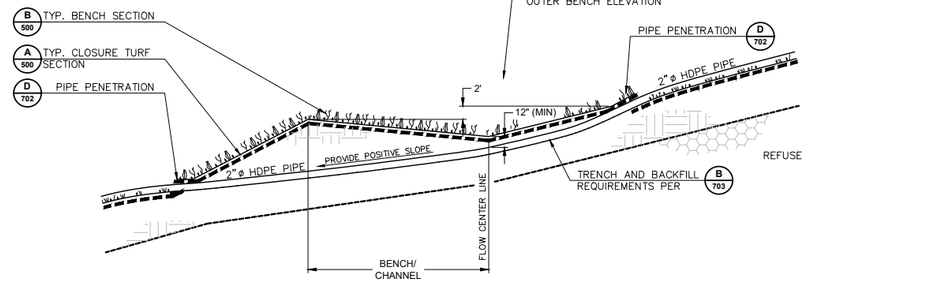


B CLOSURE TURF SURFICIAL COLLECTION STRIP

NOT TO SCALE

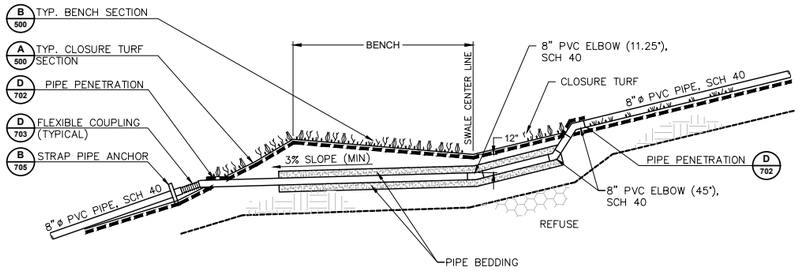
C ROAD CROSSING, TYPE 2 - DETAIL

NOT TO SCALE



D BURIED CONDENSATE LINE CROSSING (TYPICAL)

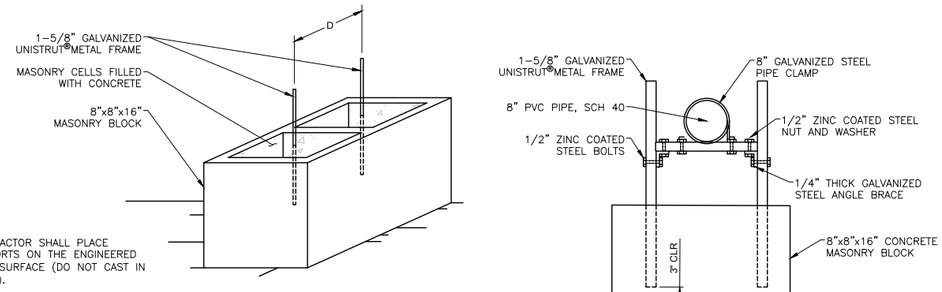
NOT TO SCALE



* CONTRACTOR SHALL ADJUST FOUNDATION GRADE PLAN FOR INSTALLATION OF LFG COLLECTION PIPING, ASSURING PROPER SECTION PER A 500. SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE SECTION.

E BURIED HEADER CROSSING (TYPICAL, TYPE 1)

NOT TO SCALE



F BLOCK TYPE PIPE ANCHOR (TYPICAL)

NOT TO SCALE

EBA ENGINEERING
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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:
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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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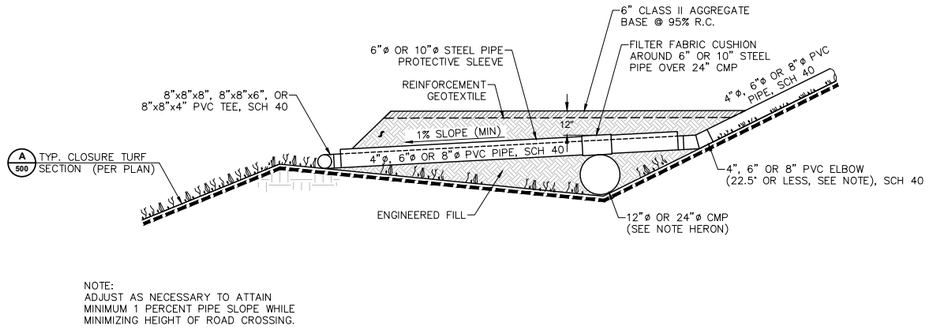
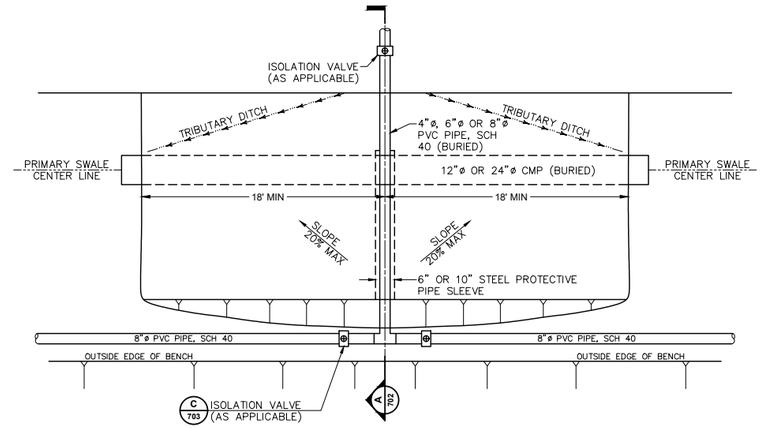
Date: 2-Mar — Title Block Mod
File: G:\2019\02-907\Work\Cad\Sheets\Civil — (C701) Civil Details.dwg Plot Date: Apr 30, 2019 at 16:19



NOTE:
ADJUST AS NECESSARY TO ATTAIN MINIMUM 1 PERCENT PIPE SLOPE WHILE MINIMIZING HEIGHT OF ROAD CROSSING.

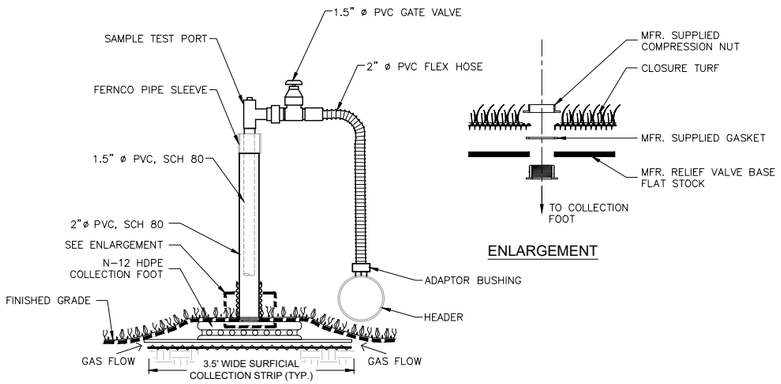
A ROAD CROSSING TYPE 1 - DETAIL (TYPICAL)

NOT TO SCALE



B ROAD CROSSING, TYPE 1 - PLAN VIEW (TYPICAL)

NOT TO SCALE

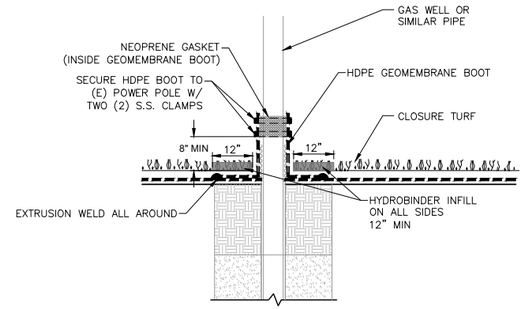


C CLOSURE TURF COLLECTION FOOT & LFG WELLHEAD

NOT TO SCALE

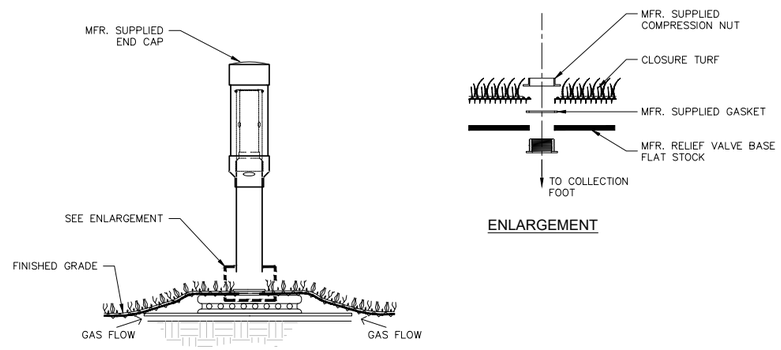
NOTES:

1. PIPE AND GEOMEMBRANE SHALL BE CLEAN TO PROVIDED AIRTIGHT CONNECTION.
2. CONTRACTOR SHALL TIGHTEN HOSE CLAMP TO ENSURE PROPER SEAL OF GEOMEMBRANE AROUND PIPE WHILE PREVENTING PIPE DAMAGE.



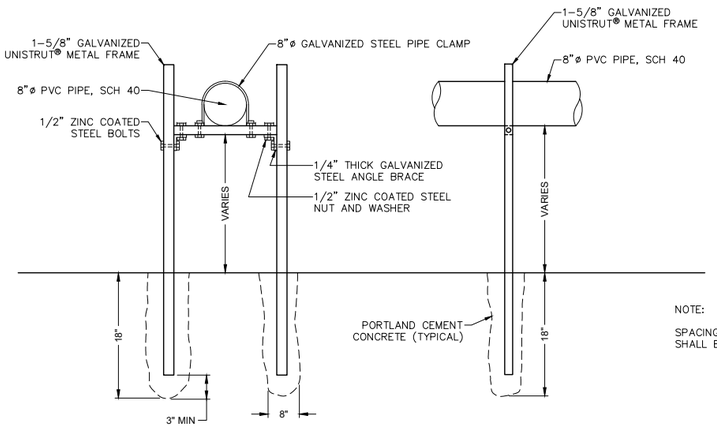
D PIPE PENETRATION (TYPICAL)

NOT TO SCALE



E CLOSURE TURF RELIEF VALVE

NOT TO SCALE



NOTE:
SPACING OF PIPE SUPPORTS SHALL BE 6 FEET ON CENTER.

F METAL FRAME PIPE SUPPORT OUTSIDE WASTE BOUNDARY (TYPICAL)

(NON-CLOSURE TURF AREAS)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:
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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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702
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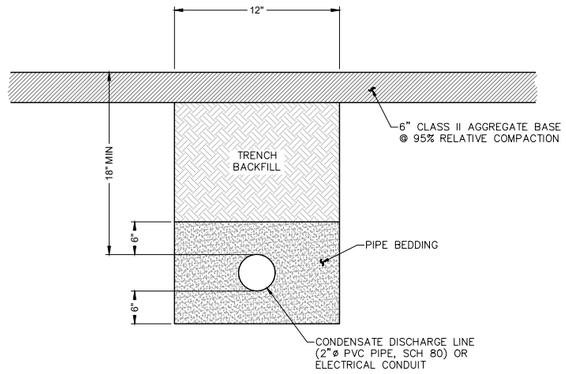
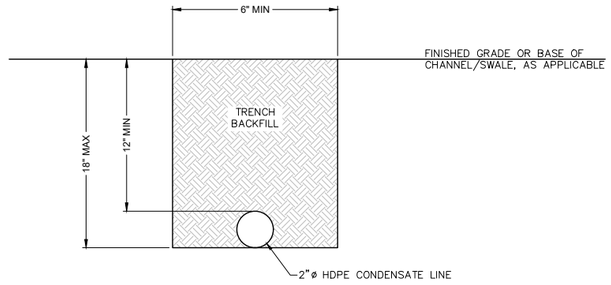
Date: 5 May — Title Block.dwg
Path: S:\Projects\02-907 Ukiah LF Closure - (CCR)\Civil\Sheets\Det Plot Date: Apr 30, 2019 at 16:19



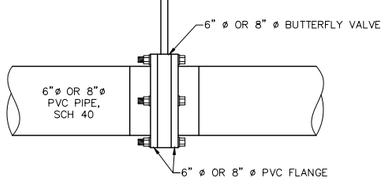
A FLARE STATION TRENCH DETAIL

NOT TO SCALE



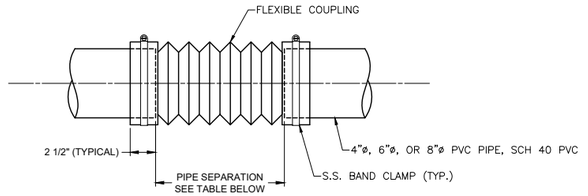
B BURIED CONDENSATE LINE TRENCH DETAIL (TYPICAL)

NOT TO SCALE



C ISOLATION VALVE ASSEMBLY (TYPICAL)

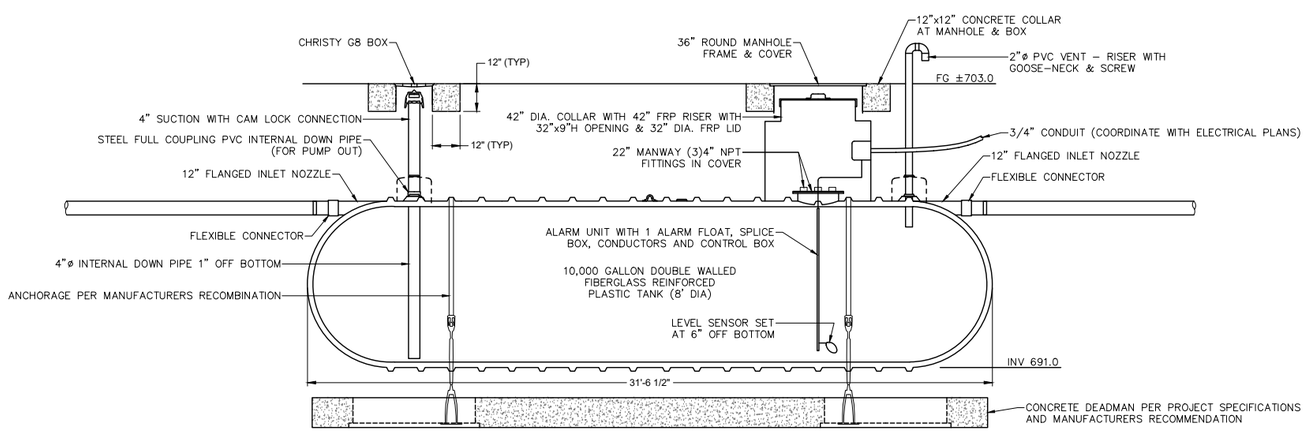
NOT TO SCALE



PIPE SEPARATION TABLE								
INSTALLATION TEMPERATURE (F°)	30	40	50	60	70	80	90	100
PIPE SEPARATION (in)	13	12	12	11	11	10	10	9

D FLEXIBLE COUPLING (TYPICAL)

NOT TO SCALE



E LEACHATE OVERFLOW STORAGE TANK-ELEVATION

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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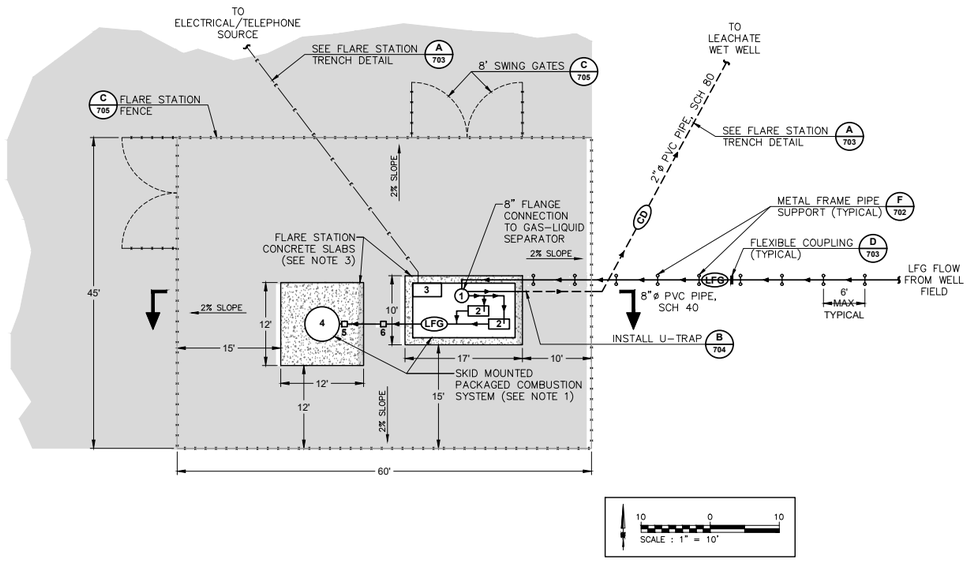
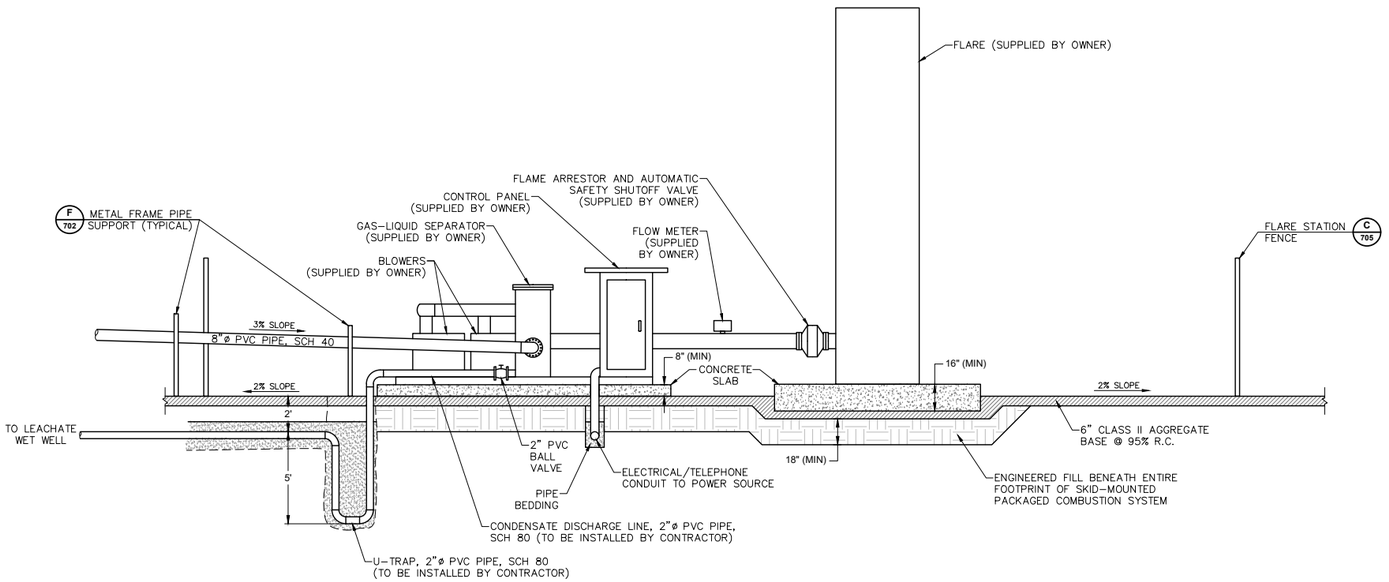
Date: 5 Mar - Time: 09:00 AM
File: G:\2002\02-907\Civil\Sheet\ LF Close - (C700) Gas Details.dwg Plot Date: Apr 30, 2019 at 16:19



A FLARE STATION - PLAN VIEW

SCALE: 1"=10'

EAST **WEST**



B FLARE STATION - SECTION VIEW

SCALE: 1"=4'

LEGEND

1 GAS-LIQUID SEPARATOR (SUPPLIED BY OWNER)
2 BLOWER (SUPPLIED BY OWNER)
3 CONTROL PANEL (SUPPLIED BY OWNER)
4 FLARE (SUPPLIED BY OWNER)
5 FLAME ARRESTOR AND AUTOMATIC SAFETY SHUTOFF VALVE (SUPPLIED BY OWNER)
6 FLOW METER (SUPPLIED BY OWNER)
CD CONDENSATE DISCHARGE LINE, 2" PVC PIPE, SCH 80
LFG LANDFILL GAS PRIMARY HEADER PIPE

ABOVE GROUND LINE/PIPE
UNDERGROUND LINE/PIPE
ELECTRICAL/TELEPHONE LINE
8' HIGH CHAIN LINK FENCE
FLEXIBLE COUPLING
PIPE SUPPORT

NOTES

1. THE ORIENTATION OF THE SKID-MOUNTED PACKAGED COMBUSTION SYSTEM COMPONENTS SHOWN HEREON ARE FOR ILLUSTRATION PURPOSES ONLY. THE ACTUAL ORIENTATION OF THESE COMPONENTS ON THE CONCRETE SLAB ARE SUBJECT TO CHANGE BASED ON MANUFACTURER'S FINAL DESIGN.
2. ALL CONDUIT AND PIPING OUTSIDE LIMITS OF FLARE STATION CONCRETE SLAB SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR.
3. THE CONCRETE SLAB FOR THE FLARE (12'x12') SHALL BE 16" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY AT TOP AND BOTTOM OF SLAB. THE OTHER SLAB (10'x17') SHALL BE 8" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY.
4. COMPLETION HEIGHTS OF PIPE SUPPORTS SHALL BE ADJUSTED ACCORDINGLY TO MAINTAIN POSITIVE SLOPE (3% MINIMUM) OF LFG COLLECTION SYSTEM PIPING TOWARDS THE GAS-LIQUID SEPARATOR.

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STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By:	DFB
Date:	2019-04-30

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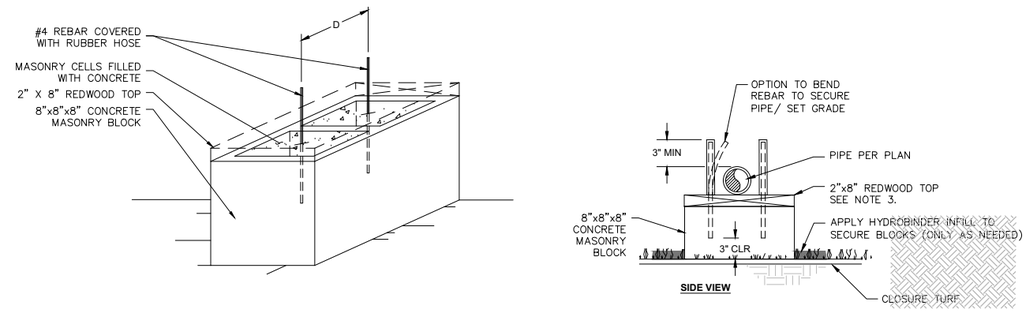
Date: 5 May - Time: 09:04 AM
File: G:\2002\907\CAD\Sheet LT Close - LFCOD Gas Details.dwg Plot Date: Apr 30, 2019 at 16:30

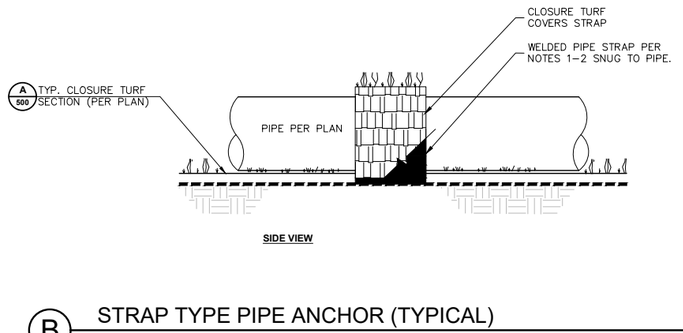


NOTES:

1. CONTRACTOR SHALL PLACE SUPPORTS ON THE ENGINEERED TURF SURFACE (DO NOT CAST IN PLACE).
2. D = 11" FOR 8" PVC
   D = 9" FOR 6" PVC
   D = 7" FOR 4" PVC
3. 6" HEIGHT CONCRETE MASONRY BLOCK OR ADDITIONAL 1X REDWOOD TOP MAY BE USED TO ADJUST SUPPORT HEIGHT.
4. PIPE SUPPORTS SHALL BE SPACED AT 6 FEET ON CENTERS FOR ALL PIPING INSTALLED ON BENCHES.

A BLOCK TYPE PIPE SUPPORT (TYPICAL)

NOT TO SCALE

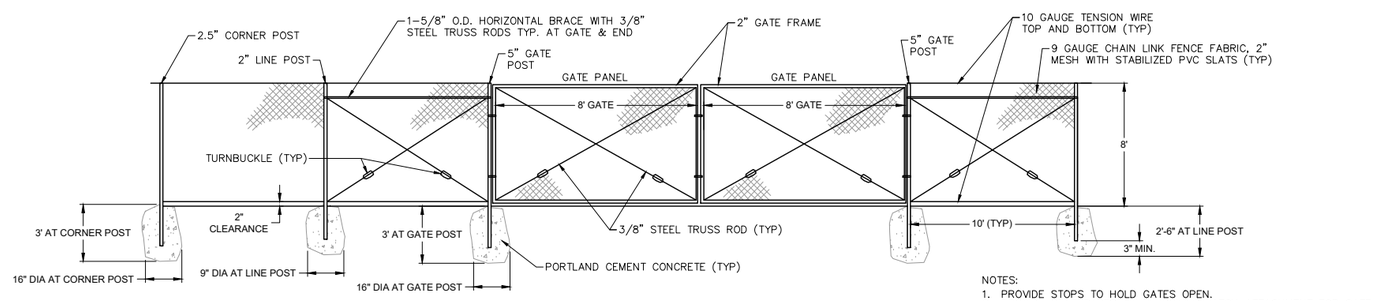


NOTES:

1. HDPE OR LLDPE (GEOMEMBRANE) MATERIAL STRIP TO CROSS PIPE PERPENDICULAR AND FORM SNUG FIT PREVENTING MOVEMENT.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO STRAP USING EXTRUSION WELD METHOD, 3"MIN. OVERLAP.
3. CONTRACTOR TO ENSURE NO PENETRATION OF THE GEOMEMBRANE. ANY DAMAGE TO THE GEOMEMBRANE SHALL BE REPARED AT CONTRACTOR'S EXPENSE.

B STRAP TYPE PIPE ANCHOR (TYPICAL)

NOT TO SCALE



NOTES:
1. PROVIDE STOPS TO HOLD GATES OPEN.
2. PROVIDE CENTER REST AND LOCKING LATCH ATTACHMENT FOR GATE.
3. LINE POST SPACING SHALL NOT EXCEED 10 FEET.

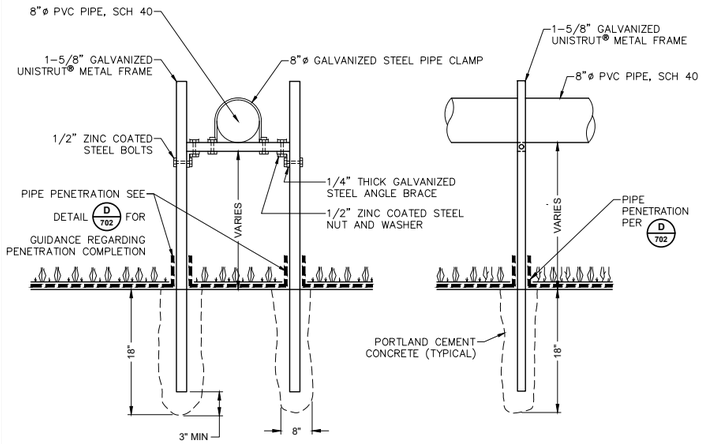
C FLARE STATION FENCE AND GATES

NOT TO SCALE



D VACUUM TEST PORT (TYPICAL)

NOT TO SCALE



NOTE:

SPACING OF PIPE SUPPORTS SHALL BE 6 FEET ON CENTER.

E METAL FRAME PIPE SUPPORT WITHIN WASTE BOUNDARY (TYPICAL)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Drawn By:	WC
Checked By:	DFB
Date:	2019–04–30

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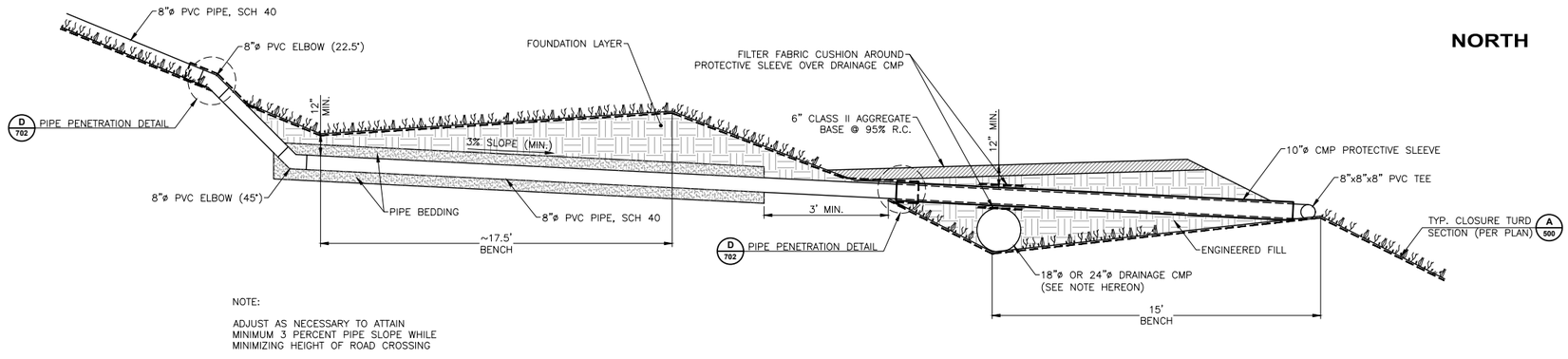
Date: 5 May - Time: 08:04:44pm
Path: G:\2002\907\Civil\Sheet LF Close - (C705) Gas Details.dwg Plot Date: Apr 30, 2019 at 16:30

SOUTH **NORTH**



NOTE:

ADJUST AS NECESSARY TO ATTAIN MINIMUM 3 PERCENT PIPE SLOPE WHILE MINIMIZING HEIGHT OF ROAD CROSSING

A ROAD CROSSING, TYPE 3

NOT TO SCALE

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LFG COLLECTION SYSTEM DETAILS

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3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:
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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

Sheet Number

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Scale: 0.5in = 1in Block.dwg
Path: G:\907\DWG\Details\LF Close - LFCDD1.dwg Plot Date: Apr 30, 2019 at 16:20

APPENDIX F

COLLECTION SYSTEM PIPING HEAD LOSS CALCULATIONS

File No. L:\PROJECT\907\LFG DESIGN\DESIGN PLAN\HEADCALC.XLS

CITY OF UKIAH LANDFILL - FRICTION LOSS CALCULATIONS

Darcy-Weisbach Equation	
Head Loss:	(27.7*(f*L*v^2*p))/(144*D*2*gc)
Friction Factor (f):	0.316/Nre(0.25)
Reynolds Number (Nre):	(D*v*p)/ue
Specific Gravity:	0.9714
Absolute Viscosity (ue):	8.14E-06 lbm/feet-sec
Density (p):	0.075 lbs/ft^3
Absolute Roughness (e):	0.000005 ft (for PVC)
LFG EXTRACTION WELL (EW) FLOW	10 scfm

PVC EQUIVALENT LENGTHS (Feet)

	2″	*4″*	*6″*	*8″*	*10″*	*12″*
90 Elbow	5.5	10.1	15.2	20.0	25.1	29.8
45 Elbow	2.8	5.4	8.1	10.6	13.4	15.9
T (Header)	4.3	8.3	12.5	16.5	20.7	24.7
T (Branch)	12.0	22.1	32.2	39.9	50.1	59.7
Dropout	---	32.2	47.4	59.9	75.2	89.5
Gate Valve	2.2	4.4	6.6	8.6	10.9	12.9
Butterfly Valve						
Wellhead (Full	10.5	12.7	---	---	---	---
Wellhead (1/2)	35.9	62.0	---	---	---	---
Wellhead (1/4)	163.3	310.3	---	---	---	---

SIMPLIFIED GENERAL DARCY CALCULATION (TOTAL)

FLOW (Q):	**210**	cfm
INTERNAL PIPE DIAMETER (d)	**7.981**	in
INTERNAL PIPE DIAMETER (D)	**0.665**	ft
AREA (A)	0.347	ft^2
VELOCITY (v):	10.080	fps
LINEAR FEET OF PIPE	**3570**	ft
REYNOLDS NUMBER (Nre)	6.177E+04	
RELATIVE ROUGHNESS (e/D)	7.518E-06	
FRICTION FACTOR (f)	0.0175	(from Moody Chart)
TOTAL FRICTION LOSS (PSI)	0.077	
TOTAL FRICTION LOSS (in w.c.)	2.136	
FRICTION LOSS/100 FT (in w.c.)	0.060	

PVC PIPE INSIDE DIAMETERS (Inches)

	Sch. 40	*Sch. 80*
2"	2.067	1.939
4"	4.026	3.826
6"	6.065	5.761
8"	7.981	7.625
10"	10.020	9.564
12"	11.938	11.376

CITY OF UKIAH LANDFILL
FRICTION HEAD LOSS CALCULATIONS

DESIGN FLOW CONDITIONS

LFG Extraction Wells:	8 SCFM
LFG Collection Foot Assembly:	1 SCFM

MANIFOLD SYSTEM	PIPE DIA. (INCHES)	AREA (FT^2)	SEGMENT FLOW (CFM)	CUM. FLOW (CFM)	VELOCITY (FPM)	REYNOLDS	FRICTION (f)	EQUIV. LENGTH (FEET)	FRICTION LOSS (PSI)	FRICTION LOSS (INCHES W.C.)
END : EW-18	4.026	0.0884	3.14	3	36	1831	0.0483	483.4	0.0002	0.0055
EW-18 : MAIN HEADER	7.981	0.3472	19.14	22	64	6553	0.0351	736.8	0.0004	0.0100
MAIN HEADER : EW-15 BRANCH	7.981	0.3472	14.28	37	105	10753	0.0310	271.4	0.0003	0.0087
EW-15 BRANCH: EW-13 BRANCH	7.981	0.3472	15.85	52	151	15415	0.0284	363.9	0.0008	0.0220
EW-13 BRANCH : EW-11 BRANCH	7.981	0.3472	26.99	79	229	23354	0.0256	483.4	0.0022	0.0604
EW-11 BRANCH : EW-4 BRANCH	7.981	0.3472	30.28	110	316	32260	0.0236	1439.6	0.0114	0.3165
EW-4 BRANCH : EW-1 BRANCH	7.981	0.3472	73.27	183	527	53811	0.0207	764.0	0.0149	0.4113
EW-1 BRANCH : T.O. UNIT	7.981	0.3472	26.99	210	605	61750	0.0200	214.9	0.0053	0.1472
SUBTOTAL:								4757.4		**0.9815**
T.O. KNOCKOUT	7.981			210						**0.4000**
WELL HEAD	1.59	0.0138	8	8	580	11811	0.0303	163.3	0.0283	**0.7825**
								TOTAL FRICTION LOSS		***2.1640***

APPENDIX G

ALTERNATIVE WALKING PATTERN DOCUMENTATION

July 18, 2013

Mr. Robert Scaglione
Mendocino County Air Quality Management District (MCAQMD)
306 East Gobi Street
Ukiah, CA 95482-5511

RE: REQUEST FOR ALTERNATIVE COMPLIANCE – WALKING PATTERN
CITY OF UKIAH LANDFILL, MENDOCINO COUNTY, CALIFORNIA
EBA JOB No. 13-1953 (TASK 2)

Dear Mr. Scaglione:

This document is being submitted on behalf of the City of Ukiah, Department of Public Works, operator of the City of Ukiah Landfill in Ukiah, California, to request an alternative compliance under Title 17, California Code of Regulations (17CCR), §95468 as it pertains to the required walking pattern stipulated in the Assembly Bill 32 (AB32) regulations for *Methane Emissions from Municipal Solid Waste Landfills*. In general, 17CCR, §95471(c)(1)(B) requires that the walking pattern be no more than a 25-foot spacing interval within each 50,000-square foot monitoring grid. Whereas the uppermost (southern) portions of the landfill surface readily allow for the implementation of this procedure, the majority of the landfill surface is comprised of steep, vegetated slopes that present logistical and safety issues. These issues are as follows:

- The height of the established grass cover on the primary slopes is typically on the order of 12 to 24 inches tall. Based on the 17CCR, §95471(c)(1)(A) requirement that the detector probe must be held within 3 inches of the landfill surface while traversing the grid, the grass would likely have to be cut two to three times over the course of the year in order to meet this criterion. Due to the steepness of the primary slopes, the grass would have to be cut by hand using a "weed wacker". It is estimated that such a provision would take approximately 200 to 300 man-hours to complete per event. This provision is considered to be overly burdensome and costly.

- The grass cover, regardless of its height or moisture content (wet or dry), can be slippery when trying to traverse by foot. In addition, the landfill surface is uneven in places due to the presence of rocks and depressions. Finally, add to this a sampler carrying a 30- to 40-pound instrument on his or her back/shoulder and holding the detector probe in one hand, while simultaneously trying to focus on both the monitoring device and the ground

surface. The combination of these constraints makes for a potential fall hazard and overall safety concern.

- The existing grass cover has been shown to harbor rattlesnakes. Thus, exposure to this potential hazard would be incurred as part of the quarterly surface emissions monitoring, as well as to personnel conducting the grass cutting as described above.

In light of these circumstances, it is recommended that surface emissions monitoring for the primary slope areas target the respective benches. Under this approach, both the inside and outside edges of each bench would be monitored in accordance with the instantaneous surface emissions monitoring procedures described in the regulations. This approach is considered to offer a means of monitoring for surface emissions within the primary slope areas as a whole while promoting a safe monitoring procedure for the individuals responsible for implementing the program in the field.

A site plan illustrating the overall grid network proposed for the site with respect to the monitoring grid required under 17CCR, §95471(c)(1) is attached as Figure 1. Please note that the grid network is not symmetrical in shape, but is instead designed to allow for easy identification and orientation in the field based on prominent site and topographic features. As shown on Figure 1, 39 grids (G1 through G39) have been established for the approximate 40-acre Landfill. This equates to an average grid size of approximately 44,700 square feet, which is compliant with the 50,000-square foot size requirement stipulated in the regulations. As presented in the previous paragraph, the monitoring of benches is proposed for the majority of the grids due to the steep, vegetated slopes. Those grids that include areas that can be monitored using the 25-foot spacing interval include G6, G7, G10, G11, G14, G18, G19, G26, G27, G38 and G39 (see Figure 1).

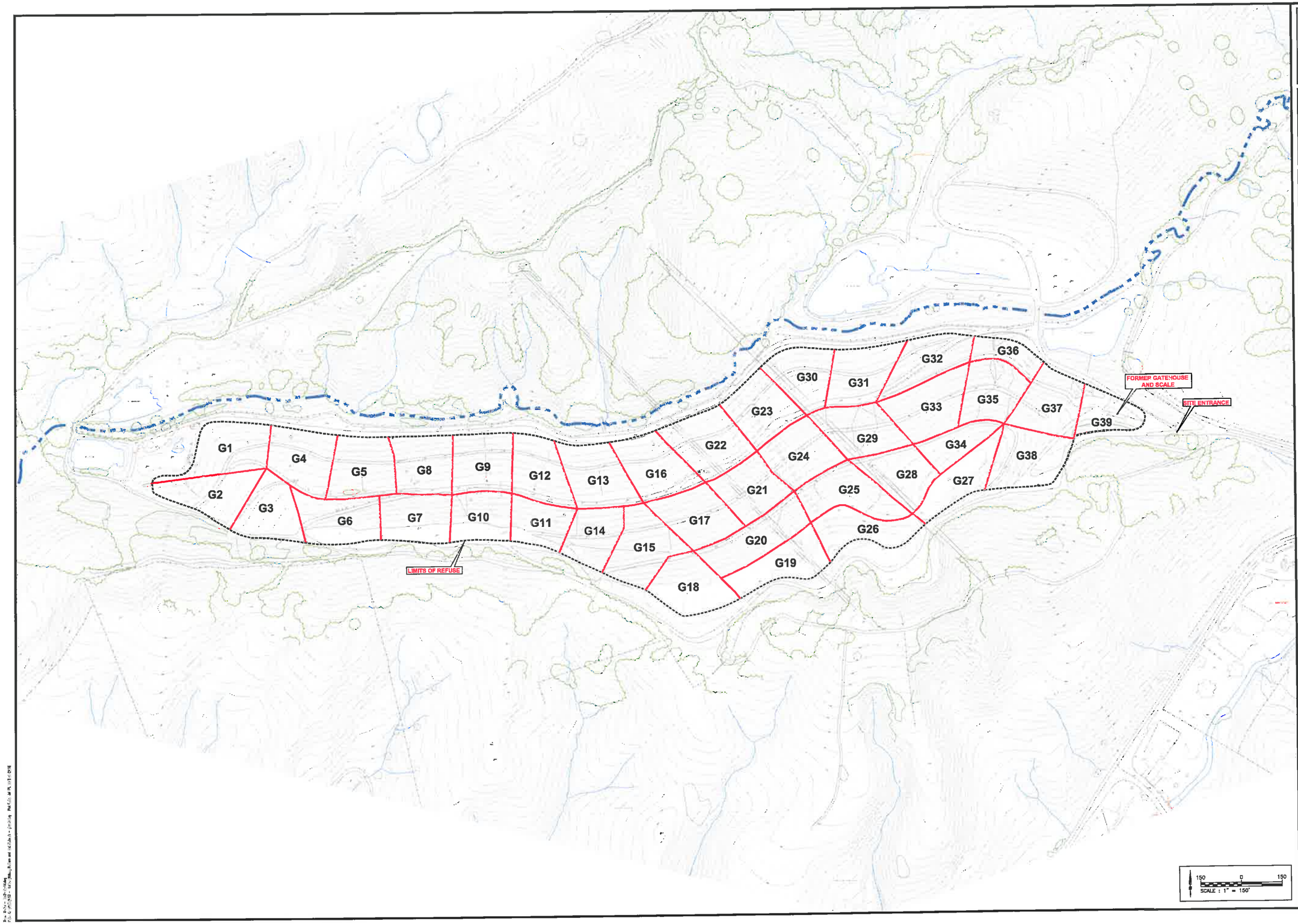
Thank you in advance for your consideration of this matter. If you should have any questions regarding the information contained herein, please do not hesitate to contact our office at (707) 544-0784.

Sincerely,
EBA ENGINEERING

Mike Delmanowski, C.E.G., C.Hg.
Senior Hydrogeologist

cc: Mr. Tim Eriksen, City of Ukiah, Department of Public Works

Attachment: Figure 1 (Proposed AB32 Monitoring Grid Network)



EBA ENGINEERING

PROPOSED AB32 MONITORING GRID NETWORK

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

Submittal / Revision:	
1	
2	
3	
4	
5	
6	
7	

Job No:	13-1953
Drawn By:	SGH
Checked By:	MD
Date:	2013-07-15

FIGURE
1
1 of 1

APPENDIX H

FINAL CLOSURE
TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

for the

CITY OF UKIAH
DEPARTMENT OF PUBLIC WORKS

CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

April 2019

EBA Job No. 02-907

Prepared by:

EBA ENGINEERING
825 Sonoma Avenue
Santa Rosa, CA 95404
(707) 544-0784

TECHNICAL SPECIFICATIONS
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

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DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Project description.

B. Work by Contractor

C. Work by Owner.

D. Work by Others.

1.02 PROJECT DESCRIPTION

A. The Project is titled "City of Ukiah Landfill Final Closure Construction". The City of Ukiah Landfill is located in Mendocino County, California approximately two miles east of the City of Ukiah. The Work site address is 3100 Vichy Springs Road, Ukiah, California 95482 (Sheet 1). The City of Ukiah Landfill was operated as a Class III solid waste disposal facility and is comprised of a single waste management unit that is approximately 40 acres in size. The Final Closure generally consists of the following construction features:

Site Preparation:
- Refuse excavation and relocation.
- Interim cover preparation.

ClosureTurf™ Final Cover System (in ascending order):
- 2-foot thick foundation layer.
- Gas relief/venting system.
- LLDPE geomembrane liner.
- Engineered synthetic turf with specific grade sand infill ballast.

Miscellaneous items:
- Drainage and erosion control measures.
- Access roads.
- General earthwork, including various excavations and fills.
- Leachate overflow collection and storage system, including installation of a leachate underground storage tanks (UST).
- Landfill gas (LFG) collection system, including condensate drainage components.
- Installation of skid-mounted packaged combustion system provided by others.
- Borrow area reclamation.
- Seeding and fertilizing.
- Security fencing.

1.03 WORK BY CONTRACTOR

A. Unless noted otherwise, the Contractor shall perform, or subcontract to perform, all Work shown on the Plans in accordance with the Technical Specifications.

B. The geosynthetics installation subcontractor or Installer and the Installer's foreman must have experience in placing 1,000,000 square feet of geomembrane material on at least three (3) landfill projects and at least on project installing ClosureTurf™.

C. Except as specifically noted, the Contractor shall provide the following Work:
   1. All labor and materials.
   2. All tools, construction equipment, and machinery.
   3. Any water, heat, and utilities required.
   4. All other facilities and services necessary for proper execution and completion of the Work.

D. The Contractor shall pay legally required sales, consumer, and use taxes.

E. The Contractor shall secure and pay for, as necessary for proper execution and completion of the Work, all applicable permits and licenses.

F. The Contractor shall comply with the requirements of all permits.

G. The Contractor shall give all required notices.

H. The Contractor shall comply with all codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of the work.

I. The Contractor shall within five (5) calendar days, submit written notice to the Design Engineer of observed variance of Contract Documents from legal requirements.

J. The Contractor shall give written notice to the Design Engineer of any conditions encountered at the Work site which are unforeseen, concealed, or materially different from those set forth in the Plans or Technical Specifications, or ordinarily encountered and generally recognized as inherent in the Work. Such written notice shall be given to the Design Engineer within five (5) calendar days of the discovery of any such facts.

K. If any Subcontractor or person employed by the Contractor appears to the Design Engineer to be incompetent or to act in a disorderly or improper manner, he or she shall be discharged immediately at the request of the Design Engineer, and such person shall not again be employed on the Work. This provision does not impose an obligation upon the Design Engineer to ensure proper or orderly behavior on the part of the Contractor's employees or the employees of the Contractor's subcontractors, nor shall the Engineer's failure to make such a request relieve the Contractor of the obligation to require employees and subcontractor employees to refrain from engaging in disorderly or improper conduct.

1.04 WORK BY OWNER

A. All portions of the Work specified to be performed by the "Owner" refers to the responsibilities of the City of Ukiah, Department of Public Works and are not the responsibility of the Contractor.

B. The Owner will award a contract to the Contractor for construction of the project, administer the contract, measure quantities for progress payments and final payment, and manage the contract. Performance of the Work will commence as indicated in the Bid Documents.

1.05 WORK BY OTHERS

A. All portions of the Work specified to be performed by the "Design Engineer", "CQA Officer", "CQA Monitor", "CQA Surveyor", "Soils Testing Laboratory" or "Geosynthetics Testing Laboratory" refer to the responsibilities of EBA Engineering (EBA, or subcontractors to EBA) which have contracted separately and directly with the Owner and are not the responsibility of the Contractor.

END OF SECTION

SECTION 01039
PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

A. Preconstruction meeting.

B. Progress meetings.

C. Preparatory meetings.

1.02 PRECONSTRUCTION MEETING

A. The Design Engineer will schedule the preconstruction meeting after awarding the Contract to the Contractor. The objectives of this meeting are to:
   1. Clearly define the roles, responsibility, and authority of each organization and individual involved in the project.
   2. Review details of the Construction Quality Assurance (CQA) program.
   3. Establish a foundation of cooperation to achieve quality construction.

B. The following agenda, as related to CQA, will be addressed by the Design Engineer or CQA Officer.
   1. Introduce and discuss role, authority, and responsibilities of each organization and individual involved in the project.
   2. Establish lines of communication.
   3. Review Technical Specifications and Plans.
   4. Distribute of the CQA Plan.
   5. Review of CQA activities to be performed.
   6. Discuss Contractor's construction schedule and workplan.
   7. Discuss Contractor's Construction Quality Control (CQC) procedures and responsibilities.
   8. Discuss submittal review and approval procedures.
   9. Discuss non-conformance and corrective action procedures.
   10. Discuss construction restrictions due to weather conditions.
   11. Discuss and schedule weekly progress meetings.
   12. Discuss health and safety issues.

C. Meeting minutes and items for resolution will be recorded by the Design Engineer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preconstruction meeting.
   1. Owner's Project Manager or representative.
   2. Contractor's Project Manager and on-site Superintendent.
   3. Installer's Project Manager and on-site Superintendent.
   4. Design Engineer's Project Manager and CQA Officer.

E. The Contractor's attendance at the preconstruction meeting is not a payable item. Any costs incurred by the Contractor for attendance at the preconstruction meeting should be included in the Contract Lump Sum Price for "Mobilization".

1.03 PROGRESS MEETINGS

A. In coordination with the Engineer, the CQA Officer will schedule and administer weekly progress meetings. The objectives of these meetings are to: 1) maintain lines of communication; 2) review procedures and results of the CQA program; and 3) maintain and improve the established foundation of cooperation to achieve quality construction. The following agenda will be addressed by the CQA Officer.
   1. Review minutes of previous progress meeting.
   2. Review work progress.
   3. Review and update construction schedule and obtain a schedule from the Contractor, listing the construction activities for the following two (2) weeks.
   4. Discuss CQA and CQC related field observations, testing results, problems, decisions, and conflicts.
   5. Review and update Submittal Log.
   6. Review status of pending Change Orders.

B. Meeting minutes and items for resolution will be recorded by the CQA Officer and distributed to all parties in attendance.

C. The following representatives from each organization are required to attend the weekly progress meetings.
   1. Owner's Project Manager or representative.
   2. Contractor's on-site Superintendent.
   3. Installer's on-site Superintendent (during geosynthetics installation).
   4. Design Engineer's Project Manager and CQA Officer.
   5. Representative of major subcontractors performing work during the week of the weekly progress meeting

D. The Contractor's attendance at the progress meetings is not a payable item. Any costs incurred by the Contractor for attendance at the progress meetings should be included in the Contract Lump Sum Price for "Mobilization".

1.04 PREPARATORY MEETINGS

A. In coordination with the Design Engineer, the CQA Officer will schedule and administer, as needed, informal preparatory meetings prior to construction of the following items.
   1. Refuse excavation and interim cover preparation.
   2. Foundation layer placement.
   3. Gas relief/venting system installation.
   4. LLDPE geomembrane and engineered turf installation.
   6. General earthwork, drainage and erosion control, and access road construction, as needed.
   7. Sedimentation basin improvements.
   8. Leachate overflow collection and storage system installation.
   9. LFG collection system installation.
   10. Borrow area reclamation and seeding and fertilizing.

B. The objective of the preparatory meetings is to establish a complete understanding of the upcoming unit of construction and CQA procedures and testing that will be implemented during construction. To achieve this objective, the following agenda will be addressed by the CQA Officer.
   1. Review "Products" section of the applicable Technical Specifications.
   2. Review "Execution" section of the applicable Technical Specifications.
   3. Discuss any construction and grade control staking needed to complete the Work.
   4. Discuss CQA testing, observation, and surveying to be performed.
   5. Verify that all submittals have been or will be received and approved by the CQA Officer in accordance with the schedule.
   6. Discuss Contractor's CQC responsibilities.
   7. Discuss Contractor's coordination, scheduling, and sequencing of the Work.
   8. Discuss Contractor's proposed equipment and manpower.

C. Meeting minutes and items for resolution will be recorded by the CQA Officer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preparatory meetings.
   1. Design Engineer's Project Manager or representative.
   2. Contractor's on-site Superintendent.
   3. On-site Superintendent of any Subcontractor, as applicable to the unit of construction.
   4. CQA Officer.
   5. CQA Monitor(s), as applicable to the unit of construction.

E. The Contractor's attendance at the preparatory meetings is not a payable item. Any costs incurred by the Contractor for attendance at the preparatory meetings should be distributed and included in the Contract Unit Price for the item for which the meeting is held.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01060
SURVEYING AND FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

A. Surveying and field engineering. All survey and layout for all improvements are to be provided by the Contractor.

B. Quality assurance.

C. Submittals.

D. Project record documents.

E. Examination.

F. Survey reference points.

G. Survey requirements.

H. Surveying accuracy and tolerances in setting of survey stakes.

I. Surveys for record drawings.

J. Payment.

1.02 RELATED SECTIONS

A. Information Available to Bidders: Topographic survey.

B. Section 01720 - Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 DESCRIPTION

A. Reference points: Reference points to be provided by Design Engineer pursuant to the General Conditions will include referenced monuments and elevation benchmarks in the vicinity of the Project. If displaced by Contractor, replacement of these reference points will be at the expense of Contractor.

B. Contractor will furnish all necessary detail surveys including all lines, grades, and elevation appropriate to control construction. At a minimum, construction surveys are required for top of foundation layer.

C. Use by Design Engineer: Design Engineer may at any time use line and grade points and markers established by Contractor. Contractor's surveys are a part of the Work and may be checked by Engineer at any time. Contractor is responsible for any lines, grades, or measurements which do not comply with specified or proper tolerances, or which are otherwise defective, and for any resultant defects in the Work. Contractor will be required to conduct re-surveys or check surveys to correct errors indicated by review of the field notebooks or otherwise detected.

3.02 QUALITY ASSURANCE

A. Employ a Land Surveyor or eligible Engineer registered in the State of California and acceptable to the Design Engineer to perform survey work of this Section.

B. Submit evidence of Land Surveyor's or eligible Engineer's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

C. Provide instruments and other survey equipment that are accurate, suitable for the surveys required in accordance with recognized professional standards, and in proper condition and adjustment at all times. Perform surveys under the direct supervision of a licensed Land Surveyor or eligible Engineer.

D. Record surveys in field notebooks.

3.03 SUBMITTALS FOR REVIEW

A. Submit name, address, and telephone number of Land Surveyor or eligible Engineer before starting survey work.

B. On request, submit documentation verifying accuracy of survey work.

C. Submit a certificate signed by the Land Surveyor or eligible Engineer, that the elevations and locations of the Work are in conformance with Contract Documents.

3.04 RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

B. Submit record documents under provisions of Section 01720.

3.05 EXAMINATION

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Design Engineer of any discrepancies discovered.

3.06 SURVEY REFERENCE POINTS

A. Contractor to locate and protect survey control and reference points.

B. Control datum for survey is that indicated on the Plans.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Design Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Owner.

3.07 SURVEY REQUIREMENTS

A. Provide field engineering services for all proposed improvements. Utilize recognized engineering survey practices.

B. Establish a minimum of two (2) permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on record documents.

C. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including: stakes for grading, fill, slopes, and all site improvements.

D. Periodically verify layouts by same means.

E. Contractor's layout work will include the following:
   1. Slope staking for top of erosion-resistant layer at 50-foot grid and grade breaks.
   2. All as-built surveys as specified here in.
   3. Surveys to measure completed units of Work specified here in.

F. Contractor must perform all additional slope staking, off-setting and other control staking necessary to perform the Work.

3.08 SURVEYING ACCURACY AND TOLERANCES IN SETTING OF SURVEY STAKES

A. Perform control traverse field surveys and computations to an accuracy of at least 1:10,000.

B. The tolerances applicable in setting survey stakes are as set forth below. Such tolerances cannot supersede stricter tolerances required by the Plans or Technical Specifications, and cannot otherwise relieve the Contractor of responsibility for measurements in compliance therewith.

Type of Mark	Horizontal Position	Elevation
Permanent reference points	1 in 10,000	±.01 ft
General excavation and earthwork	1 in 2,000	±.10 ft

C. Tolerances for the thickness of earthen layers shown on Plans and for elevations shown on the Plans are ±0.10 foot unless otherwise specified.

3.09 SURVEYS FOR RECORD DRAWINGS

A. Provide the Design Engineer with as-built record drawings (field surveyed) for items that were revised during construction and differ from the Plans including the following items:
   1. Topography that depicts the top of the foundation layer.
   2. Topography of ditches.
   3. Locations of catch basins.
   4. Alignment, ends, and invert elevations of pipes and culverts.
   5. Topography of storm water retention basins and borrow area.
   6. Locations of LFG collection system components, including collection system piping, LFG extraction wells, above ground condensate drain lines, condensate discharge points, flare station concrete pads, and flare station security fencing.
   7. Location of leachate UST manway.

B. The Design Engineer may perform independent checks.

C. Provide record documents on 24" x 36" size drawings, and on a computer disk in AutoCAD. Use the coordinate system shown on the drawings.

PART 4 MEASUREMENT AND PAYMENT

4.01 PAYMENT

A. Payment for providing all surveying and field engineering is included in the Contract Unit Price paid for the various items of Work for which they are required. No separate or additional payment will be made therefore.

END OF SECTION

SECTION 01200
ACRONYM LIST

PART 1 GENERAL

1.01 SUMMARY

A. Standards, Institutes and Societies

B. Materials and Units

C. Miscellaneous

1.02 STANDARDS, INSTITUTES AND SOCIETIES

A. Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AASHTO	-	American Association of State Highway and Transportation Officials
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standards Institute
ASTM	-	American Society for Testing and Materials
AWWA	-	American Water Works Association
CAC	-	California Administrative Code
CFR	-	Code of Federal Regulations
CRSI	-	Concrete Reinforcing Steel Institute
CTM	-	California Test Methods
NEMA	-	National Electrical Manufacturer's Association
NEC	-	National Electric Code
NFPA	-	National Fire Protection Association
OSHA	-	Occupational Health and Safety Administration
RWQCB	-	Regional Water Quality Control Board
SWANA	-	Solid Waste Association of North America
SWRCB	-	State Water Resources Control Board
UL	-	Underwriters Laboratories Inc.
US	-	United States

1.03 MATERIALS AND UNIT S

A. Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AC	-	acre
AWG	-	American Wire Gauge
cm	-	centimeter
ClosureTurf™		Three (3) component final cover system composed of structured LLDPE geomembrane liner drainage studs

		and spike, engineered synthetic turf, and a specific grade of sand infill ballast.
CMP	-	corrugated metal pipe
Engineered Turf		Synthetic turf component of ClosureTurf™
EPDM	-	ethylene propylene diene monomer
°F	-	degree Fahrenheit
ft	-	foot
g	-	gram
LLDPE	-	Linear Low-Density Polyethylene
HDPE	-	High-Density Polyethylene
HP	-	horse power
HydroBinder		Cementious infill used for surface drainage conveyance areas of engineered turf.
in	-	inch
”	-	inch
kN	-	kilonewtons
lb	-	pound
MARV	-	minimum average roll value
m	-	meter
mm	-	millimeter
mil	-	1/1000 of 1 inch
ml	-	milliliters
min	-	minute
No.	-	number
oz	-	ounce
%	-	percent
psf	-	pounds per square foot
psi	-	pounds per square inch
psig	-	pounds per square inch gauge
PVC	-	Polyvinyl Chloride
SDR	-	Standard Dimension Ratio
sec	-	second
TFE	-	tetrafluoroethylene
TRM	-	turf reinforcement mat
yd	-	yard

1.04 MISCELLANEOUS

A. Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AST	-	Above Ground Storage Tank
@	-	at
BMP	-	Best Management Practice
CQA	-	Construction Quality Assurance
CQC	-	Construction Quality Control
CSMP	-	Construction Storm Water Management Plan
EBA	-	EBA Engineering
=	-	equals
LFG	-	Landfill Gas

max.	-	maximum
min.	-	minimum
MQC	-	Manufacturer's Quality Control
MSDS	-	Material Data Safety Sheet
NOI	-	Notice of Intent
NPDES	-	National Pollutant Discharge Elimination System
PDF	-	Portable Document Format
POC	-	Point of Connection
QSD	-	Qualified SWPPP Developer
QSP	-	Qualified SWPPP Practitioner
REAP	-	Rain Event Action Plan
SAP	-	Storm Water Action Plan
SMARTS	-	Storm Water Multiple Application and Report Tracking System
SPC	-	Storm Water Pollution Control
Std.	-	Standard
SWPPP	-	Storm Water Pollution Prevention Plan
TEFC	-	Totally Enclosed Fan Cooled
UST	-	Underground Storage Tank
UV	-	Ultra-violet
WDID	-	Waste Discharge Identification
WPC	-	Water Pollution Control

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Submittal Control Log.

B. Submittal review and approval procedures.

1.02 SUBMITTAL CONTROL LOG

A. All submittals required by the Technical Specifications are included in individual sections. A Submittal Control Log will be maintained by the CQA Officer in coordination with the Contractor during construction. The Submittal Control Log documents: 1) submittal number; 2) referenced specification section; 3) submittal description; 4) submitter; 5) date received; 6) reviewer; 7) action taken determination; and 8) return date.

1.03 SUBMITTALS - GENERAL REQUIREMENTS

A. The Contractor shall submit to the Engineer all submittals required by the Contract Documents and as required herein, or subsequently required by modifications. All such items required to be submitted for review shall be furnished by and at the expense of the Contractor, and any work affected by them shall not proceed without such review. Submittals and their contents shall be properly prepared, identified, and transmitted as provided herein or as the Engineer may otherwise direct. Except for record documents, and instructional manuals for operation and maintenance, each submittal shall be approved before the material or equipment covered by the submittal is delivered to the site.

B. Unless otherwise specified, three (3) sets of printed submittals shall be submitted.

C. Contractor shall allow a total period of not less than two (2) calendar weeks for review and approval of submittals by the Engineer, not including the time necessary for delivery or mailing, and shall cause no delay in the Work. Extension of the Contract Time will not be granted because of the Contractor's failure to make timely and correctly prepared and presented submittals with allowance for the checking and review periods.

D. At the time of the submission, the Contractor shall give notice, in writing, in the submittal, of any deviation from the requirements of the Contract Documents. The deviations shall be clearly indicated or described. The Contractor shall state in writing, all variation in costs occasioned by the deviations, and his assumption of the cost of all related changes if the deviation is approved.

E. The Contractor shall deliver submittals by means of dated, signed, and sequence numbered transmittals on the Engineer provided forms, identifying as to initial or resubmittal status, and fully describing the submittal contents. In each transmittal, the Contractor shall state the Project Number and Name, Name and Address of Contractor, Name and Address of Sub-Contractor, Manufacturer, Distributor, and specification Section (as applicable), Articles, and

paragraphs to which the submittal pertains; accompanying data sheets, catalogs, and brochures shall be identified in the same manner. Where several types or models are contained in the literature, the Contractor shall delete non-applicable portions, or specifically indicate which portions are intended and applicable. Submittal transmittals shall fully index all items submitted.

1. Incomplete Submittals, including those not correctly transmitted, not correctly titled and identified, or not bearing the Contractor's review and approval stamp, will be returned to the Contractor without review.
2. Interrelated Submittals: Except where the preparation of a submittal is dependent upon the approval of a prior submittal, all submittals pertaining to the Work, shall be submitted simultaneously.

F. Every submittal of shop drawings, samples, materials lists, equipment data, instruction manuals, and other submittals upon which the proper execution of the Work is dependent, shall bear the Contractor's review and approval stamp certifying that the Contractor: 1) has reviewed, checked and approved the submittal and has coordinated the contents with the requirements of the Contract Documents, 2) has determined and verified all quantities, field measurements, field construction criteria, materials, equipment, catalog numbers, and similar data, or will do so, and 3) states the Work covered by the submittal is recommended by the Contractor and the Contractor's guarantee will fully apply thereto. Contractor's stamp shall be dated and signed by the Contractor in every case.

G. Submittals will be reviewed only for conformance with the design concept of the Project and with the information given in the Contract Documents. The approval of a separate item, as such, will not indicate approval of the assembly in which the item functions, nor shall approval be construed as revising, in any way, the requirements for a fully integrated and operable system, as specified. The approval of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents, or for any revision in resubmittals, unless the Contractor has given notice, in writing, of the deviation or revision at the time of submission or resubmission, and written approval has been given to the specific deviation or revision, nor shall any approval relieve the Contractor of responsibility for errors or omissions in the submittals, or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, and completion of the Work.

H. The Contractor shall make all required corrections and shall resubmit the required number of corrected submittals until approved by the Engineer. The Contractor shall direct specific attention, in writing, to revisions other than the corrections called for on previous submittals, and shall state, in writing, all variations in costs, and his assumption of the cost of related changes. Identify each resubmittal with number of the original submittal, followed by consecutive letters starting with "A" for first resubmittal, "B" for second resubmittal, etc. Note that in addition to any applicable liquidated damages, the Owner reserves the right to deduct monies from the amounts due to Contractor to cover the cost of Engineer's review time beyond the second submission.

I. The Contractor shall check submittals returned to him for correction and ascertain if the corrections result in extra cost to him above that included under the Contract Documents, and shall give written notice to the Engineer within five (5) days, if in his opinion, such extra cost results from corrections. By failing to notify the Engineer or by starting any Work covered by

a submittal, the Contractor waives all claims for extra costs resulting from required corrections.

J. No Work represented by required submittals shall be purchased, or paid for, or commenced until the applicable submittal has been approved. Work shall conform to the approved submittals and all other requirements of the Contract Documents, unless subsequently revised by an appropriate modification, in which case, the Contractor shall prepare and submit revised submittals as may be required. The Contractor shall not proceed with any related Work which may be affected by the Work covered under submittals until the applicable submittals have been approved.

K. Piecemeal submittals will be returned unreviewed. However, for mechanical equipment and the like, separate submittals for embedded items, embedded metal work and anchors, will be reviewed, as applicable.

1.04 OTHER SUBMITTALS.

A. Provide no less than two (2) copies of other submittals such as calculations, manufacturer's certified reports, operational demonstration and system validation reports specified elsewhere in the Contract Documents, one (1) of which will be retained by the Engineer and the rest of which will be returned to the Contractor marked to show the required corrections.

1.05 FORM OF APPROVAL.

A. Copies of submittals which are returned to the Contractor and which are subject to approval will be marked with notations (1), (2), (3) or (4), and may also be marked with notation (6), in which case the action so indicated shall be taken by the Contractor.
   1. No Exceptions Taken.
   2. Furnish as Corrected
   3. Revise and Resubmit.
   4. Not reviewed.
   5. Rejected.

B. Returned copies of drawings marked with either notation (1), or (2) authorize Contractor to proceed with the fabrication, or construction, or any combination thereof, covered by such returned drawings, provided, that such fabrication, or construction shall be subject to the comments, if any, shown on such returned copies.

C. Returned copies of drawings marked with notation (3), (4) or (5) shall be corrected as necessary and a revised submittal shall be submitted in the same manner as before.

D. Returned copies of drawings marked with either notation (3), (4) or (5) shall be resubmitted not later than seven (7) days after date of transmittal by Engineer.

E. The Submittal Control Log will be reviewed and updated in coordination with the Contractor at the weekly progress meetings.

END OF SECTION

SECTION 01500
MOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all services associated with the mobilization and demobilization of personnel, equipment, supplies, and incidentals to the Work site in accordance with this Section.

B. The Contractor shall supply and implement all construction facilities and temporary controls in accordance with this Section and as shown on the Plans.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Standard Plans Book.* California Department of Transportation, 2010.

1.03 SUBMITTALS

A. At least 14 calendar days prior to mobilizing to the Work site, the Contractor shall submit a Dust Control Plan for approval by the Design Engineer prior to commencement of the Work. The plan shall comply with the requirements of the Mendocino County Air Quality Management District and shall identify procedures to minimize dust related impacts with the intent of eliminating dust nuisance complaints from adjacent areas or regulatory agencies.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MOBILIZATION

A. The Contractor shall perform preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the Work site; for the establishment of all offices, buildings, and other facilities necessary for execution of the Work; and for all other work and operations which must be performed or costs incurred prior to beginning the Work in accordance with Section 11 of the Standard Specifications.

B. The Contractor shall give written notice to the Design Engineer at least 48 hours prior to transporting oversize and/or overload equipment to the Work site.

3.02 DEMOBILIZATION

A. The Contractor shall perform any work and operations, including, but not limited to, those necessary for the removal of personnel, equipment, supplies, temporary utilities (underground

and above ground), construction facilities, excess, surplus, waste materials and incidentals from the Work site prior to application for final payment.

B. The Contractor shall clean and repair damage caused by installation or use of construction facilities or temporary controls.

3.03 CONSTRUCTION FACILITIES

A. General
   1. Unless noted otherwise within these Technical Specifications or allowed through specific agreement with the Design Engineer, the Contractor shall provide and pay for all labor, materials, tools, equipment, machinery, necessary permits, water, heat, utilities, and any other facilities or services necessary to complete the Work in accordance with these Technical Specifications and as shown on the Plans.
   2. Provision of all construction facilities shall be coordinated with the Design Engineer.

B. Access Roads
   1. The Contractor may construct and maintain any haul road necessary to execute the Work or use existing haul and access roads at the Work site.
   2. The Contractor shall repair any existing roads damaged by the Contractor during construction, as directed by the Design Engineer.

C. Staging Area
   1. The Contractor shall utilize a staging area for equipment and materials storage, and personnel parking. The location of the staging area shall be determined in coordination with the Design Engineer.

D. Temporary Buildings
   1. The Contractor may provide and maintain a weather-tight temporary office trailer, for the use of the Contractor and any Subcontractors, equipped as desired by the Contractor.
   2. The Contractor shall provide a weather-tight temporary office trailer, for the use of the Owner and CQA representatives, equipped with a table, desk, and chairs. The Contractor shall locate the trailer at a location approved by the Design Engineer.
   3. The Contractor's office trailer shall be located adjacent to the CQA office trailer as determined by the Design Engineer.
   4. The Contractor shall install a security fence around their office trailer and the CQA Office, as directed by the Design Engineer. The fences shall be chain link, a minimum 6 feet in height with three strands of barbed wire and a minimum 12-foot-wide gate.

E. Temporary Utilities
   1. Electricity
      a. The Contractor shall provide and pay to connect to electrical power required for construction facilities and execution of the Work including, but not limited to, a temporary electric feeder from electrical service, adequate power outlets with branch wiring and distribution boxes located as required, flexible power cords as required, and main service disconnect and overcurrent protection at convenient location.

b. The Contractor shall provide and pay for the electrical service and all power required for the temporary office trailer for use by the Owner and CQA representatives for the duration of the project.

2. Telephone and Facsimile
   a. The Contractor shall provide, maintain, and pay for separate telephone and facsimile service for the Contractor's office trailer and the CQA Officer's trailer, as needed.
3. Water
   a. Construction Water
      1. The Contractor shall be responsible for developing a water supply for construction water and dust control and delivering and applying water as needed. Full compensation for developing a water supply and delivering and applying water shall be considered as included in the Contract Unit Price paid for the various contract items requiring water.
   b. Drinking Water
      1. Drinking water shall be provided by the Contractor from a potable source so piped or transported as to keep it safe, fresh, and served from single service containers or satisfactory types of sanitary drinking stands or fountains. Drinking water services and facilities shall be furnished in strict accordance with existing governing health regulations.
4. Sanitary Facilities
   a. The Contractor shall furnish, install, and maintain ample sanitary facilities as required for the Contractor's and Design Engineer's employees and for the employees of any Subcontractors.
   b. A sufficient number of enclosed temporary toilets shall be conveniently placed as required by the sanitary codes of state and local government.

3.04 TEMPORARY CONTROLS

A. General
   1. The Contractor shall comply with all codes, ordinances, rules, regulations, orders, or other legal requirements of public authorities, which bear on performance of the Work.
   2. The Contractor shall instruct all personnel and maintain strict control of all Work activities to protect and maintain the integrity of all existing environmental monitoring and control systems for the landfill.

B. Safety
   1. The Contractor shall submit a Health and Safety Plan with an Emergency Contact List to the Design Engineer prior to commencement of the Work and in accordance with Section 01800 (Health and Safety) of these Technical Specifications.
   2. The entire Work site is subject to shutdown, at the discretion of the Design Engineer, due to heavy rain, high winds, or other inclement weather.
   3. The Contractor's equipment and vehicles shall not travel at speeds of more than 20 miles per hour within 200 feet of any active work areas, equipment, or personnel.
   4. The Contractor shall contact PG&E with regard to the overhead power lines and associated health and safety issues prior to the commencement of work.

C. Equipment Fueling and Maintenance

1. The Contractor shall perform equipment fueling and maintenance within a contained area, to be constructed by the Contractor in a location approved by the Design Engineer to prevent any release of fuel or other contaminants. The Contractor shall immediately remediate any leaks, spills, or other release of fuel or other contaminants as directed by the Design Engineer.

D. Drainage Control

1. The Contractor shall provide ample means and devices with which to promptly remove and dispose of all water from any source entering the Work areas and maintain these at all times during execution of the Work and until the final Work has been approved by the Design Engineer.

E. Erosion and Sediment Control

1. Temporary erosion and sediment control measures shall be implemented by the Contractor for all Work areas in accordance with the SWPPP prepared as part of Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications.

F. Dust Control

1. Dust control measures shall be implemented by the Contractor for all Work areas in accordance with the Contractor's approved Dust Control Plan submitted under Section 14-9.02A of the Standard Specifications.

PART 4 MEASUREMENT AND PAYMENT

2.01 MOBILIZATION

A. Payment for mobilization, demobilization, construction facilities and temporary controls including temporary erosion control described in these Technical Specifications is considered as included in the Contract Lump Sum Price paid for "Mobilization" and includes all compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the Work specified herein and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Payment for "Mobilization" shall be as follows:

1. When the monthly partial payment estimate exceeds 5% the contract amount, not including any amount paid for Mobilization, 5% of the contract amount or 50% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

2. When the monthly partial payment estimate exceeds 10% the contract amount, not including any amount paid for Mobilization, 7.5% of the contract amount or 75% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

3. When the monthly partial payment estimate exceeds 20% the contract amount, not including any amount paid for Mobilization, 9.5% of the contract amount or 95% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

4. When the monthly partial payment estimate exceeds 50% the contract amount, not including any amount paid for Mobilization, 10% of the contract amount or 100% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

5. After the Engineer determines that the work is substantially complete, any amount bid for Mobilization exceeding 10% of the contract amount will be paid in the final payment.

END OF SECTION

SECTION 01550
STORM WATER POLLUTION PREVENTION

PART 1 GENERAL

1.01 SUMMARY

A. Preparation, implementation, and monitoring of the Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharge of pollutants from the Work site into receiving waters. This includes, but is not limited to the prevention of sedimentation from the Work site into storm drains and natural drainages and the prevention of pollution discharges derived from equipment fueling and maintenance/repairs, improper dumping, spills, or leakage from storage tanks or transfer areas.

B. Prohibit illicit discharge (non-rainwater) into the storm drain system or natural drainages.

C. Construct any and all necessary systems to eliminate contaminants from entering the storm drain system or natural drainages.

D. Clean up and control of Work site materials, spoils, and debris.

E. Removal of contaminants produced by the Project.

F. Implement erosion and sediment control measures to prevent discharge of sediment to the storm drain system and natural drainages (see Section 02960 [Temporary Erosion and Sediment Controls] of these Technical Specifications).

G. The Work shall include the provision of all labor, materials, equipment, and apparatus not specifically mentioned herein or noted on the Plans, but which are incidental and necessary to complete the Work specified.

1.02 REFERENCES

A. *California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ (NPDES No. CAS000002)*. State Water Resources Control Board, 2010.

B. *California Storm Water Best Management Practice Handbooks:*
   1. Municipal
   2. Industrial/Commercial
   3. Construction Activity

1.03 REGULATORY REQUIREMENTS

A. Contractor shall comply with the State Water Resources Control Board (SWRCB), Regional Water Quality Control Board (RWQCB), county, city, municipal, and other local agency

requirements regarding storm water discharges and management. The State does not obtain local permits.

1.04 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A. A SWPPP shall be prepared for the Project by the Contractor. SWPPP preparation includes obtaining SWPPP acceptance, amending the SWPPP, preparing a Construction Storm Water Management Plan (CSMP) and a Storm Water Action Plan (SAP), and monitoring and inspecting Water Pollution Control (WPC) practices at the Work site and shall include:

1. Storm water sampling and analysis including reporting of storm water quality per qualifying rain event. If specified for the risk level, the work includes preparation, collection, analysis, and reporting of storm water samples for turbidity, pH, and other constituents.
2. Preparation of the Storm Water Annual Report including certifications, monitoring and inspection results, and obtaining Storm Water Annual Report acceptance.
3. If specified for the project risk level, preparation of a Rain Event Action Plan (REAP) including preparing and submitting REAP forms and monitoring weather forecasts.

B. The Contractor shall amend the SWPPP, as necessary, during construction showing the best management practices (BMPs) for the prevention and control of pollutants and erosion of the Work site. The SWPPP shall be in accordance with all of the requirements of the General Construction Storm Water Permit (Permit). Contractor is responsible to implement the SWPPP and make revisions to the SWPPP as necessary until completion of the Project. Information on the Permit can be found on the internet at http://www.swrcb.ca.gov/stormwtr/construction.htm. The Contractor shall prepare the Notice of Intent (NOI) to the SWRCB and provide to the Owner for filing at the SWRCB.

1.05 RISK LEVEL

A. The Risk Level for this Project is Level D.

1.06 QUALITY ASSURANCE

A. All work performed under this Contract and all Contractors and their associates and/or employees are required to comply with all applicable storm water regulations and to implement BMPs at all times.

B. A SWPPP shall be provided by the Contractor for the proposed control of contaminants entering the storm water system and natural drainages. The SWPPP must be approved by the Design Engineer prior to commencement of work.

C. All employees and subcontractors shall be trained on the storm water pollution prevention requirements contained in these Technical Specifications.

D. A supply of spill clean-up materials such as rags or absorbents shall be kept readily accessible on-site at all times.

1.07 SUBMITTALS

A. The Contractor shall submit a site-specific SWPPP prepared by a Qualified SWPPP Developer (QSD). The Contractor shall amend the SWPPP when required, prepare a CSMP, and perform water pollution control work under the oversight of a Qualified SWPPP Practitioner (QSP), as specified in the General Permit. All reports and data that must be submitted to the SWRCB will be uploaded by the Contractor's QSP to the Storm Water Multiple Application and Report Tracking System (SMARTS) website for final submittal. Final submittal and certification will be performed by the Owner.

B. Within 14 calendar days of Authorization to Proceed, the Contractor shall submit three (3) printed copies of the SWPPP and Site Map and one (1) electronic copy in a Portable Document Format (PDF) to the Design Engineer for review. The Contractor shall allow five (5) working days for the Design Engineer's review. If revisions are required, the Design Engineer will provide comments, and the Contractor shall revise and resubmit the SWPPP and Site Map in printed and electronic form within five (5) working days of receipt of the Design Engineer's comments. Within three (3) working days of receipt of the Design Engineer's approved SWPPP, the Contractor shall submit three (3) paper copies of the approved SWPPP to the Design Engineer and prepare the NOI and upload all pertinent documentation to SMARTS for final submittal and certification by the Design. The SWRCB will review the NOI and the issue a Waste Discharge Identification (WDID) number for the Project.

C. The Contractor shall not perform work that may cause water pollution until the state has issued a WDID number for the Project. The Design Engineer's review and approval of the SWPPP shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State and local laws, regulations, and requirements.

D. The Contractor shall keep a copy of the approved SWPPP at the Work site. The SWPPP shall be made available when requested by a representative of the RWQCB, SWRCB, United States Environmental Protection Agency, or the local storm water management agency. Requests from the public shall be directed to the Owner.

E. The Contractor shall submit a Construction Management Plan that includes proposed provisions to prevent pollution and debris from reaching the water channel and shall include wet weather protection, erosion measures, methods, and location for cleaning tools and equipment dust control, litter prevention, debris collection and removal, location of portable toilets, storm water management controls, and hazardous material (including fuel) management at the Work site.

F. The Contractor shall submit Storm Water Training Records including training dates and subjects for employees and subcontractors including:
   1. Within five (5) working days of SWPPP acceptance for existing employees.
   2. Within five (5) working days following training of all new employees (Contractor and subcontractors).
   3. At least five (5) working days prior to subcontractors starting work for subcontractor's employees.

G. The SWPPP including the CSMP and SAP, SWPPP amendments, training records, REAPs, sampling and analysis results, exceedance reports, visual monitoring reports, inspection reports, BMP status reports, annual reports, and reporting on Storm Water Pollution Control (SPC) practices, shall be prepared and submitted to the Design Engineer under the direction of a QSD.

1.08 PERMIT

A. Within three (3) working days of receipt of the Design Engineer's approved SWPPP, the Contractor shall submit three (3) paper copies of the approved SWPPP to the Owner and prepare the NOI and upload all pertinent documentation to SMARTS for final submittal and certification by the Owner. The SWRCB will review the NOI and the issue a WDID number for the Project.

B. The Owner shall pay required fees and pay annual renewal fees until completion of the Project.

1.09 LIABILITIES AND PENALTIES

A. Review of the SWPPP, amended and finalized by the Contractor from an initiated plan, shall not relieve the Contractor from liabilities arising from non-compliance of storm water pollution regulations.

B. Contractor will be held responsible for paying penalties for violations of permit conditions. In the event of any fines against the City, due to non-compliance by the Contractor, the City shall recover all costs of the fines from the Contractor.

1.10 IMPLEMENTATION

A. The Contractor shall not perform work that may cause water pollution until the SWRCB has issued a WDID number for the Project. The City's review and approval of the SWPPP shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State, and local laws, regulations, and requirements.

B. Contractor shall comply with the requirements of the Permit and the SWPPP. Contractor shall update the SWPPP and have the SWPPP map available at the Work site at all times.

C. Contractor shall implement BMPs for control of all pollutants including sediment, fuel and other petroleum and non-petroleum hydrocarbon products, concrete waste, fertilizers, soil amendments and other construction related pollutants.

D. Contractor shall implement an effective combination of erosion and sediment controls by stabilizing all disturbed soil, paying particular attention to exposed slopes. Back up erosion prevention measures with sediment control measures. Ensure all control measures are adequate, in place, and in operable condition.

E. Contractor shall conduct site inspections before, during extended storm events, and after each storm event to identify areas that may contribute to erosion and sediment problems or any other pollutant discharges. If additional control measures are needed, implement them

immediately. Document all inspection findings and actions taken in detailed, site specific inspection reports. These reports must be maintained on site for review.

F. Contractor shall maintain and repair all erosion prevention and sediment control measures throughout the season and until completion of the project. Replacement supplies shall be kept on the Work site.

G. Contractor shall train all site personnel in erosion prevention and sediment control techniques, and the responsibilities under the Permit.

H. Contractor shall conduct weekly training meetings and training for personnel collecting water samples.

I. Contractor shall immediately report to the RWQCB office any instances of sediment or other pollutant discharges from the Work site.

J. Contractor shall obtain services and pay for any sampling, testing, and analysis of storm water as required for compliance with the General Permit and the SWPPP.

K. Contractor shall make the SWPPP available to the RWQCB staff and correct any requirements imposed as a result of their inspections.

1.11 CERTIFICATION AND REPORTS

A. Prior to July 1 of each year during the construction period, submit two (2) copies of the Annual Report that the construction activities are in compliance with the General Permit and the SWPPP to the Design Engineer for review.

B. At Completion of the Project, submit records of all inspections, compliance certifications and noncompliance reports to the SWRCB.

C. Upon Completion of the Project, the Contractor shall file a Notice of Termination with the SWRCB.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 HAZARDOUS MATERIAL/WASTE MANAGEMENT/MATERIALS MANAGEMENT

A. Designated areas of the Work site shall be proposed by the Contractor for approval by the Design Engineer suitable for material delivery, storage, and waste collection as far from catch basins, drainage inlets, and natural drainages as possible.

B. All hazardous materials such as fuels and solvents and all hazardous waste such as waste oil and antifreeze shall be labeled and stored in accordance with State and Federal regulations.

C. All hazardous materials and all hazardous waste shall be stored in accordance with secondary containment regulations, and it is recommended that these materials and waste be covered as needed to avoid potential management of collected rainwater as a hazardous waste.

D. Regular hazardous waste collection shall be arranged for to comply with time limits on the storage of hazardous waste.

E. Granular materials shall be stored a minimum 10 feet from the closest catch basin and drainage inlet associated with the storm drain system. The Contractor shall not allow these granular materials to enter the storm drain system or natural drainages.

F. Warning signs shall be posted in areas containing or treated with chemicals.

G. An accurate up-to-date inventory, including Material Safety Data Sheets (MSDSs) of hazardous waste stored on site shall be kept and available to assist emergency response personnel in the event of a hazardous materials incident.

H. Maintenance and fueling of vehicles and equipment shall be performed in a designated, bermed area, or over a drip pan that will not allow run-off of spills. Vehicles and equipment shall be regularly checked and have leaks repaired promptly. Secondary containment shall be used to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.

3.02 DUST CONTROL

A. The Contractor's Dust Control Plan required under Section 01500 (Mobilization) of these Technical Specifications shall comply with the requirements of the Mendocino County Air Quality Management District, including the acquisition of a Large Area Grading Permit.

B. A minimum of two (2) water trucks with operators shall be in operation at all times during excavation to provide dust control at all excavation, haul road, stockpile and staging areas. If necessary, additional water trucks or other equipment with operators shall be provided and used by the Contractor to maintain these areas in a misted condition at all times during excavation.

C. Access and haul roads shall be watered on a continuous basis to control dust.

D. The Contractor will be restricted from areas where dust cannot be controlled and excessive equipment speeds, which cause dust, may be regulated by the Owner.

E. The Design Engineer will require all excavation activities to cease if the Contractor's dust control efforts do not follow the approved SWPPP, or fail to meet any of the requirements of this Part, until such time that the Contractor can demonstrate a return to compliance.

F. Other methods of dust control and suppression may be used, however; Design Engineer approval must be obtained prior to such use.

3.03 CONCRETE WASTE MANAGEMENT

A. Concrete trucks shall not be washed out into storm drains or natural drainages.

B. Concrete trucks and equipment shall be washed out off-site or in a designated area on-site where the water will flow onto dirt or into a temporary pit or bermed area. The water shall percolate into the soil and the hardened concrete placed in a waste container for disposal. If a suitable soil or bermed area is not available on-site, the wash water shall be collected and removed off-site and disposed of properly.

3.04 EROSION AND SEDIMENT CONTROL

A. Stabilize all denuded areas and install and maintain all temporary erosion and sediment control continuously between October 15th and April 15th of each year, until permanent erosion controls have been installed (see Section 02960 [Temporary Erosion and Sediment Controls] of these Technical Specifications).

B. Divert on-site runoff around exposed areas and divert off-site runoff around the Work site (e.g., swales and dikes).

C. Incorporate provisions for preventing erosion and trapping sediment on-site, such as sediment basins or traps, earthen dikes or berms, silt fences, check dams, storm drain inlet protection, soil blankets or mats, covers for soil stock piles, and/or other measures.

3.05 CONSTRUCTION SITE BMPs

A. Store, handle, and dispose of construction materials and waste properly, so as to prevent their contact with storm water.

B. Control and prevent the discharge of all potential pollutants, including concrete, petroleum products, chemicals, washwater or sediments, and non-storm water discharges to storm drains and natural drainages.

C. Use sediment controls or filtration to remove sediment when dewatering site and obtain all necessary permits.

D. Avoid cleaning, fueling, or maintaining vehicles on-site, except in a designated area where washwater is contained and treated.

E. Delineate with field markers clearing limits, easement, setbacks, sensitive or critical areas, buffer zones, trees, and drainage courses.

F. Protect adjacent properties and undisturbed areas from construction impacts using vegetative buffer strips, sediment barriers or filters, dikes, mulching, or other measures as appropriate.

G. Perform clearing and earth moving activities only during dry weather.

H. Limit and time applications of fertilizers to prevent polluted runoff.

I. Limit construction access routes and stabilize designated access points.

J. Avoid tracking dirt or other materials off-site; clean off-site paved areas using dry sweeping methods.

K. The Contractor shall train and provide instruction to all employees and subcontractors regarding the construction BMPs.

3.06 SITE CLEANUP

A. The cleaning of equipment or materials shall not be performed on-site using soaps, solvents, degreasers, steam cleaning, or equivalent methods.

B. All cleanup must be performed in a designated area that will not allow the cleaning rinse to flow off-site or into on-site storm drains or natural drainages.

3.07 PERFORMANCE REQUIREMENTS

A. The SWPPP is a minimum requirement. Revisions and modifications to the SWPPP are acceptable only if they maintain levels of protection equal to or greater than originally specified.

B. Read and be thoroughly familiar with all of the requirements of the SWPPP.

C. Inspect and monitor all work and storage areas for compliance with the SWPPP prior to any anticipated rain.

D. Complete any and all corrective measures as may be directed by regulatory agencies.

E. Costs: Contractor to pay all costs associated with the implementation of the requirements of the SWPPP in order to maintain compliance with the Permit. This includes installation of all Housekeeping BMPs, General Site and Material Management BMPs, inspection requirements, maintenance requirements, and all other requirements specified in the SWPPP.

PART 4 MEASUREMENT AND PAYMENT

4.01 STORM WATER POLLUTION PREVENTION

A. Measurement and payment for storm water pollution prevention shall be considered as included in the Contract Lump Sum Price paid for "Temporary Erosion and Sediment Controls" addressed in Section 02960 (Temporary Erosion and Sediment Controls) of these Technical Specifications.

END OF SECTION

SECTION 01720
RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUBMITTALS

A. Quality Control Submittals: Written procedures for maintaining and markup of record documents.

B. Contract Closeout Submittal: Submit record documents in accordance with the requirements of this section. Submit prior to application for final payment.

1.02 QUALITY ASSURANCE

A. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.

B. Accuracy of Records:

1. Coordinate changes within record documents, making legible and accurate entries on each page of Technical Specifications and each sheet of Plans and other documents where such entry is required to show change.
2. Purpose of Project record documents is to provide factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.

C. Make entries within 24 hours after receipt of information that a change in Work has occurred.

D. Prior to submitting each request for progress payment, request Design Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in delay of Progress Payment made by the Owner.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Maintain record documents completely protected form deterioration, loss, and damage until completion of Work.

B. In event of loss of recorded data, use means necessary to again secure data to Design Engineer's acceptance.

1. Such means shall include, if necessary in Design Engineer's opinion, removal and reconstruction of covering materials, at no cost to Owner.

PART 2 PRODUCTS

2.01 RECORD DOCUMENTS

A. Promptly following commencement of Contract Times, secure from Owner at no cost to Contractor, one complete set of Contract Documents. Plans will be full size.

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

A. General:
1. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
2. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

B. Preservation
1. Maintain record documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make record documents and samples available at all times for observation by Design Engineer.

C. Making Entries on Plans
1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
    a. Color Coding:
        i. Green when showing information deleted from Plans.
        ii. Red when showing information added to Plans.
        iii. Blue and circled in blue to show notes.
2. Date entries
3. Call attention to entry by "cloud" drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including but not limited to:
    a. Horizontal and vertical locations of existing and new underground facilities and appurtenances, and other underground structures, equipment or Work. Reference to at least two measurements of permanent surface improvements.
    b. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
    c. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
    d. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and Design Engineer's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.

5. Dimensions on Schematic Layouts: Show on record documents, by dimension, the centerline of each run of items such as described in the previous subparagraph above.
   a. Clearly identify the item by accurate note such as "cast iron drain," galv. water," and the like.
   b. Show, by symbol or note, vertical location of item ("under slab", "exposed", and the like).
   c. Make identification sufficiently descriptive that it may be related reliably to the Technical Specifications.

D. Make entries in other pertinent record documents as accepted by Design Engineer.

E. If record documents are not accepted by Design Engineer, secure a new copy of that record document from Design Engineer at Design Engineer's usual charge for reproduction and handling, and carefully transfer change data to new copy to acceptance of Design Engineer.

END OF SECTION

SECTION 01800
HEALTH AND SAFETY

PART 1 GENERAL

1.01 SUMMARY

A. Site safety.

B. LFG hazards.

C. Other landfill related hazards.

1.02 SITE SAFETY

A. All safety requirements are applicable to the Work to be performed under the Contract and any subsequent addenda, modifications, alterations, and extensions thereto.

B. The Contractor shall be solely and completely responsible for conditions of the Work site, including the safety of all persons and property during performance of the Work and provision of safety measures on weekends and holidays. This requirement will apply continuously and shall not be limited to normal working hours.

C. The Contractor shall comply with all federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Agency, and Division of Industrial Safety, State of California, and other such safety measures as may be required by the above mentioned regulatory agencies.

D. Contractor shall be solely and completely responsible for the safety of all construction personnel performing the Work, including all Subcontractors. Contractor shall be ultimately responsible for any and all necessary safety precautions and safety programs.

E. Contractor shall also be held responsible for their own compliance with the provisions of this Section, as well as the compliance of all Subcontractors with the provisions of this Section. Contractor shall be held responsible for any and all violations of the provisions of this Section, as well as violations of any federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Agency, and Division of Industrial Safety, State of California, and other such safety statutes and requirements which apply to the Work.

F. No act, service, drawing review or construction review by the Owner, Design Engineer, CQA Officer or their Consultants is intended to include review of the adequacy of the Contractor's safety measures in, on, or near the Work site.

G. If a conflict should occur between the safety requirements of the Standard Specifications, these Technical Specifications, the approved Health and Safety Plan, Referenced Standards, or other federal, state, and local safety codes, ordinances, and regulations, the more stringent requirement shall prevail.

H. The Contractor shall contact PG&E with regard to the overhead power lines and associated health and safety issues prior to the commencement of work.

1.03 LFG HAZARDS

A. The Contractor is advised that decomposing refuse produces LFG, which is approximately 50 percent methane and 50 percent carbon dioxide by volume. LFG may be present in the Work area. LFG is colorless, can be odorless, may contain benzene, vinyl chloride, hydrogen sulfide, and other toxic constituents, is combustible, and contains little or no oxygen. LFG can migrate through soil near the surface so the Contractor is therefore advised of the need for precautions against fire, explosion, and asphyxiation when working in or near excavations which are in or near refuse fill areas.

B. The Contractor shall be responsible for informing his or her employees and Subcontractors and their employees of the potential danger of LFG on and near landfills.

C. Smoking shall be prohibited at all times and at all locations within the limits of the Work shown on the Plans.

D. The Contractor shall be familiar with "A Compilation of Landfill Gas Field Practices and Procedures" as prepared by the Solid Waste Association of North America (SWANA).

E. LFG has the potential to create hazardous conditions if not controlled or recognized. Some of the hazards of LFG include:
   1. Fires which may start spontaneously from exposed and/or decomposing refuse.
   2. Fires and explosions which may occur from the presence of methane gas.
   3. Oxygen deficiency in underground trenches, excavations, vaults, conduits and structures.
   4. The potential presence of hydrogen sulfide, a highly toxic and flammable gas.
   5. The potential presence of benzene, vinyl chloride, and other toxic gases which are known to the State of California to cause cancer, birth defects, and reproductive harm.
   6. Water vapor in LFG often becomes over saturated and condenses as a liquid in contained pipes and vessels. This condensate may contain the toxic constituents found in LFG.

1.04 OTHER LANDFILL-RELATED HAZARDS

A. The Contractor is advised that solid waste fills and the decomposing refuse therein may present other unique health and safety considerations. Such considerations include, but are not limited to:
   1. Unstable ground and surface cave-ins due to decomposition and differential settlement of refuse when working over, in, or near refuse fill areas.
   2. Possible caving of trenches and excavations when working over, in, or near refuse fill areas.
   3. Potentially hazardous materials in or near refuse fill areas.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 HEALTH AND SAFETY PLAN

A. Prior to start of construction, the Contractor shall submit a written Health and Safety Plan, to the Design Engineer indicating all proposed safety measures. Said plan shall be prepared in accordance with the requirements of Part 29 of the Code of Federal Regulations (29 CFR) 1910.120.

B. The Health and Safety Plan shall comply with all federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Administration (OSHA), and Division of Industrial Safety, State of California. The Contractor shall comply with Section 5-1.02A of the Standard Specifications for safety plan requirements for trenches and excavations. Contractor's attention is further directed to Section 6705 of the Labor Code concerning trench excavation safety plans.

3.02 SITE SAFETY MONITOR

A. The Contractor shall provide a person who will be designated as the Site Safety Monitor.

B. The Site Safety Monitor shall be thoroughly trained in rescue procedures, and use of safety equipment and gas detectors as required by the Health and Safety Plan.

C. At a minimum the Site Safety Monitor shall have taken a certified 40-hour OSHA safety course and 8-hour supplementary health and safety supervisor course which meets the requirements of 29 CFR 1910.120. Certificates of participation shall be submitted to the Design Engineer prior to start of construction.

D. The Site Safety Monitor shall have the delegated authority to order any person or worker to follow safety rules related to LFG or other site safety hazards. Failure to observe these rules shall be sufficient cause for removal of the person or worker from the Work site.

E. Supplemental to the Contractor's regular safety program, the Site Safety Monitor shall develop and institute procedures to inform all workers and the public visiting the Work site of the potential for the presence of methane and other landfill gases emanating from the natural decomposition of refuse buried at or near the Work site, and the importance of safety precautions to provide for the safety of workers and the public.

3.03 TRENCH AND EXCAVATION SAFETY

A. Contractor shall comply with all requirements of the trench and excavation safety, including provisions of Section 5-1.02A of the Standard Specifications and all occupational safety and health requirements of the Labor Code. In particular, the Contractor shall:

1. Submit to the Design Engineer at least 14 calendar days in advance of excavation, a detailed plan showing the design of sheeting, shoring, bracing, slopes, or other provisions to be made for worker protection from the hazard of caving ground during excavation. Sheeting and shoring plans shall be designed

and stamped by a Registered Civil or Structural Engineer with experience in shoring design. The Contractor shall be solely responsible for ensuring the safety of any excavation. Shoring and submittal of any plans for sheeting, shoring, bracing, slopes, or other provisions to be made for worker protection shall not relieve the Contractor from this responsibility.

2. If required, obtain a permit from the division of Industrial Safety for the construction of excavations that are 5 feet in depth or deeper and into which a person or persons is (are) required to descend.

B. Contractor shall provide all necessary materials to sheet, shore, brace, or otherwise provide for worker protection in temporary excavations as well as may be required to prevent adjacent surface settlement or damage to public and private property and to ensure safe working conditions at the Work site.

C. Contractor shall remove all sheeting, shoring, bracing or similar structures in accordance with the above requirements and in such a manner as to prevent any damage to the Work.

D. The Contractor shall repair all damages resulting from improper sheeting, shoring, bracing or similar measures, or damages resulting from failure to provide such measures at no expense to the City.

PART 4 MEASUREMENT AND PAYMENT

4.01 HEALTH AND SAFETY

A. Payment for providing all health and safety measures, including preparation of required Health and Safety Plan, is included in the Contract Unit Price paid for the various items of Work for which they are required. No separate or additional payment will be made therefore.

END OF SECTION

DIVISION 2

SITE WORK

SECTION 02200
REMOVAL, REPLACEMENT, AND ADJUSTMENT OF EXISTING FACILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Existing facilities that interfere with the Work shall be removed, reset, relocated, adjusted, or otherwise modified as specified herein, as shown on the Plans, or as directed by the Engineer. The Contractor shall perform all removal, replacement, abandonment, and adjustment of existing facilities in accordance with this Section and at the locations and details shown on the Plans including the following:

1. Adjust three (3) existing groundwater monitoring wells to grade;
2. Adjust two (2) existing leachate wells to grade;
3. Remove existing CMP and HDPE downdrains and drain outlets to creek;
4. Remove and/or abandon existing leachate piping;
5. Adjust of five (5) existing leachate manholes to grade;
6. Remove and replace existing vault boxes;
7. Install G5 traffic vault with checker plate top over existing valve;
8. Adjust existing gas vault to grade;
9. Adjust existing air release valve and vault to grade;
10. Adjust four (4) existing landfill gas perimeter monitoring wells/vaults to grade;
11. Remove existing fencing at site entrance; and
12. Demolish existing scale house structure.

B. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to implement the respective removal, replacement, and adjustment activities outlined above and within this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Standard Plans Book.* California Department of Transportation, 2010.

1.03 SUBMITTALS

A. At least 14 calendar days prior to beginning any replacement work in accordance with the requirements of this Section, the Contractor shall provide three (3) copies to the Design Engineer manufacturer's product data sheets for any new materials used in the replacement or adjustment of existing facilities.

1.04 PROJECT CONDITIONS

A. Except for materials indicated to be stockpiled or to remain the City's property, cleared materials are the Contractor's property. Remove cleared materials from the project site and dispose of in lawful manner.

B. Salvaged Materials: Carefully remove items indicated to be salvaged and store where indicated on Plans or where designated by the City. Avoid damaging materials designated for

salvage.

C. Unidentified Materials:
   1. If unidentified materials are discovered, including hazardous materials that may require additional removal other than is required by the Contract Documents, immediately report the discovery to the City.
   2. I necessary, the City will arrange for any testing or analysis of the discovered materials and shall provide instruction regarding the removal and disposal of unidentified materials.

PART 2 PRODUCTS

2.01 SOIL MATERIAL

A. Backfill excavations resulting from removal operations with onsite or import materials conforming to the specification for compacted engineered fill as described in Section 02224 (Engineered Fill).

2.02 VAULT BOXES

A. New or replacement vault boxes shall be pre-cast boxes with solid concrete or steel lids at the sizes and dimensions as indicated on the Plans. Extension risers shall be used as necessary to raise vault box to grade. Vault boxes shall be Christy boxes or equivalent with traffic rated cover where indicated.

PART 3 EXECUTION

3.01 GENERAL

A. Items demolished or removed that are not to be salvaged or reused in the Work shall become the property of the Contractor and shall be legally disposed of or recycled.

B. Verify that utilities have been disconnected and capped before starting demolition operations.

3.02 DOWNDRAIN AND DRAIN OUTLET REMOVAL

A. Unless indicated on the Plans to remain, all existing aboveground and below ground CMP and HDPE downdrains and drain pipe including any hardware shall be removed within the limits of Work.

B. Backfill trench excavations resulting from removal operations with onsite or import materials conforming to the specification for compacted engineered fill as described in Section 02224 (Engineered Fill). Compact to 90% relative compaction.

3.03 LEACHATE PIPING REMOVAL/ABANDONMENT

A. Cut existing leachate pipe at points shown on the Plans. The pipe cuts shall be square, perpendicular to the center of the pipe. Cap or plug with concrete the ends of the piping where indicated.

B. Unless piping is shown on the Plans to be abandoned in place, excavate and remove piping for disposal per section 1.04A.

C. Backfill excavations resulting from removal operations with onsite or import materials conforming to the specification for compacted engineered fill as described in Section 02224 (Engineered Fill). Compact to 90% relative compaction.

3.04 LEACHATE MANHOLE ADJUSTMENT

A. Frames and covers of existing leachate manholes shall be adjusted to grade with new materials similar in character to those in the original structure in accordance with the provisions of these specifications.

C. After the existing cover and frame has been removed, the top of the structure to be raised shall be trimmed to provide a suitable foundation for the new material.

D. When reconstruction or adjustment of a concrete structure requires partial removal of concrete, sufficient concrete shall be removed to permit new reinforcing steel to be spliced to existing reinforcing steel. Existing reinforcement that is to be incorporated in new work shall be protected from damage and shall be thoroughly cleaned of adhering material before being embedded in new concrete.

E. Concrete removal shall be performed without damage to the portion that is to remain in place. Damage to the existing concrete, which is to remain in place, shall be repaired to a condition equal to that existing prior to the beginning of removal operations. The cost of repairing existing concrete damaged by the Contractor's operations shall be at the Contractor's expense.

F. At the option of the Contractor, raising devices may be used in place of adjusting manholes to grade with new materials similar in character to those in the original structure.

G. The shape and size of the raising devices shall match the existing frame and shall produce an installation which is equal to or better than the existing installation in stability, support and non-rocking characteristics. Each section of the raising device shall be fastened securely to the existing frame.

3.05 DEMOLITION

A. Demolish indicated existing buildings as shown on the Plans. Use methods required to complete the Work within limitations of governing regulations.

B. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental protection regulations. Do not use water when it may damage construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Proceed with demolition of structural framing members systematically, from higher to lower level.

D. Remove below-grade construction, including footings and foundation walls completely.

E. Remove existing utilities within limits of structure completely. Fill depressions and voids

with onsite or import fill compacted to a relative compaction of 90%.

F. Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory onsite or import fill compacted to a relative compaction of 90%.

PART 4 MEASUREMENT AND PAYMENT

4.01 ADJUST GROUNDWATER MONITORING WELLS TO GRADE

A. Adjustment of groundwater monitoring wells to grade shall be measured by each well that is adjusted. Payment shall be included in the Contract Unit Price per each well adjusted for "Adjust Groundwater Monitoring Wells to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 ADJUST LEACHATE WELLS TO GRADE

A. Adjustment of leachate wells to grade shall be measured by each well that is adjusted. Payment shall be included in the Contract Unit Price per each well adjusted for "Adjust Leachate Wells to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 REMOVE EXISTING CMP AND HDPE DOWNDRAINS AND DRAIN OUTLETS

A. Measurement and payment for removal of existing above ground and underground CEP and HDPE downdrains and drain outlets shall be included in the Contract Lump Sum Price for "Remove Existing CMP and HDPE Downdrains and Drain Outlets" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the removal as shown on the Plans, as specified herein, and as directed by the Design Engineer, including pipe removal, excavations, disposal, and trench backfill and compaction. No additional compensation will be allowed therefore

4.04 REMOVE EXISTING LEACHATE PIPING

A. Measurement and payment for removal and abandonment of existing leachate piping shall be included in the Contract Lump Sum Price for "Remove Existing Leachate Pipe" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the removal as shown on the Plans, as specified herein, and as directed by the Design Engineer, including cutting and capping pipe, excavation, pipe removal, and trench backfill and compaction. No additional compensation will be allowed therefore.

4.05 ADJUST LEACHATE MANHOLES

A. Adjustment of leachate manholes to grade shall be measured by each manhole that is adjusted. Payment shall be included in the Contract Unit Price per each manhole adjusted for "Adjust Leachate Manhole to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to

complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.06 INSTALL G5 TRAFFIC VAULT WITH CHECKER PLATE COVER

A. Installation of G5 traffic vault with checker plate cover shall be measured by each vault that is installed. Payment shall be included in the Contract Unit Price per each vault removed and replaced for "Install G5 Traffic Vault with Check Plate Cover" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the replacement as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.07 ADJUST EXISTING GAS VAULT TO GRADE

A. Adjustment of gas vault to grade shall be measured by each vault that is adjusted. Payment shall be included in the Contract Unit Price per each manhole adjusted for "Adjust Existing Gas Vault to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.08 INSTALL B2436 GAS EXTRACTION VAULT WITH CHECKER PLATE TOP

A. Installation of B2436 gas extraction vault with checker plate cover shall be measured by each vault that is installed. Payment shall be included in the Contract Unit Price per each vault removed and replaced for "Install B2436 Gas Extraction Vault with Check Plate Cover" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the replacement as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.09 ADJUST EXISTING AIR RELEASE VALVE AND VAULT TO BOX GRADE

A. Adjustment of existing air release valve and vault box to grade shall be measured by each valve adjustment that is performed. Payment shall be included in the Contract Unit Price per each vault removed and replaced for "Adjust Existing Air Release Valve and Vault Box to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the replacement as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.10 ADJUST LFG PERIMETER MONITORING WELLS

A. Adjustment of LFG perimeter monitoring wells to grade shall be measured by each well that is adjusted. Payment shall be included in the Contract Unit Price per each well adjusted for "Adjust LFG Monitoring Wells to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.11 REMOVE EXISTING FENCING

A. Measurement and payment for removal of existing fencing shall be included in the Contract Lump Sum Price for "Remove Existing Fencing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the removal as shown on the Plans, as specified herein, and as directed by the Design Engineer, including cutting and capping pipe, excavation, pipe removal, and trench backfill and compaction. No additional compensation will be allowed therefore.

4.12 STRUCTURE DEMOLITION

A. Measure and payment for the demolition of the existing scale house structure shall be included in the Contract Lump Sum Price for "Structure Demolition" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the demolition as shown on the Plans, as specified herein, and as directed by the Design Engineer, including demolition of structure and foundation, removal of utilities, disposal of materials, and backfill and compaction of voids and depressions. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02207
AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all aggregate materials, including aggregate base for the construction of access roads, road crossings, and placement within and around the flare station, sand ballast and hydrobinder infill for the engineered turf, pipe bedding for trenches, rock riprap for lined swales and outfalls, gravel pack material for LFG extraction wells, concrete aggregate, coarse rock for the construction entrance, and tank bedding and backfill for the leachate UST, in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to install the respective aggregate materials.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. *California Test Methods*. California Department of Transportation, Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM C 33	Standard Specification for Concrete Aggregates.
B.	ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates.
C.	ASTM D 2434	Standard Test Method for Permeability of Granular Soils (Constant Head).
D.	CTM 229	Method of Test for Durability Index.
E.	CTM 301	Method for Determining the Resistance "R" Value of Treated and Untreated Bases, Subbases, and Basement Soils by the Stabilometer.

1.04 SUBMITTALS

A. At least 14 calendar days prior to beginning any aggregate material installation, the Contractor shall provide three (3) copies of the name and location of the proposed borrow source, and laboratory test results on the aggregate materials from the proposed borrow source to the Design Engineer which show that the aggregate materials have the properties specified in Part 2 of this Section. The Design Engineer will provide the

Contractor with an approval or rejection of the borrow source and aggregate materials within two (2) working days of receipt of the borrow source information and laboratory test results.

1.05 QUALITY ASSURANCE

A. Testing of the aggregate materials shall be conducted in accordance with the CQA Plan.

B. If the Design Engineer's review of Contractor's submittals indicates that an aggregate material(s) does not meet specified requirements, the Contractor shall provide an alternative material(s) and submit corresponding test results to the Design Engineer for approval.

PART 2 PRODUCTS

2.01 GENERAL

A. Each aggregate product shall come from the same source throughout the Work.

2.02 AGGREGATE BASE

A. The aggregate base material shall be clean, hard, sound, durable, uniform in quality, free of any surface coatings, and free of any detrimental quantity of soft, friable, thin, elongated, or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substance. The aggregate base material may contain Portland cement concrete and asphalt concrete meeting the grading specifications.

B. Aggregate base shall conform to requirements of Section 26 of the Standard Specifications and these Technical Specifications. Aggregate base shall meet the requirements for Class 2, ¾-inch maximum per the Standard Specifications.

2.03 SAND BALLAST INFILL

A. Sand Ballast Infill will meet Particle Size Parameters of ASTM C-33 for fine aggregates as shown in Table 1 below:

Table 1: Sand Ballast Infill ASTM C-33-03 Particle Size Distribution

ASTM C-33-03	
Sieve	Percent Passing
9.5 mm (3/8 in.)	100
4.75 mm (No. 4)	95 to100
2.36 mm (No. 8)	80 to 100

(Continued)

ASTM C-33-03	
Sieve	Percent Passing
1.18 mm (No. 16)	50 to 85
600 µm (No. 30)	25 to 60
300 µm (No. 50)	5 to 30
150 µm (No. 100)	0 to 10

2.04 HYDROBINDER INFILL

A. HydroBinder™ is a cementious product used as the infill component for surface drainage conveyance areas.

B. HydroBinder™ infill Shall be HydroBinder™ Cementitious Infill. The HydroBinder™ infill material may be delivered in either pallet form of 80 lb. bags or 3,000 lb. bulk super sacks.

C. Cement, except as otherwise specified herein, will be a brand of Portland Cement, meeting ASTM C 150 and will be Type I or Type II. Only one brand of cement will be used throughout the duration of this Contract.

D. The cementitious infill mix design will conform to the requirements of ASTM C 387 for high strength mortars.

E. The cementious infill will have a minimum 28 day compressive strength of 5,000 psi.

2.05 PIPE BEDDING

A. Pipe bedding material shall conform to Section 19-3.02E(2) of the Standard Specifications.

2.06 LOOSE ROCK RIPRAP

A. Stone and/or recycled concrete for loose rock riprap shall conform to Section 72-5.02 of the Standard Specifications and the following size requirements:

Screen Size	% (By Weight) Retained Above
4" x 4"	95-100
6" x 6"	75-100
9" x 9"	25-100

2.07 GROUTED ROCK RIPRAP

A. Stone and/or recycled concrete for grouted rock riprap shall be "Light" class rock per Section 72-2.02 of the Standard Specifications.

2.08 GRAVEL PACK

A. Gravel pack material for the LFG extraction wells shall be 1- to 2-inch diameter non-calcareous washed rock.

2.09 CONCRETE AGGREGATE

A. Coarse and fine aggregate for concrete shall conform to ASTM C 33 as determined by the Supplier. All aggregate shall be thoroughly washed. Maximum aggregate size shall be 3/4 inches in diameter.

2.10 COARSE ROCK FOR CONSTRUCTION ENTRANCE

A. Coarse rock for construction entrance shall be 2- to 3-inch crushed stone.

2.11 TANK BEDDING AND BACKFILL

A. Tank bedding shall consist of filter sand.

B. Tank backfill shall be clean naturally rounded aggregate with a mix of particle sizes not less than 1/8-inch or more than ¾-inch (pea gravel) in accordance with the tank manufacturer's specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall provide all construction, grading control, and other staking necessary to construct the aggregate materials to the lines, grades, and thickness shown on the Plans.

3.02 STOCKPILING

A. Materials shall be stockpiled at the Work site at a location(s) designated by the Design Engineer.

B. Stockpiles shall be of sufficient quantity to meet Project schedule and requirements.

C. Surface water shall be directed away from stockpile site(s) so as to prevent erosion or deterioration of materials.

3.03 STOCKPILE CLEANUP

A. Surplus aggregate material stockpiles shall be removed or left in a clean and neat

condition. Stockpile area surface(s) shall be graded to prevent free standing surface water.

3.04 PLACEMENT

A. Aggregate base shall be placed in accordance with the requirements for aggregate base placement in Section 02310 (Access Roads) and Section 15300 (Flare Station) of these Technical Specifications.

B. Pipe bedding shall be placed in accordance with the requirements for backfilling in Section 02225 (Trenching and Backfilling) of these Technical Specifications.

C. Sand ballast infill and HydroBinder infill shall be placed in accordance with the requirements for infill placement, respectively in Section 02773 (Engineered Turf) of these Technical Specifications.

D. Rock riprap shall be placed in accordance with the requirements for placement in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

E. Gravel pack material shall be placed in accordance with the requirements for backfilling in Section 15100 (Landfill Gas [LFG] Extraction Wells) of these Technical Specifications.

F. Coarse rock shall be placed at the construction entrances in accordance with the requirements of Section 02960 (Temporary Erosion and Sediment Controls) of these Technical Specifications.

G. Concrete sand shall be placed in accordance with the requirements of Section 02774 (Geosynthetic Clay Liner [GCL]) of these Technical Specifications.

H. Tank bedding and backfill shall be placed in accordance with the requirements of Section 15500 (Leachate Overflow and Collection System) of these Technical Specifications.

PART 4 MEASUREMENT AND PAYMENT

4.01 AGGREGATE BASE

A. Measurement and payment for aggregate base shall be included in the Contract Unit Prices for “Access Roads” addressed in Section 02310 (Access Roads) and “Flare Station” addressed in Section 15300 (Flare Station) of these Technical Specifications.

4.02 SAND BALLAST INFILL

A. Measurement and payment for sand ballast infill shall be included in the Contract Unit Prices for “Engineered Turf ” addressed in Section 02773 (Engineered Turf) of these Technical Specifications

4.03 HYDROBINDER INFILL

A. Measurement and payment for HydroBinder infill shall be included in the Contract Unit Prices for "Engineered Turf" addressed in Section 02773 (Engineered Turf) of these Technical Specifications

4.04 PIPE BEDDING

A. Measurement and payment for pipe bedding shall be included in the Contract Unit Price paid for the various items of Work for which pipe bedding is required.

4.05 LOOSE AND GROUTED ROCK RIPRAP

A. Measurement and payment for loose and grouted rock riprap shall be included in the Contract Unit Price paid for the various items of Work for which loose and grouted riprap is required.

4.06 GRAVEL PACK

A. Measurement and payment for gravel pack shall be included in the Contract Unit Price for "LFG Extraction Wells" addressed in Section 15100 (Landfill Gas [LFG] Extraction Wells) of these Technical Specifications.

4.07 CONCRETE AGGREGATE

A. Measurement and payment for concrete aggregate shall be included in the Contract Unit Price paid for the various items of Work for which concrete aggregate is required.

4.08 COARSE ROCK FOR CONSTRUCTION ENTRANCE

A. Measurement and payment for coarse rock for the construction entrance shall be considered as included in the Contract Lump Sum Price paid for "Mobilization" addressed in Section 01500 (Mobilization) of these Technical Specifications.

4.09 TANK BEDDING AND BACKFILL

A. Measurement and payment for tank bedding and backfill for the leachate UST installation shall be considered as included in the Contract Unit Price paid for "Leachate UST" addressed in Section 15500 (Leachate Overflow and Collection System) of these Technical Specifications.

END OF SECTION

SECTION 02222
EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall perform all excavation work including clearing, grubbing, stripping, excavation, and grading of the on-site borrow area and construction of the final cover system's foundation layer, drainage and erosion control structures, LFG collection system and condensate drain/discharge components, and leachate UST in accordance with this Section and at the locations and to the dimensions shown on the Plans.

B. The Contractor shall excavate refuse in selected areas and relocate the refuse to the designated refuse relocation area shown on the Plans. Incidental refuse excavation and disposal shall also be performed as part of the installation of drainage, LFG collection system, and condensate drain/discharge components.

C. Excavation to be performed by the Contractor shall also include construction of any necessary haul roads, stockpiling of all excavated materials, hauling and disposal of any excavated refuse, and provisions for temporary dust, erosion, and drainage control measures.

D. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to implement the respective excavation activities outlined above and within this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

1.03 SUBMITTALS

A. Temporary erosion and sediment control measures associated with excavation activities shall be addressed in the Work site's SWPPP prepared as part of Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications.

B. The Contractor shall provide the Design Engineer with certified weight tags issued by the permitted transfer station or solid waste disposal facility for all loads of refuse transported off-site for disposal.

1.04 QUALITY ASSURANCE

A. Observation
   1. The CQA Monitor will periodically observe performance of the excavations to verify conformance with the execution requirements in Part 3 of this Section.

2. If any portion(s) of the excavations are determined by the CQA Monitor to not meet the requirements of this Section, the Contractor, at his expense, shall rework or replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

B. Surveying

1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the excavations to the lines, grades, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Project for use by the Contractor's Land Surveyor or eligible Engineer.
2. All grades and dimensions of completed areas of the excavations shall be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA field surveying that any portion(s) of the excavations does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Unless provided otherwise within this Section, all excavation activities shall conform to the applicable requirements of Section 16 and 19 of the Standard Specifications.

B. The Contractor shall instruct all personnel and maintain strict control over all excavation activities to protect and maintain the integrity of all existing environmental monitoring and control systems and any other facilities for the existing landfill. The cost of repairing any damage to these existing features will be determined by the Owner and be borne by the Contractor. The total repair cost to be borne by the Contractor will include those for exploration to determine extent of damage, mobilization of work crews, materials, material delivery, CQA testing and observation, and additional design.

3.02 CLEARING AND GRUBBING

A. The existing interim cover soil on the landfill surface and natural ground surface within the limits of the on-site borrow area as depicted on the Plans shall be cleared of all vegetative growth, such as brush, grass, weeds, or other deleterious material.

B. Clearing and grubbing shall be performed prior to beginning excavation in any area.

C. Cleared and stripped topsoil shall be stockpiled separately from excavated material or disposed of in accordance with this Section.

3.03 REFUSE EXCAVATION AND RELOCATION

A. Refuse shall be excavated at the designated locations beneath the existing power lines to the lines, grades and dimensions shown on the Plans.

B. After clearing and grubbing, residual existing interim cover soil overlying the designated refuse excavation areas shall be segregated and subsequently reused as foundation layer material. This material shall be free of refuse and shall be placed and compacted in accordance with Section 02240 (Foundation Layer) of these Technical Specifications.

B. Excavated refuse shall be relocated to the designated refuse relocation area shown on the Plans.

C. Relocated refuse placed within the designated refuse relocation area shall be spread in uniform lifts not to exceed 2 feet in thickness and each lift compacted with a minimum of four (4) passes using a dozer.

D. Relocated refuse lifts shall be covered with a minimum of 6 inches of soil at the end of each working day to minimize vector hazards and odor nuisance.

E. Within five (5) working days of completing the refuse excavation work beneath the existing power lines, the refuse relocation area shall be completely covered with a minimum of 12 inches of prepared and compacted foundation layer material in accordance with Section 02240 (Foundation Layer) of these Technical Specifications.

3.04 INCIDENTAL REFUSE EXCAVATION AND DISPOSAL

A. Refuse shall be excavated as necessary to accommodate the installation of drainage, LFG collection system, and condensate drain/discharge components at the locations and to the details shown on the Plans.

B. Excavated refuse may be temporarily stockpiled on and covered with visqueen at a designated location on-site, or discharged directly into a roll-off bin or dump truck. If temporarily stockpiled, the refuse must be removed by the end of each working day and transferred into a roll-off bin or dump truck for subsequent transport and disposal by the Contractor to a permitted transfer station or solid waste disposal facility. Refuse remaining on-site overnight in a roll-off bin or dump truck shall be covered at the end of each working day. Excavated refuse shall not remain on-site for more than a 48-hour period.

C. The Contractor shall not mix excess, surplus, or waste materials from other general construction activities with the refuse derived from the excavation work described in this Section. Those materials shall be managed and paid for separately under the Contract Lump Sum Price for "Mobilization" as outlined in Section 01500 (Mobilization) of these Technical Specifications.

3.05 SOIL EXCAVATION

A. The horizontal control points and one (1) benchmark shall be provided by the Design Engineer in the vicinity of the Work site. It shall be the responsibility of the Contractor to maintain control points and property line markers and to provide and maintain construction

staking, grading control, or other staking necessary to perform the excavation and construct the stockpile.

B. Control points and property line markers that are removed, damaged, or destroyed by the Contractor shall be reestablished by the Contractor at the Contractor's expense.

C. Boulders encountered by the Contractor during excavation shall be removed, separated by size as directed by the Design Engineer, and stockpiled separately from excavated material or disposed of in accordance with this Section.

D. Excavation for drainage and erosion control structures shall conform to Section 19-1.03E of the Standard Specifications.

3.06 GRADING

A. The excavation shall be constructed in conformance with the lines, grades, and dimensions shown on the Plans; all distances and measurements, except elevations and structural dimensions, shall be made on a horizontal plane unless otherwise stated in this Section.

B. When completed, the grading plane for the drainage channels at any point shall not vary more than 0.10 foot above or below the grade shown on the Plans on slopes less than 10 percent nor vary more than 0.20 foot above or below the grade shown on the Plans on slopes greater than 10 percent.

C. Unsuitable materials, as determined by the Design Engineer, encountered at the subgrade elevation shall be removed and stockpiled separately from excavated material or disposed of in accordance with this Section. If, after removal of the unsuitable materials, a surface in accordance with Part 3 of this Section does not result, overexcavation correction procedures in this Section shall be followed.

D. If any portion of the excavation area is excavated by the Contractor below the design (prepared subgrade) elevations shown on the Plans, the Contractor shall perform overexcavation correction procedures, resulting in a surface which meets the requirements of Part 3 of this Section, as directed by the Design Engineer. Overexcavation correction procedures may consist of excavating, grading, and surface preparation of the entire overexcavated slope, or some portion thereof, to a lower subgrade elevation determined by the Design Engineer; backfilling with engineered fill and compacting to provide a firm and unyielding subgrade in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications; or as otherwise directed by the Design Engineer. The cost of overexcavation correction procedures, redesign, additional surveying, and other incidental fees resulting from the overexcavation shall be paid by the Contractor, unless the overexcavation is performed at the direction of the Design Engineer to remove unsuitable materials at the subgrade elevation.

3.07 HAUL ROAD CONSTRUCTION

A. The Contractor shall construct and maintain any haul roads necessary to perform excavation.

B. The location of all haul roads proposed for construction and use by the Contractor must be approved by the Design Engineer.

3.08 DUST CONTROL

A. Dust control shall comply with the Contractor's approved Dust Control Plan.

B. A minimum of two (2) water trucks with operators shall be in operation at all times during excavation to provide dust control at all excavation, haul road, stockpile and staging areas. If necessary, additional water trucks or other equipment with operators shall be provided and used by the Contractor to maintain these areas in a misted condition at all times during excavation.

C. The Design Engineer will require all excavation activities to cease if the Contractor's dust control efforts do not follow the approved Dust Control Plan, or fail to meet any of the requirements of this Part, until such time that the Contractor can demonstrate a return to compliance.

3.09 EROSION AND SEDIMENT CONTROL

A. Erosion and sediment control measures shall be implemented by the Contractor in accordance with the approved SWPPP, and as directed by the Design Engineer for all excavation work areas including haul roads and stockpile areas, adjacent areas which have been disturbed, or other affected areas.

B. The Contractor shall maintain erosion and sediment control measures until the final graded surface of the excavation is approved by the Design Engineer. If erosion creates a final subgrade surface which is not in accordance with any requirements of this Section, overexcavation correction procedures in this Section shall be performed by the Contractor, at the expense of the Contractor, including payment of all incidental fees.

3.10 DRAINAGE CONTROL

A. The Contractor shall provide ample means and devices with which to promptly remove and dispose of all water from any source entering the excavation or stockpile area(s) and maintain these at all times during excavation and until the final graded surface of the excavation and stockpile are approved by the Design Engineer. The Contractor shall perform excavation in the borrow source area in a manner that allows for the discharge and retention of storm water that does no conflict with the Contractor's excavation activities in the borrow area.

3.11 ARCHAEOLOGICAL AND PALEONTOLOGICAL RESOURCES

A. The Design Engineer shall serve as the Archaeological and Paleontological Monitor. The Contractor shall notify the Design Engineer in the event that he suspects that an archaeological or paleontological discovery is found during excavation for the Design Engineer's investigation. Should a paleontological or archaeological discovery be made during excavation, the Contractor shall cease work in that area until the discovery is evaluated or recovered. The Contractor may resume work elsewhere on the Work site that does not disturb the discovery until the evaluation or recovery is completed. Should the discovery result in an unavoidable delay to the Contractor, the Contractor shall immediately notify the Design Engineer of the delay in writing. Additional working days will be allowed for such a delay. The Contractor shall not charge the Owner for the delay under Sections 8-1.09 or 8-1.10 of the Standard Specifications until such delay exceeds a total of 20 hours for the Project, after which the Contractor may be entitled to compensation under said sections.

PART 4 MEASUREMENT AND PAYMENT

4.01 CLEARING AND GRUBBING

A. Clearing and grubbing shall be measured by the acre cleared and grubbed. Payment shall be included in the Contract Unit Price per acre for "Clearing and Grubbing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the clearing and grubbing as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 REFUSE EXCAVATION AND RELOCATION

A. Refuse excavation and relocation shall be measured by the in-place cubic yards to be removed and includes all excavation, loading, transport, placement, compaction, and cover soil. Payment shall be included in the Contract Unit Price per cubic yard for "Refuse Excavation and Relocation" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the refuse excavation and relocation as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 INCIDENTAL REFUSE EXCAVATION AND DISPOSAL

A. Measurement and payment for incidental refuse excavation shall be included in the Contract Unit Price paid for the various items of Work for which incidental refuse excavation is required.

B. Disposal of refuse shall be measured by the tonnage of refuse disposed of off-site at a permitted transfer station or solid waste disposal facility. Payment shall be included in the Contract Unit Price per ton for "Refuse Disposal" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to dispose of refuse as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 SOIL EXCAVATION

A. Measurement and payment for soil excavation associated with construction of the foundation layer, drainage and erosion control structures, LFG collection system and condensate drain/discharge components, and the leachate overflow collection and storage system shall be included in the Contract Unit Price paid for these various items of Work for which soil excavation is required.

END OF SECTION

SECTION 02224
ENGINEERED FILL

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall install all engineered fill including all fill needed for backfilling of the former leachate pond, fill required for conforms outside ClosureTurf™ footprint area, as well as incidental engineered fill placement for access road subgrades, buried header crossings, road crossings, and backfilling anchor trenches and pipe/conduit trenches in the flare station area, in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, equipment, transportation and incidentals as necessary to prepare the subgrade, excavate, haul, place, moisture condition, compact, and grade the material to install the engineered fill.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of engineered fill shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If field and/or laboratory testing by CQA Monitor indicate that any area(s) of engineered fill does not meet compacted moisture content and dry density requirements, the Contractor shall rework the material in that area(s) at his expense until the engineered fill is in conformance with the requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to pay for testing of the recompacted engineered fill material.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from disking or aerating the subject materials to achieve acceptable conditions.

B. Surveying

1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the engineered fill to the lines, grades, contour lines, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Project for use by the Contractor's Land Surveyor or eligible Engineer.
2. All grades and dimensions of completed areas of the engineered fill may be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA verification surveying that any portion(s) of the engineered fill does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 PRODUCTS

2.01 SOURCE

A. On-site material meeting the requirements of this Section and as follows shall be used for engineered fill. The Contractor may need to segregate suitable on-site material for use as engineered fill.

B. Material excavated from within the on-site borrow area and leachate UST excavation meeting the requirements of this Section shall be used for engineered fill.

C. It is expected that sufficient suitable material for engineered fill will be available from the on-site sources described in these Technical Specifications. The Contractor may need to segregate or select material from these sources for use as engineered fill, however the Contractor will not be required to mechanically screen or import material for engineered fill.

2.02 PROPERTIES

A. Engineered fill material shall be soil or soil/rock mixture that is free of organic matter, debris, and/or deleterious or other unsuitable materials.

B. Engineered fill material shall not contain rocks or clods over 6 inches in greatest dimension, and not more than 15 percent by dry weight shall be larger than 2 inches in greatest dimension or as approved by the Design Engineer.

PART 3 EXECUTION

3.01 PLACEMENT

A. Prior to placement of engineered fill on native ground, scarify the exposed soils in-place to a depth of approximately 6 inches, moisture condition to within 1 to 3 percentage points of optimum moisture content, and compact as engineered fill to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

B. General engineered fill shall be placed in 6-inch lifts with a maximum uncompacted thickness of 8 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition in each layer. Engineered fill material shall then be brought to a uniform moisture content within 1 to 3 percentage points of the optimum moisture content, mixed as required to establish uniform moisture, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557.

PART 4 MEASUREMENT AND PAYMENT

4.01 ENGINEERED FILL

A. Engineered fill for backfilling the former leachate pond and the construction of access roads and other improvements outside the ClosureTurf™ footprint area, shall be included in the Contract Unit Price for "Fill (Foundation Layer and Engineered Fill)" addressed in Section 02240 (Foundation Layer) of these Technical Specifications and includes all excavation, transport, placement, moisture conditioning and compaction. The quantity for "Fill (Foundation Layer and Engineered Fill" shall be a final pay quantity as described in Section 9-1.015 of the Standard Specifications and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install engineered fill as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 INCIDENTAL ENGINEERED FILL

A. Measurement and payment for incidental engineered fill shall be included in the Contract Unit Price paid for the various items of Work for which incidental engineered fill is required.

END OF SECTION

SECTION 02225
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall perform all trenching and/or backfilling operations necessary to install corrugated metal pipe (CMP) and high-density polyethylene (HDPE) drainage components, down drains and overflow pipes, sedimentation basin outlet, buried pipes and conduits, anchoring of the ClosureTurf™ (if necessary), and condensate drain lines in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation and incidentals as necessary to implement the trenching and backfilling operations.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of trenching and backfilling shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If field testing by the CQA Monitor indicates that the moisture content or density of any lift, or portion thereof, of trench and former leachate pond backfill fails to meet the specified requirement, the subject layer or portion thereof shall be re-worked, at the Contractor's expense, until the required moisture and density have been attained. No additional backfill shall be placed until the in-place fill has been inspected and accepted by the Design Engineer.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from discing or aerating the subject materials to achieve acceptable conditions.

PART 2 PRODUCTS

2.01 PIPE BEDDING

A. Pipe bedding shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.02 CONDENSATE DRAIN LINE TRENCH BACKFILL

A. Backfill material for the condensate drain line trenches as shown on the Plans shall consist of material excavated from the trench unless specified otherwise by the Design Engineer.

2.03 OTHER TRENCH BACKFILL

A. Backfill material for all other trenches (i.e., utilities, road crossings, ClosureTurf™ anchor trenches, condensate drop-outs/discharge points, etc.) shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 TRENCH PREPARATION

A. Required points of connection, lines, levels, contours, and datum locations shall be identified by the Contractor. Locations for points of connection that are shown on the Plans are approximate. The Contractor shall locate utilities to best serve the intended use and to avoid mechanical and structural interference.

3.02 TRENCH EXCAVATING

A. Trenches shall be excavated to the lines and grades as shown on the Plans. Water or materials that interfere with the work shall be removed.

B. Soft areas of trench subgrade not capable of compaction in place shall be cut out.

C. The trench bottom shall be firm, continuous, relatively smooth and free of rocks and/or unsuitable material prior to the installation of pipe bedding or trench backfill material.

3.03 SHORING, SHEETING, AND BRACING OF TRENCH

A. The trench shall be braced and supported with sheets when necessary to prevent caving during excavation in unstable material, or to protect adjacent structures, property, and workers.

B. The Contractor shall secure a trench permit from the California Division of Industrial Safety prior to the excavation of any trench over 5 feet in depth.

C. Shoring and sheeting shall be removed as the backfill is completed in a manner that will not damage the pipe or permit voids in the backfill.

D. All sheeting, shoring, and bracing of trenches shall conform to the safety requirements of the federal, state, or local public agency having jurisdiction. The most stringent of these requirements shall apply.

3.04 PIPE/CONDUIT TRENCH BACKFILLING

A. Trenches shall be backfilled to the lines and grades as shown on the Plans.

B. Placement methods shall be employed that do not disturb or damage buried drainage pipes and conduits in the trench.

C. Pipe bedding material shall be placed at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth and compacted to 90 percent of maximum dry density as determined by ASTM D 1557.

D. Pipe bedding shall be placed around the sides and to the top of the pipe/conduit, tamped in place, and compacted to 90 percent of maximum dry density as determined by ASTM D 1557.

E. Optimum moisture content of pipe bedding material shall be maintained to attain required compaction density.

F. Portion of trench above pipe bedding shall be backfilled with engineered fill in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

G. Jetting of trenches shall not be permitted, unless allowed by the Design Engineer.

H. For buried pipe that does not require pipe bedding or engineered fill (condensate drain pipe), the trench backfill shall be placed in a manner that will not damage the pipe. The trench backfill shall be compacted to a firm consistency consistent with surrounding erosion-resistant layer material.

3.05 ANCHOR TRENCH BACKFILLING (IF NECESSARY)

A. A placement method shall be employed that does not damage the ClosureTurf™ in the trench.

B. The portion of the trench above the ClosureTurf™ shall be backfilled with engineered fill in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

C. Jetting of trenches shall not be permitted, unless allowed by the Design Engineer.

D. Trenches shall be backfilled to the lines and grades as shown on the Plans.

PART 4 MEASUREMENT AND PAYMENT

4.01 TRENCHING

A. Measurement and payment for trenching per this Section shall be considered as included in the Contract Unit Price paid for the various items of Work for which it is required.

4.02 SHORING, SHEETING, AND BRACING

A. Measurement and payment for any shoring, sheeting and trench bracing per this Section shall be considered as included in the Contract Unit Price paid for the various items of Work for which they are required.

4.03 TRENCH BACKFILLING

A. Measurement and payment for backfilling of trenches per this Section shall be considered as included in the Contract Unit Price paid for the various items of Work for which it is required.

END OF SECTION

SECTION 02240
FOUNDATION LAYER

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall prepare all existing interim cover soil to be incorporated into the foundation layer and place all new foundation layer material as necessary in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare, haul, place and grade soil material to install the foundation layer.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the foundation layer, including verification of thickness, shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If field and/or laboratory testing by CQA Monitor indicates that any area(s) of the foundation layer does not meet compacted moisture content and dry density requirements, the Contractor shall rework the material in that area(s) at his expense until the foundation layer is in conformance with the requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to pay for testing of the recompacted foundation layer material.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from discing or aerating the subject materials to achieve acceptable conditions.

B. Surveying
   1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the foundation layer to the lines, grades, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Work site for use by the Contractor's Land

Surveyor or eligible Engineer.

2. All grades and dimensions of completed areas of the foundation layer may be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA verification surveying that any portion(s) of the foundation layer does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

C. Foundation Layer Thickness

1. If field testing by CQA Monitor indicates that any area(s) of the foundation layer does not meet the minimum thickness requirements, the Contractor shall place additional foundation layer material at his expense until the deficient area(s) is in conformance with the requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to pay for testing of the new foundation layer placement area(s).

PART 2 PRODUCTS

2.01 SOURCE

A. On-site material meeting the requirements of this Section and as follows shall be used for the foundation layer.

B. Existing interim cover soils removed from the designated refuse excavation areas meeting the requirements of this Section shall be used for the foundation layer.

C. Material excavated from within the on-site borrow area meeting the requirements of this Section shall be used for the foundation layer.

D. It is expected that sufficient suitable material for the foundation layer will be available from the above on-site sources. The Contractor may need to segregate or select material from the borrow area for use as foundation layer material, however the Contractor will not be required to mechanically screen or import material for the foundation layer.

2.02 PROPERTIES

A. Foundation layer material shall be soil or soil/rock mixture that is free of organic matter, debris, and/or deleterious or other unsuitable materials.

B. Foundation layer material shall not contain rocks or clods over 6 inches in greatest dimension, and not more than 15 percent by dry weight shall be larger than 2 inches in greatest dimension or as approved by the Design Engineer.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. All vegetative growth on existing interim cover soil surfaces shall be removed in accordance

with the "Clearing and Grubbing" procedures presented in Section 02222 (Excavation) of these Technical Specifications.

B. The existing interim cover soils shall be fine graded to eliminate rough or low areas.

C. The existing interim cover soils shall be scarified within the limits shown on the Plans to a depth of approximately 12 inches, moisture conditioned to within 1 to 3 percentage points of optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

3.02 PLACEMENT OF NEW FOUNDATION LAYER MATERIAL

A. In areas requiring additional foundation layer material as shown on the Plans, new foundation layer material shall be placed in 6-inch lifts with a maximum uncompacted thickness of 8 to 12 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition in each layer. Foundation layer material shall then be brought to a uniform moisture content within 1 to 3 percentage points of the optimum moisture content, mixed as required to establish uniform moisture, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557.

3.03 SURFACE GRADING

A. When completed, the surface of the foundation layer shall conform to the grades shown on the Plans after placement and compaction and at no point on the completed grading plane shall the grade vary above the designated grades by more than 0.10 feet.

B. When completed, the surface of all foundation layer slopes greater than 10 percent shall conform to the grades shown on the Plans. At no point on the completed grading plane shall the grade vary below the designated grades measured perpendicular to the slope, nor by more than 0.20 feet above the designated grades as measured perpendicular to the slope.

PART 4 MEASUREMENT AND PAYMENT

4.01 SUBGRADE PREPARATION

A. Subgrade preparation shall be measured by the square foot and includes all fine grading, scarification, moisture conditioning and recompaction. Payment shall be included in the Contract Unit Price per square foot completed for "Subgrade Preparation" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to prepare the subgrade as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 NEW FOUNDATION LAYER MATERIAL

A. New foundation layer material comprised of interim cover soil removed from the designated refuse excavation areas shall be measured by the in-place cubic yard installed and includes all excavation, transport, placement, moisture conditioning and compaction. The quantity for "Fill (Refuse Excavation Interim Cover Soils)" shall be a final pay quantity as described in Section 9-1.015 of the Standard Specifications and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install new foundation layer material derived from the designated refuse excavation areas as shown on the

Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. New foundation layer material from all other sources shall be measured by the in-place cubic yard installed and includes all excavation, transport, placement, moisture conditioning and compaction. The quantity for "Fill (Foundation Layer and Engineered Fill)" shall be a final pay quantity as described in Section 9-1.015 of the Standard Specifications and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install new foundation layer material as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02310
ACCESS ROADS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall construct all access roads, including grading and subgrade preparation, in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare and construct the access roads.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the access roads shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If any portion(s) of the access road construction is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall rework or remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from discing or aerating the subject materials to achieve acceptable conditions.

PART 2 PRODUCTS

2.01 REINFORCEMENT GEOTEXTILE

A. Reinforcement geotextile for the access road construction shall conform to the requirements of Section 02771 (Reinforcement Geotextile) of these Technical Specifications.

2.02 AGGREGATE BASE

A. Aggregate base for the access road construction shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.03 ENGINEERED FILL

A. Engineered fill for the access road construction shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall provide all construction, grading control, and other staking necessary to construct the access roads to the lines, grades, and dimensions shown on the Plans.

3.02 SUBGRADE

A. Where access roads are not constructed on engineered fill, the subgrade for the access roads shall be scarified a minimum of 6 inches, uniformly moisture conditioned to within 1 to 3 percentage point of optimum moisture content and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557.

B. Where access roads are constructed on engineered fill, the engineered fill shall be placed and compacted in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

C. Where access roads are constructed on the installed engineered turf, the following precautions and requirements shall be implemented:
   1. Vehicle and equipment access on the installed engineered turf during the access road construction shall conform with applicable provisions outlined in Section 02772 (Geomembrane) of these Technical Specifications. This requirement no longer applies once a minimum of 12 inches of material has been placed atop the engineered turf.
   2. The initial lift of engineered fill placed atop the installed engineered turf shall be well graded and shall not contain rock or clods over 1 inch in greatest dimension.
   3. Damage to the underlying engineered turf resulting from the access road construction operations shall be repaired at the Contractor's expense and in accordance with applicable repair procedures outlined in Section 02772 (Geomembrane) of these Technical Specifications.

3.03 REINFORCEMENT GEOTEXTILE

A. Prior to placing geotextile on the subgrade for access roads, the stability of the subgrade shall be checked in the presence of the CQA Officer by proof rolling with a roller or loaded water truck. Areas which are not suitable shall be allowed to air dry until stable or shall be over-excavated and backfilled with aggregate base, at the Contractor's expense.

B. Reinforcement geotextile shall be installed over the access road subgrade and seamed as specified in Section 02771 (Reinforcement Geotextile) of these Technical Specifications, as shown on the Plans, and in accordance with the manufacturer's instructions.

C. Reinforcement geotextile panels shall be installed (unrolled) in the direction of traffic (longitudinally).

D. Reinforcement geotextile panels shall be overlapped a minimum of 2 feet on sides and ends.

E. Trucks and other construction equipment shall not drive on reinforcement geotextile prior to covering with the full thickness of aggregate base.

3.04 AGGREGATE BASE

A. Prior to placing aggregate base on subgrade for access roads, the stability of the subgrade shall be checked in the presence of the CQA Officer by proof rolling with a roller or loaded water truck. Areas which are not suitable shall be allowed to air dry until stable or shall be over-excavated and backfilled with aggregate base, at the Contractor's expense.

B. Trucks shall back-dump aggregate base onto the reinforcement geotextile, driving on previously dumped aggregate base to progress.

C. The aggregate base shall be spread in uniform loose lifts not exceeding 8 inches in thickness.

D. The aggregate base shall be moisture conditioned to within 1 to 3 percentages points of optimum moisture content, and compacted to a minimum of 95 percent of maximum dry density per ASTM D 1557.

E. Access roads shall be "proof rolled" in the presence of the Design Engineer or their representative with a heavy wheel-load vehicle, such as a loaded water truck, to identify weak areas. Weak areas shall be reworked to the Design Engineer's satisfaction without additional compensation.

PART 4 MEASUREMENT AND PAYMENT

4.01 ACCESS ROADS

A. Access roads constructed over engineered turf shall be measured by the square foot in place as determined by the actual length constructed by the actual width constructed and includes all engineered fill (supply and installation), subgrade preparation, reinforcement geotextile and aggregate base. Payment shall be included in the Contract Unit Price per square foot installed for "Access Roads over Engineered Turf" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the access roads as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. All other access roads shall be measured by the square foot in place as determined by the actual length constructed by the actual width constructed and includes all grading, subgrade preparation, reinforcement geotextile and aggregate base. Payment shall be included in the Contract Unit Price per square foot installed for "Access Roads" addressed in this Section and

shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the access roads as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02722
DRAINAGE AND EROSION CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install (including necessary excavations) all drain inlets, drain pipes, sedimentation basin outlet structures, side slope drainage channels (grading only), earthen and lined swales, rock riprap swales, rock riprap outfalls and inlets, and erosion control materials in accordance with this Section and at the locations and to the dimensions and grades shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare and construct the various drainage and erosion control features.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plan*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 [2,700 kN-m/m3]).

1.04 SUBMITTALS

A. At least 14 calendar days prior to beginning any drainage or erosion control construction in accordance with the requirements of this Section, the Contractor shall provide three (3) copies to the Design Engineer of the name and location of material sources, laboratory test results and/or material data sheets conforming with relevant details shown on the Plans.

B. The Contractor shall provide the name and location of source, laboratory test results, and product data sheets (mix design) for the concrete to be used showing that the material meets or exceeds the product requirements. If more than one (1) concrete mix is to be used, mix designs for each area shall be submitted and clearly marked as to the area of Work that the mix is intended for.

C. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall submit the following to the Design Engineer for approval:
   1. Samples, manufacturer's product data sheets, and manufacture's installation guidelines for the following materials to verify that the materials meet or exceed the corresponding product requirements:
      a. CMP, HDPE, fittings, anchor assembly stakes and hardware.
      b. Turf reinforcement mat (TRM) and anchorage stakes.

c. Erosion control netting and anchorage staples.

1.05 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the drainage and erosion control structures shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
3. If any portion(s) of the drainage and erosion control structures is determined by the CQA Monitor to not meet the requirements of this Section, based on either testing or observations, the Contractor shall, at his expense, rework or remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

B. Surveying
1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the drainage components to the lines, grades, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Work site for use by the Contractor's Land Surveyor or eligible Engineer.
2. All lines, grades and dimensions of installed drainage components may be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA verification surveying that any portion(s) of the drainage components does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 PRODUCTS

2.01 DRAIN INLETS

A. Drain inlets shall be as shown on the Plans. Drain inlets shall be manufactured of cast in place concrete or prefabricated reinforced concrete or approved steel equivalent to the dimensions set forth in the Plans.

B. Concrete for the drain inlets shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.02 PIPE AND FITTINGS

A. The CMP for the drain pipe shall be of 16 gauge continuous helical lock corrugated steel pipe conforming to the requirements of Section 66 "Corrugated Metal Pipe" of the Standard Specifications. All CMP and standard assembly fittings required for complete assembly shall be galvanized conforming to the requirements of Section 66-1.02 E(1) of the Standard Specifications for zinc coated steel.

B. HDPE pipe shall be Type S corrugated polyethylene pipe with smooth interior and shall conform to the requirements in AASHTO Designation M294. The pipe shall be manufactured from high-density polyethylene virgin compounds.

C. Pipe (including all couplings and fabricated fittings) shall be supplied from the source approved by the Design Engineer based on the submittal requirements in Part 1.04 of this Section.

D. Anchor assembly stakes and hardware for above ground CMP shall conform to Section 75-1.02 of the Standard Specifications. All hardware shall be galvanized after fabrication. All pipe stakes shall be either galvanized after fabrication, or be fabricated from pre-galvanized pipe. If pre-galvanized pipe is used, weld areas shall be cleaned and painted with zinc-rich primer.

2.03 PIPE BEDDING

A. Pipe bedding shall conform to the requirements of Section 02207 (Aggregate Base) of these Technical Specifications.

2.04 BACKFILL

A. Backfill above the pipe bedding shall consist of material excavated from the trench/excavation unless specified otherwise by the Design Engineer.

2.05 EROSION MATTING

A. Erosion matting as shown on the Plans for erosion mat lined swales shall be lined with TRM and shall be made of thermally-welded PVC monofilaments in a two-dimensional web as manufactured by Greenstreak and distributed as "PEC-MAT," or approved equivalent.

B. Anchorage for the TRM shall be wooden survey stakes, 1 inch by 4 inches in dimension, and approximately 10 to 12 inches in length.

2.06 FILTER GEOTEXTILE

A. Filter geotextile shall conform to the requirements of Section 02771 (Geotextile) of these Technical Specifications.

2.07 ROCK RIPRAP

A. Loose and grouted rock riprap for the swales and outfalls shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.08 CONCRETE

A. Concrete for the drain inlets, sedimentation basin outlet structure foundations, and grouted riprap outfalls shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.09 EROSION CONTROL

A. Straw for erosion control shall be certified weed free.

B. Erosion control netting shall be lightweight polypropylene having an approximate 0.50-inch x 0.50-inch mesh.

C. U-staples to anchor the netting shall be 0.50-inch by 10-inch U-staples as recommended by the netting manufacturer or as approved by the Design Engineer.

2.09 WOOD POSTS AND RAILING

A. The wood used for the posts and railing at the drainage inlets shall be construction common or better grade redwood. The wood shall be painted with two coats of premium quality exterior grade flat white latex paint approved by the Engineer. Nails used to fasten the rails to the posts shall be galvanized box gauge.

2.10 STEEL GRATE

A. The steel grate on the drainage inlet shall be made of #6 reinforcing bars at a 12 inch spacing. The bars shall be shop welded to form the grate per Plans. The ends of the bars in the upper mat shall be bent downward ¾ inch so that they will rest flat on the bottom of the notch at the top of the drainage inlet. The steel in the reinforcing bars may be Grade 40 or 60.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall provide all construction, grading control, and other staking necessary to construct drainage and erosion control structures to the lines and grades shown on the Plans.

3.02 STOCKPILING

A. The Contractor shall stockpile drainage and erosion control materials in an area(s) approved by the Design Engineer.

3.03 EXCAVATION

A. Excavation for drainage and erosion control structures shall be in conformance with the requirements specified in Section 02222 (Excavation) of these Technical Specifications.

3.04 DRAIN INLETS AND DRAIN PIPE

A. Trenching for drain inlets and buried drain pipe shall be in conformance with the requirements specified in Section 02225 (Trenching and Backfilling) of these Technical Specifications.

B. Placement of drain inlets/buried drain pipe and associated bedding and backfill material shall be in conformance with Section 66-1 of the Standard Specifications and Section 02225 (Trenching and Backfilling) of these Technical Specifications.

C. Above ground drain pipe shall be placed and anchored in conformance with Section 66 of the Standard Specifications and as shown on the Plans.

3.05 SEDIMENTATION BASIN OUTLET STRUCTURES

A. Vertical slots shall be cut in the sedimentation basin drainage risers to the dimensions, orientation and frequency as shown on the Plans.

B. Trenching for the drainage riser foundations shall be in conformance with the requirements specified in Section 02225 (Trenching and Backfilling) of these Technical Specifications.

C. Minor concrete for the drainage riser foundations shall be installed as shown on the Plans and placed in conformance with Section 03300 (Concrete) of these Technical Specifications.

D. Placement of backfill material shall be in conformance with Section 66-1 of the Standard Specifications and Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.06 EARTHEN SWALES

A. Earthen swales shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

3.07 EROSION MAT LINED SWALES

A. The TRM shall be installed as shown on the Plans and per manufacturer's recommendations.

B. Trenches for terminal and check slots (anchorage) shall be excavated into the erosion-resistant layer as shown on the Plans. Backfill of trenches shall be compacted to 90 percent of maximum dry density as determined by ASTM D 1557.

C. TRM placed at the top of swale (finish surface) shall be at or below the final grade so surface drainage can flow freely into the swale.

D. TRM shall first be installed in the upstream terminal end slow and rolled downstream with care taken to assure that the TRM conforms to the flow surface of the channel and is not in tension.

E. All splices shall be shingled downstream.

F. Anchorage stakes shall be installed as shown on the Plans and per manufacturer's recommendations.

3.08 LOOSE ROCK RIPRAP LINED SWALES

A. The earthen portion of the swale shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

B. Filter geotextile shall be installed to the dimensions as shown on the Plans and in accordance with Section 02771 (Geotextile) of these Technical Specifications.

C. Rock riprap shall be placed on the earthen and ClosureTurf™ swales (where applicable) to the dimensions as shown on the Plans. Rock riprap shall be placed to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

D. Rock riprap shall not be placed by dumping.

E. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire length of the swale. The placed rock riprap shall be free of pockets of small stones or clusters of larger stones.

3.09 GROUTED ROCK RIPRAP OUTFALLS

A. The footprint of the outfall shall be excavated to the dimensions as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

B. Rock riprap shall be placed within the excavated footprint to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Rock riprap shall not be placed by dumping.

D. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution over the entire footprint of the outfall. The placed rock riprap shall be free of pockets of small stones or clusters of larger stones.

E. Placement of concrete for the grouted rock riprap shall be in conformance with Section 03300 (Concrete) of these Technical Specifications.

3.10 LOOSE ROCK RIPRAP INLETS AND OUTLETS

A. The earthen portion of the inlets and outlets shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

B. Filter geotextile shall be installed to the dimensions as shown on the Plans and in accordance with Section 02771 (Geotextile) of these Technical Specifications.

C. Rock riprap shall be placed on the installed filter geotextile to the dimensions as shown on the Plans. Rock riprap shall be placed to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

D. Rock riprap shall not be placed by dumping.

E. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire

area of protection. The placed rock riprap shall be free of pockets of small stones or clusters of larger stones.

3.11 EROSION CONTROL

A. Following the application of seed and fertilizer, straw shall be blown onto landfill and borrow area surface slopes that are steeper than 10 percent. Blown straw shall be applied to achieve a minimum thickness of 1.5 inches in place.

B. Following application of the straw, cover the straw with erosion control netting. Space netting anchors at a frequency of 1 foot on center along the edges, and one (1) every 35 square feet for interior areas. Space the butt joints 1 foot apart.

PART 4 MEASUREMENT AND PAYMENT

4.01 DRAIN INLETS AND DRAIN PIPE

A. Drain inlets shall be measured by each drain inlet installed and include all trenching, CMP, backfill, concrete, metal cover, and bars at the opening. Payment shall be included in the Contract Unit Price per each unit installed for "Concrete Drain Inlets (4'x4')" and "30" CMP Drain Inlets" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the respective drain inlets as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Above ground drain pipe shall be measured by the linear foot in place and include all pipe, couplings, and anchor assemblies. Payment shall be included in the Contract Unit Price per linear foot installed for the various sizes and types of "CMP Drain Pipe (Above Ground)" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the above ground drain pipe as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

C. Buried drain pipe shall be measured by the linear foot in place and include all trenching, pipe bedding, pipe and couplings, backfill, and compaction. Payment shall be included in the Contract Unit Price per linear foot installed for the various sizes and types of "CMP Drain Pipe (Buried)" and "HDPE Drain Pipe (Buried)" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the respective buried drain pipe as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 SEDIMENTATION BASIN OUTLET STRUCTURES

A. Sedimentation basin outlet structures shall be measured on each outlet structure at each sedimentation basin for the complete installation of the outlet structure including all trenching, excavation, backfill, CMP, HDPE pipe, HDPE riser, pipe bedding, concrete, concrete riprap outfall, and other incidentals shown on the Plans. Payment shall be included in the Contract Unit Price for "Sedimentation Basin Outlet Structures" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the sedimentation basin outlet

labor, equipment, tools, and incidentals required to install the sedimentation basin outlet structures as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore. All payment items under this section shall be excluded from other payment in other sections.

4.03 SIDE SLOPE DRAINAGE CHANNEL GRADING

A. Side slope drainage channel grading shall be measured by the linear foot in place and include all excavation and grading. Installation of the ClosureTurf™ portion is covered separately under payment for the geomembrane and engineered turf pay items. Payment shall be included in the Contract Unit Price per linear foot constructed for "Side Slope Drainage Channel Grading" addressed in this Section and shall include full compensation for providing all labor, equipment, tools, and incidentals required to construct the side slope drainage channels as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 SWALES

A. Earthen swales (Type I) shall be measured by the linear foot in place and include all excavation and grading. Payment shall be included in the Contract Unit Price per linear foot installed for "Type I Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type I swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Earthen swales with TRM (Types II and IV) shall be measured by the linear foot in place and include all excavation, grading and TRM materials. Payment shall be included in the Contract Unit Prices per linear foot installed for "Type II Swales" and "Type IV Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type II and Type IV swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

C. Earthen swales with loose rock riprap (Type III) shall be measured by the linear foot in place and include all excavation, grading, filter geotextile and riprap. Payment shall be included in the Contract Unit Price per linear foot installed for "Type III Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type III swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

D. Loose rock riprap swales over ClosureTurf™ (Type V) shall be measured by the linear foot in place and include all excavation, grading and riprap. Installation of the ClosureTurf™ portion is covered separately under payment for the geomembrane and engineered turf pay items. Payment shall be included in the Contract Unit Price per linear foot installed for "Type V Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type V swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 GROUTED ROCK RIPRAP OUTFALLS

A. Grouted rock riprap outfalls shall be measured by each grouted rock riprap outfall installed and include all excavation, rock riprap and concrete. Payment shall be included in the Contract Unit Price per each unit installed for "Grouted Rock Riprap Outfalls" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the grouted rock riprap outfalls as shown on the Plans, as specified herein, and as directed by the Design Engineer. The Contractor shall make provisions for additional material needed to account for excessive voids between rocks, as no additional compensation will be allowed therefore.

4.06 LOOSE ROCK RIPRAP INLETS AND OUTLETS

A. Rock riprap inlets and outlets shall be measured by each rock riprap inlet and outlet installed and include all excavation, filter geotextile and rock riprap. Payment shall be included in the Contract Unit Price per each unit installed for "Loose Rock Riprap Inlets and Outlets" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the rock riprap protection as shown on the Plans, as specified herein, and as directed by the Design Engineer. The Contractor shall make provisions for additional material needed to account for excessive voids between rocks, as no additional compensation will be allowed therefore.

4.07 EROSION CONTROL

A. Erosion control straw/netting shall be measured by the square foot in place and includes all straw, netting and anchorage. Payment shall be included in the Contract Unit Price per square foot installed for "Erosion Control" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the erosion control materials as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02771
GEOTEXTILE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all filter and reinforcement geotextiles in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials (including sewing thread), equipment, transportation, and incidentals as necessary to install the filter and reinforcement geotextiles, including that needed for testing and joining materials in field (sewing, heat bonding, etc.).

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM D 4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
B.	ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
C.	ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
D.	ASTM D 4632	Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
E.	ASTM D 4751	Standard Test Method for Determining the Apparent Opening Size of a Geotextile.
F.	ASTM D 5261	Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
G.	ASTM D 6241	Standard Test Method for Static Puncture Strength Resistance of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of filter and reinforcement geotextile rolls to the Work site, the Contractor shall submit three (3) copies of the following to the Design Engineer for approval:

1. Samples, product data sheets, and complete description of filter and reinforcement geotextiles that meet or exceed the product requirements of this Section.
2. Manufacturer's Quality Control (MQC) testing reports for filter and reinforcement geotextiles to be delivered to the Work site. At a minimum, results of those tests specified in Part 2 of this Section must be included in the MQC testing reports.
3. Manufacturer's recommended procedures for transporting, unloading, storage, handling, installation, repair, and seaming (sewing, heat bonding, and lapping) of filter and reinforcement geotextiles.
4. Samples, product data sheets, and complete description of sewing thread recommended by the Manufacturer to sew the filter and reinforcement geotextile.

1.05 TRANSPORT AND STORAGE

A. The filter and reinforcement geotextile rolls shall be transported to the Work site by the Contractor with opaque protective coverings in a closed trailer.

B. At least seven (7) calendar days prior to any Work site delivery, the Contractor shall notify the Design Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Design Engineer prior to site delivery.

C. Unloading and storage (stacking) of the filter and reinforcement geotextile rolls at the Work site shall be the responsibility of the Contractor; who shall observe and certify, in writing, that the unloading and storage of filter and reinforcement geotextile rolls was performed in accordance with the submitted Manufacturer's recommended procedures.

D. The Contractor shall transport filter and reinforcement geotextile rolls from the storage area in a manner that does not damage the reinforcement geotextiles, and in accordance with the Manufacturer's recommended procedures.

1.06 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the filter and reinforcement geotextile shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
3. If any portion(s) of the filter and reinforcement geotextile installation is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 FILTER GEOTEXTILE

A. The geotextile filter shall be manufactured of non-woven, continuous or staple filament, needle-punched, polypropylene or polyester, ultra-violet (UV)-stabilized yarn orientated into a stable network that maintains its structure during handling, placement, and long-term service.

B. The geotextile filter shall be chemical resistant and cannot be heat burnished or contain recycled materials.

C. The geotextile filter shall have the following minimum average roll values:

1.	Mass per Unit Weight (ASTM D 5261)	3.8 oz./square yard
2.	Grab Tensile Strength (ASTM D 4632)	110 lbs.
3.	Trapezoidal Tear Strength (ASTM D 4533)	50 lbs.
4.	Puncture (ASTM D 6241)	310 lbs.
5.	Permittivity (ASTM D 4491)	1.7 sec^{-1}
6.	Apparent Opening Size (ASTM D 4751)	<No. 70 U.S. Std. Sieve
7.	UV Resistance (ASTM D 4355)	Retain 70% strength @ 500 hrs.

D. A geotextile product which can be used and meets these specifications is TenCate Mirifi 140N.

2.02 REINFORCEMENT GEOTEXTILE

A. Reinforcement geotextile shall be constructed of polypropylene materials and shall be resistant to damage under normal construction activities, and to biological and chemical degradation.

B. Reinforcement geotextile shall be a woven geotextile manufactured for the purposes of separation, confinement, and roadway subgrade reinforcement.

C. Physical properties of the reinforcement geotextile shall be tested at a minimum testing frequency of once per every 100,000 square feet of reinforcement geotextile manufactured and the physical properties shall be as follows:

Test Method	Property	Required Value/MARV
ASTM D 4632	Grab Tensile	
	-Machine Direction	315 lb.
	-Cross Direction	315 lb.
ASTM D 4632	Grab Elongation	
	-Machine Direction	12%
	-Cross Direction	12%
ASTM D 4833	Puncture	120 lb.
ASTM D 4533	Trapezoid Tear Strength	
	-Machine Direction	113 lb.
	-Cross Direction	113 lb.

D. Geotextile products which can be used and meet these specifications are TC Mirafi 600X, Synthetic Industries Geotex 315ST, or equivalent.

2.02 SEWING THREAD

A. The thread used for sewing of filter and reinforcement geotextiles shall be polymeric and have strength properties equal to or greater than the filter and reinforcement geotextiles.

B. The thread used for sewing of filter and reinforcement geotextiles shall be chemical resistant.

C. The thread used for sewing the filter and reinforcement geotextiles shall be equivalent to that recommended by the filter and reinforcement geotextile Manufacturer(s) submitted in accordance with Part 1.04A of this Section.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. The Contractor shall verify that the material and surface upon which the filter and reinforcement geotextiles are to be placed are complete and in accordance with the Technical Specifications for that material or surface prior to filter and reinforcement geotextile installation.

3.02 INSTALLATION

A. Filter and reinforcement geotextiles shall be installed in accordance with Manufacturer's instructions.

B. Filter and reinforcement geotextiles shall be installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

C. Filter and reinforcement geotextile panels shall be overlapped with sufficient material to create a prayer fold for sewing operations.

D. Filter and reinforcement geotextiles shall be ballasted during installation and until they are covered with the overlying material.

E. Temporary anchorage for the filter and reinforcement geotextiles during placement shall be the responsibility of the Contractor.

F. Terminal ends of reinforcement geotextile, where the type and purpose of the reinforcement geotextile changes as shown on the Plans, shall be overlapped a minimum of 4 feet.

G. Portions of the filter and reinforcement geotextiles wasted by the Installer, and rendered unusable, as determined by the CQA Monitor, shall be transported by the Contractor off-site to a permitted transfer station or solid waste disposal facility for disposal at the Contractor's expense.

3.03 SEAMING

A. All seams for filter and reinforcement geotextiles shall be made by sewing; alternate seaming methods may be allowed if it is demonstrated by the Contractor that the method will create a seam that is acceptable for the intended purpose and will not reduce the properties of the filter and reinforcement geotextiles below those specified in Part 2 of this Section or cause damage to any underlying geosynthetic materials.

B. Soil materials which could adversely affect sewing operations shall be cleaned from the filter and reinforcement geotextiles prior to sewing.

C. A prayer fold shall be created within the overlap prior to sewing.

D. The prayer fold shall be sewn with a 401 two-thread chain stitch.

PART 4 MEASUREMENT AND PAYMENT

4.01 FILTER GEOTEXTILE

A. Measurement and payment for filter geotextile shall be included in the Contract Unit Prices for "Type III Swales", "Type V Swales" and "Rock Riprap Inlet Protection" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

4.02 REINFORCEMENT GEOTEXTILE

A. Measurement and payment for reinforcement geotextile shall be included in the Contract Unit Price for "Access Roads" addressed in Section 02310 (Access Roads) of these Technical Specifications.

END OF SECTION

SECTION 02772
GEOMEMBRANE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and transport to the site all geomembrane as shown on the Plans and a sufficient amount of extrudate rod to complete the extrusion welding necessary for testing and repairing the geomembrane.

B. The Contractor shall furnish all labor, tools, supervision, transportation, and equipment necessary for the installation of the geomembrane, including that needed for testing and welding materials in the field.

1.02 REFERENCES

A. ASTM D 638 Standard Test Method for Tensile Properties of Plastics.

B. ASTM D 746 Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

C. ASTM D 792 Standard Test Method for Specific Gravity and Density of Plastics by Displacement.

D. ASTM D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting.

E. ASTM D 1204 Standard Test Method for Linear Dimensional Changes to Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures.

F. ASTM D 1505 Test Method for Density of Plastics by the Density-Gradient Technique.

G. ASTM D 3895 Standard Test Method for Copper Induced Oxidative Induction Time of Polyolefins by Thermal Analysis.

H. ASTM D 4218 Test Method for Carbon Black Content.

I. ASTM D 4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

J. ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.

K. ASTM D 5397 Standard Test Method for Notched Constant Tensile Load Test of Geomembrane.

L. ASTM D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.

M. ASTM D 5617 Standard Test Method for Multi-Axial Tension Test for Geosynthetics.

N. ASTM D 5994 Sheet Thickness for Textured Geomembrane.

O. ASTM D 6392 Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.

P. ASTM D 7466 Standard Test Method for Measuring Asperity Height of Textured Geomembranes.

Q. FTMS 101C Puncture Resistance.

1.03 QUALIFICATIONS (Not Used - See Section 01010-1.03B)

1.04 SUBMITTALS

A. At least 14 days prior to delivery of geomembrane rolls to the site, the Contractor shall submit the following, in triplicate, to the Engineer for approval:
1. A Certificate of Compliance stating that all resin used for the product to be supplied is from a single source in the United States or Canada, of the same general type, and meets the requirements of Part 2.01 of this Section.
2. Manufacturer's Quality Control (MQC) test results for the geomembrane base resin.
3. Samples, product data sheets, and a complete description of the geomembrane to be supplied that meets or exceeds the product requirements of Part 2.02 of this Section.
4. A 2-foot by 2-foot (minimum size) sample from the same geomembrane specimen tested in accordance with Part 2.02G of this Section and possessing a degree of texturization representative of the material that will be shipped to the site.
5. MQC test results for the geomembrane rolls to be delivered to the site. At a minimum, the results of the tests specified in Part 2.02 of this Section must be included in the MQC testing reports.
6. Manufacturer's recommended procedures for transporting, unloading, storage, handling, installation, repair, seaming (extrusion and fusion welding), and seam testing of geomembrane.
7. A Certificate of Compliance stating that the extrudate rod material meets the product requirements of Part 2.03 of this Section.

B. At least 14 days prior to beginning installation of geomembrane, the Contractor shall submit the following, in triplicate, to the Engineer for approval:
1. Installer's Geomembrane Installation Quality Control Plan, which includes testing procedures and frequencies.
2. Shop Drawings showing the proposed geomembrane panel layout and details of field fabrications including skirt and sleeve pipe boots.
3. Installer's Qualifications including the following:
   a. Resume of Installer's foreman.
   b. Resume of Installer's master welder.
   c. Resumes of Installer's welding and quality control personnel.

C. Upon completion of the geomembrane installation, the Contractor shall submit the following, in triplicate, to the Engineer.
1. Installer's warranty in compliance with Part 1.07B of this Section.

2. As-built geomembrane panel layout drawings showing all panels, testing, sampling, and repair locations.

1.05 TRANSPORT AND STORAGE

A. At least seven days prior to any site delivery, the Contractor shall notify the Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Engineer prior to site delivery.

B. Unloading and storage (stacking) of the geomembrane rolls at the site is the responsibility of the Contractor; however, unloading and storage of geomembrane rolls shall be performed in accordance with the submitted Manufacturer's recommended procedures.

C. The Contractor shall transport geomembrane rolls from the storage area in a manner that does not damage the geomembrane, and in accordance with the Manufacturer's recommended procedures.

D. The storage area for the geomembrane rolls will be located by the Contractor and must be approved by the Engineer.

1.06 QUALITY ASSURANCE TESTING

A. The CQA Monitor will take at least one sample for every 100,000 square feet of geomembrane delivered to the site and perform the following quality CQA conformance testing to verify that the product meets the requirements of Part 2.02 of this Section.
1. Tensile Properties (ASTM D 6693 / ASTM D 638).
2. Density (ASTM D 1505).
3. Carbon Black Content (ASTM D 4218).
4. Carbon Black Dispersion (ASTM D 5596).
5. Sheet Thickness (ASTM D 5994)

B. The CQA Monitor will take at least one sample per lot of geomembrane delivered to the site for CQA conformance testing to verify compliance with the interface shear strength requirements of Part 2.02F of this Section.

C. Geomembrane shipped to the site that does not contain a degree of texturization comparable to the approved texture sample submitted in accordance with Part 1.04A of this Section will be rejected by the Engineer.

D. Sampling for CQA conformance testing may be performed by the CQA Monitor at the manufacturing plant prior to shipping.

E. The CQA Monitor will collect samples and send them to the Geosynthetics Testing Laboratory for seam testing in accordance with Part 3.05E of this Section. Within 48 hours of sampling, the Engineer will accept or reject the seams based on the results of laboratory testing.

F. The Contractor shall assist with seam sampling by cutting samples and repairing sample locations at the direction of the CQA Monitor.

1.07 WARRANTIES

A. The Contractor shall provide a five-year prorata warranty for the geomembrane against deterioration due to exposure to the elements, either exposed or buried.

B. The Contractor shall provide a two-year non-prorata warranty for the geomembrane against installation defects.

PART 2 PRODUCTS

2.01 RESIN

A. The resin used for manufacturing the geomembrane shall be new virgin material, first quality, compounded Linear Low-density Polyethylene (LLDPE), and manufactured specifically for producing geomembrane.

B. Preferred, but not required to have a 4- to 6-inch wide smooth edge to promote welding.

C. No mixing of different resin types shall occur during geomembrane manufacturing.

D. No second run or recycled materials shall be used during geomembrane manufacturing.

E. The resin used for manufacturing the geomembrane shall have a Specific Gravity (ASTM D 792) of minimum 0.940 g/cm^3 after addition of carbon black and other additives.

F. The resin used for manufacturing the geomembrane shall not contain more than 1 percent (by weight) additives other than carbon black.

G. The resin used for manufacturing the geomembrane shall not contain more than 3.5 percent (by weight) total additives.

2.02 GEOMEMBRANE

A. All geomembrane shall be manufactured by the same Manufacturer in the United States or Canada.

B. Geomembrane shall have a structured studded drainage surface on the top side and a spiked friction surface on the bottom side using a method which fully integrates the texture asperities with the sheet, such as Super Gripnet®, or equivalent; no spray-on texturing shall be allowed.

C. Additives for UV protection, thermal stability, or processing agents must not “bloom” to the surface of the geomembrane over time or inhibit welding.

D. Finished geomembrane rolls shall be free from blemishes, holes, pin holes, bubbles, blisters, excessive gels, undispersed resins, undispersed carbon black, contamination by foreign materials, nicks, and cuts.

E. Geomembrane shall meet the following minimum average roll values for the following properties.

TEST	MINIMUM AVERAGE ROLL VALUE[1]	MQC[3] TEST FREQUENCY
Sheet Thickness (ASTM D 5994)	50-mil ±10 % [2]	10 per roll
Density (ASTM D 792, Method B)	0.993 g/cm^3	1 per rail car
Tensile Strength @ Break (ASTM D 6693)	105 ppi	1 per 100,000 ft^2
Elongation @ Break (ASTM D 638)	300 %	1 per 100,000 ft^2
Tear Resistance (ASTM D 1004)	30 lb	1 per 100,000 ft^2
Puncture Resistance (ASTM D 4833)	55 lb	1 per 100,000 ft^2
Carbon Black Content (ASTM D 4218)	2.0 to 3.0 %	1 per 100,000 ft^2
Carbon Black Dispersion (ASTM D 5596)	All Category 1 or 2	1 per 100,000 ft^2
Oxidation Induction Time (ASTM D 3895)	140 minutes minimum @ 200°C	1 per 100,000 ft^2
Low Temperature Brittleness (ASTM D 746)	< -40°F	Certification
Dimensional Stability (ASTM D 1204)	2 % maximum change	Certification
Drainage Stud Height (ASTM D 7466)	130-mil	1 per 100,000 ft2
Friction Spike Height (ASTM D 7466)	175-mil	1 per 100,000 ft2

[1] The average of all measurements on any roll shall not be less than the MARV value.
[2] The minimum allowable thickness for any measurement shall not be less than 10% of the nominal specified thickness. The average of all measurements on any roll shall not be less than 48 mils.
[3] Manufacturing Quality Control.

F. The geomembrane shall have the following minimum seam strength and test failure criteria when welded in accordance with the submitted Manufacturer's recommended procedures:
   1. For peel test specimens:
      a. The failure mode shall be a film tear bond (FTB).
      b. There shall be no more than 10 percent peel penetration into the weld.
      c. The quantitative value for the peel strength shall be a minimum of 75 ppi.
   2. For shear test specimens:
      a. The failure mode shall be film tear bond (FTB).
      b. The specimen shall achieve a 2-inch elongation with the grips initially set one inch back from the edge of the weld.
      c. The quantitative value for bonded seam strength shall be a minimum of 120 ppi.

2.03 EXTRUDATE ROD

A. All extrudate rod shall be made from same resin as the geomembrane.

B. All additives shall be thoroughly dispersed throughout the rod.

C. Extrudate rod shall be free of contamination by moisture or foreign materials.

2.04 FIELD FABRICATIONS

A. All geomembrane used for field fabrications shall be obtained from the approved geomembrane rolls to be used for the panel installation which meet the material property requirements of Part 2.02 of this Section.

B. The Installer shall fabricate and weld all skirt and sleeve pipe boots in the locations shown on the Plans, and as shown on the approved Shop Drawings.

2.05 GEOMEMBRANE SURFICIAL STRIPS

A. Geomembrane surficial strip material shall be Super Gripnet or single-sided geocomposite (200 mil).

2.06 CLOSURE TURF™ COLLECTION FOOT ASSEMBLIES

A. The ClosureTurf™ LFG collection foot is a component of the ClosureTurf™ to provide the interface between the surficial collection strips, the geomembrane, and the LFG collection well head. The collection foot components are to be provided by the manufacturer of the ClosureTurf™ product.

B. PVC assembly components (i.e., pipe, fittings, valves, sample test port, etc.) shall conform to the requirements of Section 15200 (LFG Collection System Components) of these Technical Specifications.

C. Wellhead adapter shall be 2-inch by 1.5-inch flexible coupling with stainless steel band clamps as manufactured by Fernco, or approved equivalent.

2.07 CLOSURE TURF™ PRESSURE RELIEF VALVES

A. The ClosureTurf™ pressure relief valves are a component of the ClosureTurf™ to provide necessary release of pressure in the event the LFG collection system malfunctions. These pressure relief valves are to be provided by the manufacturer of the ClosureTurf™ product.

2.08 FIELD TESTING EQUIPMENT

A. A field tensiometer shall be used by the Installer for seam strength testing and be calibrated and accurate to within 2 pounds.

B. A one-inch (width) by six-inch (length) cutting die shall be used for cutting seam strength test specimens from bulk seam samples.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. The Installer shall verify that the subgrade surface upon which the geomembrane is to be placed is smooth, uniform, firm and unyielding, and free from rocks or other debris. No protrusions, ruts, or ridges greater in depth or height than 1.0 inch shall be allowed prior to geomembrane installation.

B. The Contractor and Installer shall complete and sign the Subgrade Acceptance Form provided by the CQA Monitor, verifying that the surface which the GCL will be installed upon is acceptable. The CQA Monitor and the Design Engineer will also verify that the surface which the GCL will be installed upon is acceptable. Once the Contractor has signed the Subgrade Acceptance Form, it is the Contractor's responsibility to maintain the surface in the condition required by Part 3.01A of this Section.

C. The Contractor is responsible for temporary anchorage during installation and until permanent ballast is fully installed.

D. Prior to and at the middle of each geomembrane welding work shift and whenever adjustments are made to the welding machines, the Installer shall prepare and test trial welds for each welding machine that are being used or will be used during that work shift. Trial welds shall be prepared for both fusion and extrusion welding machines. Trial weld samples for fusion welding machines shall be a minimum of 6-feet in length; trial weld samples for extrusion welding machines will be a minimum of 3-feet in length with the trial weld centered on and running the length of the sample. Trial welds shall be tested as follows.

1. Trial welds shall be allowed to cool to ambient conditions, prior to testing. After cooling, excessive material shall be cut from the beginning and the end of the trial weld sample (approximately 4-inches from each end). Using the cutting die, four 1-inch specimens shall be cut at an even spacing along the length of the trial weld.
2. Using the field tenisometer, two non-adjacent specimens shall be tested for peel adhesion (peel) and two for bonded seam strength (shear). Both sides of fusion welds shall be tested for peel. The rate of separation for both the peel and the shear tests shall be 2 inches per minute. The CQA Monitor will be present for, and observe, all trial weld tests.
3. All peel test specimens shall meet all of the following criteria:
    a. The failure mode shall be a film tear bond (FTB).
    b. There shall be no more than 10 percent peel penetration into the weld.
    c. The quantitative value for the peel strength shall be a minimum of 75 ppi.
4. All shear test specimens shall meet all of the following criteria:
    a. The failure mode shall be film tear bond (FTB).
    b. The specimen shall achieve a 2-inch elongation with the grips initially set one inch back from the edge of the weld.
    c. The quantitative value for bonded seam strength shall be a minimum of 120 ppi.
5. If any of the four test specimens do not meet the peel or shear criteria, the entire trial weld will be rejected and that machine shall not be used for installation of the geomembrane until passing a retest. Retesting shall consist of repeating the entire trial weld sampling and testing procedure on a new weld performed with the failing machine. If the retested trial weld fails, that welding machine shall not be used for installation of the geomembrane until proper adjustments or repairs and a passing trial weld test results. If the welding machine continually fails field testing, the machine shall be tagged and completely removed from work area.

3.02 INSTALLATION

A. Geomembrane panels shall be deployed parallel to the slope by unrolling down the entire length of the slope. Corrections or adjustments shall be made to panels which become askew to the parallel line of the slope. End-to-end panel butt seams shall occur on benches.

B. The textured geomembrane shall be placed in direct and uniform contact with underlying protective cover subgrade soil, with the spikes down and the stud side up. The geomembrane surface shall not be dragged over the underlying subgrade; a plastic slip sheet or other means shall be used to position the geomembrane without dragging it over the subgrade.

C. Adjacent geomembrane panel edges shall be overlapped a minimum of 4-inches for fusion welding. The alignment of the overlap shall be kept consistent by marking overlap indicator points.

D. Geomembrane damaged during handling, transport, or deployment shall be removed or repaired as directed by the Engineer.

E. Geomembrane installation and seaming methods shall not damage underlying subgrade or soil materials; any damage to underlying soil materials shall be repaired at the expense of the Contractor.

F. The Installer shall only deploy the quantity of geomembrane which can be completely welded and anchored by the end of the work shift or day.

G. The Contractor shall prepare an adequate number of sandbags to ballast the geomembrane during deployment. Geomembrane rolls may also be used for ballast provided that no damage to the deployed geomembrane occurs. Only plastic ties shall be used to close sandbags; no metal or wire ties shall be used. Sandbags shall be removed prior to deploying overlying materials and after completion of permanent closure turf ballast installation. Sandbags shall be disposed of as directed by the Engineer. Sandbag fill shall not be disposed of within the limits of work unless the fill consists of material which meets the Specification for the material it is disposed upon. Adequate sandbags and timely covering are required to prevent wind shifting of geomembrane. If shifting of geomembrane occurs, inspection of underlying subgrade will be required to ensure the subgrade has not been compromised. Repairs or replacement will be required if displacement or damage has occurred .

H. The Installer shall deploy and seam the geomembrane in a manner which minimizes wrinkles; however, the Installer shall be responsible for, and coordinate with the Manufacturer in, providing the proper amount of slack in the installed geomembrane to compensate for contraction due to local temperature extremes prior to covering. Stress-bridging and "fishmouths" shall not be allowed.

I. Immediately after geomembrane panels running through ditch flow lines or at toes of slopes are welded, sandbags shall be placed end-to-end along the entire length of the flow or toe line to prevent geomembrane stress-bridging at those locations.

J. The geomembrane surficial strips, ClosureTurf™ collection foot assemblies, and ClosureTurf™ pressure relief valves shall be installed per the Plans and in accordance with manufacturer's recommendations.

K. Portions of the geomembrane wasted by the Installer, and rendered unusable, as determined by the CQA Monitor, shall be transported and disposed of by the Contractor.

L. No equipment will be allowed on slopes exceeding 15% on the partially constructed turf cap system until after the completed installation of the sand infill ballast. On slopes less than

15%, ATV type vehicles will be allowed prior to infill placement if the tire /track pressure is less than 5 psi.

M. Following full specified sand infill ballast thickness installation, shall be limited to light duty vehicles with drivability tire/track pressures of less than 35 psi.

3.03 FUSION WELDING

A. Fusion welding shall only take place when the ambient temperature is between 40°F and 110°F. The Installer shall measure ambient temperature 6-inches above the deployed geomembrane. Special weather seaming plans shall be submitted by the Installer and approved by Engineer to perform fusion welds outside this ambient temperature range.

B. All geomembrane seams shall be fusion welded by the double-track method leaving an air gap for leak testing. Extrusion welding shall only be used for repairs, patches, and fabrications.

C. Fusion welding machines shall complete trial weld procedures and pass field testing as specified in Part 3.01 of this Section prior to welding the geomembrane seams.

D. A power source capable of producing sufficient and constant voltage under the combined line load of other welders and equipment shall be used.

E. The surface of the geomembrane to be welded shall be thoroughly cleaned.

F. Geomembrane panels shall be welded at the same speed, temperature, roller pressure, and gauge settings used to prepare the trial weld; the Installer shall adjust the above settings as temperature conditions indicate and record welding machine number, operator, machine settings, time, and date for each seam welded.

3.04 EXTRUSION WELDING

A. Extrusion welding guns shall complete trial weld procedures and pass field testing as specified in Part 3.01 of this Section prior to welding patches or fabrications.

B. Geomembrane patches to be extrusion welded shall overlap the underlying geomembrane panel a minimum of 4 inches.

C. The Installer shall cut square repair patches with rounded corners large enough to extend a minimum of 4 inches beyond the repair area in all directions.

D. The geomembrane patch shall be tack-welded to the underlying geomembrane panel to prevent movement during grinding and extrusion welding operations.

E. A disc grinder shall be used to remove surface debris and oxidation from the outer edge of overlapped geomembrane patches and the underlying geomembrane. Grinding parallel to seam shall not be allowed.

F. The nozzle of the extrusion gun shall be purged to remove solidified extrudate before each use.

G. The extrusion weld shall completely cover the entire width of the grind area and extend 4 inches up any intersecting fusion weld.

H. A cap strip patch shall be extrusion welded at all fusion welded seam intersections of three or more geomembrane panels.

3.05 QUALITY CONTROL

A. General
1. The Installer shall perform all quality control procedures and testing in accordance with the approved Geomembrane Installation Quality Control Plan.
2. The Installer shall maintain an accurate geomembrane panel layout drawing during installation. The drawing shall include: 1) roll and panel numbers; 2) seam numbers; 3) geomembrane limits; 4) anchor trench locations; and 5) seam test sample dates and locations.

B. Deployment
1. The Installer shall coordinate with the CQA Monitor in assigning geomembrane panel and corresponding seam numbers.
2. The Installer shall maintain, and submit to the CQA Monitor, daily deployment logs and panel layout drawings as the deployment progresses and record panel and seam numbers, panel dimensions, and deployment quantities.

C. Fusion Welding
1. The Installer shall maintain, and submit to the CQA Monitor, daily welding logs on which are recorded welding machine number, operator, machine settings, time, and date for each seam welded.
2. The entire length of each fusion welded seam shall be air-pressure tested by the Installer. The Installer shall provide an air pump capable of generating and maintaining 40 psi of pressure and equipped with a regulator and pressure gauge. The Installer shall provide pressure feed needles with pressure gauges accurate to 1 psi and perform the following air pressure test procedure:
   a. Seal both ends of the fusion welded seam with vise-grip plate clamps or an extrusion weld. Heat may be applied to the seam ends to aid in sealing the seam in conjunction with the clamps. Due to the potential hazard of igniting landfill gas, propane torches or any other flame producing device shall not be used.
   b. At one end of the seam, insert air pressure needle into the fusion weld channel.
   c. Pressurize the channel to 40 psi and maintain pressure for 5 minutes.
   d. Release air from the opposite end of the seam to verify that the entire length of the fusion weld channel was pressurized. If channel pressure is not maintained with a maximum allowable pressure loss of 2 psi over the 5-minute test period or does not stabilize at all; the Installer shall locate the defective area, isolate it, and repeat air pressure test procedures in each direction from the defective area.
   e. The Installer shall maintain air pressure test logs on which are recorded seam numbers, beginning and ending air pressures, beginning and ending test times, lengths of tested seam, defective areas found, and confirmation of repair.

D. Extrusion Welding

1. The Installer shall maintain, and submit to the CQA Monitor, daily welding logs on which are recorded welding machine number, operator, machine settings, time, and date.
2. The Installer shall vacuum test each extrusion welded along its entire length. The Installer shall provide a vacuum pump capable of generating and maintaining a pressure of 30 inches of mercury, and equipped with a regulator and vacuum gauge. The Installer shall also provide a vacuum box with a gasket-type seal and a clean view window, and vacuum gauge accurate to 1 psi and perform the following vacuum test procedure:
    a. Saturate the extrusion weld with a soap and water solution.
    b. Place view box over the saturated weld, create an air tight seal, and apply vacuum in the box.
    c. Maintain the vacuum for 10 seconds and examine weld for forming bubbles which indicate leaks. Mark detected leaks for follow up extrusion weld repair. Retest detected leaks after repair to verify that the leaks were successfully repaired.
    d. The Installer shall maintain vacuum test logs on which are recorded repair numbers, vacuum test dates, and vacuum test results.

E. Seam Test Sampling Procedures

1. The CQA Monitor will determine seam test sample locations at minimum intervals of 500 lineal feet of welded seam. The CQA Monitor may decrease or increase this frequency based on previous seam test results. The Installer shall cut the seam test sample where indicated by the CQA Monitor.
2. The Installer shall repair sample holes with an extrusion welded patch in accordance with Part 3.04 of this Section and perform a vacuum test in accordance with Part 3.05D of this Section.
3. Seam test samples shall be 12-inches wide by 36-inches long with the weld centered along the length of the sample. Sample sizes may be modified at the request of the CQA Monitor. The Installer shall cut one 1-inch specimen from each end of the sample and field test the specimens for peel adhesion in accordance with Part 3.01 of this Section. If these specimens pass the field peel test, the CQA Monitor will divide the remaining sample and submit one specimen to the Geosynthetics Testing Laboratory for further testing and retain one for archive. If either of the specimens fail the field peel test, the Installer shall perform Failed Seam Analysis Procedures in accordance with Part 3.07 of this Section.
4. The Installer may take and test any sample at its option; however, all sampling and testing shall be done under the observation of the CQA Monitor and all tests and repairs shall be in accordance with the procedural requirements of this Part.

3.06 LABORATORY TESTING

A. The Geosynthetics Testing Laboratory will perform the following test procedure at the direction of the Engineer:

1. Test five specimens from each sample submitted for peel adhesion and five specimens from each sample for bonded seam strength (ASTM D 6392).
2. All specimens must meet the criteria specified in Part 3.01C of this Section for each type of test.
3. Both sides of fusion welded seams shall be tested for peel adhesion.

B. The Engineer's acceptance of the welded geomembrane seams will be based on the results of laboratory seam analysis.

C. The Engineer will notify the Installer of acceptance or rejection of the seam within 24 hours of submission of the samples to the Geosynthetics Testing Laboratory.

3.07 FAILED SEAM ANALYSIS PROCEDURES

A. The Installer shall perform the following procedures in the event of a seam failure determined by field or laboratory testing:

1. The Installer shall mark the failed seam at a distance of 10 feet in each direction from the failed test sample location. The Installer shall cut a 12-inch by 12-inch sample from each location, then cut one 1-inch wide specimen from each end of the sample, and field test the specimens for peel adhesion in accordance with Part 3.01 of this Section. If all specimens pass the field peel test, the Installer shall cut, and submit to the CQA Monitor, a 12-inch wide by 18-inch long sample from each location for laboratory seam testing. If any of the specimens fail the field peel test at either location, the Installer shall continue sampling the failed seam at 10-foot intervals until specimens successfully pass the field peel tests and a sample can be submitted for laboratory testing. If specimens continually fail field peel tests at the 10-foot intervals, the entire seam or portion of the welded seam shall be repaired by the Installer as directed by the Engineer.
2. The Installer shall repair the failed length of seam determined by field peel testing with an 18-inch wide extrusion welded cap strip in accordance with Part 3.04 of this Section. The installer shall vacuum test the cap strip in accordance with Part 3.05D of this Section.
3. If the retest sample fails laboratory testing in accordance with Part 3.06 of this Section, the Installer shall repeat the interval sampling and testing procedure.

B. At the discretion of the CQA Monitor, seam test samples will be taken from extrusion welded cap strips exceeding 100 feet in length.

PART 4 MEASUREMENT AND PAYMENT

4.01 GEOMEMBRANE

A. Geomembrane material shall be measured on a horizontal plane in plan view by the square foot of the in-place material installed. The quantity for "Geomembrane" shall be a final pay quantity as described in Section 9-1.02C, "Final Pay Quantities," of the Standard Specifications and as shown on the Plans. The price paid per square foot for geomembrane shall include full compensation for providing all labor, equipment, tools, and incidentals (including ClosureTurf™ pressure relief valves) required for installation of the geomembrane as shown on the Plans, as specified herein, and as directed by the Engineer and no additional compensation will be allowed therefor. The Contractor shall make provisions for additional material needed to account for overlaps, anchorage, and waste, as no additional compensation will be allowed therefor.

4.02 GEOMEMBRANE SURFICIAL STRIPS

A. Geomobrane material for the surficial strips shall be measured by the lineal foot for the 3.5 foot wide strips. The price per lineal foot for geomembrane surficial strips shall be included in the Contract Unit Price per lineal foot installed for "Geomembrane Surficial Strips" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the geomembrane surficial strips as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefor.

4.03 CLOSURE TURF™ COLLECTION FOOT ASSEMBLIES

A. ClosureTurf™ collection foot assemblies, including connection to the LFG collection system piping, shall be measured by each collection foot assembly installed. Payment shall be included in the Contract Unit Price per each unit installed for "ClosureTurf™ Collection Foot Assembly" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install and connect the collection foot assemblies to the LFG collection system piping as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefor.

END OF SECTION

SECTION 02773
ENGINEERED TURF

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all engineered turf in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to install the engineered turf, sand ballast infill, HydroBinder® Infill, and water release vents, including that needed for testing and connecting materials in field.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

ASTM D 2256	Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method.
ASTM D 4595	Test Method for Tensile Product (MD/XD).
ASTM D 4632	Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
ASTM D 4716	Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile.
ASTM D 5035	Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).
ASTM D 5261	Test Methods for Mass Per Unit Area (weight) of Woven Fabrics.
ASTM D 5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.
ASTM D 6241	Standard Test Method for Static Puncture Strength Resistance of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
ASTM D 6913	Standard Test Methods for Particle-Size Distribution.

ASTM D 7277	Standard Test Method for Performance Testing of Articulating Concrete Block Systems in Open Channel Flow
ASTM D 96459	Standard Test Method for Determining Rainfall Induced Erosion
ASTM G 147	Standard Test Method for Determining the UV Stability of Engineered Fiber, Natural and Artificial Weathering Tests.
ASTM G 1545(M)	Standard Test Method for Determining UV Stability (exposed), Modified Cycle, UVA340.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of engineered turf rolls to the Work site, the Contractor shall submit three (3) copies of the following to the Design Engineer for approval:
   1. Samples, product data sheets, and complete description of engineered turf that meets or exceed the product requirements of this Section.
   2. MQC testing reports for engineered turf to be delivered to the Work site. At a minimum, results of those tests specified in Part 2 of this Section must be included in the MQC testing reports.
   3. For the geonet base resin:
      a. A Certificate of Compliance stating that all resin used for the product to be supplied is from a single source in the United States or Canada, of the same general type, and meets the requirements of Part 2 of this Section.
      b. MQC test results.
   4. Manufacturer's recommended procedures for transporting, unloading, storage, handling, installation, repair, and seaming (sewing, heat bonding, lapping, and plastic ties) of the geonet composite.
   5. Samples, product data sheets, and complete description of plastic fasteners (ties) recommended by the Manufacturer to join the geonet and sewing thread recommended by the Manufacturer to sew the geotextile.
   6. Panel layout showing machine direction of rolls.

1.05 TRANSPORT AND STORAGE

A. The engineered turf rolls shall be shipped by the Supplier with protective coverings in a closed trailer or a covered open trailer.

B. At least seven (7) calendar days prior to any Work site delivery, the Contractor shall notify the Design Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Design Engineer prior to Work site delivery.

C. Unloading and storage (stacking) of the engineered turf rolls at the Work site shall be the responsibility of the Contractor; however, unloading and storage of engineered turf rolls shall be performed in accordance with the submitted Manufacturer's recommended procedures. engineered turf rolls shall be stacked no more than three (3) high.

D. The Contractor shall transport engineered turf rolls from the storage area in a manner that does not damage the geonet composite, and in accordance with the Manufacturer's recommended procedures.

1.06 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the engineered turf shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
3. If any portion(s) of the engineered turf installation is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 ENGINEERED TURF

A. The engineered turf is a synthetic structured material consisting of one or more geotextiles tufted with polyethylene yarns that resemble grass blades such as DuraTurf manufactured by Shaw, or equivalent. Engineered turf shall be manufactured of UV-stabilized yarn oriented into a stable network that maintains its structure during handling, placement and long-term service.

B. The engineered turf shall be chemical resistant and cannot be heat burnished or contain recycled materials.

C. The engineered turf shall have the following minimum average roll values:

ENGINEERED TURF COMPONENT

Product Data	Test Method	Values
CBR Puncture	ASTM D6241	800 lb, (MARV)
Tensile Product (MD/XD)	ASTM D4595	1,000 lb/ft min (MARV)
Rainfall Induced Erosion	ASTM D96459	< 0.45% Infill Loss 6 in/hr
Aerodynamic Evaluation	GTRI Wind Tunnel	120 mph with maximum uplift of 0.12 lb/sf
Engineered Turf Fiber UV Stability	ASTM G147	> 60% retained tensile strength at 100 years (projected)
Backing System UV Stability (Exposed)	ASTM G1545 Modified Cycle 1.UVA340	110 lbs/ft retained tensile strength at 6500 hours (projected)
Steady State Hydraulic Overtopping (ClosureTurf® with HydroBinder™)	ASTM D7277/D7276	5 ft overtopping resulting in 29 ft/s velocity and 8.8 psf shear stress for Manning N Value of 0.02
Full Scale Wave Overtopping Test Cumulative Volume (ClosureTurf® with HydroBinder™)	Colorado State University Wave Simulator	165,000 ft^3/ft
Full Scale Wave Overtopping Test Wave Overtopping Discharge(ClosureTurf® with HydroBinder™)	Colorado State University Wave Simulator	4.0 ft^3/s/ft
Transmissivity w/ underlying structured geomembrane Normal stress 50 psf and 0.33 gradient (m2/sec)	ASTM D4716	2.5E -03m^2/sec., min.
Internal Friction of combined components	ASTM D5321	35°, min.
Sand Infill Gradation and Ballast	ASTM D6913	ASTM C-33 Fine Aggregates
Yarn Weight (Total Product Weight)	ASTM D5261	19 oz. / sq. yd. (25 oz. / sq. yd. +-1 oz.)
Tensile Strength of Yarn	ASTM D2256	15 lbs. min.

2.02 SEWING THREAD

A. The thread used for sewing of engineered turf shall be polymeric and have strength properties equal to or greater than the engineered turf.

B. The thread used for sewing of engineered turf shall be chemical resistant.

C. The thread used for sewing the engineered turf shall be equivalent to that recommended by the engineered turf Manufacturer submitted in accordance with Part 1.04A of this Section.

2.03 SAND BALLAST INFILL

A. Sand Ballast Infill will meet Particle Size Parameters of ASTM C 33-03 for fine aggregates as shown in the following Table 1:

Table 1: Sand Ballast Infill

Sieve	Percent Passing
9.5 mm (3/8")	100
4.75 mm (No. 4)	95 to 100
2.36 mm (No. 8)	80 to 100
1.18 mm (No. 16)	50 to 85
600 µm (No. 30)	25 to 60
300 µm (No. 50)	5 to 30
150 µm (No. 100)	0 to 10

2.04 HYDROBINDER™ INFILL

A. HydroBinder™ is a cementious product used as the infill component for surface drainage conveyance areas.

B. HydroBinder™ infill Shall be HydroBinder™ Cementitious Infill. The HydroBinder™ infill material may be delivered in either pallet form of 80 lb. bags or 3000 lb. bulk super sacks.

C. Cement, except as otherwise specified herein, will be a brand of Portland Cement, meeting ASTM C 150 and will be Type I or Type II. Only one brand of cement will be used throughout the duration of this Contract.

D. The cementitious infill mix design will conform to the requirements of ASTM C 387 for high strength mortars.

E. The cementious infill will have a minimum 28 day compressive strength of 5000 psi.

2.05 WATER RELEASE VENTS

A. Water release vent material shall be double-sided geocomposite (200 mil).

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. The Installer shall verify that the material and surface upon which the engineered turf is to be placed is complete and in accordance with these Technical Specifications for that material prior to beginning geonet installation.

B. The Contractor is responsible for temporary anchorage during installation and until permanent anchorage is constructed and completed.

3.02 INSTALLATION

A. Engineered turf shall be installed in accordance with the Manufacturer's instructions.

B. Engineered turf shall be installed with the machine (lengthwise) direction of the roll oriented down the slope in accordance with the Panel Layout.

C. Engineered turf panels shall be deployed from the top of the slope in a way that the engineered turf is laid substantially smooth and filaments are pointing upslope after deployment is complete.

D. The first engineered turf panel deployed shall have the turf filaments facing upward. Subsequent panels shall be deployed turf side down, and on top of the previously installed panel. After seaming each panel, the panel shall be flipped onto the geomembrane component with care to avoid pulling of tufts in the drainage studs.

E. End-to-end panel overlaps shall only occur on benches, unless the length of a slope between benches exceeds the total length of a full engineered turf roll.

F. Engineered turf shall be installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

G. A single stitch prayer type seam shall be constructed using a Nulong sewing machine or equivalent. Sewing thread shall be 207 Polyester or equivalent. Sewing will occur between the 1st and 2nd row of Engineered Turf stitches.

H. Engineered turf shall be ballasted during installation and until the engineered turf is covered with the sand ballast infill material.

I. The water release vents shall be installed per the Plans and in accordance with manufacturer's recommendations.

J. On slopes exceeding 15%, no equipment will be allowed on the partially constructed turf cap system until after the completed installation of the sand ballast infill. On slopes less than 15%, ATV type vehicles will be allowed prior to infill placement if the tire /track pressure is less than 5 psi.

K. Following full specified sand ballast infill thickness installation, shall be limited to light duty vehicles with drivability tire/track pressures of less than 35 psi.

L. Engineered turf damaged during installation shall be removed and/or repaired with a sewn or fastened patch at the direction of the Design Engineer.

M. Portions of the engineered turf wasted by the Installer, and rendered unusable, as determined by the Design Engineer, shall be transported by the Contractor and disposed of off-site at a permitted transfer station or solid waste disposal facility.

3.03 SAND BALLAST INFILL PLACEMENT

A. Sand ballast infill shall be placed between the tufts of the engineered turf and:
   1. Shall be per plan either 5/8-inch thick or 2-1/8-inch thick, with a thickness tolerance of ±1/8 inch. Measuring the sand ballast infill thickness will be performed utilizing a digital caliper, or approved alternate measuring device approved by the CQA Officer.
   2. Shall consist wholly of sand meeting ASTM C-33-03 for fine aggregates. See Section 2.03 - SAND BALLAST INFILL - Table 1 for sand infill ballast grain size parameters.
   3. Engineered turf areas that are to receive sand ballast infill must be accepted by the CQA Officer before placement of sand ballast infill takes place.

B. Sand ballast infill shall be worked into the Engineered Turf between the synthetic yarn blades.

C. Conveyor systems and/or Express Blowers shall be used to spread and place the sand ballast infill.

D. The Contractor shall explain with detail in the Preparatory Meeting the method of sand infill deployment to be used.

E. Previously installed components shall not be displaced or damaged as a result of the sand ballast infill component installation.

F. A standard washer will be utilized as a plate for the point of entry into the sand ballast infill for consistent depth control.

3.04 INFILL – HYDROBINDER® PLACEMENT

A. See also Section 2.04 - HydroBinder® INFILL.

B. The HydroBinder® infill layer may be placed using any appropriate equipment capable of completing the work. Manual hand spreading is acceptable when equipment isn't practical.

C. The Contractor shall explain in detail during the Preparatory Meeting the method of HydroBinder® infill deployment.

D. Installation of HydroBinder® infill will only be performed by a Manufacture's approved installer using techniques and equipment approved by the Manufacture.

E. The HydroBinder® shall be installed into the turf while it is in a dry state. The HydroBinder® will be worked into the tufts so the tufts are in an upright position.

F. The HydroBinder® infill shall be placed dry to a thickness of 7/8 inch with a tolerance of +/- 1/8 inch.

G. The hydration process must occur on the same day as the HydroBinder® infill placement. The required HydroBinder® infill thickness will be achieved prior to the hydration process.

H. The cemented infill shall be hydrated thoroughly, however care must be taken to avoid displacement of the non-hydrated infill. The objective is to soak the area to start the hydration process but not to inundate with water beyond saturation.

I. Once hydration is completed as described, backfill and compaction of the vertical anchor trenches (if applicable) shall take place.

K. The HydroBinder® shall be at minimum performance levels within 24 hours. HydroBinder® that does not meet minimum performance levels within 24 hours will be removed and replaced.

3.05 REPAIR

A. All damaged areas or holes shall be repaired with a patch by the Installer as directed by the Design Engineer.

B. Repairs to engineered turf are completed by using a heat-bonded seam. All tie-in seams along flatter slopes less than 15% with length greater than 25 feet will use an approved leistering machine so consistent pressure is achieved throughout the seam. A hand held heat gun with a pressure wheel shall be used for repair of smaller areas. The patch shall extend 2 feet beyond the edge of the damaged area or hole.

C. Contractor may also demonstrate techniques and practices for approval. Field demonstration and approval by the CQA Officer and the Manufacturer is required before incorporating any alternative repair technique.

PART 4 MEASUREMENT AND PAYMENT

4.01 ENGINEERED TURF WITH 5/8" SAND BALLAST INFILL

A. Engineered Turf with 5/8" Sand Ballast Infill shall be measured by the square foot of engineered turf in place covering the entire limits of waste, installed to the toes of all slopes on the landfill or five feet beyond the limits of waste, whichever is greater, as shown on the Plans. The quantity measured for engineered turf shall be as measured on a horizontal plane in plan view and shall include an allowance for overlaps, anchorage and waste. Payment shall be included in the Contract Unit Price per square foot installed for "Engineered Turf with 5/8" Sand Ballast Infill" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered turf and sand ballast infill, including that needed for testing and connecting materials in field as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 ENGINEERED TURF WITH 2" SAND BALLAST INFILL

A. Engineered Turf with 2" Sand Ballast Infill shall be measured by the square foot of engineered turf in place covering the entire limits of waste, installed to the toes of all slopes on the landfill or five feet beyond the limits of waste, whichever is greater, as shown on the Plans. The quantity measured for engineered turf shall be as measured on a horizontal plane in plan view and shall include an allowance for overlaps, anchorage and waste. Payment shall be included in the Contract Unit Price per square foot installed for "Engineered Turf with 2" Sand Ballast Infill" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered turf and sand ballast infill, including that needed for testing and connecting materials in field as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 ENGINEERED TURF WITH HYDROBINDER INFILL

B. Engineered Turf with HydroBinder® Infill shall be measured by the square foot of engineered turf in place covering the entire limits of waste, installed to the toes of all slopes on the landfill or five feet beyond the limits of waste, whichever is greater, as shown on the Plans. The quantity measured for engineered turf shall be as measured on a horizontal plane in plan view and shall include an allowance for overlaps, anchorage and waste. Payment shall be included in the Contract Unit Price per square foot installed for "Engineered Turf with HydroBinder® Infill" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered turf and HydroBinder® infill, including that needed for testing and connecting materials in field as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 ENGINEERED TURF/GEOMEMBRANE ANCHOR TRENCH

A. Engineered turf/geomembrane anchor trench shall be measured by the lineal foot of anchor trench installed, as shown on the Plans. The quantity measured for the anchor trench shall be measured on the horizontal plan and shall include trenching, placement of material in trench, and backfilling. Payment shall be included in the Contract Unit Price per lineal foot installed for "Engineered Turf/Geomembrane Anchor Trench" and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered tur/geomembrane anchor trench, as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 WATER RELEASE VENTS

A. Water release vents shall be measured by each water release vent installed. Payment shall be included in the Contract Unit Price per each unit installed for "Water Release Vent" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the isolation valves as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefor.

END OF SECTION

SECTION 02900
SEEDING AND FERTILIZING

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall seed and fertilize the on-site borrow area surfaces, earthen drainage swales, and all construction-related disturbed surfaces in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to seed and fertilize the various areas identified herein.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

1.03 SUBMITTALS

A. Prior to seeding, the Contractor shall submit to the CQA Monitor, in triplicate, the name and location of material sources, laboratory test results, and/or material data sheets conforming to the relevant details shown on the Plans as outlined herein.

B. After seeding, the Contractor shall submit to the CQA Monitor the certified tags from the seed bags.

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the seeding, fertilizing and mulching shall be conducted in accordance with the CQA Plan.
   2. If any portion(s) of the seeding and fertilizing is determined by the CQA Monitor to not meet the requirements of this Section, the Contractor, at his expense, shall rework that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 SEED

A. Seeding shall conform to the provisions of Section 20-2.10 (Seed) and Section 20-3.04 (Seeding and Fertilizing) of the Standard Specifications.

B. The seed shall consist of the following mix of species and corresponding application rates:
   1. Trilfolium Incarnaium (Crimson Clover): 25 lbs/AC
   2. Hordeum Vulgare (Common Barley): 50 lbs/AC

3. Festuca Rubra (Creeping Red Fescue): 50 lbs/AC
4. Lolium Perenne (Perennial Ryegrass): 25 lbs/AC

2.02 FERTILIZER

A. Fertilizer shall consist of the following components and percentages:

Ammonia Phosphate Sulfate	16 percent
Phosphoric Acid	20 percent
Water Soluble Potash	0 percent

PART 3 EXECUTION

3.01 GENERAL

A. The method and equipment used to spread the seed and fertilizer shall be subject to the approval of the Design Engineer.

B. Seed and fertilizer shall be applied after the after the access roads and drainage structures have been placed to grade.

C. Seed and fertilizer shall not be applied to the access roads, rock riprap swales, and sedimentation basins.

3.02 APPLICATION

A. The application of seed and fertilizer shall be performed by hydroseeding methods using the following steps:
1. *Step 1:* Seed and fiber shall be hydroseeded onto the designated surfaces at a rate of 150 lbs/AC and 500 lbs/AC, respectively.
2. *Step 2:* Hydromulch with tackifier and fertilizer shall then be applied at rates of 500 lbs/AC (fiber), 150 lbs/AC (tackifier [M-binder, organic bean base glue]), and 200 lbs/AC (fertilizer).

B. All products shall be spread uniformly over all areas subject to revegetation.

PART 4 MEASUREMENT AND PAYMENT

4.01 SEEDING AND FERTILIZING

A. Seeding and fertilizing shall be measured by the acre installed and includes all seed, fertilizer, tackifier and fiber. No adjustments in compensation will be made in the Contract Unit Price paid for "Seeding and Fertilizing" as a result of an increase or decrease in the quantity of revegetation products used, regardless of the reason for the increase or decrease, even if the increase or decrease exceeds 25 percent of the Design Engineer's Estimate. The provisions in Section 4-1.03B (Increased or Decreased Quantities) of the Standard Specifications shall not apply.

B. Payment shall be included in the Contract Unit Price per acre installed for "Seeding and Fertilizing" addressed in this Section and shall include full compensation for providing all

materials, labor, equipment, tools, and incidentals required for seeding and fertilizing as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02960
TEMPORARY EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall implement all erosion control provisions consisting of, but not limited to, the construction of permanent and temporary facilities and taking measures as are necessary to prevent, control and abate water, mud, and erosion damage to public and private property as a result of the construction of this Project. Erosion control shall apply year round to all areas where earthen material is exposed on the Work site and shall not be limited to those areas outlined in these Technical Specifications or as shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to implement the erosion control provisions.

1.02 REFERENCES

A. *Caltrans Standard Specifications (Section 20).* California Department of Transportation, May 2006.

B. *California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ (NPDES No. CAS000002)*. State Water Resources Control Board, 2010.

1.03 SUBMITTALS

A. The Contractor shall prepare and implement a SWPPP for construction activities in accordance with Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications.

PART 2 PRODUCTS

2.01 STRAW BALES

A. Straw for bales shall be noxious weed free and shall be derived from wheat, rice or barley.

2.02 STRAW WATTLES

A. Straw wattles shall be fiber rolls composed of bio-degradable fibers stuffed in a photo-degradable open weave netting.

2.03 ROCK FOR CONSTRUCTION ENTRANCE

A. Rock for the construction entrance shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.04 SILT FENCING

A. Silt Fencing: Filter fabric shall be a pervious sheet of synthetic polymer composed of at least 85% by weight ethylene, propylene, amide, ester, or vinylidene yarn, woven or non-woven. It shall contain stabilizers and/or inhibitors to resist deterioration by heat, water, and ultra-violet light. The fabric shall conform to the following:
   1. The Equivalent Opening Size (U.S. Standard Sieve) shall be within the range 70-100.
   2. The tensile strength (per ASTM D4632) shall be at least 120 pounds.

B. Silt Fencing Posts: Posts for silt fences shall be either 4-inch diameter wood or 1.33 pounds per linear foot steel with a minimum length of 3 feet. Steel posts shall have projections for fastening wire to them.

PART 3 EXECUTION

3.01 SCHEDULE

A. Construction or implementation of erosion control measures shall be performed year round. Between October 15 and May 15 of each year, such temporary erosion control features as are necessary to prevent damage during the forthcoming winter season shall be constructed and remain functional.

B. The Contractor shall comply with the pollution control measures referenced in these Technical Specifications as part of the overall program to control erosion and de-silt runoff.

C. All temporary erosion control facilities shall be maintained during temporary suspension of Work periods.

3.02 PROTECTION

A. All areas of exposed earth created by the Contractor beyond what is shown on the Plans and referred to in these Technical Specifications and areas cleared and grubbed prior to excavation or embankment operations which are subject to wind erosion and runoff shall also be subject to these Technical Specifications, except that the Contractor shall be fully responsible for all costs and liabilities associated with water pollution and temporary erosion control work in these areas.

3.03 TEMPORARY EROSION CONTROL FACILITIES

A. The Contractor shall conduct his operations in such a manner that storm water runoff will be contained within the Work site or channeled into the storm drain system which serves the runoff area. Storm water runoff from one area shall not be allowed to divert to another runoff area.

B. Temporary down drains, drainage structures, and other devices shall be provided to channel storm water runoff water into the respective permanent storm drain systems during construction. Permanent drainage structures, not fully completed, shall be modified as required to accept de-silted runoff.

C. Fill areas, while being brought to grade, and during periods of completion prior to final construction, shall be protected by various measures to eliminate erosion and the siltation of downstream facilities and adjacent areas. These measures may include, but shall not be limited to:

1. Temporary down drains, either in the form of pipes or paved ditches with protected outfall areas;
2. Graded berms around areas to eliminate erosion of embankment slopes by surface runoff;
3. Embankment slopes, not included as part of the construction contract and constructed by the Contractor for temporary access roads, shall be compacted by track walking the face of the slope in a direction perpendicular to the slope contours. Several passes may be required to adequately compact the slope face.

D. Contour graded areas shall be protected against erosion and the resulting siltation of downstream facilities and adjacent areas during grading operations. Various measures may include, but shall not be limited to:

1. Use of graded contour berms to control sheet flow.
2. Supplemental grading of large areas around temporary or unfinished inlet structures, such as inside ramp loops.

E. Culvert pipe used in conjunction with temporary erosion control measures which was new when delivered to the Work site and, in the opinion of the Design Engineer, is not damaged and whose dimensions and other properties conform to the requirements for new material may be used in the new Work.

PART 4 MEASUREMENT AND PAYMENT

4.01 TEMPORARY EROSION AND SEDIMENT CONTROL

A. Measurement and payment for temporary erosion and sediment control provisions including preparation and implementation of a SWPPP shall be considered as included in the Contract Lump Sum Price paid for "Temporary Erosion and Sediment Controls" as addressed in this Section and Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications and includes all compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the Work specified herein and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 03300
CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall supply, transport to the Work site, and install all concrete for construction of drain inlets and the pads at the flare station, post footings for the metal frame pipe supports and security fencing, foundation for the sedimentation basin outlet structures, and grouted rock riprap outfalls in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare and construct the various concrete structures.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. *Manual of Standard Practice*, Concrete Reinforcing Steel Institute (CRSI), 2009.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM A 615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
B.	ASTM C 31	Standard Specification for Making and Curing Concrete Test Specimens in the Field.
C.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
D.	ASTM C 143	Standard Test Method for Slump of Portland Cement Concrete.
E.	ASTM D 1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall provide three (3) copies of the following information to the Design Engineer for approval:
   1. Name and location of the source for the concrete and reinforcing bars.
   2. Laboratory test results for the concrete and reinforcing bars.

3. Manufacturer's product data sheets for the concrete and reinforcing bars to verify that the materials meet or exceed the corresponding product requirements.

1.05 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the concrete components shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
3. If any portion(s) of the concrete is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 CONCRETE

A. Concrete shall be supplied from the same approved source during construction of each structure.

B. Concrete for the drain inlets and flare station concrete pads shall be Type II Portland cement concrete meeting all material requirements of Sections 90-1 and 90-2 of the Standard Specifications and shall exhibit a maximum 4-inch slump when tested in accordance with ASTM C 143 and have a designated 28-day compressive strength of 2,500 psi (drain inlets) and 3,000 psi (flare station concrete pads) when tested in accordance with ASTM C 31 and ASTM C 39.

C. Concrete for post footings and sedimentation basin outlet structure foundations shall be minor concrete conforming to the requirements of Section 90-10 of the Standard Specifications.

D. Concrete for the grouted rock riprap outfalls shall be minor concrete conforming to the requirements of Sections 72-5.02 and 90-10 of the Standard Specifications.

2.02 REINFORCEMENT

A. Reinforcing bars shall be billet-steel bars for concrete reinforcement conforming to ASTM A 615, Grade 40, #4 bars.

2.03 FORMS

A. Forms used in concrete installations shall be APA “Plyform” or equivalent as designed by then Contractor and exhibiting sufficient strength to hold the concrete.

2.04 EPOXY

A. Epoxy used for securing dowels or anchors in concrete shall be Simpson "SET – Epoxy" or Covert "CIA-Gel 7000 Epoxy".

2.05 AGGREGATE BASE

A. Aggregate base for the flare station concrete pads shall conform to the requirements of Section 02207 (Aggregate Base) of these Technical Specifications.

2.06 ENGINEERED FILL

A. Engineered fill for the flare station concrete pads shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The locations, dimensions, and final elevations of the concrete slabs shall be as shown on the Plans or as staked by the Design Engineer.

B. The footprint areas for the flare station concrete pads as shown on the Plans shall be cleared and grubbed in accordance with the requirements of Section 02222 (Excavation) of these Technical Specifications.

C. Following clearing and grubbing, the flare station concrete pad areas shall be overexcavated to a depth of 18 inches and recompacted as engineered fill in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications. Overexcavation is not required if compaction data beneath the concrete slab footprints are available from the former leachate pond backfilling operations that demonstrate that the upper 18 inches meet the engineered fill compaction requirements.

D. Aggregate base for the flare station concrete pads shall be spread in a uniform loose lift not exceeding 8 inches in thickness, moisture conditioned to within 1 to 3 percentage points of the optimum moisture content, and compacted to a minimum of 95 percent of maximum dry density per ASTM D 1557.

3.02 REINFORCEMENT

A. All reinforcement shall be installed in conformance with CRSI's "Manual of Standard Practice".

B. All reinforcement shall be free from rust, oil, dirt, or any other coating.

C. Continuous reinforcing bars shall be lapped at splices at a minimum of 32 diameters.

D. Unless otherwise noted, reinforcement shall have a minimum concrete cover of 3 inches.

E. Reinforcement shall not be damaged and shall be securely supported and anchored to avoid movement during placement of concrete.

3.03 FORMWORK

A. Design and erection of concrete formwork shall be the responsibility of the Contractor. Strength of concrete formwork shall be sufficient to hold the concrete with minimal or no leakage. Shoring and bracing shall be provided to ensure stability of formwork. Three-quarter-inch chamfer strips shall be used at exposed corners.

3.04 CONCRETE SLAB PLACEMENT

A. Subgrade and forms shall be moistened prior to placing concrete.

B. Care shall be taken to not damage or displace the reinforcing steel components.

C. Concrete shall be placed in a continuous operation and thoroughly vibrated to ensure consolidation around reinforcement.

D. The final surface of the concrete slabs shall have a non-slip broom finish.

E. The Contractor shall repair or patch all significant cracks, spalls and irregularities in formed or finished surfaces or other defects, as required to attain the workmanship standards herein.

3.05 MINOR CONCRETE PLACEMENT

A. Minor concrete for post footings and sedimentation basin outlet structure foundations shall be installed as shown on the Plans and in conformance with Sections 51 and 90-10 of the Standard Specifications, as applicable.

B. Minor concrete for the grouted rock riprap shall be placed in conformance with Section 72-5.04 of the Standard Specifications.

3.06 EPOXY SECURED DOWELS OR ANCHORS

A. The diameter and depth of the drill hole shall be as indicated. If not included, the hole shall be drilled 1/8-inch larger and ten (10) times deeper than the diameter of the dowel or anchor.

B. The hole shall be thoroughly cleaned by blowing it out with compressed air and by using a wire brush.

C. Placement of epoxy in the hole shall be performed using a dispensing tool provided by, or recommended by the manufacturer. The hole shall be completely filled with epoxy.

D. The dowel or anchor shall be placed in the hole and the epoxy allowed sufficient time to completely cure before disturbing the dowel or anchor.

PART 4 MEASUREMENT AND PAYMENT

4.01 CONCRETE SLABS

A. The concrete slabs for the flare station shall be measured by the cubic yard of concrete installed and includes all subgrade and pad preparation work, aggregate base, reinforcement steel, formwork, and epoxy secured dowels and anchors. Payment shall be included in the Contract Unit Price per cubic foot installed for "Flare Station Concrete Slabs" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the flare station concrete slabs as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 DRAIN INLETS

A. Measurement and payment for concrete associated with the drain inlets shall be included in the Contract Unit Price for "Drain Inlets" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

4.03 CONCRETE POST FOOTINGS

A. Measurement and payment for concrete post footings associated with the metal frame pipe supports and security fencing for the flare station shall be included in the Contract Unit Prices for "Metal Frame Pipe Supports" addressed in Section 15200 (LFG Collection System Components) and "Security Fencing" addressed in Section 15300 (Flare Station), respectively, of these Technical Specifications.

4.04 SEDIMENTATION BASIN OUTLET STRUCTURES

A. Measurement and payment for concrete associated with the sedimentation basin outlet structure foundations shall be included in the Contract Unit Price for "Sedimentation Basin Outlet Structures" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

4.05 GROUTED ROCK RIPRAP OUTFALLS

A. Measurement and payment for concrete associated with the grouted rock riprap outfalls shall be included in the Contract Unit Price for "Grouted Rock Riprap Outfalls" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

END OF SECTION

SECTION 15100
LANDFILL GAS (LFG) EXTRACTION WELLS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall install all LFG extraction wells as shown on the Plans and in accordance with these Technical Specifications. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to install the LFG extraction wells.

1.02 REFERENCES

A. *Caltrans Standard Specifications*. California Department of Transportation, 2010.

1.03 SUBMITTALS

A. At least 14 calendar days prior to commencement of drilling operations, the Contractor shall submit the following to the Design Engineer for approval:
   1. Drilling subcontractor information, including name of subcontractor, proof of State of California drilling contractor license (Class C-57), type and make of drill rig, names and experience of drill rig operator and helpers, and proposed operating procedures.
   2. The name and location of source, laboratory test results, and/or product data sheets for the following materials to verify that the materials meet or exceed the requirements in Section 7-1.2:
      a. PVC well casing and fittings.
      b. Gravel pack material.
      c. Bentonite.
      d. PVC well bore seal.
      e. Prefabricated Well Head Assemblies.
   3. Manufacturer's recommended installation procedures and operation instructions for prefabricated well head assemblies.
   4. Copies of approved drilling permits (if required) issued by the local governing agency.

B. At the completion of each working day, the Contractor shall prepare a work order summarizing the total footage drilled and amount of materials used for well construction, and submit it to the Design Engineer for approval.

C. The Contractor shall submit to the Design Engineer performance test results for the prefabricated well head assemblies within 14 calendar days of completion of the testing.

1.04 QUALITY ASSURANCE

A. Testing and Observation

1. Testing and/or observation of the casing, annular materials, PVC well bore seal and prefabricated well head assembly installations shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
3. If any portion(s) of the LFG extraction well installations is determined by the Design Engineer to not meet the requirements of this Section based on observations, the Contractor, at his expense, shall mitigate that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 LFG EXTRACTION WELLS

A. PVC WELL CASING AND FITTINGS: PVC well casing and fittings for the LFG extraction wells shall conform to the requirements of Section 15200 (LFG Collection System Components) of these Technical Specifications.

B. GRAVEL PACK: Gravel pack material shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

C. BENTONITE SEAL: Bentonite seal material shall be 100 percent premium grade bentonite clay.

D. PVC WELL BORE SEAL: PVC well bore seals shall consist of a prefabricated pipe boot and a 10-foot by 10-foot skirt manufactured from 30 mil PVC and designed specifically for the intended purpose. The boot portion shall have a minimum length of 4 feet and shall be sized to accommodate a 4-inch diameter well casing.

E. SOIL BACKFILL: Soil backfill material shall be engineered fill material in accordance with Section 02224 (Engineering Fill) of these Technical Specifications.

2.02 PREFABRICATED WELL HEAD ASSEMBLIES

A. Prefabricated well head assemblies for LFG extraction wells shall be Series 3100 PVC well heads manufactured by Real Environmental Products [(209) 296-7900], or approved equivalent. The overall assembly shall include: Series 3100 PVC well head equipped with a 1.5-inch diameter PVC gate valve and dedicated thermometer; orifice assembly with four (4) interchangeable orifice plates with bore diameters of ½ inch, ¾inch, 1 inch and 1-1/2 inch; elastomeric adaptor for connection between the well casing and well head; and a 2-inch diameter PVC flexible hose for connection between the well head and the LFG collection system piping.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor's attention is directed to the details contained in the Plans for information regarding individual well construction characteristics.

B. The locations of LFG extraction wells will be staked by the Design Engineer prior to the commencement of drilling operations.

C. All required drilling permit(s), fees, and inspections shall be arranged, and paid for, by the Contractor.

3.02 DRILLING

A. Drilling and installation of LFG extraction wells shall be by a drilling contractor licensed (Class C-57) in the State of California.

B. Individual LFG extraction wells shall be drilled and installed in a single day so as to minimize the potential for LFG emissions from the borehole. Installation shall include placement of casing, gravel pack, and surface seal (including lower and upper hydrated bentonite seals). The top of the casing shall be capped until installation of the prefabricated well head assembly. In the event of equipment breakdown or other unforeseen circumstance prohibits complete installation of the LFG extraction well within the same working day, provisions shall be made to cover and seal the exposed borehole at the surface to prevent LFG emissions.

C. The boreholes for the LFG extraction wells shall be drilled using a bucket auger drill rig capable of drilling 24-inch diameter boreholes. The Design Engineer will prepare boring logs and associated records.

D. The borehole depths listed in the Plans are estimated and may be adjusted in the field by the Design Engineer.

E. Spoils generated as part of drilling operations may be temporarily stockpiled in proximity of the borehole, or discharged directly into a roll-off bin or dump truck. If temporarily stockpiled, the spoils must be removed by the end of each working day and transferred into a roll-off bin or dump truck for subsequent transport and disposal by the Contractor in accordance with Section 02222 (Excavation) of these Technical Specifications. Spoils remaining on-site overnight in a roll-off bin or dump truck shall be covered at the end of each working day. Spoils shall not remain on-site for more than a 48-hour period.

F. As soon as drilling is completed, a safety screen shall be placed over the top of the borehole. This screen shall stay in place until backfilling is within 4 feet of the surface. The safety screen size should be large enough to accommodate all backfill materials and activities yet not large enough for any human to accidentally fall through.

G. The borehole shall be straight and the well casing shall be installed in the center of the borehole. The Contractor shall take all tension off of the pipe by mechanical means and center the well casing in the middle of the borehole before starting to backfill.

H. PVC well casing joints shall be solvent cemented and secured with 3/8-inch long Type 316 stainless steel lag screws.

I. The completion height of the well casing above ground surface shall be such that the final height of the installed prefabricated well head assembly is 5 feet above final grade.

J. Obstructions and saturated conditions may be encountered during drilling; the Contractor is expected to make reasonable effort to drill through obstructions and saturated conditions and may only abandon the borehole if written approval is obtained from the Design Engineer.

3.03 BACKFILLING

A. Backfilling operations shall commence immediately after well drilling is completed and the well casing has been installed in the borehole. Backfill materials shall be installed as shown on the Plans and as directed by the Design Engineer.
   1. If water is encountered during drilling, the Design Engineer may elect to have the borehole remain open overnight to allow the water level to stabilize. Under this scenario, the Contractor shall make provisions to cover and secure the borehole as a safety precaution and to prevent LFG emissions.

B. The gravel pack shall be poured or scooped through the safety screen at a rate that will not endanger the integrity of the well casing.

C. The upper and lower bentonite seals shall be formed by evenly distributing the bentonite material around the annulus of the well casing and then adding fresh water in a manner that will allow for a thorough saturation of the bentonite. The proportion of water added versus bentonite material shall be in accordance with the bentonite manufacturer's recommendations. This process shall be continued until the minimum bentonite seal thickness as specified on the Plans has been achieved.

D. Soil backfill shall be placed from the top of the lower bentonite seal to the bottom of the upper bentonite seal in a manner that will promote self compaction and avoid bridging of the soil backfill material.

E. The PVC well bore seal shall be installed in accordance with the manufacturer's recommendations around the well casing and placed at the location shown on the Plans. At a minimum, the following provisions shall be implemented during PVC well bore seal installation:
   1. The boot portion of the well bore seal shall be secured around the well casing with stainless steel straps to provide an air-tight connection. Following placement of erosion-resistant layer material, the boot shall be installed in a collapsed position above the final grade to accommodate potential settlement.
   2. Following installation, the PVC well bore seal shall be covered with the overlying GCL material or soil (temporary) if the PVC well bore seal is going to be exposed for more than three (3) working days.

F. For each completed LFG extraction well, the Design Engineer will make a record of borehole and well completion details to include the following information:
   1. Boring log summarizing materials and conditions encountered.

2. Well construction log outlining completion depths and intervals for well casing and construction materials.
3. Map showing the well location by grid coordinates and ground surface elevation.
4. Numbering system to correlate each well with its corresponding well log.

3.04 INSTALLATION OF PREFABRICATED WELL HEAD ASSEMBLIES

A. The prefabricated well head assemblies shall be handled and installed in accordance with the manufacturer's recommendations and as shown on the Plans.

B. Provisions shall be made to ensure that the well head is installed such that the interior extension tube assembly is concentric within the well casing.

C. The completion height of the well head assembly shall be 5 feet above final grade as shown on the Plans.

D. The PVC flexible hose connection between the well head and LFG collection system piping shall be installed with sufficient slack (6 to 8 inches) to accommodate expansion and contraction. "IPS Weld-On 795" plastic pipe cement, or approved equivalent, shall be used for flexible hose connections to the well head and LFG collection system piping.

3.05 ABANDONMENT OF LFG EXTRACTION WELL BOREHOLE (IF REQUIRED)

A. Boreholes approved by the Design Engineer for abandonment shall be backfilled with refuse and/or soil to the final grade and compacted. If refuse is used, the refuse should be mechanically compacted within the borehole using the bucket auger to eliminate potential voids.

B. Upon completion of borehole abandonment activities, the area around the borehole shall be restored to meet the surrounding grades as shown on the Plans.

3.06 PERFORMANCE TESTING

A. During testing of the entire LFG collection system as described in Section 15300 (Flare Station) of these Technical Specifications, the Contractor shall test the prefabricated well head assemblies to verify proper operation. The scope of testing shall include the following:
1. Testing of static and differential pressure ports with valve completely open and completely closed.
2. Operation of temperature gauge.
3. Operation of gas sample port.
4. General inspection of well head assembly, PVC flexible hose, and fittings for leaks.

B. Testing of the static and differential pressure ports and gas sample port shall be conducted using a LANDTEC GEM-2000 Analyzer or equivalent. The Contractor shall measure and record the following information for subsequent submittal to the Design Engineer:
1. Static and differential pressure (valve open and closed).
2. Temperature (valve open and closed).

3. Gas composition: methane, carbon dioxide, oxygen and balance (valve open and closed).

PART 4 MEASUREMENT AND PAYMENT

4.01 LFG EXTRACTION WELLS

A. LFG extraction wells shall be measured by the vertical linear foot installed and includes all drilling, backfilling, and materials. Payment shall be included in the Contract Unit Price per vertical linear foot installed for "LFG Extraction Wells" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the LFG extraction wells as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 PREFABRICATED WELL HEAD ASSEMBLIES

A. Prefabricated well head assemblies shall be measured by each assembly installed and include supply of four (4) interchangeable orifice plates for each assembly. Payment shall be included in the Contract Unit Price per each unit installed for "Prefabricated Well Head Assemblies" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the prefabricated well head assemblies as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 ADDITIONAL BOREHOLE SET-UP

A. Additional borehole set-up (resetting on boreholes allowed to sit overnight for water level stabilization) shall be measured by each set-up required. Payment shall be included in the Contract Unit Price per each occurrence for "Additional Borehole Set-up" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to implement an additional borehole set-up as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 BOREHOLE ABANDONMENT

A. Borehole abandonment shall be measured by the vertical liner foot of borehole abandoned and includes all drilling, backfilling, and materials. Payment shall be included in the Contract Unit Price per vertical linear foot of borehole drilled/backfilled for "Borehole Abandonment" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to implement each borehole abandonment as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 REFUSE DISPOSAL

A. Measurement and payment for disposal of refuse generated by the LFG extraction well drilling operation shall be included in the Contract Unit Price for "Refuse Disposal" addressed in Section 02222 (Excavation) of these Technical Specifications.

4.06 PERFORMANCE TESTING

A. Measurement and payment for performance testing of the prefabricated well head assemblies described in this Section shall be included in the Contract Unit Price paid for "Prefabricated Well Head Assemblies". No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15200
LFG COLLECTION SYSTEM COMPONENTS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all required LFG collection system components, including PVC and HDPE pipe, fittings, and valves, flexible couplings, pipe supports and anchors, condensate drop-outs, and condensate discharge points, as shown on the Plans and in accordance with these Technical Specifications. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals, including excavation and backfilling services, necessary to install the respective LFC collection system components outlined above.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, May 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. American National Standards Institute (ANSI).

E. Plastic Pipe Institute.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM A 193	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
B.	ASTM A 194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
C.	ASTM A 325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength.
D.	ASTM D 1784	Standard Specification for Rigid PVC Compounds and Chlorinated PVC Compounds.
E.	ASTM D 1785	Standard Specification for PVC Plastic Pipe, Schedules 40, 80, and 120.
F.	ASTM D 2464	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 80.

G. ASTM D 2466 Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 40.

H. ASTM D 2467 Standard Specification for Socket-Type PVC Plastic Pipe Fittings, Schedule 80.

I. ASTM D 2513 Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.

J. ASTM D 2564 Standard Specification for Solvent Cements for PVC Plastic Piping Systems.

K. ASTM D 2855 Standard Specification for Making Solvent-Cemented Joints with PVC Pipe and Fittings.

L. ASTM D 3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

M. ASTM D 3350 Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall provide three (3) copies of the following to the Design Engineer for approval:
   1. Manufacturer's product data sheets for the following materials to verify that the materials meet or exceed the corresponding product requirements:
      a. PVC pipe, fittings, and valves (including gasket, seal, bearing and gear materials).
      b. HDPE pipe and fittings.
      c. Vacuum test port fittings.
      d. PVC-HPDE transition coupling.
      e. Flexible couplings and band clamps.
      f. Block type pipe supports and anchors (including concrete masonry blocks, pipe clamps and miscellaneous fittings).
      g. Metal frame pipe supports (including metal frames, pipe clamps and miscellaneous fittings).
      h. Primer and paint.
   2. Manufacturer's recommended procedures for handling (transporting, unloading, storage, etc.), installation, and welding of PVC and HDPE pipe, fittings, and valves, as applicable.

B. At least 14 calendar days prior to conducting performance testing, the Contractor shall submit proposed procedures for the following to the Design Engineer for approval:
   1. Vacuum pressure test of HDPE condensate drain pipe.
   2. Gravity flow discharge test of condensate discharge points.

C. Within 14 calendar days of completion of performance testing for the respective components, the Contractor shall submit to the Design Engineer test results for the following system components:
   1. PVC LFG collection system pipe.
   2. HDPE condensate drain pipe.
   3. Condensate discharge points.

1.05 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the LFG collection system component installations shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
   3. If any portion(s) of the LFG collection system component installations is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 PVC PIPE AND FITTINGS

A. PVC pipe shall meet the requirements of ASTM D 1784 and ASTM D 1785 for Schedule 40 and Schedule 80 PVC pipe. The pipe shall be manufactured from a PVC compound which meets the requirements of Cell Classification 12454-B PVC as outlined in ASTM D 1784.

B. PVC fittings shall meet the requirements of ASTM D 2464, ASTM D 2466, and ASTM D 2467 for Schedule 40 and Schedule 80 PVC pipe fittings. Fittings unavailable in Schedule 40 may be replaced with Schedule 80. The fittings shall be manufactured from a PVC compound which meets the requirements of Cell Classification 12454-B PVC as outlined in ASTM D 1784.
   1. Fittings shall be industrial, heavy duty, hub style.
   2. Socket fittings shall be pressure rated as for the corresponding pipe size prescribed by ASTM D 1785. Threaded fittings shall be pressure rated at 50 percent of the rating for socket fittings.
   3. *Flanges:* Flanges shall meet the following specifications:
      a. Flanges shall be one-piece solid design or two-part van stone type which use the tapered, serrated face and full-face gasket technique for joining and are comparable with ANSI B16.5 Class 150 metal flanges.
      b. Flanges shall be non-shock and pressure rated at 150 psi for water service at 73ºF, and have a minimum burst requirement of 3.3 times the rate pressure.
      c. Bolts shall be Type 316 stainless steel ASTM A 193, Grade B8M hex head and nuts shall be ASTM A 194, Grade 8m hex head.
      d. Gaskets shall be full-face neoprene.

4. *Branch Saddles:* Branch saddles shall either be socket style affixed using PVC cement or clamp-on style secured using stainless steel screws.

2.02 PVC BUTTERFLY VALVES (ISOLATION VALVES)

A. Butterfly valves used for isolating LFG collection system piping segments shall be wafer-type design with a body and disc manufactured from a PVC compound which meets the requirements of Cell Class 12454-B PVC as outlined in ASTM D 1784 and shall be compatible with associated PVC pipe fittings. The PVC butterfly valves shall also meet the following material and performance specifications:

1. Shaft shall be cadmium-plated steel alloy or 300 series stainless steel, positively attached to the disc, and totally sealed from exposure to the process gas or environment. The shaft shall also have a directional indicator on top to indicate disc position with handle removed.
2. Valve body shall be of the wafer design for ease of installation and maintenance and shall be compatible with ANSI B16.5 Class 150 metal flanges.
3. Seat material shall be Viton.
4. Bearings shall be corrosion resistant TFE or polypropylene 20 percent glass filled.
5. Secondary seal material shall be Viton and correspond to the seat material for maximum chemical resistance.
6. Handles and worm gear operators shall be corrosion resistant.
7. Valves shall be non-shock, rated at 150 psi for water service at 73°F, and have a minimum burst requirement of 3.3 times the rate pressure.

2.03 PVC BALL VALVES

A. PVC ball-type valves shall be designed with the major components manufactured from a PVC compound which meets the requirements of Cell Class 12454-B PVC as outlined in ASTM D 1784 and shall be compatible with associated PVC pipe fittings. The PVC ball valves shall also meet the following material and performance specifications:

1. Ball seats shall be virgin TFE and the stem/body seals and seat energizers shall be Viton.
2. PVC socket type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2467.
3. Threaded type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2464 and ANSI B1.20.1 for tapered pipe threads.
4. The valve assembly shall be of construction such that a two-piece body is screwed together to contain seats which are maintained under compressive load against the ball.
5. Valves shall be non-shock, rated at 150 psi for water service at 73ºF, and have a minimum burst requirement of 3.3 times the rated working pressure.

2.04 PVC GATE VALVES

A. PVC gate-type valves shall be designed with the major components manufactured from a PVC compound which meets the requirements of Cell Class 12454-B PVC as outlined in ASTM D 1784 and shall be compatible with associated PVC pipe

fittings. The PVC gate valves shall also meet the following material and performance specifications:

1. Seals shall be Viton.
2. PVC socket type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2467.
3. Threaded type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2464 and ANSI B1.20.1 for tapered pipe threads.
4. Valve wedge shall be constructed of polypropylene and have strain-equalizing threads.
5. Valves shall be non-shock, rated at 150 psi for water service at 73ºF, and have a minimum burst requirement of 3.3 times the rated working pressure.

2.05 PVC CEMENT

A. PVC cements shall meet the requirements of ASTM D 2564 for solvent cemented PVC joints.

2.06 VACUUM/SAMPLE TEST PORTS

A. Vacuum/sample test ports for the LFG collection system piping and ClosureTurf™ collection foot assemblies shall be 1/8-inch flow, ¼-inch threaded polypropylene quick disconnect couplings.

2.07 HDPE PIPE AND FITTINGS

A. HDPE pipe and fittings for the condensate drain piping shall be SDR 9 and rated PE 3408 by the Plastics Pipe Institute. The HDPE pipe shall have a cell classification per ASTM D 3350 of 345444C

B. HDPE pipe and fittings shall meet the following criteria:
   1. The nominal inside diameter of the HDPE pipe shall be true to the pipe size shown on the Plans in accordance with ASTM D 2513.
   2. HDPE fittings for use in laying pipe shall have standard dimensions that conform to ASTM D 3261.
   3. Where possible, HDPE pipe and fittings should be produced by the same manufacturer from identical materials meeting the requirements of this specification. Special or custom fittings may be exempted from this requirement.

2.08 PVC-HDPE TRANSITION COUPLING

A. The PVC-HDPE transition coupling used in the condensate discharge point assemblies to the existing leachate drain shall be Series 735 transition couplings manufactured by Poly-Cam, Inc. [(763) 786-6682], or approved equivalent.

2.09 FLEXIBLE COUPLINGS

A. Flexible couplings shall be 4, 6, or 8 inches in diameter by 18 inches long (Model # LFG44) as manufactured by Snook, Inc. [(2310 799-3333], or approved equivalent.

B. Band clamps used to secure the flexible couplings shall be stainless steel.

2.10 BLOCK TYPE PIPE SUPPORTS AND ANCHORS

A. Blocks for pipe supports and anchors shall be 8” x 8” x 16” masonry blocks.

B. The masonry blocks for the pipe supports shall be equipped with a 2” x 8” redwood cap and #4 rebar stakes covered with rubber hose.

C. Metal frames for the pipe anchors shall be 1-5/8-inch hot-dipped galvanized carbon steel as manufactured by UNISTRUT® (Part No. P1000HS[HG]), or approved equivalent.

D. Pipe clamps shall be galvanized carbon steel and as shown on the Plans.

E. Miscellaneous fittings (i.e., angle braces, bolts, nuts and washers) shall be zinc-coated carbon steel and conform to ASTM A 325.

2.11 METAL FRAME PIPE SUPPORTS

A. Metal frames for pipe supports shall be 1-5/8-inch hot-dipped galvanized carbon steel as manufactured by UNISTRUT® (Part No. P1000HS[HG]), or approved equivalent.

B. Pipe clamps shall be galvanized carbon steel and as shown on the Plans.

C. Miscellaneous fittings (i.e., angle braces, bolts, nuts and washers) shall be zinc-coated carbon steel and conform to ASTM A 325.

2.12 CORRUGATED METAL PIPE (CMP)

A. CMP for pipe supports/drainage for the Type 1 and 3 roadcrossings shall be of 16 gauge CMP continuous helical lock steel conforming to the requirements of Section 66-3 of the Standard Specifications. All CMP shall be galvanization compatible and conform to the requirements of Section 66-3.02 of the Standard Specifications for zinc coated steel.

2.13 STEEL PIPE PROTECTIVE SLEEVES

A. Steel pipe protective sleeves used for the Type 1 and 3 road crossings shall conform to ASTM A53.

2.14 REINFORCED CONCRETE PIPE (RCP) PROTECTIVE SLEEVE

A. The RCP protective sleeve used for the Type 2 road crossing shall conform to ASTM C76, Class III with mesh reinforcement; minimum wall thickness not less than 1.75 inches; steel areas not less than 0.06 square inches per linear foot of pipe barrel; bell and spigot end joints.

2.15 CONCRETE

A. Concrete for block type pipe supports/anchors and metal frame pipe supports shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.16 PIPE BEDDING

A. Pipe bedding for buried header crossings shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.17 ENGINEERED FILL

A. Engineered fill for buried header crossings and road crossings shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The alignment and locations of the LFG collection system components will be staked by the Design Engineer prior to installation.

B. PVC and HDPE pipe, fittings, and valves shall be installed by skilled laborers experienced in installation of such materials.

C. All exposed PVC pipe and fittings shall be painted.

3.02 LFG COLLECTION SYSTEM PIPING

A. LFG collection system piping, including flexible couplings, isolation valves and condensate drop-out points, shall be installed as shown on the Plans.

B. All PVC pipe, fittings and valves shall be handled carefully in loading and unloading, and in such a manner as to avoid shock during placement. PVC pipe, fittings and valves shall not be dropped or dumped.

C. Prior to painting and installation, all PVC pipe, fittings and valves shall be inspected for cuts, scratches, or other damages. Pipe, fittings and valves with imperfections shall not be used.

D. Prior to installation, all PVC pipe and fittings to be left exposed shall be steam cleaned and allowed to dry, then painted with an undercoat coat of high-quality, water-based exterior latex primer, followed by a topcoat of high-quality, ultra-violet resistant, water-based exterior latex paint. The pipe shall be painted to within 6 inches of each end of the pipe section length. Light sanding may be necessary to achieve an acceptable bond. The paint shall be medium gray or white in color, or as specified by the City. Within 24 hours of cleaning, the first coat shall be applied followed by the second coat no more than 48 hours after the first coat has dried. The pipe joints shall be painted in this manner after installation.

E. PVC pipe, fittings and valves shall be joined with socket and solvent cement welding in accordance with ASTM D 2855. Joining of PVC pipe, fittings and valves shall be in accordance with these specifications and the pipe manufacturer's recommendations.

F. All PVC pipe cuts shall be square and perpendicular to the centerline of the pipe. In addition, PVC pipe ends shall be beveled prior to applying primer and solvent cement so that the primer or cement are not wiped off during insertion into the fitting socket.

G. All burrs, chips, etc. generated as a result of cutting operations shall be removed from the pipe interior and exterior. In addition, the inside of the piping shall be kept clean of dirt and debris. Piping left overnight shall be capped.

H. A coating of CPS primer as recommended by the PVC pipe supplier shall be applied to the entire interior surface of the fitting socket, and to an equivalent area on the exterior of the pipe prior to applying solvent cement.

I. The solvent cement shall comply with the requirements of ASTM D 2564 and shall be applied in strict accordance with manufacturer's specifications.

J. PVC pipe, fittings and valves shall not be primed or solvent welded when it is raining or when ambient temperature is below 40°F or above 100°F.

K. After solvent welding, the PVC pipe, fittings and valves shall remain undisturbed until cement has thoroughly set. As a guideline for joint setting time, use 1 hour for ambient temperatures 60°F to 100°F, or 2 hours when ambient temperature is 40°F to 60°F.

L. Flexible couplings shall be installed at the locations shown on the Plans. The flexible couplings shall be installed per the pipe separation criteria specified in the Plans based on the ambient temperature at the time of installation. The stainless steel band clamps shall be secured around the ends of the flexible coupling in such a manner as to provide an air-tight joint.

M. Vacuum/sample test ports shall be installed at the locations and orientations shown on the Plans. The ports shall be installed by drilling and tapping an appropriate sized hole in the LFG collection pipe to allow insertion of the threaded quick disconnect coupling. The ports shall be installed currently with the LFG collection pipe installation and near the end of pipe sections (but not within coupled joints) to facilitate the removal of PVC shavings introduced into the pipe by the drilling/tapping process.

N. Block type pipe supports shall be installed under all pipe segments located on benches. The block type pipe supports shall be spaced at 6 feet on-center (maximum) along the full length of the pipe segments.

O. Block type pipe anchors shall be installed every 50 linear feet (minimum) of LFG collection system piping, as well as at the locations of all tee, elbow and wye fittings (both ends, but not on the fittings themselves). Pipe clamps shall be secured around the LFG header system pipe to ensure that the pipe does not move. Securing of the pipe clamps shall be done in such a manner as to not damage the pipe. No portion of the fittings and flexible couplings shall rest on the block type pipe anchors.

P. Strap type pipe anchors shall be installed at various locations as shown on the Plans to prevent movement associated with thermal expansion. Strap type pipe anchors shall be installed per the Plans and in accordance with the manfucturer’s recommendations.

Q. Metal frame pipe supports shall be installed at channel crossings and near the flare station at the locations shown on the Plans. The pipe supports shall be spaced at 6 feet on-center (maximum) along the full length of the designated spans. Concrete for the pipe supports shall be batched and placed in accordance with the requirements of Section 03300 (Concrete) of these Technical Specifications. The height of cross-bar pipe supports shall be adjusted as appropriate to ensure positive slope of LFG collection system piping.

3.03 BURIED HEADER CROSSINGS

A. Trenching across bench sections shall be to the depth and dimensions shown on the Plans. *Do not excavate deeper than necessary to avoid or minimize the volume of refuse that may be encountered*.

B. Pipe bedding material and LFG collection system piping shall be placed to the dimensions shown on the Plans. LFG collection system piping shall be sloped as shown on the Plans to maintain proper condensate drainage capabilities. The pipe bedding shall be placed in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications

C. The remainder of trench shall be backfilled with engineered fill in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

3.04 ROAD CROSSINGS

A. CMP used for pipe support/drainage and the steel pipe/RCP protective sleeves shall be installed in the orientations shown on the Plans. The CMP shall be aligned with the center line of the drainage swale.

B. A small section of reinforcement geotextile used in the access road construction shall be wrapped around the steel pipe protective sleeve where it will be in direct contact with the underlying pipe support/drainage CMP in order to provide a cushion between the two pipes.

C. LFG collection system piping shall be inserted through the steel pipe/RCP protective sleeves in a manner that will not damage or compromise the LFG collection system piping.

D. Engineered fill shall be placed around and over the CMPs and protective sleeves as shown on the Plans and in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

E. The final surface of the road crossing shall be completed in accordance with the requirements of Section 02310 (Access Roads) of these Technical Specifications and as shown on the Plans.

3.05 CONDENSATE DRAIN PIPE AND FITTINGS

A. The HDPE pipe and fitting manufacturer shall package products for shipment in a manner suitable for safe transport and shall be subsequently handled in accordance with the manufacturer's recommendations.

B. Prior to installation, all HDPE pipe and fittings shall be inspected for cuts, scratches, or other damages. Pipe and fittings with imperfections shall not be used.

C. Trench excavation and backfill for buried HDPE pipe and fittings shall be as shown on the Plans.

D. HDPE pipe connection ends and fittings shall be joined by butt fusion procedures in accordance with the HDPE pipe and fitting manufacturer's recommended procedures.

E. The Contractor shall not bend the HDPE pipe to a degree greater than the minimum radius recommended by the manufacturer.

F. The HDPE pipe shall not be subjected to strains that will overstress or buckle piping or impose excessive stress on joints.

G. Open ends of fused HDPE pipe shall be covered or capped at the end of each working day to prevent entry by animals or debris.

H. For segments completed above ground, provide sufficient slack to allow for thermal expansion and contraction so as to not promote excessive stress on the piping following installation.

I. For segments completed below ground, the Contractor shall allow for thermal expansion or contraction of the HDPE pipe within the trench and coordinate pipe backfill operations to avoid buildup of thermal stresses. Whenever possible, segment tie-ins shall be completed within the trench to prevent overstressed conditions.

J. Following placement of HDPE pipe, sufficient time shall be allowed (per manufacturer's recommendations) for the pipe to adjust to trench temperature prior to testing, segment tie-ins, or backfilling activities.

3.06 CONDENSATE DROP-OUTS

A. Condensate drop-outs, including u-trap assemblies, shall be installed at the locations and to the dimensions shown on the Plans. *Do not excavate deeper than necessary to avoid or minimize the volume of refuse that may be encountered.*

B. The transition from PVC to HDPE shall be at the flange connection as shown on the Plans.

C. PVC and HDPE pipe, fittings and valves shall be installed in accordance with Part 3.02 (LFG Collection System Piping) and Part 3.05 (Condensate Drain Pipe and Fittings) of this Section.

D. Strap type pipe anchors shall be installed at various points on the u-trap piping as shown on the Plans to prevent movement associated with thermal expansion. Strap type pipe anchors shall be installed per the Plans and in accordance with the manfucturer's recommendations.

E. Following construction of u-trap assemblies and prior to start of LFG collection system operations, the u-trap assemblies shall be filled with clean water.

3.07 CONDENSATE DISCHARGE POINTS

A. Condensate discharge points shall be installed at the locations and to the dimensions shown on the Plans.

B. Soil and/or refuse shall be excavated to expose the existing condensate drain. If refuse is encountered, the refuse shall be removed and disposed of in accordance with Section 02222 (Excavation) of these Technical Specifications.

C. When entering excavations to install branch saddles, miscellaneous piping and/or backfill materials, the Contractor's Health and Safety Plan shall be followed accordingly, including trench safety, LFG hazards and possible confined space entry (i.e., oxygen-deficient atmosphere).

D. PVC and HDPE pipe and fittings shall be installed in accordance with Part 3.02 (LFG Collection System Piping) and Part 3.05 (Condensate Drain Pipe and Fittings) of this Section.

E. For condensate discharge points located within the limits of the final cover system, the respective final cover system components shall be placed and installed in accordance with Sections 02240 (Foundation Layer), 02772 (Geomembrane), and 02773 (Engineered Turf) of these Technical Specifications. Portions below the final cover system shall be backfilled in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications.

F. For condensate discharge points located outside the limits of the final cover system, the excavation shall be backfilled in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.08 PERFORMANCE TESTING

A. *PVC LFG Collection System Pipe:* After all PVC pipe and fittings have been joined, including flexible couplings, all connections shall be visually inspected to verify that the connections are securely intact. Tension on the stainless steel straps for the flexible couplings shall also be checked to ensure that the ends of the flexible couplings are adequately secured to the LFG collection system piping and that the tension within the flexible couplings is appropriate based on the given ambient temperature.

B. *HDPE Condensate Drain Pipe:* Before the HDPE condensate drain pipe is connected to the PVC piping system and existing leachate drain, each HDPE condensate drain pipe segment shall be tested and withstand a minimum of 5 psig vacuum for a period of not less than 10 minutes without any drop in pressure. Vacuum shall be measured by a

mercury manometer, slope gauge, or an equivalent device calibrated to read increments of not greater than 0.1 psi. The source of the vacuum shall be isolated before the test is made. Testing shall be performed prior to backfilling segments of the HDPE condensate drain pipe that are to be buried. It shall be the Contractor's responsibility to ensure that proper safety precautions are observed during the testing.

C. *Condensate Discharge Points:* After the HDPE condensate drain pipe is connected to the leachate drain but prior to connecting it to PVC piping system, the functionality of each HDPE condensate drain pipe segment shall be tested to verify each segment's ability to transmit water to the existing leachate drain. Testing shall include introducing water at the uppermost point (i.e., highest elevation) of each segment and verifying the influx of water into the existing leachate drain utilizing the closest downgradient manhole as the point of observation.

PART 4 MEASUREMENT AND PAYMENT

4.01 LFG COLLECTION SYSTEM PIPING

A. PVC pipe and fittings for the LFG collection system piping shall be measured by the linear foot of each for each size of pipe installed and includes all fittings. Payment shall be included in the Contract Unit Price per linear foot installed for "PVC Pipe and Fittings" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the PVC pipe and fittings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Isolation valves shall be measured by each isolation valve installed. Payment shall be included in the Contract Unit Price per each unit installed for "Isolation Valves" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the isolation valves as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

C. Flexible couplings shall be measured by each flexible coupling installed. Payment shall be included in the Contract Unit Price per each unit installed for "Flexible Couplings" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the flexible couplings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

D. Vacuum test ports shall be measured by each vacuum test port installed. Payment shall be included in the Contract Unit Price per each unit installed for "Vacuum Test Ports" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the vacuum test ports as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore

E. Block type pipe supports shall be measured by each block type pipe support installed. Payment shall be included in the Contract Unit Price per each unit installed for "Block Type Pipe Supports" addressed in this Section and shall include full compensation for

providing all materials, labor, equipment, tools, and incidentals required to install the block type pipe supports as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

F. Block type pipe anchors shall be measured by each block type pipe anchor installed. Payment shall be included in the Contract Unit Price per each unit installed for "Block Type Pipe Anchors" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the block type pipe anchors as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

G. Strap type pipe anchors shall be measured by each strap type pipe anchor installed. Payment shall be included in the Contract Unit Price per each unit installed for "Strap Type Pipe Anchors" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the strap type pipe anchors as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

H. Metal frame pipe supports installed within the waste boundary shall be measured by each metal frame pipe support installed and includes all fittings and concrete post footings. Payment shall be included in the Contract Unit Price per each unit installed for "Metal Frame Pipe Supports – Within Waste Boundary" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the metal frame pipe supports within the waste boundary as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

I. Metal frame pipe supports installed outside the waste boundary shall be measured by each metal frame pipe support installed and includes all fittings and concrete post footings. Payment shall be included in the Contract Unit Price per each unit installed for "Metal Frame Pipe Supports – Outside Waste Boundary" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the metal frame pipe supports outside the waste boundary as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

J. The buried header crossing shall be measured by each buried header crossing installed and includes all trenching and backfill materials. *PVC pipe and fittings for the LFG collection system piping are not included in this payment as they are addressed separately.* Payment shall be included in the Contract Unit Price per each unit installed for "Buried Header Crossing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the buried header crossing as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

K. Road crossings shall be measured by each road crossing (Type 1, 2, or 3) installed and includes all trenching, steel pipe/RCP protection sleeves, pipe support/drainage CMPs, and backfill materials. *PVC pipe and fittings for the LFG collection system piping and reinforcement geotextile/aggregate base associated with the access road construction are*

not included in this payment as they are addressed separately. Payment shall be included in the Contract Unit Prices per each unit installed for "Type 1 Road Crossings", "Type 2 Road Crossing" and "Type 3 Road Crossing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the road crossings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 CONDENSATE DRAIN PIPING

A. HDPE pipe and fittings for the condensate drain piping shall be measured by the linear foot installed and includes all fittings. *HDPE pipe and fittings for the condensate drop-outs and condensate discharge points are not included in this payment as they are addressed separately* Payment shall be included in the Contract Unit Price per linear foot installed for "Condensate Drain Piping" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the condensate drain piping as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 CONDENSATE DROP-OUTS

A. Condensate drop-outs, including u-trap assemblies, shall be measured by each condensate drop-out installed. Payment shall be included in the Contract Unit Price per each unit installed for "Condensate Drop-outs" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the condensate drop-outs as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 CONDENSATE DISCHARAGE POINTS

A. Condensate discharge points shall be measured by each condensate discharge point installed. Payment shall be included in the Contract Unit Price per each unit installed for "Condensate Discharge Points" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the condensate discharge points as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 PERFORMANCE TESTING

A. Measurement and payment for performance testing of the various LFG collection system components described in this Section shall be included in the Contract Unit Price paid for the various items of Work for which they are required. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15300
FLARE STATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall assemble all required flare station components and associated appurtenances and implement improvements as shown on the Plans and in accordance with these Technical Specifications, including: installation of a skid-mounted packaged combustion system; installation of condensate drainage line between the skid-mounted packaged combustion system and leachate wet well; completion of all electrical, telephone, and mechanical connections; installation of security fencing; and placement of aggregate base within and around the flare station area as shown on the Plans.

B. The Contractor shall furnish all labor, supervision, tools, materials, equipment, and incidentals necessary to assemble all required flare station components and associated appurtenances, including all required piping, fittings, and connections.

C. The Contractor shall not begin flare station assembly activities requiring hookup to the LFG collection system until performance testing of that system is completed in accordance with Section 15100 (Landfill Gas [LFG] Extraction Wells) and Section 15200 (LFG Collection System Components) of these Technical Specifications.

D. The Owner will be responsible for purchasing and arranging delivery of the skid-mounted packaged combustion system. The actual plans and specifications for these units are not currently available. Based on this circumstance, the design plans, specifications, and installation instructions for the aforementioned system will be supplied to the Contractor a minimum of six (6) weeks prior to commencement of the scheduled LFG collection system installation activities. The Contractor shall be responsible for reviewing the design plans, specifications, and installation instructions in a timely manner and furnishing all necessary materials required to complete the Work in accordance with the approved Construction Schedule.

E. The Contractor shall be responsible for mechanical and electrical assembly and connections of the skid-mounted packaged combustion system. As noted above, actual plans and specifications for these units are not currently available. Based on these circumstances, an assumed scope of work has been developed based on the Design Engineer's experience on similar projects. Whereas the assumed scope of work presented herein is considered representative of what the assembly will entail, the actual work scope is subject to minor revisions based on requirements specified by the selected flare manufacturer.

F. Assembly of the skid-mounted packaged combustion system will require use of a 5 ton crane. The crane will also be required for unloading the skid-mounted packaged combustion system upon its delivery to the Work site. The Contractor shall be responsible for furnishing and operating the crane to implement these tasks. The Design

Engineer or Owner will coordinate the delivery schedule of the skid-mounted packaged combustion system with the Contractor.

G. A representative of the manufacturer of the skid-mounted packaged combustion system will be present during start-up and troubleshooting of the system. Written approval of the system installation and operation by the manufacturer will be required prior to Owner's acceptance of the flare station components. The Owner will pay for the manufacturer's inspection services under the provisions and requirements of this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. American Institute of Steel Construction (AISC).

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 SUBMITTALS

A. At least 14 calendar days prior to commencement of flare station assembly, the Contractor shall submit to the Design Engineer copies of any building permits (if required) issued by the local governing agency.

B. Within 14 calendar days of completion of flare station assembly, the Contractor shall submit to the Design Engineer copies of any building inspection reports (if required) issued by the local governing agency.

C. At least 14 calendar days prior to conducting performance testing, the Contractor shall submit proposed procedures for the following to the Design Engineer for approval:
   1. Skid-mounted packaged combustion system operation.
   2. Hydrostatic pressure test of PVC condensate discharge pipe.

D. Within 14 calendar days of completion of performance testing for the respective components, the Contractor shall submit to the Design Engineer test results for the following system components:
   1. Skid-mounted packaged combustion system.
   2. PVC condensate discharge pipe.

1.05 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the flare station components shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
   3. If any portion(s) of the flare station components is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall fix that portion(s) to meet the requirements of this Section as directed by the Design Engineer.
   4. Abraded and otherwise damaged portions of shop-applied paint shall be cleaned and repainted per the flare manufacturer's recommendations. Welded seams and other un-coated surfaces, heads and nuts of field-installed bolts, and surface where paint was damaged during installation shall be given a coat of specified primer, followed by top coat paint once the primer has completely dried.

PART 2 PRODUCTS

2.01 SKID-MOUNTED PACKAGED COMBUSTION SYSTEM

A. The skid-mounted packaged combustion system will be furnished by the Owner. In general, the system will be comprised of the following primary equipment components:
   1. *Primary Skid Assembly* (AISC designed) housed on a galvanized structural steel skid. This skid will be installed on the eastern flare station concrete pad as shown on the Plans. Primary equipment components mounted to the skid include:
      a. Gas-liquid separator.
      b. Two (2) centrifugal blowers equipped with TEFC electric motors and variable frequency drive.
      c. 4-inch to 8-inch diameter LFG process piping (stainless steel or HDPE) equipped within an automatic block valve.
      d. Control station assembly that includes a self-supporting steel rack with a weather-proof control panel, main power supply disconnect, power transformer, and pilot gas control system.
   2. *Totally-Enclosed Vertical Ground Flare* constructed of A-36 carbon steel. The flare will be installed on the western flare station concrete pad as shown on the Plans. The flare stack diameter will be 4 feet (estimated) with an overall height of approximately 30 feet (estimated). Primary equipment components mounted to the skid include:
      a. One (1) or two (2) combustion air dampers.
      b. Self-checking ultra-violet flame scanner.
      c. Purge air blower.
      d. Thermocouples.
   3. *Miscellaneous Appurtenances* including a flow meter, inlet flame arrestor, continuous chart recorder, and an automatic telephone dialer system.
   4. All piping, conduit and manual valves are pre-piped/pre-wired to the greatest extent possible and are mounted within the skid boundaries.

2.02 ELECTRICAL CONDUIT, WIRE AND FITTINGS

A. Electrical conduit, wire, and fittings for the flare station shall conform to the requirements of Section 15400 (Flare Station Electrical and Telephone Feed) of these Technical Specifications.

2.03 PVC PIPE, FITTINGS AND BALL VALVE

A. PVC pipe, fittings and ball valve for the condensate drainage line between the skid-mounted packaged combustion system and leachate wet well shall conform to the requirements of Section 15200 (LFG Collection System Components) of these Technical Specifications.

2.04 PIPE BEDDING

A. Pipe bedding for the buried portion of the condensate drainage line shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.05 TRENCH BACKFILL

A. Backfill for the buried portion of the condensate drainage line shall conform to the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

2.06 CHAIN LINK FENCE

A. Chain link fence materials for the security fence shall conform to the requirements of Section 80-4.01 of the Standard Specifications and as shown on the Plans.

2.07 CONCRETE

A. Concrete for the security fence post footings shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.08 AGGREGATE BASE

A. Aggregate base placed on the completed ground surface within and around the flare station shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

PART 3 EXECUTION

3.01 FLARE STATION ASSEMBLY

A. All required building permits, fees, and inspections shall be arranged and paid for by the Contractor.

B. Assembly of the flare components shall be performed by skilled laborers experienced in installation of similar equipment.

C. The skid-mounted packaged combustion system shall be installed in strict accordance with the manufacturer's specifications. Design drawings and installation instructions will be provided to the Contractor upon selection of the flare manufacturer. In general, installation of the skid-mounted packaged combustion system will include the following tasks:

1. *Mechanical Assembly*
   a. Mount/anchor the primary skid assembly and totally-enclosed vertical ground flare to the concrete slabs.
   b. Connect inlet flame arrestor to the totally-enclosed vertical ground flare.
   c. Connect LFG process piping from the primary skid assembly to the flame arrestor.
   d. Mount thermocouples (three or four) onto the totally-enclosed vertical ground flare (elevated).
   e. Connect the LFG collection system header pipe from the wellfield to the primary skid assembly.
2. *Electrical Assembly*
   a. Connect main power supply, telephone line, and conduit to the control station assembly.
   b. Connect thermocouple wire and conduit between the thermocouples (elevated) and the control station assembly.

D. Abraded and otherwise damaged

3.02 CONDENSATE DRAINAGE LINE

A. Trenching and pipe bedding placement shall conform to the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

B. Handling and installation of the PVC pipe, fittings and ball valve shall conform to the requirements of Section 15300 (LFG Collection System Components) of these Technical Specifications.

C. The condensate drainage line shall be installed at a minimum slope of 1 percent in the direction of the leachate wet well.

D. The wall of the leachate wet well shall be penetrated at the appropriate depth by coring or other means to allow for insertion of the condensate drainage line. The annular space between the condensate drainage line and the wall of the leachate wet well shall be sealed using non-shrink grout.

E. Following placement of pipe bedding material, the remainder of the trench shall be backfilled in accordance with the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.03 SECURITY FENCE

A. The chain link fence and gates shall be installed as shown on the Plans and in accordance with the requirements of Section 80-4.02 of the Standard Specifications.

B. All line, corner, and gate post assemblies shall be constructed with concrete post footings in accordance with the requirements of Section 03300 (Concrete) of these Technical Specifications.

C. Soil between fence posts shall be leveled to create a 2-inch clearance under the fence fabric.

3.04 FLARE STATION AGGREGATE BASE

A. Aggregate base within and around the flare station shall be placed to the dimensions shown on the Plans.

B. The aggregate base shall be spread in uniform loose lifts not exceeding 8 inches in thickness.

C. The aggregate base shall be moisture conditioned to within 1 to 3 percentage points of optimum moisture content, and compacted to a minimum of 95 percent of maximum dry density per ASTM D 1557. The final compacted thickness shall be a minimum of 6 inches.

3.05 PERFORMANCE TESTING

A. *Skid-Mounted Packaged Combustion System:* The skid-mounted packaged combustion system shall be tested to verify proper operation in accordance with the manufacturer's recommendations. Performance testing shall be supervised by the flare manufacturer's on-site inspector and shall encompass all aspects of system operations, including but not limited to the verification of proper operation of the following components:

1. Gas-liquid separator.
2. Blowers.
3. Automatic ignition and pilot gas control system.
4. Automatic temperature controls, including thermocouples and actuated louver assembly.
5. Automatic block valve operation.
6. Flow meter and continuous chart recorder.
7. Control panel gauges and indicator lighter.
8. Safety shut-down and alarm systems, including automatic telephone dialer system.

Written approval from the flare manufacturer's representative for the system installation and operation will be required prior to the Owner's acceptance of the flare station components. The written approval shall certify that the equipment was properly installed and connected, is in accurate alignment, and is free of undue stress imposed by piping or mounting bolts. The performance testing and acquisition of the manufacturer's approval shall be done within a 3-day work period.

During performance testing of the flare station, the entire LFG collection system well field shall be visually inspected to identify any problems or breaks in the system that may have resulted from system operations.

B. *Condensate Drainage Line:* The PVC condensate drainage line between the flare station and existing leachate wet well shall be hydrostatically pressure tested in accordance with the pipe manufacturer's recommended procedures. It shall be the Contractor's responsibility to ensure that proper safety precautions are observed during the testing.

PART 4 MEASUREMENT AND PAYMENT

4.01 FLARE STATION ASSEMBLY

A. Measurement and payment for flare station assembly shall be included in the Contract Lump Sum Price for "Flare Station Assembly" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, general electrical work, and incidentals required to assemble the flare station as shown on the Plans, as specified herein and within the flare manufacturer's specifications, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 CONDENSATE DRAINAGE LINE

A. Measurement and payment for the condensate drain line shall be included in the Contract Lump Sum Price above for "Flare Station Assembly" of this Section. No additional compensation will be allowed therefore.

4.03 SECURITY FENCE

A. Security fencing for the flare station shall be measured by the linear foot installed and includes all posts, chain link fence fabric, gates, slats and fittings. Payment shall be included in the Contract Unit Price per linear foot installed for "Security Fencing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the security fence as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 FLARE STATION AGGREGATE BASE

A. Aggregate base placed within and around the flare station shall be measured by the square foot installed. Payment shall be included in the Contract Unit Price per square foot installed for "Flare Station Aggregate Base" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the aggregate base as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 PERFORMANCE TESTING

A. Measurement and payment for performance testing of the skid-mounted packaged combustion system and condensate discharge pipe described in this Section shall be

included in the Contract Lump Sum Price paid for "Flare Station Assembly". No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15400
FLARE STATION ELECTRICAL AND TELEPHONE FEED

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install the electrical and telephone feed for the flare station as shown on the Plans and in accordance with these Technical Specifications, which includes extending electrical and telephone services from the existing service point locations to the flare station control panel. The Contractor shall furnish all labor, tools, supervision, equipment, and materials necessary to provide the flare station electrical and telephone feed.

B. The Owner will be responsible for upgrading the power supply at the existing electrical service point shown on the Plans to accommodate the following power requirements for the flare station: 480 volts, 3 phase, 60 hertz, 100 amps, and 35 HP. In addition, the Owner will be responsible for extending telephone service to the service point shown on the Plans.

1.02 APPLICABLE STANDARDS AND SPECIFICATIONS

A. California Administrative Code (CAC) - Title 24.

B. County Ordinances.

C. National Electrical Code (NEC).

D. National Electrical Manufacturer's Association (NEMA).

E. National Fire Protection Association (NFPA).

F. Underwriters Laboratory Inc. (UL).

1.03 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall submit the following to the Design Engineer for approval:

1. Name and location of source, product data sheets, and manufacturer's installation instructions for the following materials to verify that the materials meet or exceed the product requirements specified herein:
    a. Wire.
    b. Conduit and fittings.
    c. Meter socket.
    d. Pull boxes.
    e. Panel.
    f. Junction and outlet boxes.

B. At least 14 calendar days prior to commencement of a specific task, the Contractor shall submit to the Design Engineer copies of electrical permits (if required) issued by the local governing agency.

C. Within 14 calendar days of completion of all electrical work, the Contractor shall submit to the Design Engineer copies of electrical inspection reports (if required) issued by the local governing agency.

1.04 QUALITY ASSURANCE

A. Testing and Observation
1. The Contractor shall notify the Design Engineer of progress of all Work in order that the Design Engineer may make the appropriate site inspections.
2. The Contractor shall cooperate with the Design Engineer during testing and observation.
3. If any portion(s) of the electrical components is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall repair or replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

1.05 HAZARDOUS CLASSIFICATION

A. All underground electrical installed shall be classified as Class 1, Division 2. Above ground electrical work from the ground surface to within 18 inches above the ground surface shall be classified as Class 1, Division 2.

PART 2 PRODUCTS

2.01 GENEAL

A. All electrical materials shall be new, meet UL requirements, and bear appropriate UL labels.

2.02 WIRE

A. Wire shall be NEC standard copper wire and shall bear UL and manufacturer's labels. Wire shall provide proper connection and operation of all equipment. Requirements for connection of the respective electrical components are as follows:
1. *Main Power Supply:* Copper AWG No. 2, THW (four [4] wires total).
2. *Automatic Telephone Dialer System:* Standard telephone line (one [1] wire total).

2.03 CONDUIT AND FITTINGS

A. All exposed conduit and fittings shall be rigid PVC type, Schedule 80. All buried conduit and fittings shall be rigid PVC type, Schedule 40. Conduit size requirements for the respective electrical components are as follows:
1. *Main Power Supply:* 1-1/4 inch conduit.
2. *Automatic Telephone Dialer System:* ½ inch conduit.

2.04 METER SOCKET

A. Meter socket for main power supply shall be NEMA 3R, raintight-outdoor, UL listed, with drip shield top that requires no gasketing. Size of meter socket shall accommodate power service requirements.

2.05 JUNCTION AND OUTLET BOXES

A. Junction and outlet boxes shall be NEMA 4 galvanized metal type, cast iron, or malleable iron with proper cover and/or mounting lugs as required.

2.06 WARNING TAPE

A. Direct burial warning tape reading "CAUTION, ELECTRICAL LINE BURIED BELOW", 4 mil polyethylene with foil laminate shall be installed in all underground electrical installations. Panduit, Motivator 3M, or approved equivalent.

2.07 PIPE BEDDING

A. Pipe bedding for conduit shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.08 ENGINEERED FILL

A. Engineered fill for backfill above the pipe bedding shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. All required electrical permits, fees, and inspections shall be arranged and paid for by the Contractor.

B. The Contractor shall furnish, install, and maintain all temporary power and lighting systems needed for construction. After construction is completed, the Contractor shall remove all temporary power equipment and devices.

C. All electrical work shall be conducted by skilled electricians and laborers experienced in this type of work. All equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 and the NEC.

D. The Contractor shall verify that the wire and conduit sizes specified herein for the main power supply and automatic telephone dialer system are appropriate for the intended use.

E. The Contractor shall install all electrical components in accordance with the NEC, NFPA and local codes and regulations for installation in a Class 1, Division 1 or Class 1, Division 2 classified locations as defined in Part 1.05 of this Section and shown on the Plans. Nothing on the Plans or in these Technical Specifications is to be construed to permit work not conforming to these governing codes and standards.

F. Installation of electrical and telephone feed shall be performed in accordance with the local electrical and telephone company rules and regulations.

G. The electrical and telephone feed from the existing service points to the flare station control panel shall be completed below grade as shown on the Plans.

H. The Contractor shall verify service and panel locations and all other service requirements prior to starting Work. Except for Work specifically excluded from the Contract, the Contractor shall provide all Work required by the serving utility companies to render utility services to the Project.

3.02 PREPARATION

A. The Contractor shall handle electrical materials carefully during loading and unloading. All means necessary shall be used to protect electrical materials before, during and after installation and to protect the installed work of other trades. In the event of damage, provisions shall be made to immediately make repairs and replacement necessary to the approval of the Design Engineer.

B. The Contractor shall inspect materials for damage and imperfections prior to installation. Damaged materials or materials with imperfections shall not be used.

3.03 TRENCHING AND BACKFILLING

A. Trenching and placement of pipe bedding and backfill material shall conform to the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.04 INSTALLATION

A. All equipment, motors, conduit and outlets, as applicable, shall be permanently and effectively grounded in accordance with NEC, CAC - Title 24 and local codes.

B. Conduits shall be sloped towards pull boxes. Conduits shall run in straight lines except where a change in direction is necessary. Couplings shall be staggered for maximum duct line strength.

C. Buried conduit and fittings shall not be dropped or dumped into trenches and the ends of conduit shall be kept closed with approved conduit seals during construction. Immediately prior to pulling wire or cable, a swab shall be drawn through all conduits to force out water and foreign materials.

D. Junction boxes shall be installed in an accessible location as required for splicing, connections and pulling of wire.

E. All above ground conduit shall be properly secured on pipe supports or concrete slabs.

F. The meter socket installed at the existing service pole shall comply with the height and fastening specifications outlined in the local electric company rules and regulations.

3.05 CLEAN-UP

A. All exposed portions of electrical installation shall be thoroughly cleaned, including the removal of all traces of soil, labels, grease, oil, and other foreign matter. Only cleaners recommended by the manufacturer shall be used.

PART 4 MEASUREMENT AND PAYMENT

4.01 ELECTRICAL AND TELEPHONE FEED

A. The electrical and telephone feed shall be measured by the linear foot installed, including trench excavation and backfill. Payment shall be included in the Contract Unit Price per linear foot installed for "Electrical and Telephone Feed" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the electrical and telephone feed as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 GENERAL ELECTRICAL WORK

A. Measurement and payment for general electrical work associated with assembly of the flare station shall be included in the Contract Lump Sum Price for "Flare Station Assembly" addressed in Section 15300 (Flare Station) of these Technical Specifications. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15500
LEACHATE OVERFLOW COLLECTION AND STORAGE SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all leachate overflow collection and storage system components, including a 10,000 gallon double wall fiberglass reinforced leachate UST, tank accessories, field testing, collection system piping and accessories, and lining of the existing sediment chamber and leachate wet well in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to install the leachate overflow collection and storage system.

B. The existing sediment chamber is a concrete manhole structure, approximately nine feet deep (base to top of manhole); four feet in diameter with a 30" high riser cone (48" to 24" in diameter). The existing wet well is approximately 18 feet deep and five feet in diameter and contains two submersible pumps.

C. The Contractor accepts full responsibility for proper handling and installation of the leachate UST and shall insure that good workmanship, practices, and construction procedures are followed during the handling and installation of the leachate UST, regardless of the inclusion or omission of any applicable suggestion in this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans.* California Department of Transportation, May 2010.

C. *American Society for Testing Materials.* Current Edition.

D. *Occupational Safety and Health Agency (OSHA) Construction Standards.* Current Edition.

E. American National Standards Institute (ANSI).

F. American Water Works Association (AWWA).

1.03 APPLICATBLE STANDARDS AND SPECIFICATIONS

A. ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

B. ASTM D 143 Standard Test Method for Slump of Portland Cement Concrete.

C. ASTM D 3034 Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

D. ASTM D 4414 Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages.

E. ASTM F 477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

F. UL Standard for Safety 1316.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall provide three (3) copies of the following information to the Design Engineer for approval:
   1. Manufacturer's product data sheets for the following materials to verify that the materials meet or exceed the corresponding product requirements:
      a. Leachate UST, fittings, and accessories.
      b. Collection piping and fittings.
      c. Concrete junction boxes and accessories.
   2. Manufacturer's recommended procedures for handling (transporting, unloading, storage, etc.) and installation of each of the products identified in Subsection 1.04(A)(1) of this Part.

B. Field Test Reports: Tank tightness test at delivery and after installation.

C. At least 14 calendar days prior to commencement of lining the leachate sediment chamber and wet well, the Contractor shall submit the following to the Design Engineer for approval:
   1. Procedures for removal and re-installation of the existing pumps within the leachate wet well.
   2. Name, location and experience of Subcontractor responsible for installation of lining product. Subcontractor shall have sufficient prior experience in the installation of the lining product.
   3. Manufacturer's recommended application procedures for lining product.
   4. Product data and chemical resistance data.

1.05 TRANSPORT AND STORAGE

A. Unloading and storage of the leachate UST and collection piping at the Work site shall be the responsibility of the Contractor and shall be performed in accordance with the manufacturer's recommended procedures.

1.06 QUALITY ASSURANCE

A. Governing Standards, as applicable:
   1. Manufacturer of the leachate overflow storage tank shall be in the business of manufacturing tanks with materials conforming to the requirements of ANSI/AWWA D120-02 Thermosetting Fiberglass-Reinforced Plastic Tanks.

2. Tank manufacturer shall be in the business of manufacturing tanks to UL 1316 standards.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

A. Pipe for gravity drain lines shall be PVC per AWWA C-900, with integral wall, bell and spigot joints. Pipe and fitting shall meet wall and strength minimum of SDR 26, and the requirements of ASTM D 3034. Joints shall be equipped with rubber rings. The bell shall consist of an integral wall section with a solid cross section rubber ring factory assembled, securely locked in place to prevent displacement. Rubber rings shall meet the requirements of ASTM F 477. All fittings and accessories shall be manufactured and furnished by the pipe supplier and have bell and/or space configurations identical to that of the pipe.

2.02 PIPE ACCESSORIES

A. All fittings and accessories shall be manufactured and furnished by pipe supplier of same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.03 PIPE BEDDING

A. Pipe bedding shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.04 CONCRETE JUNCTION BOXES

A. Concrete junction boxes for the leachate collection piping shall be as shown on the Plans. Concrete boxes shall be manufactured of cast in place concrete or prefabricated reinforced concrete or approved steel equivalent to the dimensions set forth in the Plans.

B. Concrete for the junction boxes shall be a 6 sack Portland cement Type II mix and must meet the requirements of a maximum slump of 4 inches and a minimum 28-day compressive strength of 2,500 psi when tested in accordance with ASTM C 143 and ASTM C 39, respectively.

2.05 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Lining material for the existing sediment chamber and wet well shall be a solids epoxy resin-based coating formulated for use in chemically aggressive sewer systems. It is the intent that this material shall provide waterproofing, sealing, structural reinforcement, and corrosion protection of the existing sediment chamber and wet well.

B. The coating material shall be resistant to attack from the following: volatile organic compounds; bleaches; sulfuric, acetic, hydrochloric, phosphoric, nitric, chromic, oleic, and stearic acids; sodium and calcium hydroxides; ammonium, sodium, calcium, magnesium, and ferric chlorides; ferric sulfate, hydrogen sulfides, petroleum oil and greases, vegetable and

animal oils, fats, greases, soaps and detergents. The coating shall be impermeable to sewage gases and liquid and shall be non-conducive to bacterial or fungus growth.

2.06 LEACHATE UST

A. Design Criteria
   1. *Internal Load:* Tank shall withstand a 5 psig air pressure test with 5:1 safety factor. Contractor shall individually test tank for leakage prior to installation. Maximum test pressure is 5-psi.
   2. *Vacuum Test:* To verify structural integrity, tank shall be vacuum tested by the manufacturer at the factory to 11.5 inches of mercury.
   3. *Surface Load:* Tank shall withstand surface H-20 axle loads when properly installed according to current manufacturer's installation instructions.
   4. *External Hydrostatic Pressure:* Tank shall be capable of being buried in ground with 7 feet of overburden over the top of the tank, the hole fully flooded, and a safety factor of 5:1 against general buckling.
   5. Tank shall support accessory equipment such as drop tubes when installed according to tank manufacturer's recommendations and limitations.

B. Tank shall be double wall, horizontal glass fiber reinforced tank manufactured with 100 percent resin and glass-fiber reinforcement. No sand fibers. Capacity shall be as indicated on Plans.

C. Product Storage:
   1. Tank shall be capable of storing chemicals or leachate with specific gravity up to 1.1.
   2. Tank shall be vented to atmospheric pressure.
   3. Tanks shall be capable of storing products identified in the manufacturer's current standard limited warranty.

D. Interstitial Space: Double wall tank shall have a space between the walls to allow for the free flow and containment of leaked material from the primary tank. The space also allows the insertion of a monitoring device through a monitoring fitting.

2.07 TANK ACCESSORIES

A. Manway: Flanged 22-inch (minimum) inside diameter manway with UL listed gasket, bolt and cover.

B. NPT Fittings: NPT fittings shall be sized and located as indicated on Plans. Fittings shall be UL listed. All fittings are to be 4 inches in diameter and supplied with plugs. NPT fittings shall withstand a minimum of 150 foot-pounds of torque and 1,000 foot-pounds of bending, both with a 2:1 safety factor. The monitor fitting shall consist of a 4-inch NPT fitting on the tank.

C. Striker plates shall be installed under each service fitting and manway opening.

D. Float Switch and Alarm Panel: One (1) mechanical float switch shall be provided and set at bottom of tank to detect presence of any liquid. The float switch shall be approved for use with intrinsically safe, Class I, Division 1 applications and shall be connected to an alarm

panel located at pump station structure, warning lights only. The alarm shall also be connected to an existing auto-dialer.

E. A 2-inch diameter PVC vent pipe shall be installed from tank to the surface with a goose-neck and screen.

F. Anchor Straps: Anchor straps shall be of glass fiber reinforced type and located per manufacturer's recommendations. Each strap shall be capable of withstanding the maximum buoyance force of the tank assuming the tank empty and submerged in groundwater. Number and location of straps shall be per manufacturer's recommendations.

G. Concrete Deadman: Two concrete deadman, 12" x 12" x the tank length, shall be installed at the bottom of the tank excavation as shown on the Plans.

2.08 TANK BEDDING

A. Tank bedding shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.09 BACKFILL MATERIAL

A. Backfill material above the pipe bedding and tank bedding shall conform to the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

PART 3 EXECUTION

3.01 BRACING AND SHORING

A. As required by the Trench Construction Safety Orders of the California Construction Safety Orders of the Division of Occupational Safety and Health, bracing and shoring shall be installed in trenches or excavations of 5 feet or greater depth to insure the safety of workers and to protect and facilitate the Work.

B. Bracing and shoring shall comply with Section 5-1.02A and 7-1.01E of the Standard Specifications.

3.02 GENERAL PIPE INSTALLATION

A. Contractor shall verify location of point of connection (POC) at the existing leachate collection piping as shown the Plans by potholing to determine the location and depth (elevation).

B. For the gravity drain pipe, the trench subgrade shall provide uniform support at a uniform slope along full length of pipe.

C. Contractor shall furnish all necessary fittings, fixtures, hardware, plates, fasteners, etc. to provide complete installation.

D. Location of pipes, fixtures, fittings, and drains that are shown on the Plans are approximate. The Contractor shall locate fittings and drains to best serve the intended use and to avoid mechanical and structural interferences. Location of valves, drains, and fittings must be approved by the Design Engineer prior to installation.

E. All installations shall be secure and watertight.

3.03 PIPE INSTALLATION

A. Excavation of pipe trenches shall be in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

B. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

C. Pipe, fittings, and accessories shall be installed in accordance with manufacturer's instructions. Sealed joints shall be watertight.

D. Pipe shall be placed to the lines and grades as shown on the Plans.

E. The pipe shall be laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe.

F. The horizontal alignment of the pipe shall be laid such that any point shall not vary more than 0.10 feet from the design alignment established and shown on the Plans.

G. Pipe bedding material shall be placed at sides and over top of pipe in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

H. Trench backfill above the pipe bedding shall be in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans. Pipe shall not be displaced or damaged when compacting.

3.04 CONCRETE JUNCTION BOXES

A. Excavation for concrete junction boxes shall be in accordance with Section 02222 (Excavation) of these Technical Specifications and as shown on the Plans.

B. Concrete junction boxes shall be installed in accordance with manufacturer's instructions. Placement of the concrete junction boxes into the excavation shall be performed in a manner that will not induce damage or compromise future stability.

C. Backfill for concrete structures shall conform to the provisions in Section 19-3 of the Standard Specifications.

3.05 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Sequencing of this task shall be after installation of the condensate discharge line from the flare station to the leachate wet well in order to ensure that the new penetration is properly sealed by the lining application.

B. The Contractor's Health and Safety Plan shall be followed accordingly, including LFG hazards and possible confined space entry (i.e., oxygen-deficient atmosphere), for all phases of Work.

C. Prior to start of Work, provisions shall be made to divert leachate from the existing leachate drain from discharging into the leachate sediment chamber. The leachate may be diverted to the new leachate UST (if already installed) or collected in a temporary holding tank of sufficient size.

D. Once discharge into the leachate sediment chamber has been diverted, all leachate shall be pumped from the leachate sediment chamber and wet well. The pumped leachate may be discharged to the existing leachate AST, new leachate UST (if already installed), or temporary holding tank.

E. If sediment is present at the base of the leachate sediment chamber and/or wet well, provisions shall be made to remove all sediment. Removed sediment may be disposed of with refuse excavated from other site activities, or transported separately and disposed of at a permitted transfer station or solid waste disposal facility.

F. Existing pumps and any other equipment/features that may inhibit application product shall be removed and stored in a dry and secure location.

G. The interior walls and base shall be cleaned to remove all dirt, dust, corrosion products, loose concrete, debris, grease, oils, growths, and foreign matter and residues. Residual generated by the cleaning operations shall be removed and managed in the same manner as described previously for leachate and sediment.

H. Sufficient time shall be provided to allow the surfaces of the interior walls and base to dry. Drying time may be expedited by mechanical means. Coatings shall be applied only to a sound clean surface profile consistent with the manufacturer's published recommendation.

I. Cracks, joints, eroded and damaged areas shall be sealed with a compatible grout/mortar as recommended by the coating manufacturer prior to application of the coating material.

J. Coating material shall be applied in a manner and thickness consistent with the manufacturer's published recommendation. Coatings shall be applied in a manner consistent with all applicable environmental and health and safety regulations. At a minimum, during application, the applicators shall use protective clothing, eye protection, chemical resistant gloves, and air respirators. Coating shall be applied to provide full and sufficient coverage of all interior walls and base and shall be free of blisters, pinholes, holidays, or discontinuities. Application shall be performed in strict accordance with recommended manufacturer's procedures.

K. Pumps and any other equipment/features that were removed shall be re-installed and normal operation of the leachate sediment chamber/wet well restored per pre-existing conditions.

3.06 TANK HANDLING

A. Contractor Acceptance Inspection: The Contractor is responsible for damage in shipment according to the checklist included in the tank shipment. Any discrepancies should be reported to the Design Engineer.

B. The tank shall not be dropped, rolled or impacted. The tank shall be set on smooth ground, free of rocks and foreign objects, and chock tanks to prevent movement.

3.07 TANK INSTALLATION

A. The tank excavation shall be large enough to provide:
   1. 2 feet of clearance between the tank sides and ends and the excavation walls in stable soil.
   2. 12 inches of bedding under the tank.

B. Excavation for the tank shall be in accordance with Section 02222 (Excavation) of these Technical Specifications and as shown on the Plans. Contractor shall slope or shore sides of tank hole excavation as required to comply with the requirements of "OSHA Construction Standards".

C. The tank and all related piping and accessories shall be installed as per manufacturer's printed instructions.

D. Tank backfill shall be as follows:
   1. Tank bedding material shall be evenly placed over bottom of the excavation to attain a minimum thickness of 12 inches.
   2. A 12-inch lift of tank backfill shall initially be placed evenly around the tank. Care shall be taken to push backfill material completely beneath tank bottom and under end caps to provide necessary tank support, without voids.
   3. A second 12-inch lift of tank backfill shall be placed evenly around the tank using the same procedures described above.
   4. After completion of the second lift, tank backfill can be brought to the top of the tank without additional handwork.
   5. The tank shall never be left on the bed without tank backfill to the top of tank if there is any chance of more than 12 inches of water in the hole.
   6. Once tank backfill material has been placed completely over the tank to the depth shown on the Plans, backfill the remainder of the tank excavation in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.08 PERFORMANCE TESTING

A. UST Air Test:
   1. Prior to setting the tank, the Contractor shall perform an aerostatic leakage test in the presence of the Design Engineer.

2. Pressurizing the relatively small annular space between two (2) tank shells can occur very quickly. A pressure of over 5 psi may cause damage to the tank structure which may not be immediately apparent. For all such tests, an air gauge with maximum ½ psi increments shall be used.
3. The Contractor shall provide a valve and manifold arrangement with two (2) air gauges to perform tests.
4. Testing shall be in accordance with the tank manufacturer's instructions.
5. While tank is under pressure, the entire tank, including fittings, should be wetted with a soapy solution to inspect for minor leaks which otherwise might not be evident.

B. Leachate Sediment Chamber/Wet Well:
1. Visual inspection to verify a leak-free, uniform appearance.
2. The applied wet film thickness shall be verified per ASTM D 4414, Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages.
3. The leachate sediment chamber and wet well shall be operated after the lining application and re-assembly of the pumps and other equipment/features to verify that the system is operating in accordance with pre-existing conditions.

C. If tests indicate Work does not meet specified requirements, all Work shall be removed, replaced and retested at no cost to the City.

PART 4 MEASUREMENT AND PAYMENT

4.01 LEACHATE COLLECTION PIPING

A. Leachate collection system piping shall be measured by the linear foot of collection piping installed and includes all piping, fittings, trenching, and backfilling. Payment shall be included in the Contract Unit Price per linear foot installed for the various sizes and types of "Leachate Collection Piping" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the leachate collection piping as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 CONCRETE JUNCTION BOXES

A. Concrete junction boxes for the leachate collection piping shall be measured by each box installed and include all trenching, backfill, concrete, and cover. Payment shall be included in the Contract Unit Price per each unit installed for "Concrete Junction Boxes" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the concrete junction boxes as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Measurement and payment for lining of the leachate sediment chamber/wet well shall be included in the Contract Lump Sum Price for "Leachate Sediment Chamber/Wet Well Lining" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to line the leachate sediment chamber/wet well as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 LEACHATE UST

A. Measurement and payment for the leachate UST shall be included in the Contract Lump Sum Price for "Leachate UST" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, general electrical work, and incidentals required to install the leachate UST and accessories as shown on the Plans, as specified herein and within the tank manufacturer's specifications, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

APPENDIX I

FINAL CLOSURE
CONSTRUCTION QUALITY ASSURANCE PLAN

CONSTRUCTION
QUALITY ASSURANCE PLAN

for the

CITY OF UKIAH
DEPARTMENT OF PUBLIC WORKS

CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

April 2019

EBA Job No. 02-907

Prepared by:

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CONSTRUCTION QUALITY ASSURANCE PLAN
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

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DIVISION 1

GENERAL INFORMATION

CQA SECTION 01000
INTRODUCTION

PART 1 GENERAL

1.01 PROJECT DESCRIPTION

A. The City of Ukiah Landfill is located in Mendocino County, California approximately two miles east of the City of Ukiah. The Work site address is 3100 Vichy Springs Road, Ukiah, California 95482 (Sheet 1). The City of Ukiah Landfill was operated as a Class III solid waste disposal facility and is comprised of a single waste management unit that is approximately 40 acres in size.

B. This Construction Quality Assurance (CQA) Plan applies to the final closure of the City of Ukiah Landfill. The final closure project encompasses approximately 65 acres in area and consists of the following construction features:

Site Preparation:
- Refuse excavation and relocation.
- Interim cover preparation.

Final Cover System (in ascending order):
- 2-foot thick foundation layer.
- Gas relief/venting system.
- LLDPE geomembrane.
- Engineered synthetic turf with specific grade sand infill ballast.

Miscellaneous items:
- Drainage and erosion control measures.
- Access roads.
- General earthwork, including various excavations and fills.
- Leachate overflow collection and storage system, including installation of a leachate underground storage tanks (UST).
- Landfill gas (LFG) collection system, including condensate drainage components.
- Installation of skid-mounted packaged combustion system provided by others.
- Borrow area reclamation.
- Seeding and fertilizing.
- Security fencing.

C. A detailed scope of construction for each unit of construction is presented in Section 01010 of this CQA Plan.

1.02 PURPOSE

A. The purpose of this CQA Plan is to provide a detailed guidance document for correct and thorough CQA verification procedures implemented during construction. This CQA Plan is also intended to identify, prevent, and correct problems and deficiencies that may occur during construction. This CQA Plan details general and specific requirements of the CQA program that will be implemented during construction to verify and document that

construction is in compliance with the contract documents and the design intent. Requirements of the CQA program include the following:

1. Product quality assurance verification testing to verify that all materials are in compliance with the Technical Specifications.
2. Construction monitoring and documentation to verify that each unit of construction is in compliance with the Technical Specifications and that construction was executed correctly using industry-standard construction methods and the proper materials.
3. Review and approval of product submittals to verify that construction materials are in compliance with the Technical Specifications.
4. Testing to verify that installed or constructed components are in compliance with the Technical Specifications.
5. CQA documentation consisting of Daily Summary Reports, CQA field logs, testing forms, installation logs, document control binders, material control logs, testing reports, photographic documentation, technical revisions, design modifications, record as-built drawings, and corrective action determination and verification reports.
6. Preparation of the CQA Certification Report that documents the CQA program implemented during construction and that construction was completed in compliance with the contract documents and the design intent. The CQA Certification Report will be submitted to the California Regional Water Quality Control Board, North Coast Region (RWQCB).

B. Although the CQA Plan provides a foundation for the CQA program, this plan may be modified and revised as appropriate prior to and during construction. All modifications and revisions to the CQA program will be documented in the CQA Certification Report.

1.03 PROJECT ORGANIZATION

A. The City of Ukiah, Department of Public Works (City) is the owner and operator of the City of Ukiah Landfill and has ultimate responsibility for the Project, including overall project management and project funding. For purposes of this CQA Plan, the City will be referred to as "Owner". The Owner has contracted with the following organizations to complete construction in accordance with the project documents listed in Part 1.02 of Section 01090 (References) of this CQA Plan.

1. EBA Engineering (EBA) - Design Engineer and CQA Certifying Engineer.
2. To Be Determined – Construction Contractor and Subcontractors.

B. EBA is the Design and CQA Certifying Engineer for the Project. As the Design Engineer, EBA is responsible for the design and site engineering related to the design. Site engineering includes: 1) review and approval of product and construction submittals required by the contract documents; 2) technical issues related to construction; 3) interpretation of the Technical Specifications and the Construction Drawings (herein after referred to as "Plans"); and 4) design modifications and technical revisions. For purposes of this CQA Plan, EBA will be referred to as "Design Engineer" when functioning as the Design Engineer.

As the CQA Certifying Engineer, EBA is responsible for certifying to the Owner and RWQCB that construction is in compliance with the contract documents and the design intent. Specific responsibilities of the CQA Certifying Engineer include: 1) providing a professional engineer or certified engineering geologist registered in the state of California; 2) implementing and managing the CQA program outlined in Part 1.02 of this Section; 3) review of all CQA documentation; and 4) preparation of the CQA Certification Report. EBA will provide an on-site CQA Team to implement and manage the CQA program consisting of a CQA Officer, CQA Monitors, a CQA Surveyor, and Geosynthetics and Soils CQA Testing

Laboratories. For purposes of this CQA Plan, EBA will be referred to as "CQA Officer" when functioning as the CQA Certifying Engineer.

C. The Construction Contractor is responsible for overall performance of the earthwork, including construction of drainage and erosion control measures, in accordance with the contract documents and as shown on the construction drawings. For purposes of this CQA Plan, the Construction Contractor will be referred to as "Contractor".

D. The Project Organization for CQA is shown on Table 01000-1, CQA Organization Chart

1.04 CQA PLAN FORMAT

A. This CQA Plan closely parallels the format of the Technical Specifications in the contract documents. The intent of this parallel format is to avoid discrepancies between the two documents, therefore preventing misinterpretations and misunderstandings between the Owner, Contractor, Design Engineer and CQA Certifying Engineer. This format also organizes all necessary quality assurance verification procedures for each unit of construction into a single section.

B. Division 1 of this plan presents general information about the construction project and the CQA program.

C. Division 2 of this plan provides detailed and specific CQA procedures to be implemented by the CQA Officer for each unit of construction. Division 2 is written instruction and direction for members of the CQA Team.

END OF CQA SECTION 01000
INTRODUCTION

CQA ORGANIZATION CHART
City of Ukiah Landfill
FINAL CLOSURE CONSTRUCTION PROJECT

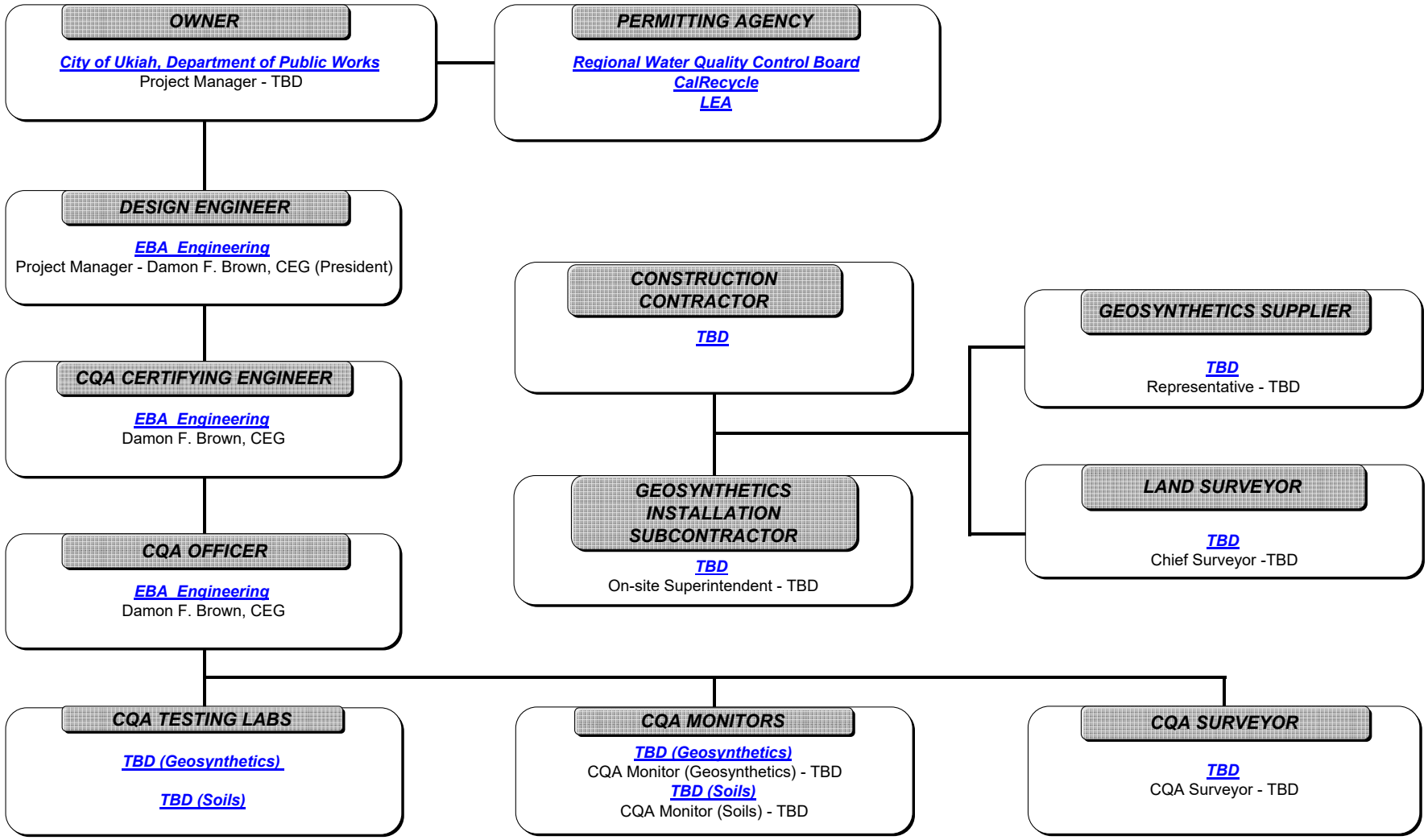

TABLE 01000-1

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CQA SECTION 01010
SCOPE OF CONSTRUCTION

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Work to be performed by the Design Engineer

B. Work to be performed by the Owner.

C. Contractor's scope of work.

1.02 WORK TO BE PERFORMED BY THE DESIGN ENGINEER

A. The Design Engineer will provide three (3) reference control points with benchmark elevations in the vicinity of the Work site. All other necessary control or reference points needed to perform construction will be established by the Contractor.

1.03 WORK TO BE PERFORMED BY THE OWNER

A. The Owner will provide the following construction materials and services:
   1. Material for engineered fill.
   2. Material for the foundation layer.
   3. Skid-mounted packaged combustion system, including totally-enclosed vertical ground flare.
   4. Extension of adequate power and telephone service to the location of the skid-mounted packaged combustion system.

1.04 CONTRACTOR'S SCOPE OF WORK

A. The Contractor's scope of work includes the following.
   1. Mobilization of construction equipment and personnel.
   2. Excavation of on-site borrow material for construction of final cover system soil components, as well as sedimentation basin improvements.
   3. Construction of final cover system, including interim cover preparation and placement/installation of foundation layer, geomembrane, engineered turf, hydrobinder, and sand ballast.
   4. Seeding and fertilizing of disturbed areas and on-site borrow area.
   5. Excavation and construction of, and supply of materials for, drainage and erosion control measures.
   6. Construction of, and supply of materials for, access roads.
   7. Construction of, and supply of materials for, leachate overflow collection and storage system, including installation of new leachate UST and lining of existing leachate sediment chamber and wet well.
   8. Construction of, and supply materials for, LFG collection and control system, including installation of LFG extraction wells, LFG collection system piping and condensate drainage components.

9. Installation of Owner-supplied skid-mounted packaged combustion system, including totally-enclosed vertical ground flare.
10. Construction of, and supply of materials for, security fencing.

END OF CQA SECTION 01010
SCOPE OF CONSTRUCTION

CQA SECTION 01039
PROJECT MEETINGS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Communication and coordination between the Design Engineer, Contractor, and CQA Team are most important to achieve the common goals of quality construction and successful completion of the project.

B. A series of project meetings will be held for the purpose of establishing a successful environment of communications, coordination, and overall teamwork; the meetings will be administered by the CQA Officer to: 1) clearly define responsibility and authority of each organization involved in the project; 2) resolve communication problems, misunderstandings, and misinterpretations; 3) find solutions to unanticipated developments; and 4) identify, prevent, and correct problems and deficiencies that may occur during the construction process.

C. Project meetings include the following.
1. Preconstruction meeting.
2. Progress meetings.
3. Preparatory meetings.

1.02 PRECONSTRUCTION MEETING

A. A preconstruction meeting will be held to discuss topics relating to the commencement of the project.

B. The objectives of this meeting are to: 1) clearly define the roles, responsibility, and authority of each organization and individual involved in the project; 2) review specific requirements of the CQA program; and 3) establish a foundation of cooperation to achieve quality construction. The following agenda, as related to CQA, will be addressed by the Design Engineer:
1. Introduce and discuss roles, authority, and responsibilities of each organization and individual involved in the project.
2. Establish lines of communication.
3. Review Technical Specifications and Plans.
4. Distribution of the CQA Plan.
5. Review of CQA activities to be performed.
6. Discuss Contractor's construction schedule and workplan.
7. Discuss Contractor's Construction Quality Control (CQC) procedures and responsibilities.
8. Discuss submittal review and approval procedures.
9. Discuss non-conformance and corrective action procedures.
10. Discuss construction restrictions due to weather conditions.
11. Discuss and schedule weekly progress meetings.
12. Discuss health and safety issues.
13. Discuss preparatory meetings.

C. A Meeting/Discussion Summary Report (see Part 1.08 of Section 01400 of this CQA Plan) will be completed by the CQA Officer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preconstruction meeting:
   1. City's Project Manager or representative.
   2. Contractor's Project Manager and on-site Superintendent.
   3. Installer's Project Manager and on-site Superintendent.
   4. Design Engineer's Project Manager and CQA Officer.

1.03 PROGRESS MEETINGS

A. The CQA Officer will schedule and administer weekly progress meetings. The objectives of these meetings are to: 1) maintain lines of communication; 2) review work progress and CQA activities performed previously; 3) discuss upcoming construction and related CQA activities; and 4) maintain and improve the established foundation of cooperation to achieve quality construction. The following agenda will be addressed by the CQA Officer.
   1. Review minutes of previous progress meeting.
   2. Review work progress.
   3. Review and update construction schedule and obtain a 2-week look-ahead schedule from the Contractor.
   4. Discuss CQA and CQC related field observations, testing results, problems, decisions, and conflicts.
   5. Review and update Submittal Log.

B. A Meeting/Discussion Summary Report (see Section 01400 of this CQA Plan) will be completed by the CQA Officer and distributed to all parties in attendance.

C. The following representatives from each organization are required to attend the weekly progress meetings.
   1. City's Project Manager or representative.
   2. Contractor's on-site Superintendent.
   3. Installers on-site Superintendent (during geosynthetics installation).
   4. Design Engineer's Project Manager and CQA Officer.

1.04 PREPARATORY MEETINGS

A. The CQA Officer will schedule and administer informal preparatory meetings prior to beginning construction/implementation of the following items.
   1. Refuse excavation and interim cover preparation.
   2. Foundation layer placement.
   3. Geomembrane placement.
   4. Engineered turf installation.
   5. Sand ballast placement.
   6. General earthwork, drainage and erosion control, and access road construction, as needed.
   7. Sedimentation basin improvements.
   8. Leachate overflow collection and storage system installation.
   9. LFG collection system installation.
   10. Borrow area reclamation.
   11. Seeding and fertilizing.

B. The objective of these preparatory meetings is to establish a complete understanding of the upcoming unit of construction and CQA activities that will be implemented during construction. To achieve this objective, the following agenda will be addressed by the CQA Officer.

1. Review "Products" part of the applicable section of the Technical Specifications.
2. Review "Execution" part of the applicable section of the Technical Specifications.
3. Discuss any construction and grade control staking needed to perform and complete the Work.
4. Discuss CQA testing, observation, and surveying to be performed.
5. Verify that all submittals have been, or will be, received by the CQA Officer and approved by the Design Engineer in accordance with the schedule.
6. Discuss Contractor's CQC responsibilities.
7. Discuss Contractor's coordination, scheduling, and sequencing of the work.
8. Discuss Contractor's proposed equipment and manpower.

C. A Meeting/Discussion Summary Report (see Section 01400 of this CQA Plan) will be completed by the CQA Officer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preparatory meetings.

1. Design Engineer's Project Manager or representative.
2. Contractor's on-site Superintendent.
3. On-site Superintendent of any Subcontractor, as applicable to the unit of construction.
4. CQA Officer.
5. CQA Monitor(s), as applicable to the unit of construction.

END OF CQA SECTION 01039
PROJECT MEETINGS

CQA SECTION 01050
GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Conformance testing.

B. Construction monitoring.

C. Construction testing.

D. Project meetings.

E. Submittal review and approval.

F. Documentation.

1.02 CONFORMANCE TESTING

A. Prior to using a product or material in construction, sampling and testing will be performed to verify that construction products and materials to be used are in conformance with the Technical Specifications.

B. Conformance testing requirements, methods, and sampling frequencies are given for each unit of construction in Division 2 of this CQA Plan.

C. All product and material conformance test samples will be recorded on the appropriate Master Testing Control Log, assigned a sample number, and processed by the CQA Officer for either on-site or off-site testing. The Master Testing Control Logs document: 1) sample numbers; 2) product or material types; 3) required testing; 4) sampling locations and dates; 5) testing personnel or organization; 6) testing completion dates; and 7) a brief summary of the testing results. The Master Testing Control Log for soils are presented in Appendix C.

D. At the request of the Design Engineer, conformance test samples will be archived at the Work site or an alternate location determined by the Owner for a period of one year. Archived samples will be stored in sealed plastic containers tagged with: 1) the sample number; 2) product or material type; 3) the project name and number; 4) sample date and location; and 5) the date for discarding the sample.

E. The following products or materials require conformance testing.
1. Miscellaneous aggregate materials.
2. Engineered fill.
3. Foundation soil layer.
4. Geomembrane.
5. Engineered turf.
6. Concrete.

1.03 CONSTRUCTION MONITORING

A. Each unit of construction will be monitored to verify compliance with the Technical Specifications and that construction was executed correctly using industry-standard construction methods and the proper materials.

B. Monitoring guidelines and procedures are specified for each construction unit in Division 2 of this CQA Plan and include the following:
   1. Field tests.
   2. Observations.
   3. Field surveys.
   4. Physical measurements.

1.04 CONSTRUCTION TESTING

A. Construction testing will be performed during installation and construction to verify compliance with the Technical Specifications.

B. Construction testing may be performed by the Contractor, Design Engineer, or CQA personnel as required for each construction unit in Division 2 of this CQA Plan and includes the following:
   1. Engineered fill.
   2. Foundation layer.
   3. Aggregate base for access roads.
   4. Geomembrane.
   5. Engineered turf.
   6. Sand ballast.

1.05 PROJECT MEETINGS

A. In accordance with Section 01039 of this CQA Plan.

1.06 SUBMITTAL REVIEW AND APPROVAL

A. In accordance with Section 01300 of this CQA Plan.

1.07 DOCUMENTATION

A. In accordance with Section 01400 of this CQA Plan.

END OF CQA SECTION 01050
GENERAL REQUIREMENTS

CQA SECTION 01090
REFERENCES

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Project Reference Documents.

B. Industry Standards and Technical Reference Documents.

C. Soils Testing Standards and Methods.

D. Geosynthetics Testing Standards and Methods.

E. Landfill Gas Collection System Testing Standards and Methods.

F. Concrete Testing Standards and Methods.

G. Acronyms.

H. Contact Addresses and Telephone Numbers.

1.02 PROJECT REFERENCE DOCUMENTS

A. The following project reference documents provide support and background information for use in conjunction with this CQA Plan.

1. *Joint Technical Document for City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, January 2008.
2. *Response to RWQCB Comments Dated February 21, 2008, Joint Technical Document, City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, April 21, 2008.
3. *January 2008 Joint Technical Document Addendum, Response to Regulatory Comments, Final Closure and Postclosure Maintenance Plans, City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, June 20, 2013.
4. *Design Plan for Landfill Gas Collection and Control System, City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, October 2013.

1.03 INDUSTRY STANDARDS AND TECHNICAL REFERENCE DOCUMENTS

A. The following industry standards and technical reference documents were used in the preparation of this CQA Plan.

1. *ASTM Standards and Other Specifications and Test Methods on the Quality Assurance of Landfill Liner Systems.* American Society for Testing and Materials, Current Edition.
2. *Technical Guidance Document, Quality Assurance and Quality Control for Waste Containment Facilities [EPA/600/R-93/182].* United States Environmental Protection Agency, September 1993.
3. *Federal Register (Vol. 56, No. 196, pp. 50978 - 51119). Part II, Environmental Protection Agency, 40 CFR Parts 257 and 258 - Solid Waste Disposal Facility*

Criteria; Final Rule [EPA/OSW-FR-91-004 FRL-4011-9]. United States Environmental Protection Agency, October 9, 1991.

4. *California Code of Regulations, Title 27 - Combined SWRCB/CIWMB Regulations, Division 2, Subdivision 1, Chapter 3, Subchapter 2, Article 4, Section 20324.* Effective July 18, 1997.
5. *Caltrans Standard Specifications.* California Department of Transportation, 2010.
6. *Caltrans Standard Plans.* California Department of Transportation, 2010.
7. *California Test Methods. California Department of Transportation, Current Edition.*
8. *California Building Code. Current Edition.*

1.04 SOILS TESTING STANDARDS AND METHODS

A. The following standard soils testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM C 33	Standard Specification for Concrete Aggregates.
2.	ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates.
3.	ASTM D 422	Standard Test Method for Particle-Size Analysis of Soils.
4.	ASTM D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).
5.	ASTM D 2434	Standard Test Method for Permeability of Granular Soils (Constant Head).
6.	ASTM D 2487	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
7.	ASTM D 2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
8.	ASTM D 2922	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9.	ASTM D 3017	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
10.	ASTM D 4959	Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating.
11.	CTM 229	Method of Test for Durability Index.
12.	CTM 301	Method for Determining the Resistance "R" Value of Treated and Untreated Bases, Subbases, and Basement Soils by the Stabilometer.

1.05 GEOSNYTHETICS TESTING STANDARDS AND METHODS

A. The following standard geosynthetics testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM D 638	Standard Test Method for Tensile Properties of Plastics.
2.	ASTM D 746	Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
3.	ASTM D 792	Standard Test Method for Specific Gravity and Density of Plastics by Displacement.
4.	ASTM D 1004	Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
5.	ASTM D 1204	Standard Test Method for Linear Dimensional Changes to Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures.

6.	ASTM D 1505	Test Method for Density of Plastics by the Density-Gradient Technique.
7.	ASTM D 2256	Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method.
8.	ASTM D 3895	Standard Test Method for Copper Induced Oxidative Induction Time of Polyolefins by Thermal Analysis.
9.	ASTM D 4218	Test Method for Carbon Black Content.
10.	ASTM D 4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
11.	ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
12.	ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
13.	ASTM D 4595	Test Method for Tensile Product (MD/XD).
14.	ASTM D 4632	Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
15.	ASTM D 4716	Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
16.	ASTM D 4751	Standard Test Method for Determining the Apparent Opening Size of a Geotextile.
17.	ASTM D 4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
18.	ASTM D 5035	Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).
19.	ASTM D 5261	Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
20.	ASTM D 5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.
21.	ASTM D 5397	Standard Test Method for Notched Constant Tensile Load Test of Geomembrane.
22.	ASTM D 5596	Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
23.	ASTM D 5617	Standard Test Method for Multi-Axial Tension Test for Geosynthetics.
24.	ASTM D 5994	Sheet Thickness for Textured Geomembrane.
25.	ASTM D 6241	Standard Test Method for Static Puncture Strength Resistance of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
26.	ASTM D 6392	Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.
27.	ASTM D 6693	Standard Test Method for Determining of Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.
28.	ASTM D 6913	Standard Test Methods for Particle-Size Distribution.
29.	ASTM D 7277	Standard Test Method for Performance Testing of Articulating Concrete Block Systems in Open Channel Flow.

30.	ASTM D 7466	Standard Test Method for Measuring Asperity Height of Textured Geomembranes.
31.	ASTM D 96459	Standard Test Method for Determining Rainfall Induced Erosion.
32.	ASTM G 147	Standard Test Method for Determining the UV Stability of Engineered Fiber, Natural and Artificial Weathering Tests.
33.	ASTM G 1545(M)	Standard Test Method for Determining UV Stability (exposed), Modified Cycle, UVA340.
34.	FTMS 101C	Puncture Resistance.

1.06 LANDFILL GAS EXTRACTION SYSTEM TESTING STANDARDS AND METHODS

A. The following standard geosynthetics testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM A 193	Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service.
2.	ASTM A 325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength.
3.	ASTM D 1784	Standard Specification for Rigid PVC Compounds and Chlorinated PVC Compounds.
4.	ASTM D 1785	Standard Specification for PVC Plastic Pipe, Schedules 40, 80, and 120.
5.	ASTM D 2464	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 80.
6.	ASTM D 2466	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 40.
7.	ASTM D 2467	Standard Specification for Socket-Type PVC Plastic Pipe Fittings, Schedule 80.
8.	ASTM D 2513	Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
9.	ASTM D 2564	Standard Specification for Solvent Cements for PVC Plastic Piping Systems.
10.	ASTM D 2855	Standard Specification for Making Solvent-Cemented Joints with PVC Pipe and Fittings.
11.	ASTM D 3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
12.	ASTM D 3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
13.	ASTM D 3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
14.	ASTM D 3350	Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.
15.	ASTM D 3786	Standard Test Method for Methoxyl and Hydroxypropyl Substitution in Cellulose Ether Products by Gas Chromatography.
16.	ASTM D 7001	Standard Specification for Geocomposites for Pavement Edge Drains and Other High-Flow Applications.
17.	ASTM F 477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

18.	ASTM F 2648	Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Pipe Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.

1.07 CONCRETE TESTING STANDARDS AND METHODS

A. The following standard concrete testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2.	ASTM C 42	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
3.	ASTM C 143	Standard Test Method for Slump of Portland Cement Concrete.
4.	ASTM C 150	Standard Specification for Portland Cement.
5.	ASTM C 260	Standard Specification for Air-Entraining Admixtures for Concrete.
6.	CBC Section 1701	Structural Tests and Special Inspections.
7.	CBC Section 1905	Concrete Quality, Mixing and Placing.

1.08 STEEL TESTING STANDARDS AND METHODS

A. The following standard steel testing methods and procedures apply as referenced in these Technical Specifications and/or the CQA Plan.

1.	ASTM A 36	Standard Specification for Carbon Structural Steel.
2.	ASTM A 90	Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coating.
3.	ASTM A 185	Standard Specifications for Steel Welded Wire Reinforcement, Plain, for Concrete.
4.	ASTM A 313	Specification for Chromium-Nickel Stainless and Heat-Resisting Steel Spring Wire.
5.	ASTM A 370-97a	Test Methods and Definitions for Mechanical Testing of Steel Products.
6.	ASTM A 615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
7.	ASTM A 641	Specification for Zinc Coated (Galvanized) Carbon Steel Wire.
8.	ASTM A 764	Specification for Steel Wire, Carbon, Drawn Galvanized and Galvanized at Size for Mechanical Springs.
9.	ASTM A 975-97	Standard Specification for Double-Twisted Hexagonal Mesh Gabions and Revet Mattresses (Metallic-Coated Steel Wire or Metallic-Coated Steel Wire with Polyvinyl Chloride (PVC) Coating).

1.09 ACRONYMS

A. Whenever the following acronyms for standards, institutes and societies are referenced in the Technical Specifications or this CQA Plan, the following meanings apply:

1.	AASHTO	American Association of State Highway and Transportation Officials
2.	AISC	American Institute of Steel Construction
3.	ANSI	American National Standards Institute

4.	ASTM	American Society for Testing and Materials
5.	AWWA	American Water Works Association
6.	CAC	California Administrative Code
7.	CFR	Code of Federal Regulations
8.	CRSI	Concrete Reinforcing Steel Institute
9.	CTM	California Test Methods
10.	NEMA	National Electrical Manufacturer's Association
11.	NEC	National Electric Code
12.	NFPA	National Fire Protection Association
13.	OSHA	Occupational Health and Safety Administration
14.	RWQCB	Regional Water Quality Control Board
15.	SWANA	Solid Waste Association of North America
16.	SWRCB	State Water Resources Control Board
17.	UL	Underwriters Laboratories Inc.
18.	US	United States

B. Whenever the following acronyms for materials and units are referenced in the Technical Specifications or this CQA Plan, the following meanings apply:

1.	AC	acre
2.	AWG	American Wire Gauge
3.	cm	centimeter
4.	ClosureTurf™	Three (3) component final cover system composed of structured LLDPE geomembrane liner drainage studs and spike, engineered synthetic turf, and a specific grade of sand infill ballast.
5.	CMP	corrugated metal pipe
6.	Enginneer Turf	Synthetic turf component of ClosureTurf™
7.	EPDM	ethylene propylene diene monomer
8.	°F	degree Fahrenheit
9.	ft	foot
10.	g	gram
11.	LLDPE	Linear Low-Density Polyethylene
12.	HDPE	High Density Polyethylene
13.	HP	horse power
14.	HydroBinder	Cementious infill used for surface drainage conveyance areas of engineered turf.
15.	in	inch
16.	”	inch
17.	kN	kilonewtons
18.	lb	pound
19.	MARV	minimum average roll value
20.	m	meter
21.	mm	millimeter
22.	mil	1/1000 of 1 inch
23.	ml	milliliters
24.	min	minute
25.	No.	number
26.	oz	ounce
27.	%	percent
28.	psf	pounds per square foot
29.	psi	pounds per square inch
30.	psig	pounds per square inch gauge
31.	PVC	Polyvinyl Chloride

32.	SDR	Standard Dimension Ratio
33.	sec	second
34.	TFE	tetrafluoroethylene
35.	TRM	turf reinforcement mat
36.	yd	yard

C. Whenever the following miscellaneous acronyms are referenced in the Technical Specifications or this CQA Plan, the following meanings apply:

1.	AST	Above Ground Storage Tank
2.	@	at
3.	BMP	Best Management Practice
4.	CQA	Construction Quality Assurance
5.	CQC	Construction Quality Control
6.	CSMP	Construction Storm Water Management Plan
7.	EBA	EBA Engineering
8.	=	equals
9.	LFG	Landfill Gas
10.	max.	maximum
11.	min.	minimum
12.	MQC	Manufacturer's Quality Control
13.	MSDS	Material Data Safety Sheet
14.	NOI	Notice of Intent
15.	NPDES	National Pollutant Discharge Elimination System
16.	PDF	Portable Document Format
17.	POC	Point of Connection
18.	QSD	Qualified SWPPP Developer
19.	QSP	Qualified SWPPP Practitioner
20.	REAP	Rain Event Action Plan
21.	SAP	Storm Water Action Plan
22.	SMARTS	Storm Water Multiple Application and Report Tracking System
23.	SPC	Storm Water Pollution Control
24.	Std.	Standard
25.	SWPPP	Storm Water Pollution Prevention Plan
26.	TEFC	Totally Enclosed Fan Cooled
27.	UST	Underground Storage Tank
28.	UV	Ultra-violet
29.	WDID	Waste Discharge Identification
30.	WPC	Water Pollution Control

1.10 CONTACT ADDRESSES AND TELEPHONE NUMBERS

A. The following are addresses, telephone numbers, and fax numbers for individual contacts at each organization involved in the project.

City of Ukiah
Department of Public Works
300 Seminary Avenue
Ukiah, CA 95482
Telephone: (707) 463-6282
Fax: (707) 463-6204

EBA Engineering
825 Sonoma Avenue
Santa Rosa, CA 95404
Contact Name: Damon F. Brown, P.G., C.E.G., C.Hg.
Telephone: (707) 544-0784
Fax: (707) 544-0866

END OF CQA SECTION 01090
REFERENCES

CQA SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Submittal Control Log.

B. Submittal review and approval procedures.

1.02 SUBMITTAL CONTROL LOG

A. The Submittal Control Log lists all submittals required by the Technical Specifications. The Submittal Control Log will be maintained by the CQA Officer in coordination with the Contractor during construction. The Submittal Control Log documents: 1) submittal number; 2) referenced specification section; 3) submittal description; 4) submitter; 5) date received; 6) reviewer; 7) action taken determination; and 8) return date.

1.03 SUBMITTAL REVIEW AND APPROVAL PROCEDURES

A. Three (3) copies of each submittal listed in the Submittal Control Log will be submitted to the CQA Officer by the Contractor in accordance with the Technical Specifications. The submittals will be forwarded by the CQA Officer to the Design Engineer for review and approval. The Design Engineer may perform a preliminary review of submittals for compliance with the Technical Specifications and issue a verbal *Approval for Use* to the CQA Officer who, in turn, will notify the Contractor that no corrective action determinations were required prior to issuing a verbal *Approval for Use*. All submittals which are not in compliance with the Technical Specifications must be immediately forwarded to the Design Engineer for review and corrective action determinations.

B. At the completion of the review process, the Design Engineer will return two (2) copies of each submittal to the CQA Officer with *Action Taken* determinations stamped on both copies of the submittal. The *Action Taken* determinations and the return dates will be recorded on the Submittal Control Log. One copy of the reviewed submittal will be returned to the Contractor and the other copy will be archived by the CQA Officer in the submittal documentation control binder.

C. The Submittal Control Log will be reviewed and updated in coordination with the Contractor at the weekly progress meetings.

END OF CQA SECTION 01300
SUBMITTALS

CQA SECTION 01400
DOCUMENTATION

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Daily Summary Report.

B. Daily Field Log (Inspection Data Sheet).

C. Construction monitoring forms.

D. Laboratory testing reports.

E. Non-conformance/Corrective Action Form.

F. Acceptance Report.

G. Meeting/Discussion Summary Report.

H. Photograph Log.

I. Document Control.

J. As-built Record Documents.

K. CQA Certification Report.

L. Documentation archive storage.

1.02 DAILY SUMMARY REPORT

A. A summary report will be prepared daily by the CQA Officer. This report will organize and summarize all construction and CQA activities (monitoring and testing) completed during each day. The Daily Summary Report will contain or reference the following information:

1. Title block containing: 1) project name; 2) project number; 3) project location; 4) name of Owner; 5) name of Contractor; 6) date and day; 7) Document Control Number (see Part 1.10 of this Section); and 8) weather conditions.
2. Summary of construction activities for each unit of construction including equipment, personnel, and subcontractors utilized for each unit of construction and identification of the general area(s) where construction took place.
3. General summary of CQA activities (monitoring and testing) completed for each unit of construction with reference to attached Daily Field Logs (see Part 1.03 of this Section) which describe construction monitoring, construction testing results, and quality control procedures and test results.
4. General description of any non-conformance with the Plans or Technical Specifications and the corrective action measures taken with reference to attached Non-conformance/Corrective Action Forms (see Part 1.06 of this Section) which

contain a more detailed description of the non-conformance issue and its corrective action.

5. List of any materials received and status of submittal(s).
6. List of project meetings or pertinent discussions with reference to attached Meeting/Discussion Summary Report (see Part 1.08 of this Section).
7. Other miscellaneous information.
8. Signature of CQA Officer.

B. A sample Daily Summary Report is included in Appendix A, Project Documentation Forms.

1.03 DAILY FIELD LOG (INSPECTION DATA SHEET)

A. Each CQA Monitor will maintain an individual Daily Field Log (or Inspection Data Sheet) which will be assigned a cross-referencing Document Control Number (see Part 1.10 of this Section) and contain daily entries of the CQA Monitor.

B. On the Daily Field Log, the CQA Monitors will provide a written account of construction activities, construction monitoring, construction testing, and quality control procedures performed during the day for the monitored construction unit(s), as well as any observations (i.e., notes, charts, sketches, or photograph reference).

C. Construction monitoring forms (see Part 1.04 of this Section) and laboratory testing forms (see Part 1.05 of this Section) will be attached to, or referenced in, the Daily Field Log.

1.04 CONSTRUCTION MONITORING FORMS

A. Construction activities, construction monitoring, and construction testing will be recorded on appropriate construction monitoring forms. The following construction monitoring forms, or similar forms, will be issued by the CQA Officer for this project and are presented in the following appendices:

1. Soils Monitoring Forms (Appendix B)
   a. Soils Test Request - Sample Custody Log
   b. Nuclear Density/Moisture Test Data
2. Geosynthetics Monitoring Forms (Appendix C)
   a. Geomembrane Delivery and Control Log
   b. Engineered Turf Delivery and Control Log
   c. Geomembrane Test Request – Sample Custody Log
   d. Engineered Turf Test Request – Sample Custody Log
   e. Geomembrane Deployment/Seaming Log
   f. Geomembrane Repair Log
   g. Engineered Turf Deployment/Seaming Lot
   h. Engineered Turf Repair Log

B. Completed construction monitoring forms will be submitted by the CQA Monitor to the CQA Officer for review with Daily Field Logs, or at the completion of testing, and will be addressed by the CQA Officer in the Daily Summary Reports.

1.05 LABORATORY TESTING REPORTS

A. Laboratory testing reports will be issued by the Soils and Geosynthetics CQA Testing Laboratories for conformance and construction testing. Laboratory testing reports will be issued for the following testing during the project.

1. Moisture content, particle size analysis, Atterberg limits, Unified Soil Classification, and/or moisture-density relationship testing for miscellaneous aggregate materials, engineered fill, foundation layer, and erosion-resistant layer materials.
2. Particle size analysis for sand ballast.
3. Conformance testing for geomembrane.
4. Conformance testing for engineered turf.
5. Conformance testing for concrete.

B. Laboratory testing reports will be addressed by the CQA Officer in the Daily Summary Report on the date of receipt.

1.06 NON-CONFORMANCE/CORRECTIVE ACTION FORM

A. A Non-conformance/Corrective Action Form will be issued by the Owner to the CQA Officer who will notify the Contractor or Installer of construction or materials not in compliance with the Plans or Technical Specifications, or for defective workmanship or materials even if in compliance with the Plans and Technical Specifications. The Non-conformance/Corrective Action Form will contain or reference the following information:
1. Title block containing: 1) project name; 2) project number; 3) project location; 4) name of Owner; 5) name of Contractor; 6) date and day; and 7) Document Control Number (see Part 1.10 of this Section).
2. Description of the non-conformance issue, construction unit, and location.
3. Reference to the technical specification(s) and/or plan(s) for which materials or construction are not in compliance.
4. Description of corrective action measures necessary to fully correct the area of non-conformance with the Plans and/or Technical Specifications as determined by the Owner.
5. Specification variance or revisions to the As-built Record Drawings (see Part 1.11 of this Section) required.
6. If necessary, any Daily Field Log, construction monitoring forms, laboratory testing report(s), Meeting/Discussion Summary Report, or Photograph Log pertaining to the non-conformance issue will be referenced by Document Control or Photograph Number to fully substantiate the non-conformance issue and corrective action determination.
7. Signature of the CQA Officer verifying that corrective measures determined by the Owner have been taken by the Contractor or Installer.

B. A sample Non-conformance/Corrective Action Form is included in Appendix A, Project Documentation Forms.

1.07 ACCEPTANCE REPORT

A. An Acceptance Report will be prepared for each Construction Unit to verify that all materials and construction are in compliance with the Plans and Technical Specifications. The Acceptance Report will reference all relevant Daily Summary Reports, Daily Field Logs (Inspection Data Sheets), and Non-conformance/Corrective Action Forms by the Document Control Number.

B. A sample Acceptance Report is included in Appendix A, Project Documentation Forms.

1.08 MEETING/DISCUSSION SUMMARY REPORT

A. A Meeting/Discussion Summary Report will be prepared for each scheduled Project Meeting (see Section 01039 of this CQA Plan) and any pertinent discussion between the Contractor and CQA personnel. The Meeting/Discussion Summary Report will contain the following information:

1. Title block containing: 1) project name; 2) project number; 3) project location; 4) name of Owner; 5) name of Contractor; 6) date and time; 7) meeting location; and 8) Document Control Number (see Part 1.10 of this Section).
2. Meeting name or general discussion subject matter.
3. List of meeting attendees or discussion participants.
4. Minutes of scheduled Project Meetings or synopsis of discussion.
5. List of any items needing resolution resulting from the meeting or discussion.
6. Signature of CQA Officer.

B. A sample Meeting/Discussion Summary Report is included in Appendix A, Project Documentation Forms.

1.09 PHOTOGRAPH LOG

A. All construction activities will be continually photographed to clearly show and define construction methods and as-built conditions of completed units of construction. Photographs will include: 1) product or material sources; 2) construction methods in progress for each unit of construction; 3) completed units of construction; 4) damaged, rejected, or substandard materials and construction; 5) corrective action measures to rectify damaged, rejected, or substandard construction; 6) completed units of construction after completion of corrective action measures; and 7) design modifications. Photographs will be identified by number, date, and time of the photograph. The CQA Officer will maintain a cross-referencing photography log documenting the subject matter of each photograph.

B. A sample Photograph Log is included in Appendix A, Project Documentation Forms.

1.10 DOCUMENT CONTROL

A. A unique Document Control Number will be assigned to all CQA documents generated during construction and implementation of this CQA Plan.

B. The Document Control Number will organize and index all CQA documentation for cross-referencing, to allow easy access to all documents, and to enable a reviewer to identify and retrieve original CQA documentation for any completed unit of construction.

C. Complete documentation of all CQA activities will be controlled and secured in a series of 3-ring binders maintained by the CQA Officer with a duplicate copy maintained at the offices of the Owner, at the option of the Owner. This documentation control structure organizes and indexes all CQA documents and is intended to allow easy access to all documents for review and audit by the Owner, Design Engineer, or regulatory agencies. The following is a preliminary list and contents of the *CQA Documentation Binders* to be established and maintained by the CQA Officer.

1. Title: *Daily Summary Reports and Field Logs.*
   Color code (optional): Blue.
   Contents: Daily Summary Reports prepared by the CQA Officer and Daily Field Logs completed by the CQA Monitors.
2. Title: *Project Administration Documentation.*
   Color code (optional): Red.
   Contents: Non-conformance/Corrective Action Forms, Acceptance Reports, Meeting/Discussion Summary Reports, Owner correspondence, Design Engineer correspondence, Contractor correspondence, and miscellaneous correspondence.
3. Title: *Contractor Daily Field Reports.*
   Color code (optional): Green.
   Contents: Any Daily Field Reports prepared by the Contractor (or Installer).
4. Title: *Submittals.*
   Color code (optional): Purple.
   Contents: Updated Submittal Control Log, submittal transmittal cover sheets, and all reviewed and approved (or other status) submittals.
5. Title: *Soils CQA.*
   Color code (optional): White.
   Contents: Construction monitoring forms and laboratory testing reports for soils.
6. Title: *Geosynthetics CQA.*
   Color code (optional): Orange.
   Contents: Construction monitoring forms and laboratory testing reports for geosynthetics.
7. Title: *CQA Plan.*
   Color code (optional): Teal.
   Contents: CQA Plan.
8. Title: *Photography Log.*
   Color code (optional): Yellow.
   Contents: Construction and CQA photographs and cross-referencing Photograph Logs.

1.11 AS-BUILT RECORD DOCUMENTS

A. As-built Record Documents will be maintained by the CQA Officer and will be reviewed and verified by the Design Engineer.

B. The As-built Record Documents will show actual as-built conditions of construction, including an aerial topographic survey illustrating the final construction grades and configuration, and will adequately reflect that construction is in substantial compliance with the design intent of the Plans and Technical Specifications; irrelevant deviations in actual construction that do not substantially affect the design intent will not be incorporated into the As-built Record Documents, but will be addressed in the CQA Certification Report (see Part 1.12 of this Section).

C. As-built Record Documents will be prepared during the construction process by making modifications as they occur to a single set of construction drawings designated as the *Site As-built Record Documents*; at the completion of construction the CQA Officer will incorporate all as-built conditions into the *Final As-built Record Documents.*

D. The final As-built Record Documents will contain revision numbers, dates, and reviewer initials; and will be signed and stamped by the CQA Certifying Engineer.

1.12 CQA CERTIFICATION REPORT

A. At the completion of the project, the CQA Certifying Engineer will prepare a CQA Certification Report and submit it to the Owner. The CQA Certification Report will consist of information and data generated by the CQA program and will document that the final closure construction is in compliance with the design intent of the Plans and Technical Specifications. At a minimum, the CQA Certification Report will contain the following information.

1. Summary of construction methods for each unit of construction completed.
2. Summary of the CQA program implemented during construction and specific CQA activities (monitoring and testing) performed for each unit of construction completed.
3. Results of conformance testing and construction testing.
4. Revisions made to Plans and variances from Technical Specifications allowed.
5. Final As-built Record Documents.
6. Statement of compliance with the design intent of the Plans and Technical Specifications, signed and stamped by the CQA Certifying Engineer, a professional engineer or certified engineering geologist registered in the State of California.

1.13 DOCUMENTATION ARCHIVE STORAGE

A. At the completion of the project and after submittal of the CQA Certification Report and As-built Record Documents to the Owner, all original documentation generated by construction and the CQA program will be archived at the Owner's administrative office with duplicate copies stored at the offices of the Design Engineer and CQA Certifying Engineer.

END OF CQA SECTION 01400
DOCUMENTATION

DIVISION 2

CONSTRUCTION QUALITY ASSURANCE PROCEDURES

CQA SECTION 02207
AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the aggregate materials are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 AGGREGATE MATERIALS

A. Verify that the following aggregate materials meet the applicable product requirements of Section 02207 (Aggregate Materials) of the Technical Specifications:
1. Aggregate base.
2. Pipe bedding.
3. Sand ballast.
4. Loose rock riprap.
5. Grouted rock riprap.
6. Gravel pack.
7. Concrete aggregate.
8. Coarse rock for construction entrance.
9. Concrete sand.
10. Tank bedding and backfill.

2.02 CONFORMANCE TESTING

A. Prior to aggregate base, pipe bedding, tank bedding and tank backfill placement operations, sample these respective materials to be used at the Work site and send the samples to the Soils Testing Laboratory to perform following test as specified:
1. Moisture-Density Relationship (ASTM D 1557); one (1) per source.

B. Prior to sand ballast placement operations, sample the actual sand material to be used at the Work site and send the samples to the Soils Testing Laboratory to perform at least one (1) of each of the following tests as specified:
1. Sieve Analysis (ASTM C 136) per every 10,000 cubic yards.
2. Permeability (ASTM D 2434 [modified]) per every 10,000 cubic yards.

C. Verify that the respective aggregate materials are derived from the approved sources throughout the Work.

PART 3 EXECUTION

3.01 STOCKPILING

A. Verify that the Contractor places all aggregate materials in the appropriate stockpile areas designated in the Plans and in accordance with all requirements in the Technical Specifications.

B. Verify that provisions are made to direct surface water away from stockpile site(s) so as to prevent erosion or deterioration of materials.

END OF CQA SECTION 02207
AGGREGATE MATERIALS

CQA SECTION 02222
EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that all excavation work associated with the various construction tasks are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of the Contractor's Storm Water Pollution Prevention Plan (SWPPP) as required in the Technical Specifications.

B. Collect certified weight tags issued by the permitted transfer station or solid waste disposal facility for all loads of refuse transported off-site for disposal.

C. Verify compliance with the submittal schedule and update Submittal Log.

D. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning of any portion of general earthwork, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the Contractor has located all underground utilities prior to performing any excavation for drainage and/or erosion control structures outside the limits of Work shown on the Plans.

3.02 CLEARING AND GRUBBING

A. Verify that all areas delineated for construction as shown on the Plans, including interim cover soil on the landfill surface and natural ground surface within the limits of the on-site borrow area, are cleared of all vegetative growth, such as brush, grass, weeds, or other deleterious material.

B. Verify that clearing and grubbing is performed prior to beginning excavation of any area.

C. Verify that cleared and grubbed debris are stockpiled separately from excavated material in accordance with the requirements set forth in Part 3.05 of this Section.

3.03 REFUSE EXCAVATION AND RELOCATION

A. After clearing and grubbing, verify that residual existing interim cover soil overlying the designated refuse excavation areas is segregated and subsequently reused as foundation layer material.

B. Verify that refuse beneath the existing power lines is excavated to the lines, grades and dimensions shown on the Plans.

C. Verify that the excavated refuse is relocated to the designated refuse relocation area shown on the Plans.

D. Verify that the relocated refuse placed within the designated refuse relocation area is spread in uniform lifts not exceeding 2 feet in thickness and the each lift is compacted with a minimum of four (4) passes using a dozer.

E. Verify that the relocated refuse lifts is covered with a minimum of 6 inches of soil at the end of each working day to minimize vector hazards and odor nuisance.

F. Verify that within five (5) working days of completing the refuse excavation work beneath the existing power lines, the refuse relocation area is completely covered with a minimum of 12 inches of prepared and compacted foundation layer material in accordance with Section 02240 (Foundation Layer) of these Technical Specifications.

3.04 INCIDENTAL REFUSE EXCAVATION AND DISPOSAL

A. Verify that refuse is excavated at the locations and to the details shown on the Plans to accommodate the installation of drainage, LFG collection system, and condensate drain/discharge components.

B. Verify that excavated refuse is handled and managed in accordance with the procedures outlined in Section 02222 (Excavation) of the Technical Specifications, including placement of refuse in roll-off bins or dump trucks, covering of roll-off bins or dump trucks containing refuse at the end of each working day, and the removal of refuse from the site within 48 hours of being excavated.

C. Verify that the Contractor does not mix excess, surplus, or waste materials from other general construction activities with the refuse derived from the excavation work described in this Section.

3.05 SOIL EXCAVATION

A. Verify that excavation of swales for drainage and erosion control structures conforms to Section 19-4.01 of the Standard Specifications.

3.06 GRADING

A. Verify that the excavations for the on-site borrow area, drainage swales, and leachate UST are constructed in conformance with the lines, grades, and dimensions shown on the Plans.

B. Verify that unsuitable materials, as determined by the Design Engineer, encountered at the subgrade elevation are removed and stockpiled separately from excavated material or disposed of in accordance with Section 02222 (Excavation) of the Technical Specifications.

C. Verify that where excavation is inadvertently carried below subgrade elevations, suitable provision is made by the Contractor for adjustment of same as determined by the Design Engineer to meet requirements incurred by the deeper excavation; also, verify that inadvertent over-excavation in such locations is rectified by backfilling with engineered fill and compacting to provide a firm and unyielding subgrade in accordance with the requirements of the Technical Specifications.

3.07 HAUL ROAD CONSTRUCTION

A. Verify that haul road locations have been approved by the Design Engineer.

3.08 DUST CONTROL

A. Verify that dust control measures are implemented by the Contractor in accordance with the approved Dust Control Plan and are effective in preventing and controlling the generation of dust in construction zones, along haul roads, in equipment parking areas, and in other locations as may be required due to operations related to performing the Work, and as required by the Design Engineer.

3.09 EROSION CONTROL

A. Verify that erosion and sediment control measures are implemented by the Contractor in accordance with the approved SWPPP, and as directed by the Design Engineer for all excavation work areas including on-site borrow area, sedimentation basins, leachate UST, stockpile areas, adjacent areas which have been disturbed, or any other affected areas.

3.10 DRAINAGE CONTROL

A. Verify that the Contractor provides ample means and devices with which to promptly remove and dispose of all water from any source entering the stockpile area(s) and any other active Work areas, and maintains these at all times until authorization for their removal is issued by the Design Engineer.

3.11 CORRECTIVE ACTIONS

A. If any portion(s) of the excavation work does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02222
EXCAVATION

CQA SECTION 02224
ENGINEERED FILL

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that engineered fill materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 ENGINEERED FILL

A. Verify that the engineered fill materials meets the applicable product requirements of Section 02224 (Engineered Fill) of the Technical Specifications.

2.02 CONFORMANCE TESTING

A. Verify that engineered fill is obtained from one of the approved on-site borrow sources.

B. If engineered fill placement operations are being performed concurrently and from the same borrow source area as the foundation layer or erosion-resistant layer construction, use results from the foundation/erosion-resistant layer conformance testing to determine moisture-density relationship for compaction. If not, sample the actual engineered fill material to be used and send the samples to the Soils Testing Laboratory to perform the following test per the stated frequency of material to be placed or a minimum of two (2) tests, whichever results in the greater number of tests:
   1. Moisture-Density Relationship Curve (ASTM D 1557) per every 5,000 cubic yards.

C. If engineered fill material appearance or properties are different from those identified from borrow source characterization or change within the same location at the on-site borrow source, based on visual observation, perform additional borrow source characterization tests in accordance with the aforementioned conformance testing program.

D. Notify the Design Engineer of a change in materials and receive approval from the Design Engineer for use of the material as engineered fill prior to excavating additional material from that location within the on-site borrow source.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to engineered fill placement operations, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Convey to the Contractor that the nuclear testing gauge shall be calibrated on a daily basis using the methods and materials recommended by the gauge manufacturer. The nuclear gauge serial number and the name of the soil technician performing the soil density testing shall be noted to demonstrate that both the technician and the nuclear gauge are certified.

3.02 PLACEMENT

A. Verify that prior to placement of engineered fill on native ground, the subgrade is scarified to a depth of approximately 6 inches, moisture conditioned to within 1 to 3 percentage points of optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557.

B. Verify that engineered fill material is spread in uniform loose lifts not exceeding 8 inches in thickness.

C. Verify that each loose lift is moisture conditioned and thoroughly mixed to ensure a uniformly distributed moisture content.

3.03 COMPACTION

A. Verify that the final thickness of compacted lifts does not exceed 6 inches.

B. Perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least four samples (4) per 1,000 cubic yards of material placed or four samples per day.
   a. For sedimentation basin improvements and former leachate pond backfill, perform at least one (1) test per every 5,000 cubic yards
2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

C. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the engineered fill does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02224
ENGINEERED FILL

CQA SECTION 02225
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that all trenching and backfilling work associated with the various construction tasks are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.02 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.03 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the pipe bedding and engineered fill as determined under CQA Section 02207 (Aggregate Materials) and CQA Section 02224 (Engineered Fill), respectively, of this CQA Plan.

PART 3 EXECUTION

3.01 TRENCH PREPARATION

A. Verify that the required points of connection, lines, levels, contours, and datum locations have been identified by the Contractor.

B. Verify that the Contractor has located all utilities to avoid mechanical and structural interference.

3.02 TRENCH EXCAVATION

A. Verify that trenches are excavated to the lines and grades as shown on the Plans.

B. Verify that any water or materials that interfere with the work is removed.

C. Verify that soft areas of trench subgrades not capable of compaction in place are cut out.

D. Verify that trench bottoms are firm, continuous, relatively smooth and free of rocks and/or unsuitable material prior to the installation of pipe bedding or trench backfill material.

3.03 SHORING, SHEETING, AND BRACING OF TRENCH

A. Verify that the Contractor has secured a trench permit from the California Division of Industrial Safety prior to excavating any trench over 5 feet in depth.

B. Verify that shoring and sheeting is removed as the backfill is completed in a manner that will not damage the pipe or permit voids in the backfill.

3.04 PIPE/CONDUIT TRENCH BACKFILLING

A. Verify that trenches are backfilled to the lines and grades as shown on the Plans.

B. Verify that the placement methods employed do not disturb or damage buried drainage pipes and conduits in the trench.

C. Verify that pipe bedding material is placed at trench bottom in one continuous level layer not exceeding 6 inches in compacted depth.

D. Verify that pipe bedding is placed around the sides and to the top of the pipe/conduit, tamped in place, and compacted.

E. Verify that optimum moisture content of pipe bedding material is maintained to attain required compaction density.

F. Perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift or at a change in material.
   2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

G. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

H. Verify that trenches are not jetted, unless allowed by the Design Engineer.

I. For buried pipe that does not require pipe bedding or engineered fill (condensate drain pipe), verify that the trench backfill is placed in a manner that will not damage the pipe and that the backfill is compacted to a firm consistency consistent with surrounding erosion-resistant layer material.

3.05 ANCHOR TRENCH BACKFILLING

A. Verify that the placement method employed does not damage the ClosureTurf™ in the trench.

B. Verify that the portion of the trench above the ClosureTurf™ is backfilled with engineered fill and field tested consistent with the procedures described in Part 3.04 of this Section.

C. Verify that trenches are not jetted, unless allowed by the Design Engineer.

D. Verify that the trenches are backfilled to the lines and grades as shown on the Plans.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the trenching and/or backfilling does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02225
TRENCHING AND BACKFILLING

CQA SECTION 02240
FOUNDATION LAYER

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the foundation layer materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 FOUNDATION LAYER MATERIAL

A. Verify that the foundation layer materials meet the applicable product requirements of Section 02240 (Foundation Layer) of the Technical Specifications.

B. Verify that residual interim cover soil derived from designated refuse excavation areas is free of refuse and suitable for reuse as new foundation layer material.

2.02 CONFORMANCE TESTING

A. Following clearing and grubbing of landfill surface but prior to fine grading and scarification operations, sample existing interim cover material to be incorporated into the foundation layer and send the samples to the Soils Testing Laboratory to perform at least one (1) of each of the following tests as specified:
   1. Particle Size Analysis (ASTM D 422) per every 5,000 cubic yards.
   2. Unified Soil Classification (ASTM D 2487) per every 5,000 cubic yards.
   3. Moisture-Density Relationship Curve (ASTM D 1557) per every 5,000 cubic yards.

B. Prior to new foundation layer placement operations, sample the actual foundation layer material to be used at the Work site and send the samples to the Soils Testing Laboratory to perform at least one (1) of each of the following tests as specified:
   1. Particle Size Analysis (ASTM D 422) per every 5,000 cubic yards.
   2. Unified Soil Classification (ASTM D 2487) per every 5,000 cubic yards.
   3. Moisture-Density Relationship Curve (ASTM D 1557) per every 5,000 cubic yards.

C. Verify that foundation layer material is obtained from the approved on-site borrow source as determined from the aforementioned conformance testing.

D. If foundation layer material appearance or properties are different from those identified from borrow source characterization or change within the same location at the on-site borrow source, based on visual observation, perform additional borrow source characterization tests in accordance with the aforementioned conformance testing program.

E. Notify the Design Engineer of a change in materials and receive approval from the Design Engineer for use of the material for foundation layer construction prior to excavating additional material from that location within the on-site borrow source.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to foundation layer placement operations, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Convey to the Contractor that the nuclear testing gauge shall be calibrated on a daily basis using the methods and materials recommended by the gauge manufacturer. The nuclear gauge serial number and the name of the soil technician performing the soil density testing shall be noted to demonstrate that both the technician and the nuclear gauge are certified.

3.02 PREPARATION OF EXISTING INTERIM COVER SOIL TO BE INCORPORATED INTO THE FOUNDATION LAYER

A. Perform visual soil classification of the interim cover soils per the following test method and frequency:
   1. *Visual Soil Classification (ASTM D 2488)*; at least one (1) test per every acre.

B. Verify that existing interim cover soils are scarified to a minimum depth of 12 inches.

C. Following scarification, verify that existing interim cover soils are moisture conditioned and thoroughly mixed to ensure a uniformly distributed moisture content to within 1 to 3 percentage points of the optimum moisture content.

D. Perform the following field tests at the frequency shown to verify that the compacted interim cover soils have a minimum dry density of 90 percent of the maximum dry density and within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*. Soil shall be sampled and tested at a frequency of four samples per 1,000 cubic yards (3/AC/lift) of material placed or four samples per day, whichever frequency results in the greatest number of tests.
   2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

3.03 PLACEMENT AND COMPACTION OF NEW FOUNDATION LAYER MATERIAL

A. Verify that foundation layer material is moisture conditioned and thoroughly mixed in the on-site borrow area to ensure a uniformly distributed moisture content. At time of placement, perform the following field test at the frequency shown to verify that the foundation layer material meets the soil classification requirements:
   1. *Soil Classification (ASTM D 2488)*; one (1) sample per three (3) acres per lift (2,400 cubic yards) of material placed or change in material, whichever results in the greater number of tests.

B. Record corresponding soil classification results on the Test Data form.

C. Continuously observe all placement operations to verify that the foundation layer material is consistent and has no oversized particles, overly wet or dry areas, or organic, deleterious, or other unsuitable matter.

D. Verify that foundation layer material is spread in uniform loose lifts not exceeding 8 or 12 inches in thickness.

E. Verify that each loose lift is moisture conditioned and thoroughly mixed to ensure a uniformly distributed moisture content.

F. Verify that the final thickness of compacted lifts for new foundation layer material does not exceed 6 inches.

G. Perform the following field tests on each 6-inch lift at the frequency shown to verify that the foundation layer has been compacted to 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*. Soil shall be sampled and tested at a frequency of four samples per 1,000 cubic yards (3/AC/lift) of material placed or four samples per day, whichever frequency results in the greatest number of tests.
2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

H. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 FINAL SURFACE PREPARATION

A. Verify that the completed foundation layer surface is free of individual particles or protrusions greater than 0.50 inches in diameter.

B. Verify that ruts and ridges on the completed foundation layer surface are limited to a maximum depth or height of 1.0 inch.

3.05 CONFORMANCE VERIFICATION

A. Verify by auger or survey that the completed foundation layer has a minimum thickness of 12 inches. Measurements by either method shall be conducted using a grid pattern with 100-foot centers.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the foundation layer does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02240
FOUNDATION LAYER

CQA SECTION 02310
ACCESS ROADS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the access road materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 REINFORCEMENT GEOTEXTILE

A. Verify reinforcement geotextile conformance under CQA Section 02771 (Reinforcement Geotextile) of this CQA Plan.

2.02 AGGREGATE BASE

A. Verify aggregate base conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the aggregate base as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

PART 3 EXECUTION

3.01 SUBGRADE

A. Where access roads are not constructed on engineered fill, verify that subgrade is scarified a minimum of 6 inches, uniformly moisture conditioned to within 1 to 3 percentages points of optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

B. Where access roads are constructed on engineered fill, verify that the engineered fill has been placed and compacted in accordance with the requirements of Section 02224 (Engineered Fill) of this CQA Plan.

C. Where access roads are constructed on installed engineered turf, verify that the following precautions and requirement are implemented:

1. Vehicle and equipment access on the installed engineered turf conform with applicable provisions outlined in Section 02772 (Geomembrane) of the Technical Specifications.

2. Verify that the initial lift of engineering filled placed atop the installed engineered turf is well graded and does not contain rocks or clods over 1 inch in greatest dimension.

3.02 REINFORCEMENT GEOTEXTILE

A. Verify that reinforcement geotextile is installed, including examination of subgrade surface, in accordance with the requirements for geotextile as set forth in Section 02771 (Geotextile) of this CQA Plan.

3.03 AGGREGATE BASE

A. Verify the stability of the subgrade by proof rolling with a roller or loaded water truck. Verify that any areas determined not to be suitable are allowed to air dry until stable or over-excavated and backfilled with aggregate base.

B. Verify that trucks do not back-dump aggregate base onto the reinforcement geotextile and that they only drive on previously dumped aggregate base to progress.

C. Verify that aggregate base material is spread in uniform loose lifts not exceeding 8 inches in thickness.

D. Perform the following field tests at the frequency shown to verify that the compacted aggregate base material has a minimum dry density of 95 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
   2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

E. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

F. Verify that access roads are "proof rolled" with a heavy wheel-load vehicle, such as a loaded water truck, to identify weak areas, and verify that any weak areas are reworked to the Design Engineer's satisfaction.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the access roads does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

B. If any portion(s) of the underlying installed engineered turf is damaged during the access road construction as determined by visual observations, verify that that portion(s) is repaired or removed and replaced to meet the requirements of the Technical Specifications and that the

corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02310
ACCESS ROADS

CQA SECTION 02722
DRAINAGE AND EROSION CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the drainage and erosion control materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 DRAINAGE AND EROSION CONTROL COMPONENTS

A. Verify that the following drainage and erosion control components meet the applicable product requirements of Section 02722 (Drainage and Erosion Controls) of the Technical Specifications:
1. Corrugated metal pipe (CMP), couplings and fabricated fittings.
2. High density polyethylene (HDPE) pipe, couplings and fabricated fittings.
3. CMP anchor assembly stakes and hardware.
4. Wood posts and railings.
5. Steel grates for drainage inlets.
6. Turf reinforcement mat (TRM).
7. TRM anchorage stakes.
8. Erosion control netting.
9. Erosion control netting anchors.

2.02 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 BACKFILL

A. Verify that backfill placed above pipe bedding consists of material excavated from the trench/excavation unless specified otherwise by the Design Engineer.

B. Review moisture-density relationship conformance test results for the erosion-resistant layer as determined under CQA Section 02250 (Erosion-Resistant Layer) of this CQA Plan.

2.04 ROCK RIPRAP

A. Verify rock riprap conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.05 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning construction of any drainage and erosion control structure, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

3.02 STOCKPILING

A. Verify that the Contractor places all drainage and erosion control materials in an area(s) approved by the Design Engineer.

3.03 EXCAVATION

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

3.04 DRAIN INLETS AND DRAIN PIPE

A. Verify trenching conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

B. Verify that drain inlets/buried drain pipe and associated bedding and backfill material are placed in conformance with Section 66-1 of the Standard Specifications and the Technical Specifications.

C. Verify that above ground drain pipes are placed and anchored in conformance with Section 66 of the Standard Specifications and as shown on the Plans.

3.05 SEDIMENTATION BASIN OUTLET STRUCTURES

A. Verify that vertical slots are cut in the sedimentation basin drainage risers to the dimensions, orientation and frequency as shown on the Plans.

B. Verify trenching conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

C. Verify that minor concrete installed for the drainage riser foundations is as shown on the Plans.

D. Verify concrete placement conformance under CQA Section 03300 (Concrete) of this CQA Plan.

E. Verify that bedding and backfill material are placed in conformance with Section 66-1 of the Standard Specifications and the Technical Specifications.

3.06 EARTHEN SWALES

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

3.07 EROSION MAT LINED SWALES

A. Verify that the TRM is installed as shown on the Plans and per manufacturer's recommendations.

B. Verify that trenches for terminal and check slots (anchorage) are excavated into the erosion-resistant layer as shown on the Plans.

C. Verify trench backfill conformance under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the trench backfill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

D. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

E. Verify that TRM placed at the top of swale (finish surface) is at or below the final grade so surface drainage can flow freely into the swale.

F. Verify that all splices are shingled downstream.

G. Verify that anchorage stakes are installed as shown on the Plans and per manufacturer's recommendations.

3.08 LOOSE ROCK RIPRAP LINED SWALES

A. Verify filter geotextile installation conformance under CQA Section 02771 (Geotextile) of this CQA Plan.

B. Verify that rock riprap is placed to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Verify that rock riprap is not be placed by dumping.

D. Verify that individual riprap stones are moved and placed as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire length of the swale.

E. Verify that the placed rock riprap is free of pockets of small stones or clusters of larger stones.

3.09 GROUTED ROCK RIPRAP OUTFALLS

A. Verify that the footprint of the outfall is excavated to the dimensions as shown on the Plans.

B. Verify that rock riprap is placed within the excavated footprint to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Verify that rock riprap is not be placed by dumping.

D. Verify that individual riprap stones are moved and placed as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution over the entire footprint of the outfall.

F. Verify that the placed rock riprap is free of pockets of small stones or clusters of larger stones.

G. Verify concrete placement conformance under CQA Section 03300 (Concrete) of this CQA Plan.

3.10 LOOSE ROCK RIPRAP INLETS AND OUTLETS

A. Verify that the footprint of the inlet or outfall is excavated to the dimensions as shown on the Plans.

B. Verify filter geotextile installation conformance under CQA Section 02771 (Geotextile) of this CQA Plan.

C. Verify that rock riprap is placed on the installed filter geotextile to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

D. Verify that rock riprap is not be placed by dumping.

E. Verify that individual riprap stones are moved and placed as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution over the entire footprint of the inlet or outfall.

F. Verify that the placed rock riprap is free of pockets of small stones or clusters of larger stones.

3.11 EROSION CONTROL

A. Verify that the finish surface has been track walked prior to placement of seeding, fertilizer and straw.

B. Verify that the straw is placed onto landfill surface slopes that are steeper than 10 percent.

C. Verify that the blown straw applied to the landfill surface slopes has a minimum thickness of 1.5 inches in place.

D. Verify that erosion control netting is placed over the applied straw and that the netting is secured with anchors at a frequency of 1 foot on center along the edges, and one (1) every 35 square feet for interior areas. Verify that butt joints are spaced 1 foot apart.

3.12 CONFORMANCE VERIFICATION

A. After construction of any portion of drainage and erosion control measures, verify all grades and dimensions of completed work by either field survey or physical measurement.

3.13 CORRECTIVE ACTIONS

A. If any portion(s) of the drainage and erosion control provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02722
DRAINAGE AND EROSION CONTROL

CQA SECTION 02771
GEOTEXTILE

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that reinforcement geotextile materials and installation are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal listed in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

1.03 TRANSPORT AND STORAGE

A. Upon delivery of the filter and reinforcement geotextile rolls to the Work site, verify that the rolls have been transported with opaque protective coverings and within a closed trailer.

B. During unloading of the filter and reinforcement geotextile rolls at the Work site, perform the following procedure:
   1. Obtain a copy of the packing list.
   2. Complete the Geotextile Delivery and Control Log for each shipment and attach a copy of the packing list. The Geotextile Delivery and Control Log documents the following:
      a. Delivery date.
      b. Roll numbers.
      c. Batch/lot numbers or production dates.
      d. Roll dimensions.
      e. Receipt of MQC test reports.
      f. CQA conformance test sampling.
      g. Receipt of CQA conformance test results.
      h. Manufacturer and Product Name or Designation.
      i. Name of CQA monitor observing delivery and storage.
      j. Total quantity delivered with each shipment and the cumulative total quantity delivered to date.
      k. Additional notes including rejection of materials, condition of delivered materials, and other materials included with the shipments.
   3. Obtain written certification from the Supplier that unloading and storage of the filter and reinforcement geotextile rolls has been done in accordance with the Manufacturer's recommended procedures.
   4. Verify that filter and reinforcement geotextile rolls are transported, unloaded, handled, and stored in a manner that does not damage the filter and reinforcement

geotextile rolls or their protective coverings in accordance with the Manufacturer's recommended procedures and the following requirements:

a. Nylon or other cloth straps were used to unload and handle the filter and reinforcement geotextile rolls to protect the rolls and their protective coverings from damage.

b. The filter and reinforcement geotextile rolls were stacked no more than five rolls high and with a 3-foot wide access path between the stacked rows.

5. Verify that damaged protective coverings are repaired or replaced.

6. Identify and separate damaged or rejected filter and reinforcement geotextile rolls.

PART 2 PRODUCTS

2.01 GEOTEXTILE COMPONENTS

A. Verify that the following filter and reinforcement geotextile components meet the applicable product requirements of Section 02771 (Geotextile) of the Technical Specifications:

1. Filter geotextile.
2. Reinforcement geotextile.
3. Sewing thread.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. Prior to filter and reinforcement geotextile installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Prior to filter and reinforcement geotextile installation, verify that all underlying material installation and construction has been completed in accordance with the Technical Specifications.

3.02 INSTALLATION

A. Verify that the filter and reinforcement geotextile is installed in accordance with Manufacturer's instructions for deployment, seaming, and exposure.

B. Verify that the filter and reinforcement geotextile is installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

C. Verify that the filter and reinforcement geotextile panels are overlapped with sufficient material to create a prayer fold for sewing operations.

D. Verify that the filter and reinforcement geotextile is adequately ballasted during installation and until geotextile is covered with the overlying material.

E. Verify that the reinforcement geotextile are permanently anchored as shown on the Plans when installation is complete.

F. Verify that filter and reinforcement geotextile damaged during installation is removed and/or repaired with a sewn patch.

G. Verify that terminal ends of reinforcement geotextile, where the type and purpose of the geotextile changes as shown on the Plans, are overlapped a minimum of 4 feet.

H. Verify that when cutting any filter and reinforcement geotextile above other geosynthetics, the Installer uses a knife with a hooked blade.

I. Verify that the underlying soil subgrade or installed geosynthetics are not damaged by filter and reinforcement geotextile installation equipment or methods and that any damaged soil subgrade or installed geosynthetics are completely repaired in accordance with the requirements of the applicable parts of Section 02771 (Geotextile) of the Technical Specifications.

J. Verify that rocks, excessive dust, excessive moisture or other matter that could cause damage, hamper sewing operations, or clog the filter and reinforcement geotextile are not trapped under the filter and reinforcement geotextile or within the overlap.

3.03 SEAMING AND REPAIR

A. Verify that all seams are sewn unless an alternate seaming method is allowed by the Design Engineer based on the Installer's demonstration of the alternative acceptability.

B. Verify that overlaps are clean and free of soil materials which could adversely affect sewing operations.

C. Verify that a prayer fold is made within the overlap prior to sewing.

D. Verify that a continuous 401 two-thread chain stitch is used to sew the prayer fold.

E. Verify that damaged filter and reinforcement geotextile is removed entirely and replaced or repaired in accordance with the following guidelines:
   1. Repair (patching) material shall be of the same type as the damaged filter and reinforcement geotextile.
   2. Patches shall extend a minimum of 12 inches in all directions beyond the damaged area with the machine direction of the patch aligned with the machine direction of the damaged filter and reinforcement geotextile.
   3. Patches shall be seamed using the same method used for seaming the damaged filter and reinforcement geotextile.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the filter and reinforcement geotextile provisions do not meet the requirements of the Plans and Technical Specifications, based on either observations and/or physical measurement, verify that that portion(s) is repaired or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02771
REINFORCEMENT GEOTEXTILE

CQA SECTION 02772
GEOMEMBRANE

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that geomembrane liner materials and installation are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three copies of each submittal listed in the Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

1.03 TRANSPORT AND STORAGE

A. During unloading of the geomembrane rolls at the site, perform the following procedure:
   1. Obtain a copy of the packing list.
   2. Complete the Geomembrane Delivery and Control Log for each shipment and attach a copy of the packing list. The Geomembrane Delivery and Control Log documents the following:
      a. Delivery date;
      b. Roll numbers;
      c. Batch/lot numbers or production dates;
      d. Roll dimensions;
      e. Receipt of MQC test reports;
      f. Manufacturer and Product Name or Designation;
      g. Name of CQA monitor observing delivery and storage;
      h. Total quantity delivered with each shipment and the a cumulative total quantity delivered to date; and
      i. Additional notes including rejection of materials, condition of delivered materials, and other materials included with the shipments.
   3. Obtain written certification from the Supplier that unloading and storage of the geomembrane rolls has been done in accordance with the Manufacturer's recommended procedures.
   4. Verify that geomembrane rolls are transported, unloaded, handled, and stored in a manner that does not damage the geomembrane rolls in accordance with the Manufacturer's recommended procedures and the following requirements:
      a. Stinger or straps (nylon or other cloth) shall be used to unload and handle the geomembrane rolls to protect the rolls from damage.
      b. The geomembrane rolls shall be stacked no more than three rolls high and with a 3-foot wide access path between the stacked rows.
   5. Identify and separate damaged or rejected geomembrane rolls.

PART 2 PRODUCTS

2.01 GEOMEMBRANE

A. Verify that geomembrane material consists of a compounded Linear Low-density polyethylene (LLDPE) meeting the product requirements of the Technical Specifications.

2.02 EXTRUDATE ROD

A. Verify that extrudate rod is made from the same resin as the geomembrane.

2.03 GEOMEMBRANE SURFICIAL STRIPS

A. Verify that geomembrane surficial strip material consists of Super Gripnet or single-sided geocomposite (200 mil).

2.04 CLOSURE TURF™ COLLECTION FOOT ASSEMBLIES

A. Verify that ClosureTurf™ collection foot components are provided by the manufacturer of the ClosureTurf™ product.

B. Verify PVC assembly components conformance under CQA Section 15200 (LFG Collection System Components) of this CQA Plan.

C. Verify that wellhead adapter consists of 2-inch by 1.5-inch flexible coupling with stainless steel band clamps as manufactured by Fernco, or approved equivalent.

2.05 CLOSURE TURF™ PRESSURE RELIEF VALVES

A. Verify that ClosureTurf™ pressure relief valves are provided by the manufacturer of the ClosureTurf™ product.

2.06 FIELD TESTING EQUIPMENT

A. Verify that the Installer provides and uses a field tensiometer for seam testing that has been calibrated within the last year and is accurate to within 2 pounds.

B. Verify that the Installer provides and uses a 1-inch (width) by 6-inch (length) cutting die for cutting seam test specimens.

2.07 CONFORMANCE TESTING

A. Conduct sampling for CQA conformance testing at the site upon delivery or at the manufacturing plant prior to shipment and delivery to the site.

B. For every 100,000 square feet of material delivered to the site, select at least one geomembrane roll to sample for CQA conformance testing.

C. Sample the selected geomembrane rolls for CQA conformance testing using the following procedure:

1. Cut and discard the first three feet of geomembrane material from across the entire width of the roll.
2. Cut the next 12 inches of material from across the entire width of the roll; this section of material is the CQA conformance testing sample.
3. Assign a CQA test number to the sample and mark the following information directly on the sample with a paint marker:
   a. Machine direction of the sample.
   b. Manufacturer's roll number.
   c. CQA test number.
4. Complete the geomembrane Test Request and Sample Custody Log and ship samples to the Geosynthetics Testing Laboratory via overnight delivery.

D. The following CQA conformance tests will be performed by the Geosynthetics Testing Laboratory to verify compliance with the product requirements of the Specifications:
1. Tensile Properties (ASTM D 6693 / ASTM D 638).
2. Density (ASTM D 1505).
3. Carbon Black Content (ASTM D 4218).
4. Carbon Black Dispersion (ASTM D 5596).
5. Sheet Thickness (ASTM D 5994).

E. Upon completion of CQA conformance testing and receipt of the results, review all results for compliance with the Specifications and report any test results which are not in compliance with the Specifications to the Engineer.

F. Additional CQA conformance testing or corrective action to be performed in the event of test results which are not in compliance with the Specifications will be determined by the Engineer.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. Prior to geomembrane installation, hold a preparatory meeting in accordance with Section 01039 (Progress Meetings) of this CQA Plan.

B. Prior to geomembrane installation, verify that all underlying material installation and construction has been completed in accordance with the Technical Specifications.

C. Verify that prior to and at the middle of each geomembrane welding work shift and whenever adjustments are made to the welding machines, the Installer prepares and tests trial welds for each welding machine that is being used or will be used during that work shift.

D. Verify that trial welds are prepared for both fusion and extrusion welding machines and sampled using the following guidelines:
1. Trial weld samples for fusion welding machines should be a minimum of 6 feet in length.
2. Trial weld samples for extrusion welding machines should be a minimum of 3 feet in length.
3. The trial weld should be centered along and run the entire length of the sample.

E. Verify that trial welds are tested as follows:
   1. Trial welds should be allowed to cool to ambient conditions prior to testing.
   2. After cooling, excessive material should be cut from the beginning and the end of the trial weld sample (approximately 4-inches from each end).
   3. Using the cutting die, four 1-inch specimens should be cut at an even spacing along the length of the trial weld.
   4. Using the field tensiometer with a rate of separation of 2 inches per minute, two non-adjacent specimens shall be tested for peel adhesion (peel) and two for bonded seam strength (shear); both sides of fusion welds shall be tested for peel.

F. Record peel and shear test results for trial welds on the Geomembrane Deployment/Welding Log using the following criteria:
   1. Peel test specimens:
      a. The break is either a film tear bond (FTB-passing) or a non-film tear bond (NFTB-failing).
      b. Percent of peel penetration into the weld (maximum of 10%).
      c. Quantitative value for peel strength (minimum of 75 ppi).
   2. Shear test specimens:
      a. The break is either a film tear bond (FTB-passing) or a non-film tear bond (NFTB-failing).
      b. Elongation of shear specimen (minimum of 2 inches).
      c. Quantitative value for bonded seam strength (minimum of 120 ppi).

G. If any of the four test specimens do not meet the peel or shear criteria, reject the entire trial weld and verify that the welding machine is not used for installation of the geomembrane until passing a retest consisting of repeating the entire trial weld sampling and testing procedure on a new weld performed with the failing machine.

H. If the retested trial weld fails, verify that the welding machine is not used for installation of the geomembrane until proper adjustments or repairs are made and passing a retest; if the welding machine continually fails field trial weld testing, verify that the welding machine is tagged and completely removed from work area.

3.02 INSTALLATION

A. Verify that geomembrane panels are deployed parallel to the slope by unrolling down the entire length of the slope and that corrections or adjustments are made to panels which become askew to the parallel line of the slope.

B. Verify that adjacent geomembrane panel edges are overlapped a minimum of 4-inches for fusion welding and alignment of the overlap is kept consistent by marking overlap indicator points.

C. Verify that geomembrane damaged during handling, transport, or deployment is removed or repaired.

D. Verify that the underlying the soil subgrade or installed geosynthetics are not damaged by geomembrane installation equipment or methods and that any damaged soil subgrade or installed geosynthetics are completely repaired in accordance with the requirements of the applicable section of the Specifications.

E. Verify that the Installer only deploys the quantity of geomembrane which can be completely welded and anchored by the end of the work shift or day.

F. Verify that the Installer prepares an adequate number of sandbags to ballast the geomembrane during deployment in accordance with the following guidelines:
   1. Only plastic ties should be used to close sandbags; no metal or wire ties are allowed.
   2. Sandbags should be removed prior to deploying overlying materials and after completion of permanent geomembrane anchorage.
   3. Sandbag fill should not be disposed of within the limits of work unless the fill consists of material which meets the Specification for the material it is disposed upon.
   4. Geomembrane rolls may also be used for ballast provided that no damage to the deployed geomembrane occurs.

G. Verify that the Installer deploys and seams the geomembrane in a manner which minimizes wrinkles and provides the proper amount of slack in the installed geomembrane to compensate for contraction due to local temperature extremes prior to covering; no stress-bridging or "fishmouths" are allowed.

H. Verify that immediately after geomembrane panels running through ditch flow lines or at toes of slopes are welded, sandbags are placed end-to-end along the entire length of the flow or toe line to prevent stress-bridging at those locations; alternatively, to reduce the number of sandbags required and to further prevent stress-bridging, the Installer may anchor the geomembrane near the toes of slopes within a backfilled anchor trench constructed in accordance with the Specifications.

I. Verify that the geomembrane surficial strips, ClosureTurf™ collection foot assemblies, and ClosureTurf™ pressure relief valves are installed per the Plans and in accordance with manufacturer's recommendations.

J. Verify that geomembrane panels are not overlapped or seamed perpendicular to the slope on slopes with a gradient of more than 10 percent, within 20 feet of the top of any slope, and unless the geomembrane is anchored within a backfilled anchor trench constructed in accordance with the Specifications.

K. Verify that when cutting any geomembrane above another geomembrane, the Installer uses a knife with a hooked blade.

L. Record the following information on the Geomembrane Deployment/Welding Log:
   Note: The abbreviations in parenthesis following each verification procedure are used on the Geomembrane Deployment/Welding Log.
   1. Temperature (T). Ambient and geomembrane surface temperatures with a description of the current weather conditions. Record every two hours and document dramatic changes in temperature and weather conditions.
   2. Trial Welds (TW). Time of trial weld, type of welding equipment, welding equipment number, welding operator, and results of field peel and shear testing of trial welds.
   3. Panel (P). Assigned panel number, geomembrane roll number, panel dimensions, and area of panel.

M. Using a graph computation sheet, field sketch a panel layout drawing of the geomembrane panels deployed during the day and attach this field sketch to the completed Geomembrane Deployment/Welding Log; the daily field sketches will be transposed to the master panel layout drawing.

3.03 FUSION WELDING

A. Verify that fusion welding operations only take place when the ambient temperature is between 40°F and 110°F unless the special weather welding plans have been submitted by the Installer and approved by Engineer to weld outside this range; measure ambient temperature 6-inches above the in-place geomembrane and record readings every two hours on the Geomembrane Deployment/Welding Log.

B. Verify that all geomembrane seams are fusion welded by the double-track method leaving an air gap for leak testing; extrusion welding can only be used for repairs, patches, fabrications, and inaccessible areas.

C. Prior to welding, verify that all fusion welding machines have performed trial welds and passed field trial weld testing.

D. Verify that the Installer's power source is capable of producing sufficient and constant voltage under the combined line load of multiple welders and other equipment.

E. Verify that surfaces to be welded are thoroughly cleaned.

F. Verify that seams are welded at the same speed, temperature, roller pressure, and gauge settings used to prepare the trial weld and that the welding operators record welding machine numbers, operators, machine settings, times, and dates on each seam welded.

G. Closely observe each fusion welding machine to verify that the machine is not adversely affecting or damaging the parent geomembrane material outside the welding area.

H. Record the following information on the Geomembrane Deployment/Welding Log:
Note: The abbreviations in parenthesis following each verification procedure are used on the Geomembrane Deployment/Welding Log.

1. Seam (S). Assigned seam number, welding equipment number that welded the seam, welding operator, and length of the welded seam.
2. End of Seam Test. (EST). If the Installer's quality control program requires that specimens be taken from the end of each welded seam and tested for peel adhesion, record these results using the same criteria as for trial welds. If the Installer records these results, request a copy of the results and this information can be omitted from the Geomembrane Deployment/Welding Log.
3. Seam Test Sample (STS). Assigned sample number, seam number sample is located on, location of sample within the seam, welding machine number, welding operator, and results of field seam testing.

3.04 EXTRUSION WELDING

A. Verify that extrusion welding is used only for repairs, patches, fabrications, and inaccessible areas.

B. Prior to welding, verify that all extrusion welding machines have performed trial welds and passed field trial weld testing.

C. Verify that geomembrane patches overlap the underlying geomembrane panel a minimum of 4 inches.

D. Verify that geomembrane patches are cut square with rounded corners and are large enough to extend a minimum of 4 inches in all directions over the repair area.

E. Verify that geomembrane patches are tack-welded to the underlying geomembrane panel to prevent movement during grinding and extrusion welding operations.

F. Verify that the outer edge of repair patches and the adjacent underlying geomembrane are disc-ground to remove surface debris and oxidation and that grinding is not parallel to seam.

G. Verify that the nozzles of extrusion guns are purged before each use to remove solidified extrudate.

H. Verify that the extrusion weld completely covers the entire width of the grind area and that extrusion safety welds extend 4 inches up any intersecting fusion weld.

I. Verify that a cap strip patch is extrusion welded at all fusion welded seam intersections of three or more geomembrane panels.

3.05 QUALITY CONTROL

A. Verify that quality control procedures are performed by the Installer in accordance with the Installer's Geomembrane Installation Quality Control Manual except where amended or modified by the Engineer or the Specifications.

B. Verify that the Installer maintains the following quality control documentation during the geomembrane installation in accordance with the Specifications:
   1. An accurate geomembrane panel layout drawing which includes; 1) roll and panel numbers; 2) seam numbers; 3) geomembrane limits; 4) anchor trench locations; and 5) seam test sample locations.
   2. Daily deployment logs and panel layout drawings to be submitted to the CQA Officer daily which include; 1) panel and seam numbers; 2) panel dimensions; and 3) deployment quantities.
   3. Daily welding logs to be submitted to the CQA Officer daily which include; 1) welding machine numbers; 2) operators; 3) machine settings; and 4) times and dates for each seam welded.

C. Verify that the entire length of each fusion welded seam is air-pressure tested by the Installer, with an air pump capable of generating and maintaining 40 psi of pressure and equipped with a regulator and pressure gauge and pressure feed needles having pressure gauges accurate to 1 psi, in accordance with the following procedure:
   1. Seal both ends of the fusion welded seam with vise-grip plate clamps or an extrusion weld; heat may be applied to the seam ends to aid in sealing the seam in conjunction with the clamps but due to the potential hazard of igniting landfill gas, propane torches or any other flame producing device are not allowed.
   2. At one end of the seam, insert air pressure needle into the fusion weld channel.

3. Pressurize the channel to 30-35 psi and maintain pressure for 5 minutes.
4. Release air from the opposite end of the seam to verify that the entire length of the fusion weld channel was pressurized.
5. If channel pressure is not maintained with a maximum allowable pressure loss of 2 psi over the 5-minute test period or does not stabilize at all, locate the defective area, isolate it, and repeat air pressure test procedures in each direction from the defective area.

D. Verify that the Installer maintains air-pressure test logs on which are recorded seam numbers, beginning and ending air pressures, beginning and ending test times, lengths of tested seam, defective areas found, and confirmation of repair.

E. Record the following air-pressure testing information on the Geomembrane Deployment/Welding Log:
Note: The abbreviations in parenthesis following each verification procedure are used on the Geomembrane Deployment/Welding Log.
1. Air-Pressure Test (AP). Seam number tested, start time of the air pressure test and initial air pressure (psi), termination time of the air pressure test and ending air pressure (psi), and length of seam or portion of seam successfully tested.

F. Verify that the entire length of each extrusion welded seam and repair is vacuum tested by the Installer in accordance with the following procedures, with a vacuum pump capable of generating and maintaining 30 inches of mercury and equipped with a clean view window, regulator, and vacuum gauge accurate to 1 psi:
1. Saturate the extrusion weld with a soap and water solution.
2. Place view box over the saturated weld, create an air tight seal, and apply vacuum in the box.
3. Maintain the vacuum for 10 seconds and examine weld for forming bubbles which indicate leaks; mark detected leaks for follow-up extrusion weld repair and retest detected leaks after repair to verify that the leaks were successfully repaired.

G. Verify that the Installer maintains vacuum test logs on which are recorded repair numbers, vacuum test dates, and vacuum test results.

H. Record the following vacuum testing information on the Geomembrane Repair Log.
1. Assigned repair number, location and description of repair, vacuum test dates, and vacuum test results.

3.06 SEAM TEST SAMPLING

A. Determine seam analysis sample locations by the *stratified random sampling method*. The stratified random sampling method allows random selection of a single sewn analysis sample location anywhere within the required 500-lineal feet sampling interval required in the technical specifications. Have the Installer perform the following seam analysis sampling procedures.
1. Seam analysis samples will be 12-inches wide by 36-inches long with the weld centered down the length of the sample. Samples sizes may be modified at the request of the Installer or CQA Officer. Cut one 1-inch specimen from each end of the sample, and field test specimens for peel adhesion in accordance with the Technical specifications. If these specimens pass the field peel test, submit sample for

laboratory seam analysis. If either of the specimens fail the field peel test, perform Faded Seam Analysis Procedures in accordance with Section 3.08 of this Section.

2. Divide the sample into equal two sections, submit one Section for seam analysis and archive storage the second section.
3. Installer may obtain and test any seam analysis sample at its option.
4. Repair sample holes and vacuum test repair in accordance with Section 3.04 of this Section.

B. Based on the seam analysis *sampling method of attributes,* the CQA Officer may decrease or increase the 500-foot sampling interval based on the following control chart of passing percentages of seam analysis results.

Percent Of Passing Seam Analysis	Sampling Modifications
100	Decrease sampling interval to 1000 lf.
90 – 100	Decrease sampling interval to 750 lf.
60 – 90	Maintain sampling interval at 500 lf.
30 - 60	Increase sampling interval to 250 lf.

Note: Sampling modifications will be considered only after 20 percent of seam analysis is completed.

3.07 LABORATORY TESTING

A. Laboratory seam analysis will be performed at the Geosynthetics Testing Laboratory, which is independent of the geomembrane Manufacturer and Installer, and will be performed in accordance with the following procedures.

1. Seam analysis will include peel adhesion and bonded seam strength (ASTM D 6392). Five specimens will be tested for each method.
2. Both sides of fusion welded seams will be tested for peel adhesion.
3. All five of the specimens must meet the Fail Criteria specified in the technical specifications.

B. Acceptance of the welded geomembrane seams will be based on the results of laboratory seam analysis.

3.08 FAILED SEAM ANALYSIS PROCEDURES

A. In coordination with the Installer, perform the following quality assurance verification procedures in the event of a seam analysis sample failure determined by either field testing or laboratory seam analysis.

1. Track the welded seam 10 feet in both directions away from the failed seam analysis sample location. Cut a small 12-inch wide by 12-inch long sample from each location. Cut one 1-inch specimen from each end of the sample, and field test specimens for peel adhesion in accordance with Part 3.01 of this Section. If these specimens pass the field peel test, submit a 12-inch wide by 18-inch long re-test sample from both locations for laboratory seam analysis. If either of the specimens fail the field peel test at either location, continue tracking the welded seam at 10-foot intervals until specimens successfully pass the field peel tests and a sample can be

submitted for laboratory seam analysis. If specimens continually fail field peel tests at 10-foot intervals, the entire seam or portion of the welded seam will be repaired at the discretion of the CQA Officer.

2. Verify that the failed length of seam is repaired with an 18-inch wide extrusion welded cap strip. Tack and extrusion welding the leading flap of the fusion welded seam is not permitted. Verify that the extrusion welded cap strip is vacuum tested in accordance with the technical specifications.
3. If the re-test sample fails laboratory seam analysis, repeat the above procedures.

B. Sample extrusion welded cap strips exceeding 100 feet in length for seam analysis.

END OF CQA SECTION 02772
GEOMEMBRANE

CQA SECTION 02773
ENGINEERED TURF

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that geonet composite material and installation are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal listed in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 of this CQA Plan.

1.03 TRANSPORT AND STORAGE

A. Upon delivery of the engineered turf rolls to the Work site, verify that the rolls have been transported with opaque protective coverings and within a closed trailer or covered open trailer.

B. During unloading of the geonet composite rolls at the Work site, perform the following procedure:
   1. Obtain a copy of the packing list.
   2. Complete the Engineered Turf Delivery and Control Log for each shipment and attach a copy of the packing list. The Engineered Turf Delivery and Control Log documents the following:
      a. Delivery date.
      b. Roll numbers.
      c. Batch/lot numbers or production dates.
      d. Roll dimensions.
      e. Manufacturer and Product Name or Designation.
      f. Name of CQA monitor observing delivery and storage.
      g. Total quantity delivered with each shipment.
      h. Additional notes including rejection of materials, condition of delivered materials, and other materials included with the shipments.
   3. Verify unloading and storage of the engineered turf rolls has been done in accordance with the Manufacturer's recommended procedures.
   4. Verify that engineered turf rolls are transported, unloaded, handled, and stored in a manner that does not damage the engineered turf rolls or their protective coverings in accordance with the Manufacturer's recommended procedures and the following requirements:

a. Nylon or other cloth straps are used to unload and handle the geonet composite rolls to protect the rolls and their protective coverings from damage.
b. The engineered turf rolls are stacked no more than five (5) rolls high and with a 3-foot wide access path between the stacked rows.

5. Identify and separate damaged or rejected engineered turf rolls.
6. Verify that damaged protective coverings are repaired or replaced.
7. If CQA conformance test sampling, in accordance with Part 2.03C of this Section, is to be performed during delivery to the Work site, determine which geonet composite rolls will be sampled by either individual roll numbers, batch/lot numbers, or production dates, and position the rolls for convenient sampling.

PART 2 PRODUCTS

2.01 ENGINEERED TURF COMPONENTS

A. Verify that the following engineered turf components meet the applicable product requirements of Section 02773 (Engineered Turf) of the Technical Specifications:
1. Engineered turf geotextiles.
2. Engineered turf polyethylene yarns (grass blades).
3. Sewing thread.
4. Sand ballast infill.
5. HydroBinder®.
6. Water release vents.

2.02 CONFORMANCE TESTING

A. Conduct sampling for CQA conformance testing at the Work site upon delivery or at the manufacturing plant prior to shipment and delivery to the Work site.

B. For every 100,000 square feet of material delivered to the Work site, select at least one (1) engineered turf roll to sample for CQA conformance testing.

C. Sample the selected engineered turf rolls for CQA conformance testing using the following procedure:
1. Cut and discard the first 3 feet of engineered turf material from across the entire width of the roll.
2. Cut the next 18 inches of material from across the entire width of the roll; this section of material is the CQA conformance testing sample.
3. Mark the sample with the following information directly on the sample with a paint marker:
a. Machine direction of the sample.
b. Manufacturer's roll number.
c. CQA test number.
4. Immediately re-wrap the sampled engineered turf roll with its protective covering; use additional opaque plastic sheeting, if needed, to completely cover the roll.
5. Complete the Engineered Turf Test Request and Sample Custody Log and ship samples to the Geosynthetics Testing Laboratory.

D. The following CQA conformance tests will be performed by the Geosynthetics Testing Laboratory to verify compliance with the product requirements of the Technical Specifications at the following frequencies:

One (1) per every 100,000 square feet of Engineered Turf material components to be installed:

1. CBR Puncture (ASTM D 6241).
2. Tensile Properties (ASTM D 4595).
3. Rainfall Induced Erosion (ASTM D 96459).
4. Fiber UV Stability (ASTM G 147).
5. Backing System UV Stability, Exposed (ASTM G 1545 Modified Cycle 1.UVA340).
6. Steady State Hydraulic Overtopping, Turf with HydroBinder® (ASTM D 7277 / ASTM D 7276).
7. Transmissivity with underlying structure geomembrane (ASTM D 4716).
8. Internal Friction of combined components (ASTM D 5321).
9. Sand Infill Gradation and Ballast (ASTM D 6913).
10. Yarn Weight (ASTM D 5261).
11. Tensile Strength of Yarn (ASTM D 2256).

E. Upon completion of CQA conformance testing and receipt of the results, review all results for compliance with the Technical Specifications and report any test results which are not in compliance with the Technical Specifications to the Design Engineer.

F. Additional CQA conformance testing or corrective action to be performed in the event of test results which are not in compliance with the Technical Specifications will be determined by the Design Engineer.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. Prior to engineered turf installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 of this CQA Plan.

B. Prior to engineered turf installation, verify that all underlying material installation and construction has been completed in accordance with the Technical Specifications.

3.02 INSTALLATION

A. Verify that engineered turf is installed in accordance with the Manufacturer's instructions.

B. Verify that engineered turf is installed with the machine (lengthwise) direction of the roll oriented down the slope.

C. Verify that the engineered turf panels are deployed from the top of the slope in a way that the engineered turf is laid substantially smooth and filaments are pointing upslope after deployment is complete.

D. Verify that the first engineered turf panel deployed has the turf filaments facing upward. Verify that subsequent panels are deployed turf side down, and on top of the previously installed panel. Verify that after seaming each panel, the panel is flipped onto the geomembrane component with care to avoid pulling of tufts in the drainage studs.

E. Verify that end-to-end panel overlaps only occur on benches, unless the length of a slope between benches exceeds the total length of a full engineered turf roll.

F. Verify that the engineered turf is installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

G. Verify that a single stitch prayer type seam is constructed using a Nulong sewing machine or equivalent. Verify that sewing thread is 207 Polyester or equivalent and that sewing occurs between the 1st and 2nd row of engineered turf stitches.

H. Verify that the engineered turf is ballasted during installation and until the engineered turf is covered with the sand ballast infill material.

I. Verify that water release vents are installed per the Plans and in accordance with manufacturer's recommendations.

J. Verify that on slopes exceeding 15%, no equipment is allowed on the partially constructed turf cap system until after the completed installation of the sand ballast infill. Verify that on slopes less than 15%, ATV type vehicles are allowed prior to infill placement if the tire /track pressure is less than 5 psi.

K. Verify that following full specified sand ballast infill thickness installation, traffic be limited to light duty vehicles with drivability tire/track pressures of less than 35 psi.

L. Verify that engineered turf damaged during installation is removed and/or repaired with a sewn or fastened patch at the direction of the Design Engineer.

M. Verify that portions of the engineered turf wasted by the Installer, and rendered unusable, as determined by the Design Engineer, are transported by the Contractor and disposed of off-site at a permitted transfer station or solid waste disposal facility.

3.03 SAND BALLAST INFILL PLACEMENT

A. Verify that sand ballast infill is placed between the tufts of the engineered turf and:
   1. Is per plan either 5/8 inch thick or 2 1/8 inch thick, with a thickness tolerance of +/- 1/8 inch.
   2. Consists wholly of sand meeting ASTM C-33-03 for fine aggregates.
   3. Turf areas that are to receive sand ballast infill are accepted by the CQA Officer before placement of sand ballast infill takes place

B. Verify that sand ballast infill is worked into the engineered turf between the synthetic yarn blades.

C. Verify that conveyor systems and/or Express Blowers are used to spread and place the sand ballast infill.

D. Verify that the Contractor has explained with detail in the Preparatory Meeting the method of sand infill deployment to be used.

E. Verify that previously installed components are not displaced or damaged as a result of the sand ballast infill component installation.

F. Verify that a standard washer is utilized as a plate for the point of entry into the sand ballast infill for consistent depth control.

3.04 INFILL – HYDROBINDER® PLACEMENT

A. Verify that the HydroBinder® infill layer is placed using appropriate equipment capable of completing the work.

B. Verify that the Contractor has explained in detail during the Preparatory Meeting the method of HydroBinder® infill deployment.

C. Verify that installation of HydroBinder® infill is only be performed by a Manufacture's approved installer using techniques and equipment approved by the Manufacture.

D. Verify that the HydroBinder® is installed into the turf while it is in a dry state and that the HydroBinder® is worked into the tufts so the tufts are in an upright position.

E. Verify that the HydroBinder® infill is placed dry to a thickness of 7/8 inch with a tolerance of +/- 1/8 inch.

F. Verify that the hydration process occurs on the same day as the HydroBinder® infill placement and that the required HydroBinder® infill thickness is achieved prior to the hydration process.

G. Verify that the cemented infill is hydrated thoroughly and that care is taken to avoid displacement of the non-hydrated infill.

H. Verify that once hydration is completed as described, backfill and compaction of the vertical anchor trenches (if applicable) take place.

I. Verify that the HydroBinder® is at minimum performance levels within 24 hours.

3.05 DOCUMENTATION

A. Document daily observations of the deployment and seaming operations.

3.06 REPAIRS

A. Verify that all damaged areas or holes are repaired with a patch that extends 2 feet beyond the edge of the damaged area or hole.

3.07 CORRECTIVE ACTIONS

A. If any portion(s) of the engineered turf components do not meet the requirements of the Plans and Technical Specifications, based on either observations and/or physical measurement,

verify that that portion(s) is repaired or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02773
ENGINEERED TURF

CQA SECTION 02900
SEEDING AND FERTILIZING

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that revegetation materials and placement methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 REVEGETATION MATERIALS

A. Verify that the following revegetation materials meet the applicable product requirements of Section 02900 (Seeding and Fertilizing) of the Technical Specifications:
1. Seed.
2. Fertilizer.
3. Tackifier.
4. Fiber.

B. Verify that fertilizer conforms to Section 20-2.02 of the Standard Specifications.

C. Verify that seed conforms to Section 20-2.10 of the Standard Specifications.

D. Verify that fiber and/or stabilizing emulsion, if used, conforms to Sections 20-2.07 and 20-2.11, respectively, of the Standard Specifications.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning of revegetation activities, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the method and equipment to be used to spread the seed, fertilizer and mulch has been approved by the Design Engineer.

C. Verify that the access roads, drainage structures, and erosion-resistant layer have been placed to grade before seed, fertilizer and mulch is applied and verify with the Contractor that revegetation shall not occur on the access roads, lined drainage swales, and sedimentation basins.

3.02 APPLICATION

A. Verify that seed and fertilizer (including fiber and/or stabilizing emulsion, if applicable) are applied to the areas designated on the Plans.

B. Verify that all products are spread uniformly over all areas subject to revegetation.

3.03 CONFORMANCE VERIFICATION

A. Verify application rates on a daily basis for the respective materials by comparing the amount used (as determined from weight tags) to the total acreage covered.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the seeding and fertilizing provisions do not meet the requirements of the Plans and Technical Specifications, based on either observations and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02900
SEEDING AND FERTILIZING

CQA SECTION 02960
TEMPORARY EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the temporary erosion and sediment control materials and installation methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (NOT USED)

PART 2 PRODUCTS

2.01 EROSION AND SEDIMENT CONTROL COMPONENTS

A. Verify that the following erosion and sediment control components meet the applicable product requirements of Section 02960 (Temporary Erosion and Sediment Controls) of the Technical Specifications:
1. Straw bales.
2. Straw wattles.
3. Silt fencing.

2.02 ROCK FOR CONSTRUCTION ENTRANCE

A. Verify rock conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION AND SCHEDULE

A. Prior to beginning installation of any temporary erosion and sediment control components, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the Storm Water Pollution Prevention Plan (SWPPP) has been prepared by a Qualified SWPPP Developer (QSD), been submitted to the State Water Resources Control Board, and that a WDID number has been received for the project.

C. Verify that temporary erosion and sediment control measures are implemented year round during the course of the Project, and that temporary erosion control features are installed and maintained between October 15 and May 15 of each year.

3.02 PROTECTION

A. Verify that temporary erosion and sediment control measures are implemented in all areas of exposed earth created by the Contractor beyond what is shown on the Plans and referred to in

the Technical Specifications and areas cleared and grubbed prior to excavation or embankment operations which are subject to wind erosion and runoff.

3.03 TEMPORARY EROSION CONTROL FACILITIES

A. Verify that the Contractor conducts his operations in such a manner that storm water runoff is contained within the Work site or channeled into the storm drain system which serves the runoff area.

B. Verify that storm water runoff from one area is not diverted to another runoff area.

C. Verify that temporary down drains, drainage structures, and other devices are provided to channel storm water runoff water into the respective permanent storm drain systems during construction. Also verify that permanent drainage structures, not fully completed, are modified as required to accept de-silted runoff.

D. Verify that fill areas, while being brought to grade and during periods of completion prior to final construction, are protected by various measures to eliminate erosion and the siltation of downstream facilities and adjacent areas.

E. Verify that contour graded areas are protected against erosion and the resulting siltation of downstream facilities and adjacent areas during grading operations.

F. Verify that incorporation of culvert pipe used in conjunction with temporary erosion control measures for final construction improvements has been approved by the Design Engineer.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the temporary erosion and sediment controls does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02960
TEMPORARY EROSION AND SEDIMENT CONTROLS

CQA SECTION 03300
CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the concrete materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 CONCRETE COMPONENTS

A. Verify that the following concrete components meet the applicable product requirements of Section 03300 (Concrete) of the Technical Specifications:
1. Concrete.
2. Reinforcement.
3. Forms.
4. Epoxy.

2.02 AGGREGATE BASE

A. Verify aggregate base conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.04 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the aggregate base as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

B. Verify that concrete and aggregate base materials are obtained from the approved sources throughout the Work.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning construction of any drainage and erosion control structure, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the locations and dimensions of the concrete pads are as shown on the Plans or as staked by the Design Engineer.

C. Verify that the footprint areas for the flare station concrete pads as shown on the Plans are properly cleared and grubbed and that the underlying subgrade conforms to the engineered fill requirements per CQA Section 02224 (Engineered Fill) of this CQA Plan.

D. Verify that aggregate base for the flare station concrete pad is spread in a uniform loose lift not exceeding 8 inches in thickness.

E. Perform the following field tests at the frequency shown to verify that the compacted aggregate base material has a minimum dry density of 95 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one test beneath each concrete pad.
   2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

F. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.02 REINFORCEMENT

A. Verify that all reinforcement is installed in conformance with Concrete Reinforcing Steel Institute's (CRSI's) "Manual of Standard Practice".

B. Verify that all reinforcement is free from rust, oil, dirt, or any other coating.

C. Verify that continuous reinforcing bars are lapped at splices at a minimum of 32 diameters.

D. Verify that reinforcement has a minimum concrete cover of 3 inches (unless otherwise noted).

E. Verify that reinforcement is not damaged and is securely supported and anchored to avoid movement during placement of concrete.

3.03 FORMWORK

A. Verify that the strength of concrete formwork is sufficient to hold the concrete with minimal or no leakage and that shoring and bracing is provided to ensure stability of formwork.

B. Verify that 3/4-inch chamfer strips are used at exposed corners.

3.04 CONCRETE SLAB AND DRAIN INLET PLACEMENT

A. Verify that the subgrade and forms are moistened prior to placing concrete.

B. Verify that care is taken to not damage or displace the reinforcing steel components.

C. Verify that concrete is placed in a continuous operation and thoroughly vibrated to ensure consolidation around reinforcement.

D. Collect samples of the concrete to be used at the Work site and perform the following tests to verify that the concrete has the slump and compressive strength characteristics specified in the Technical Specifications:
   1. *Slump (ASTM C 143)*; one test per each concrete pour.
   2. *Compressive Strength (ASTM C 31 and ASTM C 39)*; one test per each concrete pour.

E. Verify that the final surfaces of the concrete slabs have a non-slip broom finish.

F. Verify that all significant cracks, spalls and irregularities in formed or finished surfaces or other defects are properly repaired or patched.

3.05 MINOR CONCRETE PLACEMENT

A. Verify that minor concrete for post footings and the sedimentation basin outlet structure foundations are installed as shown on the Plans and in conformance with Sections 51 and 90-10 of the Standard Specifications, as applicable.

B. Verify that minor concrete for the grouted rock riprap is placed in conformance with Section 72-5.04 of the Standard Specifications.

3.06 EPOXY SECURED DOWELS OR ANCHORS

A. Verify that the diameter and depth of the drill hole is as indicated. If not included, verify that the hole is drilled 1/8-inch larger and ten (10) times deeper than the diameter of the dowel or anchor.

B. Verify that the hole is thoroughly cleaned by blowing it out with compressed air and by using a wire brush.

C. Verify that placement of epoxy in the hole is performed using a dispensing tool provided by, or recommended by the manufacturer and that the hole shall is completely filled with epoxy.

D. Verify that the dowel or anchor is placed in the hole and the epoxy allowed sufficient time to completely cure before disturbing the dowel or anchor.

3.07 CONFORMANCE VERIFICATION

A. After construction, verify by survey that the flare station concrete pads are completed at the elevations shown on the plans.

3.08 CORRECTIVE ACTIONS

A. If any portion(s) of the concrete provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 03300
CONCRETE

CQA SECTION 15100
LANDFILL GAS (LFG) EXTRACTION WELLS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the LFG extraction well materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 LFG EXTRACTION WELL COMPONENTS

A. Verify that the following LFG extraction well components meet the applicable product requirements of Section 15100 (Landfill Gas [LFG] Extraction Wells) of the Technical Specifications:
1. PVC well casing and fittings.
2. Bentonite Seal.
3. PVC well bore seal.
4. Prefabricated well head assemblies.

2.02 GRAVEL PACK

A. Verify gravel pack conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 SOIL BACKFILL

A. Verify soil backfill conformance under CQA Section 02250 (Erosion-Resistant Layer) of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to LFG extraction well drilling and installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the LFG extraction well locations conform to the locations staked by the Design Engineer.

C. Verify that a drilling permit(s), if required, has been obtained by the Contractor.

D. Verify that drilling contractor is licensed (Class C-57) in the State of California.

E. Verify that the Contractor understands that individual LFG extraction wells must be drilled and installed in a single day so as to minimize the potential for LFG emissions from the borehole. In the event of equipment breakdown or other unforeseen circumstance that prohibits complete installation of the LFG extraction well within the same working day, verify that provisions are made to cover and seal the exposed borehole at the surface to prevent LFG emissions.

3.02 DRILLING

A. Verify that the boreholes for the LFG extraction wells are drilled using a bucket auger drill rig capable of drilling 24-inch diameter boreholes.

B. Verify that a safety screen is placed over the top of the borehole as soon as drilling is completed and that the screen is kept in place until backfilling is within 4 feet of the surface. Verify that the safety screen size is large enough to accommodate all backfill materials and activities yet not large enough for any human to accidentally fall through.

C. Verify that the borehole is straight and the well casing is installed in the center of the borehole. Verify that the Contractor takes all tension off of the pipe by mechanical means and centers the well casing in the middle of the borehole before starting to backfill.

D. Verify that PVC well casing joints are solvent cemented and secured with 3/8-inch long Type 316 stainless steel lag screws.

E. Verify that the completion height of the well casing above ground surface is such that the final height of the installed prefabricated well head assembly is 5 feet above final grade.

F. Verify that the top of the casing is capped until installation of the prefabricated well head assembly.

G. Verify that spoils generated as part of the drilling process are handle and managed in conformance with CQA Section 02222 (Excavation) of this CQA Plan.

H. In the event obstructions and/or saturated conditions are encountered during drilling, verify that the Contractor makes a reasonable effort to drill through obstructions and saturated conditions and that abandonment of the borehole is not performed without written approval obtained from the Design Engineer.

3.03 BACKFILLING

A. Verify that backfilling operations commence immediately after well drilling is completed and the well casing has been installed in the borehole. Verify that backfill materials are installed as shown on the Plans and as directed by the Design Engineer.

B. Verify that the gravel pack is poured or scooped through the safety screen at a rate that will not endanger the integrity of the well casing.

C. Verify that the upper and lower bentonite seals are formed by evenly distributing the bentonite material around the annulus of the well casing and that fresh water is added in a manner that will allow for a thorough saturation of the bentonite. Verify that the proportion of water added versus bentonite material is in accordance with the bentonite manufacturer's recommendations.

D. Verify that soil backfill is placed from the top of the lower bentonite seal to the bottom of the upper bentonite seal in a manner that will promote self compaction and avoid bridging of the soil backfill material.

E. Verify that the PVC well bore seal is installed in accordance with the manufacturer's recommendations around the well casing and placed at the location shown on the Plans.

F. Verify that the boot portion of the well bore seal is secured around the well casing with stainless steel straps to provide an air-tight connection. Following placement of erosion-resistant layer material, verify that the boot is installed in a collapsed position above the final grade to accommodate potential settlement.

G. Verify that the PVC well bore seal is covered with the overlying GCL material or soil (temporary) if the PVC well bore seal is going to be exposed for more than three (3) working days.

3.04 INSTALLATION OF PREFABRICATED WELL HEAD ASSEMBLY

A. Verify that the prefabricated well head assemblies are handled and installed in accordance with the manufacturer's recommendations and as shown on the Plans.

B. Verify that the well head is installed such that the interior extension tube assembly is concentric within the well casing.

C. Verify that the final completion height of the well head assembly is 5 feet above final grade as shown on the Plans.

D. Verify that the PVC flexible hose connection between the well head and LFG collection system piping is installed with sufficient slack (6 to 8 inches) to accommodate expansion and contraction. Verify that "IPS Weld-On 795" plastic pipe cement, or approved equivalent, is used for flexible hose connections to the well head and LFG collection system piping.

3.05 ABANDONMENT OF LFG EXTRACTION WELL BOREHOLE (IF REQUIRED)

A. Verify that boreholes approved by the Design Engineer for abandonment are backfilled with refuse and/or soil to the final grade and compacted. If refuse is used, verify that the refuse is mechanically compacted within the borehole using the bucket auger to eliminate potential voids.

B. Upon completion of borehole abandonment activities, verify that the area around the borehole is restored to meet the surrounding grades as shown on the Plans.

3.06 PERFORMANCE TESTING

A. Verify that performance testing of the prefabricated well head assemblies is performed in conformance with Section 15100 (Landfill Gas [LFG] Extraction Wells) of the Technical Specifications.

3.07 CORRECTIVE ACTIONS

A. If any portion(s) of the LFG extraction well provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15100
LANDFILL GAS (LFG) EXTRACTION WELLS

CQA SECTION 15200
LFG COLLECTION SYSTEM COMPONENTS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the LFG collection system component materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 LFG COLLECTION SYSTEM COMPONENTS

A. Verify that the following LFG collection system components meet the applicable product requirements of Section 15200 (LFG Collection System Components) of the Technical Specifications:

1. PVC pipe and fittings.
2. PVC butterfly valves (isolation valves).
3. PVC ball valves.
4. PVC cement.
5. Vacuum/sample test ports.
6. HDPE pipe and fittings.
7. PVC-HDPE transition coupling.
8. Flexible couplings.
9. Block type pipe supports and anchors (including concrete masonry blocks, pipe clamps and miscellaneous fittings).
10. Metal frame pipe supports (including metal frames, pipe clamps and miscellaneous fittings).
11. CMP.
12. Steel pipe protective sleeves.
13. Reinforced concrete pipe (RCP) protective sleeve.

2.02 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

2.03 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.04 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.05 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the pipe bedding and engineered fill as determined under CQA Section 02207 (Aggregate Materials) and CQA Section 02224 (Engineered Fill), respectively, of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to LFG collection system construction, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

3.02 LFG COLLECTION SYSTEM PIPING

A. Verify that the LFG collection system piping, including flexible couplings, isolation valves and condensate drop-out points are installed as shown on the Plans.

B. Verify that all PVC pipe, fittings and valves are inspected for cuts, scratches, or other damages prior to painting and installation.

C. Verify that prior to installation, all PVC pipe and fittings to be left exposed are steam cleaned and allowed to dry, then painted in conformance with Section 15200 (LFG Collection System Components) of the Technical Specifications.

D. Verify that PVC pipe, fittings and valves are joined with socket and solvent cement welding in accordance with ASTM D 2855 and that the joining of PVC pipe, fittings and valves are in accordance with the pipe manufacturer's recommendations and the Technical Specifications.

E. Verify that PVC pipe cuts are square and perpendicular to the centerline of the pipe and that PVC pipe ends are beveled prior to applying primer and solvent cement so that the primer or cement are not wiped off during insertion into the fitting socket.

F. Verify that all burrs, chips, etc. generated as a result of cutting operations are removed from the pipe interior and exterior and that the inside of the piping is kept clean of dirt and debris. Also verify that any piping left overnight is capped.

G. Verify that a coating of CPS primer as recommended by the PVC pipe supplier is applied to the entire interior surface of the fitting socket, and to an equivalent area on the exterior of the pipe prior to applying solvent cement.

H. Verify that the solvent cement used complies with the requirements of ASTM D 2564 and is applied in strict accordance with manufacturer's specifications.

I. Verify that PVC pipe, fittings and valves are not primed or solvent welded when it is raining or when ambient temperature is below 40°F or above 100°F.

J. Verify that after solvent welding, the PVC pipe, fittings and valves are allowed to remain undisturbed until cement has thoroughly set.

K. Verify that flexible couplings are installed at the locations shown on the Plans and that the flexible couplings are installed per the pipe separation criteria specified in the Plans based on the ambient temperature at the time of installation. Also verify that stainless steel band clamps are secured around the ends of the flexible coupling in such a manner as to provide an air-tight joint.

L. Verify that vacuum/sample test ports are installed at the locations and orientations shown on the Plans and in accordance with the procedures described in Section 15200 (LFG Collection System Components) of the Technical Specifications.

M. Verify that block type pipe supports are installed under the selected pipe segments as specified on the Plans and that they are spaced at 6 feet on-center along the full length of the pipe segments.

N. Verify that block type pipe anchors are installed every 50 linear feet (minimum) of LFG collection system piping, as well as at the locations of all tee, elbow and wye fittings (both ends, but not on the fittings themselves) and that the pipe clamps are secured around the LFG header system pipe to ensure that the pipe does not move.

O. Verify that strap type pipe anchors are installed at the various locations shown on the Plans and in accordance with manufacturer's recommendations.

P. Verify that metal frame pipe supports are installed at the locations shown on the Plans and that they are spaced at 6 feet on-center. Verify that the height of cross-bar pipe supports are adjusted as appropriate to ensure positive slope of LFG collection system piping. Verify concrete placement conformance under CQA Section 03300 (Concrete) of this CQA Plan.

3.03 BURIED HEADER CROSSINGS

A. Verify that trenching across bench sections are to the depth and dimensions shown on the Plans.

B. Verify that LFG collection system piping is sloped at a minimum of 3 percent to maintain proper condensate drainage capabilities.

C. Verify backfill conformance under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.

2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

D. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 ROAD CROSSINGS

A. Verify that pipe support/drainage CMPs and steel pipe/RCP protective sleeves are installed in the orientations shown on the Plans and that the pipe support/drainage CMPs are aligned with the center line of the drainage swale.

B. Verify that reinforcement geotextile is wrapped around the steel pipe protective sleeve where it will be in direct contact with the underlying pipe support/drainage CMP.

C. Verify that LFG collection system piping is inserted through the steel pipe/RCP protective sleeves in a manner that does not damage or compromise the LFG collection system piping.

D. Verify engineered fill placement conformance under CQA Section 02224 (Engineered Fill) and perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

E. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.05 CONDENSATE DRAIN PIPE AND FITTINGS

A. Prior to installation, verify that all HDPE pipe and fittings are inspected for cuts, scratches, or other damages and that pipe and/or fittings with imperfections are not used.

B. Verify that trench excavation and backfill for buried HDPE pipe and fittings are as shown on the Plans.

C. Verify that HDPE pipe connection ends and fittings are joined by butt fusion procedures in accordance with the HDPE pipe and fitting manufacturer's recommended procedures.

D. Verify during construction that the HDPE pipe is not bent to a degree greater than the minimum radius recommended by the manufacturer and that the HDPE pipe is not subjected to strains that will overstress or buckle piping or impose excessive stress on joints.

E. Verify that open ends of fused HDPE pipe are covered or capped at the end of each working day to prevent entry by animals or debris.

F. Verify that sufficient slack is provided for segments completed above ground to allow for thermal expansion and contraction so as to not promote excessive stress on the piping following installation.

G. Verify that allowance is provided for thermal expansion or contraction of buried HDPE pipe within trenches and is coordinated with the pipe backfill operations to avoid buildup of thermal stresses.

H. Verify that sufficient time (per manufacturer's recommendations) is provided following placement of HDPE pipe to allow the pipe to adjust to trench temperature prior to testing, segment tie-ins, or backfilling activities.

3.06 CONDENSATE DROP-OUTS

A. Verify that the condensate drop-outs, including u-trap assemblies, are installed at the locations and to the dimensions shown on the Plans.

B. Verify that excavations are not deeper than necessary to maintain adequate buffer above the underlying GCL.

C. Verify that the transition from PVC to HDPE is conducted at the flange connection as shown on the Plans.

D. Verify PVC and HDPE pipe, fittings and valves installation conformance under Parts 3.01 and 3.05 of this Section.

E. Verify installation of strap type pipe anchors at various points on the u-trap piping as shown on the Plans.

F. Verify that the u-trap assemblies are filled with clean water following construction and prior to start of LFG collection system operations.

3.07 CONDENSATE DISCHARGE POINTS

A. Verify that the Condensate discharge points are installed at the locations and to the dimensions shown on the Plans.

B. Verify soil and/or refuse excavation and handling conformance under CQA Section 02222 (Excavation) of this CQA Plan.

C. Verify PVC and HDPE pipe and fittings installation conformance under Parts 3.01 and 3.05 of this Section.

D. For condensate discharge points located within the limits of the final cover system, verify placement conformance of the engineered fill and respective final cover system components above the condensate discharge points per the applicable sections of this CQA Plan.

E. For condensate discharge points located outside the limits of the final cover system, verify engineered fill placement conformance under CQA Section 02224 (Engineered Fill) and perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.

2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

F. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.08 PERFORMANCE TESTING

A. Verify that performance testing of the PVC LFG collection system pipe, HDPE condensate drain pipe, and condensate discharge points is performed in conformance with Section 15200 (LFG Collection System Components) of the Technical Specifications.

3.09 CORRECTIVE ACTIONS

A. If any portion(s) of the LFG collection system components provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15200
LFG COLLECTION SYSTEM COMPONENTS

CQA SECTION 15300
FLARE STATION

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the flare station materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 FLARE STATION COMPONENTS

A. Verify that the following flare station components meet the applicable product requirements of Section 15300 (Flare Station) of the Technical Specifications:
1. Skid-mounted packaged combustion system.
2. Electrical conduit, wire and fittings.
3. Chain link fence.

2.02 PVC PIPE, FITTINGS AND BALL VALVE

A. Verify PVC pipe, fittings and ball valve conformance under CQA Section 15200 (LFG Collection System Components) of this CQA Plan.

2.03 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.04 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.05 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

2.06 AGGREGATE BASE

A. Verify aggregate base conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.07 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the aggregate base as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

PART 3 EXECUTION

3.01 FLARE STATION ASSEMBLY

A. Prior to flare station assembly activities, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that Contractor has obtained all required building permits.

C. Verify that Contractor's laborers are skilled and experienced in the installation of similar equipment.

D. Verify that the skid-mounted packaged combustion system is installed in strict accordance with the manufacturer's specifications.

3.02 CONDENSATE DRAINAGE LINE

A. Verify that the condensate drain line between the flare station and leachate wet well is installed as shown on the Plans.

B. Verify trenching and pipe bedding conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

C. Verify PVC pipe, fittings and ball valve installation conformance under CQA Section 15200 (LFG Collection System Components) of this CQA Plan.

D. Verify that the condensate drainage line is installed at a minimum slope of 1 percent in the direction of the leachate wet well.

E. Verify that the condensate drainage line penetrates the wall of the leachate wet well at the appropriate depth and that the annular space between the condensate drainage line and the wall of the leachate wet well is sealed using non-shrink grout.

F. Verify engineered fill placement conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

3.03 SECURITY FENCE

A. Verify that the chain link fence and gates are installed as shown on the Plans and in accordance with the requirements of Section 80-4.02 of the Standard Specifications.

B. Verify that all line, corner, and gate post assemblies are constructed with concrete post footings.

C. Verify that soil between fence posts is leveled to create a 2-inch clearance under the fence fabric.

3.04 FLARE STATION AGGREGATE BASE

A. Verify that the aggregate base within and around the flare station is placed to the dimensions shown on the Plans.

B. Verify that the aggregate base is spread in uniform loose lifts not exceeding 8 inches in thickness.

C. Perform the following field tests at the frequency shown to verify that the compacted aggregate base material has a minimum dry density of 95 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at one test per every 1,200 square feet.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

D. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

E. Verify that the final compacted thickness is a minimum of 6 inches.

3.05 PERFORMANCE TESTING

A. Verify that performance testing of the skid-mounted packaged combustion system and condensate drainage line is performed in conformance with Section 15300 (Flare Station) of the Technical Specifications.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the flare station provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15300
FLARE STATION

CQA SECTION 15400
FLARE STATION ELECTRICAL AND TELEPHONE FEED

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the flare station electrical and telephone feed materials and installation methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 ELECTRICAL AND TELEPHONE FEED COMPONENTS

A. Verify that the following electrical and telephone feed components meet the applicable product requirements of Section 15400 (Flare Station Electrical and Telephone Feed) of the Technical Specifications:
1. Wire.
2. Conduit and fittings.
3. Meter socket.
4. Junction and outlet boxes.
5. Warning tape.

2.02 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.04 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

2.05 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for pipe bedding and the engineered fill used for backfilling the former leachate pond as determined under CQA Section 02207 (Aggregate Base) and CQA Section 02224 (Engineered Fill), respectively, of this CQA Plan.

PART 3 EXECUTION

3.01 GENERAL

A. Prior to electrical and telephone feed installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that Contractor has obtained all required electrical permits.

C. Verify that Contractor has furnished and installed all temporary power and lighting systems needed for construction and their subsequent removal after construction is completed.

D. Verify that Contractor has verified that the wire and conduit sizes for the main power supply and automatic telephone dialer system are appropriate for the intended use.

E. Verify that all electrical components are in accordance with the National Electric Code (NEC), National Fire Protection Association (NFPA) and local codes and regulations for installation in a Class 1, Division 1 or Class 1, Division 2 classified locations.

F. Verify that electrical and telephone feed installations are performed in accordance with the local electrical and telephone company rules and regulations.

G. Verify that the electrical and telephone feed from the existing service points to the flare station control panel is completed below grade as shown on the Plans.

H. Verify that Contractor has confirmed service and panel locations and all other service requirements prior to starting Work.

3.02 PREPARATION

A. Verify that all materials are inspected for damage and imperfections prior to installation and that damaged materials or materials with imperfections are not used.

3.03 TRENCHING AND BACKFILLING

A. Verify trenching and pipe bedding placement conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

B. Perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at least one (1) test per 100 linear feet per lift or at a change in material.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

C. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 INSTALLATION

A. Verify that all equipment, motors, conduit and outlets, as applicable, are permanently and effectively grounded in accordance with NEC, California Administrative Code (CAC) - Title 24 and local codes.

B. Verify that all conduits are sloped towards pull boxes and run in straight lines except where a change in direction is necessary. Also verify that couplings are staggered for maximum duct line strength.

C. Verify that the ends of buried conduit are kept closed with approved conduit seals during construction and that immediately prior to pulling wire or cable, a swab is drawn through all conduits to force out water and foreign materials.

D. Verify that junction boxes are installed in an accessible location as required for splicing, connections and pulling of wire.

E. Verify that all above ground conduit is properly secured on pipe supports or concrete slabs.

F. Verify that the meter socket installed at the existing service pole complies with the height and fastening specifications outlined in the local electric company rules and regulations.

3.05 CLEAN-UP

A. Verify that all exposed portions of electrical installation are thoroughly cleaned, including the removal of all traces of soil, labels, grease, oil, and other foreign matter.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the flare station electrical and telephone feed provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15400
FLARE STATION ELECTRICAL AND TELEPHONE FEED

CQA SECTION 15500
LEACHATE OVERFLOW COLLECTION AND STORAGE SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the leachate overflow collection and storage system materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 COLLECTION AND STORAGE SYSTEM COMPONENTS

A. Verify that the following leachate overflow collection and storage system components meet the applicable product requirements of Section 15500 (Leachate Overflow Collection and Storage System) of the Technical Specifications:
1. Pipe materials.
2. Pipe accessories.
3. Concrete junction boxes.
4. Lining material for leachate sediment chamber/wet well.
5. Leachate UST and accessories.

2.02 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 TANK BEDDING AND BACKFILL

A. Verify tank bedding and backfill conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.04 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.05 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the pipe bedding and tank bedding and backfill as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

B. Review moisture-density relationship conformance test results for the engineered fill as determined under CQA Section 02224 (Engineered Fill) of this CQA Plan.

PART 3 EXECUTION

3.01 BRACING AND SHORING

A. Verify that Bracing and shoring complies with Section 5-1.02A and 7-1.01E of the Standard Specifications.

3.02 GENERAL PIPE INSTALLATION

A. Verify that Contractor confirms the location of point of connection (POC) at the existing leachate collection piping as shown the Plans by potholing to determine the location and depth (elevation).

B. Verify that the trench subgrade for the gravity drain pipe provides uniform support at a uniform slope along full length of pipe.

3.03 PIPE INSTALLATION

A. Verify trench conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

B. Verify that the bottom of the trench is graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

C. Verify that pipe, fittings, and accessories are installed in accordance with manufacturer's instructions and that the sealed joints are watertight.

D. Verify that pipe is placed to the lines and grades as shown on the Plans.

E. Verify that the pipe is laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe.

F. Verify that the horizontal alignment of the pipe is laid such that no points vary more than 0.10 feet from the design alignment established and shown on the Plans.

G. Verify backfill conformance under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at least one (1) test per 100 linear feet per lift or at a change in material.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

H. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 CONCRETE JUNCTION BOXES

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

B. Verify that concrete junction boxes are installed in accordance with manufacturer's instructions and that their placement into the excavation is performed in a manner that will not induce damage or compromise future stability.

C. Verify that backfilling operations conform to the provisions in Section 19-3 of the Standard Specifications.

3.05 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Prior to start of Work, verify that provisions have been made to divert leachate from the existing leachate drain from discharging into the leachate sediment chamber and document how the leachate is being diverted and managed.

B. Verify that all leachate is pumped from the leachate sediment chamber and wet well and document where the leachate is pumped and managed.

C. Verify that any sediment present at the base of the leachate sediment chamber and/or wet well is removed and document how the sediment is removed and managed.

D. Verify that existing pumps and any other equipment/features that may inhibit application product are removed and stored in a dry and secure location

E. Verify that the interior walls and base of the sediment chamber and wet well are steam cleaned to remove residual grime and residues. Also verify that residual rinseate generated by the steam cleaning operations is removed and document how the removed rinseate is managed.

F. Verify that sufficient time is provided to allow the surfaces of the interior walls and base to dry and document the nature of any mechanical means employed to expedite the drying time, as applicable.

G. Verify that the lining product is applied to provide full and sufficient coverage of all interior walls and base and that the application is performed in strict accordance with recommended manufacturer’s procedures.

H. Verify that pumps and any other equipment/features that were removed are re-installed and verify that normal operation of the leachate sediment chamber/wet well is restored per pre-existing conditions.

3.06 TANK HOLDING

A. Verify that the tank is not dropped, rolled or impacted during unloaded and that the tank is set on smooth ground, free of rocks and foreign objects, and chock tanks to prevent movement.

3.07 TANK INSTALLATION

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

B. Verify that the tank excavation is large enough to provide 2 feet of clearance between the tank sides and ends and the excavation walls in stable soil and 12 inches of bedding under the tank.

C. Verify that the tank and all related piping and accessories are installed as per manufacturer's printed instructions.

D. Verify that the tank bedding and backfill is placed in accordance with the sequence and procedures outlined in Section 15500 (Leachate Overflow Collection and Storage System) of the Technical Specifications.

E. Following placement of the tank bedding and backfill, verify backfill conformance for the remainder of the excavation under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   a. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at one test per every 1,200 square feet.
   b. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

F. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.08 PERFORMANCE TESTING

A. Verify that performance testing of the leachate sediment chamber/wet well and leachate UST is performed in conformance with Section 15500 (Leachate Overflow Collection and Storage System) of the Technical Specifications.

3.09 CORRECTIVE ACTIONS

A. If any portion(s) of the leachate overflow connection and storage system provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15500
LEACHATE OVERFLOW COLLECTION AND STORAGE SYSTEM

APPENDIX A

PROJECT DOCUMENT FORMS

DAILY SUMMARY REPORT

Project: **Date:**

Day:

Owner: **Document Control No.:**

Contractor: **Weather:** AM
PM

Construction Activity Summary

Construction Unit/Area:

Equipment:

Personnel:

Subcontractors:

CQA Monitoring/Testing Summary

(Attach Inspection Data Sheets or Daily Field Logs)

Non-Conformance/Corrective Action

(Attach Non-conformance/Corrective Action Form)

Materials Received/Submittal Status

Meetings

Other Information

Signature: _____

NON-CONFORMANCE/CORRECTIVE ACTION FORM

Project: **Date:**

Day:

Owner: **Document Control No.:**

Contractor:

Non-conformance Summary

Description:

Specification or Drawing Reference:

Corrective Action

Description:

Specification Variance or Drawing Revision:

(Record any Drawing Revision on the Site As-built Record Drawings)

Signature: _____

ACCEPTANCE REPORT

Project: **Date:**

Day:

Owner: **Document Control No.:**

Contractor:

Acceptance Statement

All materials and construction processes for the Construction Unit stated below comply with the Design Plans and Specifications.

Construction Unit (Section No.)

Daily Summary Reports Referenced

(List Document Control Nos.)

Non-Conformance/Corrective Action Forms Referenced

(List Document Control Nos.)

Signature: _____

MEETING/DISCUSSION SUMMARY REPORT

Project: **Date:**

Time:

Owner: **Document Control No.:**

Contractor: **Location:**

Meeting Name or Subject Matter

Attendees

Minutes (if scheduled meeting) or Synopsis

Items for Resolution

Signature: _____

PHOTOGRAPH LOG

Project: **Date(s):**

Roll No.:

Owner:

Contractor:

DATE TIME	PICTURE NO.	SUBJECT MATTER

Signature: _____

SUBGRADE SOIL SURFACE ACCEPTANCE

Project: **Date:**
Day:

Owner:
CQA Monitor: **Document Control No.:**
Contractor:
Material Description: **Cell No.:**

Description of Soil Surface to be Lined:

I hereby certify that the above surface area is suitable for the installation of geosynthetics, and that (Contractor and Installer) shall be responsible for its integrity and suitability in accordance with the Specifications from this date to the completion of the installation

Installer Representative:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

Subgrade Contractor:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

Witness:

CQA Monitor:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

Owner Representative:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

APPENDIX B

SOILS MONITORING FORMS

NUCLEAR DENSITY / MOISTURE TEST DATA

Project:
Project No.:

Test No.									Test Notes
Soil Type									
Northing									
Easting									
Elevation (ft)									
Test Depth (in)									
Density Count									
Wet Density (pcf)									
Moisture Count									
Moisture (pcf)									
Dry Density (pcf)									
Moisture Content (%)									
Reference Curve (pcf)									
Reference OMC (%)									
Oven Moisture Content (%)									
Dry Density Correction (pcf)									
Relative Compaction (%)									

Standard Count Density:	Nuclear Gauge No.:	Additional Notes:
Standard Count Moisture:	CQA Monitor:	
Date:	Reviewer:	Sheet No.: of

SOILS TEST REQUEST
SAMPLE CUSTODY LOG

Project:
Project No.:

Sample No.	Atterberg Limits	Unified Soil Classification	Moisture Density Relationship	Particle Size Analysis	Moisture Content	Sample Instructions
ASTM	D 4318	D 2487	D 1557	D 422	D 2216	

Laboratory:	**Shipped by:**	**Special Instructions:**
Request Date:	**Shipped Via:**	
Results Date:	**Received by:**	

APPENDIX C

GEOSYNTHETICS MONITORING FORMS

GEOMEMBRANE DELIVERY AND CONTROL LOG

(Attach packing list)

Project:

Project No.:

Roll No.	Lot No.	Length (ft)	Width (ft)	Area (ft^2)	QC Test Report	QAVT Sample	QAVT Results	Condition Notes

Manufacturer:	CQA Monitor:	Additional Notes:
Material:	Shipment Quanity (ft^2):	
Date:	Accumulated Quanity (ft^2):	Shipment No.:

GEOMEMBRANE DEPLOYMENT/SEAMING LOG

(Attach field sketch of daily panel layout)

Project:
Project No.:

Abbreviations: Panel(P), Roll(R), Seam(S), Cross-seam(CS), Air Pressure(AP), Vacuum Test(VT), Seam Analysis Sample(SAS) End of Seam Test(EST), Trial Weld(TW), Subgrade Acceptance(SA), Temperature(T), Note(N).

Date: CQA Monitor: Sheet No.: of

GEOMEMBRANE REPAIR LOG

Project No.:

Repair No.	Repair Description	Repair Location	Repair Date	VT Date	VT Result

Abbreviations: Panel(P), Seam(S), Cross-seam(CS), Air Pressure(AP), Anchor Trench(AT), Seam Analysis Sample(SAS), End of Seam Test(EST), Safety Patch(SP), Vacuum Test(VT), North(N), South(S), East(E), West(W).

Date:	CQA Monitor:	Sheet No.: of

APPENDIX D

SUBMITTAL CONTROL LOG

SUBMITTAL CONTROL LOG

Project: Final Closure Construction, City of Ukiah Landfill
Project No.: 02-907
Owner: City of Ukiah, Department of Public Works
CQA Certifying Engineer: EBA Engineering

Contractor: _____
Installer: _____
Geosynthetics Supplier: _____

Submittal No.	Specification Section	Submittal Description	Submitted By	When Required	Date Received	Reviewer	Action Taken/Determination	Date Returned
DIVISION 1	**GENERAL PROJECT REQUIREMENTS**							
GPR-1	01060-3.03	Surveying and Field Engineering (Name and Qualifications)		Prior to Commencement of Work				
GPR-2	01310-1.01(A)	Project Schedule		Prior to Commencement of Work				
GPR-3	01500-1.03(A)	Dust Control Plan		Prior to Commencement of Work				
GPR-4	01550-1.07(A)	Storm Water Pollution Prevention Plan (SWPPP)		14 Days of Authorization to Proceed				
GPR-5	01550-1.07(F)	Storm Water Inspection Training Records		5 Days Prior to Commencement of Work				
GPR-6	01800-3.02(A, C)	Health and Safety Plan with Emergency Contact List		Prior to Commencement of Work				
DIVISION 2	**SITE WORK**							
SW-1	02200-1.03(A)	Materials used for replacement or adjustment of existing facilities		14 Days Prior to Delivery				
SW-2	02207-1.04(A)	Name & Location of source and laboratory test results for aggregate base		15 Days Prior to Delivery				
SW-3	02722-1.04(A)	Riprap Stone (Sources, Lab Test Results, Product Data Sheets)		14 Days Prior to Construction				
SW-4	02722-1.05(B)	Concrete (Sources, Lab Test Results, Mix Design)		14 Days Prior to Construction				
SW-5	02722-1.05(C)	Erosion Control (Samples, Product Data Sheets, Installation Guidelines)		14 Days Prior to Delivery				
SW-6	02722-2.01	Drain Inlets		14 Days Prior to Delivery				
SW-7	02722-2.02	Drain Pipe		14 Days Prior to Delivery				
SW-8	02771-1.04(A)(1)	Geotextile Reinforcement (Samples & Product Data Sheets)		14 Days Prior to Delivery				
SW-9	02771-1.04(A)(2)	Geotextile Reinforcement (MQC Test Results)		14 Days Prior to Delivery				
SW-10	02771-1.04(A)(3)	Geotextile Reinforcement (Manufacture's Recommended Procedures)		14 Days Prior to Delivery				
SW-11	02771-1.04(A)(4)	Geotextile Sewing Thread (Samples & Product Data Sheets)		14 Days Prior to Delivery				
SW-12	02772-1.03(A)(1)	Geomembrane Resin (Single Source Compliance Certificate)		14 Days before Delivery				
SW-13	02772-1.03(A)(2)	Geomembrane Base Resin (MQC Test Results)		14 Days before Delivery				
SW-14	02772-1.03(A)(3)	Geomembrane (Samples & Product Data Sheets)		14 Days before Delivery				
SW-15	02772-1.03(A)(4)	Geomembrane (2-foot by 2-foot Sample Geomembrane specimen)		14 Days before Delivery				
SW-16	02772-1.03(A)(5)	Geomembrane (MQC Test Results)		14 Days before Delivery				
SW-17	02772-1.03(A)(6)	Geomembrane (Manufacture's Recommended Procedures)		14 Days before Delivery				
SW-18	02772-1.03(A)(7)	Geomembrane (Certificate of Compliance for Extrudate Rod Material)		14 Days before Delivery				
SW-19	02772-1.03(B)(1)	Geomembrane (Quality Control Plan)		14 Days prior to Installation				
SW-20	02772-1.03(B)(2)	Geomembrane (Installer's Qualifications)		14 Days prior to Installation				
SW-21	02772-1.04(C)(1)	Geomembrane (Installer's Warranty)		Upon Completion of the work				
SW-22	02773-1.03(A)(1)	Engineered Turf (Samples & Product Data Sheets)		14 Days before Delivery				
SW-23	02773-1.03(A)(2)	Engineered Turf (MQC Test Results)		14 Days before Delivery				
SW-24	02773-1.03(A)(3)(a)	Engineered Turf Resin (Single Source Compliance Certificate)		14 Days before Delivery				
SW-25	02773-1.03(A)(3)(b)	Engineered Turf Base Resin (MQC Test Results)		14 Days before Delivery				
SW-26	02773-1.03(A)(4)	Engineered Turf (Manufacture's Recommended Procedures)		14 Days before Delivery				
SW-27	02773-1.03(A)(5)	Plastic Fasteners (ties) (Samples/Product Data Sheets)		14 Days before Delivery				
SW-28	02773-1.03(A)(6)	Engineered Turf Panel Layout Drawing		14 Days before Delivery				
SW-29	02900-1.03(A)	Seeding (Sources, Lab Test Results, Product Data Sheets)		Prior to Seeding				
SW-30	02900-1.03(B)	Seeding (Certified Tags from Seed Bags)		After Seeding				
SW-31	02960-1.03(A)	Storm Water Pollution Prevention Plan (SWPPP)		14 Days of Authorization to Proceed				

SUBMITTAL CONTROL LOG

Project: Final Closure Construction, City of Ukiah Landfill
Project No.: 02-907
Owner: City of Ukiah, Department of Public Works
CQA Certifying Engineer: EBA Engineering

Contractor: _____
Installer: _____
Geosynthetics Supplier: _____

Submittal No.	Specification Section	Submittal Description	Submitted By	When Required	Date Received	Reviewer	Action Taken/Determination	Date Returned
SW-32	03300-1.04(A)	Concrete (Sources, Lab Test Results, Mix Design)		14 Days before Delivery				
SW-33	15100-1.03(A)(1)	Drilling Subcontractor Information		14 Days Prior to Drilling				
SW-34	15100-1.03(A)(2)	Name & Location of source and laboratory test results for LFG well components		14 Days Prior to Drilling				
SW-35	15100-1.03(A)(3)	Well head assembly manufacturer's recommended installation procedure		14 Days Prior to Drilling				
SW-36	15200-1.02(A)(1)	Manufacturer's Product Data Sheets (HDPE and PVC pipe, fitting, and valves)		14 Days before Delivery				
SW-37	15200-1.02(A)(1)	Manufacturer's Product Data Sheets (Valve boxes)		14 Days before Delivery				
SW-38	15200-1.02(A)(2)	Manufacturer's Recommended Procedures for HDPE pipe, fittings and valves		14 Days before Delivery				
SW-39	15200-3.08	Proposed Procedures - Vacuum Pressure Test of LFG Collection Pipe		14 Days Prior to Construction				
SW-40	15400-3.08	Test Results - LFG Collection Pipe, Well head Assemblies		14 Days After Completion of Performance Testing				
SW-41	15300-1.04(A)	Flare Station Assembly Building Permit		14 Days Prior to Construction				
SW-42	15300-1.04(B)	Flare Station Assembly Building Inspection Reports		14 Days Prior to Completion				
SW-43	15300-1.04(C)	Flare Station procedures for combustion system and pressure testing		14 Days Prior to Testing				
SW-44	15300-1.04(D)	Flare Station Test Results		14 Days of Completion of Testing				
SW-45	15400-1.03(A)	Electrical Manufacturer's Product Data Sheets (Wire, conduit, boxes, etc.)		14 Days before Delivery				
SW-46	15400-1.03(B)	Electrical Permits		14 Days Prior to Construction				
SW-47	15400-1.03©	Electrical Permit Inspection Reports		14 Days Prior to Completion				
SW-48	15500-1.04(A)	Leachate Collection System Manufacturere's Product Data (UST, pipe, boxes)		14 Days before Delivery				
SW-49	15500-1.04(B)	Leachate UST Field Test Report		14 Days After Completion of Testing				
SW-50	15500-1.0(C)	Leacheat Sediment Chamber and Well Lining Procedures		14 Days Prior to Construction				

APPENDIX J

FINAL CLOSURE
CONSTRUCTION DRAWINGS

CONSTRUCTION DRAWINGS

FOR

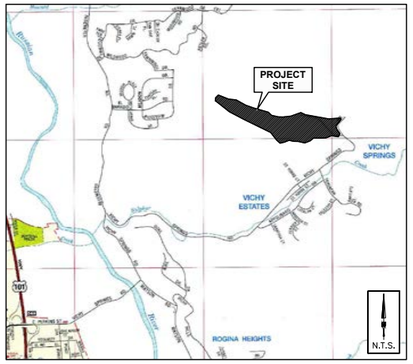
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

APN 178-130-01

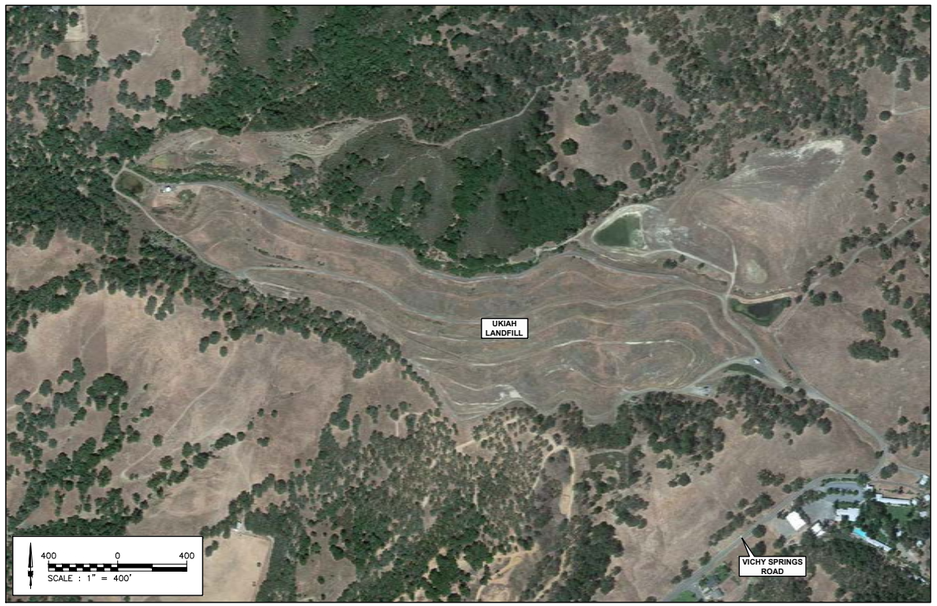
3100 VICHY SPRINGS ROAD

UKIAH, CALIFORNIA

LOCATION MAP



SITE MAP



SHEET INDEX

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001	NOTES, LEGEND AND ABBREVIATIONS
100	SITE MAP (EXISTING CONDITIONS)
101	SITE MAP (FINISHED GRADE)
102	REFUSE RELOCATION PLAN
200	LANDFILL COVER MATERIALS PLAN
201	LANDFILL COVER MATERIALS PLAN
202	LANDFILL COVER MATERIALS PLAN
300	FINISHED GRADE (LANDFILL)
301	FINISHED GRADE (LANDFILL)
302	FINISHED GRADE (LAND FILL)
303	FINISHED GRADE (BORROW AREA)
304	SECTIONS
305	SECTIONS
306	SECTIONS
307	SECTIONS
308	SECTIONS & EROSION CONTROL DETAILS
309	PLAN ENLARGEMENTS
400	FLARE STATION AREA BLOW UP
500	GRADING DETAILS
501	GRADING DETAILS
502	GRADING DETAILS
503	GRADING DETAILS
504	GRADING DETAILS
505	GRADING DETAILS
506	GRADING DETAILS
600	LFG COLLECTION SYSTEM LAYOUT - WEST PORTION
601	LFG COLLECTION SYSTEM LAYOUT - CENTRAL PORTION
602	LFG COLLECTION SYSTEM LAYOUT - EAST PORTION
700	LFG COLLECTION SYSTEM DETAILS
701	LFG COLLECTION SYSTEM DETAILS
702	LFG COLLECTION SYSTEM DETAILS
703	LFG COLLECTION SYSTEM DETAILS
704	LFG COLLECTION SYSTEM DETAILS
705	LFG COLLECTION SYSTEM DETAILS
706	LFG COLLECTION SYSTEM DETAILS

EBA ENGINEERING
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REGISTERED GEOLOGIST
No. 8
DAMON F. BROWN
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

TITLE SHEET

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

1	
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Job No: 02-907
Drawn By: WC
Checked By: DFB
Date: 2019-04-30

Sheet Number

000

1 of 36

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GENERAL NOTES

1. ALL CONSTRUCTION MATERIALS AND METHODS SHALL CONFORM TO THE REQUIREMENTS OF THE COUNTY OF MENDOCINO. ALL REFERENCES TO STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS SHALL REFER TO THE MAY, 2006 EDITION OF THE STANDARD SPECIFICATIONS. ATTENTION IS ALSO DIRECTED TO THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD PLANS (MAY 6, 2006) WHICH, WHEN APPLICABLE, ARE INCLUDED IN THESE DRAWINGS AND REFERENCED BY STANDARD PLAN NUMBER.
2. PUBLIC SAFETY AND TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH COUNTY REQUIREMENTS AND AS DIRECTED BY THE ENGINEER. SAFE VEHICULAR AND PEDESTRIAN ACCESS SHALL BE PROVIDED AT ALL TIMES DURING CONSTRUCTION.
3. A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR SHALL DO ALL FIELD STAKING AT THE EXPENSE OF THE CONTRACTOR.
4. ANY DISCREPANCY DISCOVERED BY THE CONTRACTOR IN THESE PLANS OR ANY FIELD CONDITIONS DISCOVERED BY THE CONTRACTOR THAT MAY DELAY OR OBSTRUCT THE PROPER COMPLETION OF THE WORK PER THESE PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY UPON DISCOVERY. SAID NOTIFICATION SHALL BE IN WRITING.
5. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, GENERAL CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
6. CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING MONUMENTS AND OTHER SURVEY MARKERS. MONUMENTS, SURVEY MARKERS, GAS, WATER AND MONITORING DEVICES DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
7. CONTRACTOR SHALL MAINTAIN ADEQUATE DUST CONTROL PER SECTION 10, CALTRANS STANDARD SPECIFICATIONS.
8. DURING CONSTRUCTION , THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING NOISE, ODORS, DUST, AND DEBRIS TO MINIMIZE IMPACTS ON SURROUNDING PROPERTIES AND ROADWAYS. CONTRACTOR SHALL BE RESPONSIBLE THAT ALL CONSTRUCTION EQUIPMENT IS EQUIPPED WITH MANUFACTURER'S APPROVED MUFFLER BAFFLES. FAILURE TO DO SO MAY RESULT IN THE ISSUANCE OF AN ORDER TO STOP WORK.
9. CONTRACTOR SHALL INDEPENDENTLY REVIEW GROUND, TOPOGRAPHY, AND EXISTING CONDITIONS THROUGHOUT THE LIMITS OF WORK, AND ASSUME WHOLLY AND UNCONDITIONALLY THE RISK OF COMPLETING THE WORK SET OUT ON THESE PLANS, REGARDLESS OF ROCK, WATER TABLE, OR OTHER CONDITIONS WHICH THE CONTRACTOR MAY ENCOUNTER IN THE COURSE OF THE WORK.
10. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS BEFORE LAYING OUT THE WORK AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE STARTING WORK. HE SHALL BE RESPONSIBLE FOR ANY ERRORS RESULTING FROM HIS FAILURE TO DO SO.
11. DIMENSION TAKE PRECEDENCE OVER SCALE.
12. ALL WORK TO BE COMPLETED IS ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
13. CONTRACTOR IS RESPONSIBLE FOR CONTACTING PG&E WITH REGARD TO OVERHEAD POWER LINES AND ASSOCIATED HEALTH AND SAFETY PROVISIONS PRIOR TO THE COMMENCEMENT OF WORK.

EROSION CONTROL NOTES

GENERAL

1. PERFORM EROSION PREVENTION AND SEDIMENT CONTROL IN ACCORDANCE WITH THE COUNTY OF MENDOCINO STANDARDS, CALIFORNIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND THE PROJECT CONSTRUCTION DOCUMENTS.
2. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING STORM WATER POLLUTION GENERATED FROM THE CONSTRUCTION SITE YEAR ROUND. WORK SITES WITH INADEQUATE EROSION AND SEDIMENT CONTROL MAY BE SUBJECT TO A STOP WORK ORDER.
3. IF DISCREPANCIES OCCUR BETWEEN THESE NOTES, MATERIAL REFERENCED HEREIN OR MANUFACTURER'S RECOMMENDATIONS, THEN THE MOST PROTECTIVE SHALL APPLY.
4. AT ALL TIMES THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND COMPLYING WITH THE STATE OF CALIFORNIA NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION ACTIVITY. CONSTRUCTION ACTIVITIES INCLUDE BUT ARE NOT LIMITED TO CLEARING, GRADING, EXCAVATION, STOCKPILING, AND RECONSTRUCTION OF EXISTING FACILITIES INVOLVING REMOVAL AND REPLACEMENT.

RAINY SEASON OPERATIONS

1. THE CONTRACTOR MUST IMPLEMENT AN EFFECTIVE COMBINATION OF EROSION PREVENTION AND SEDIMENT CONTROL ON ALL DISTURBED AREAS DURING THE RAINY SEASON (OCTOBER 15 - APRIL 15). CONSTRUCTION GRADING AND DRAINAGE IMPROVEMENT SHALL BE PERMITTED DURING THE RAINY SEASON ONLY WHEN ON-SITE SOIL CONDITIONS PERMIT THE WORK TO BE PERFORMED. STORM WATER BMPS REFERENCED OR DETAILED IN THE PERMIT AUTHORITY'S BEST MANAGEMENT PRACTICES GUIDE SHALL BE IMPLEMENTED AND FUNCTIONAL ON THE SITE AT ALL TIMES.

YEAR ROUND REQUIREMENTS

1. DURING THE NON-RAINY SEASON, ON ANY DAY WHEN THE NATIONAL WEATHER SERVICE FORECAST IS A CHANCE OF RAIN OF 30% OR GREATER WITHIN THE NEXT 24 HOURS, STORM WATER BMPS REFERENCED OR DETAILED IN PRMD'S BEST MANAGEMENT PRACTICES GUIDE SHALL BE IMPLEMENTED, INSTALLED, AND FUNCTIONAL ON THE SITE TO PREVENT SOIL AND OTHER POLLUTANT DISCHARGES. AT ALL OTHER TIMES, BMPS SHOULD BE STORED ON SITE IN PREPARATION FOR INSTALLATION PRIOR TO RAIN EVENTS.
2. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED BY THE CONTRACTOR BEFORE FORECASTED STORM EVENTS AND AFTER STORM EVENTS TO ENSURE MEASURES ARE FUNCTIONING PROPERLY. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES THAT HAVE FAILED OR ARE NO LONGER EFFECTIVE SHALL BE PROMPTLY REPLACED. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED.
3. THE LIMITS OF GRADING SHALL BE DEFINED AND MARKED ON SITE TO PREVENT DAMAGE TO SURROUNDING VEGETATION. PRESERVATION OF EXISTING VEGETATION SHALL OCCUR TO THE MAXIMUM EXTENT PRACTICABLE. ANY EXISTING VEGETATION WITHIN THE LIMITS OF GRADING THAT IS TO REMAIN UNDISTURBED BY THE WORK SHALL BE IDENTIFIED AND PROTECTED FROM DAMAGE BY MARKING, FENCING, OR OTHER MEASURES.
4. CHANGES TO THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN MAY BE MADE TO RESPOND TO FIELD CONDITIONS AND SHALL BE NOTED ON THE PLAN.
5. DISCHARGES OF POTENTIAL POLLUTANTS FROM CONSTRUCTION SITES SHALL BE PREVENTED USING SOURCE CONTROLS TO THE MAXIMUM EXTENT PRACTICABLE. POTENTIAL POLLUTANTS INCLUDE BUT ARE NOT LIMITED TO: SEDIMENT, TRASH, NUTRIENTS, PATHOGENS, PETROLEUM HYDROCARBONS, METALS, CONCRETE, CEMENT, ASPHALT, LIME, PAINT, STAINS, GLUES, WOOD PRODUCTS, PESTICIDES, HERBICIDES, CHEMICALS, HAZARDOUS WASTE, SANITARY WASTE, VEHICLE OR EQUIPMENT WASH WATER, AND CHLORINATED WATER.
6. ENTRANCE(S) TO THE CONSTRUCTION SITE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF POTENTIAL POLLUTANTS OFFSITE. POTENTIAL POLLUTANTS DEPOSITED ON PAVED AREAS WITHIN THE COUNTY RIGHT-OF-WAY, SUCH AS ROADWAYS AND SIDEWALKS, SHALL BE PROPERLY DISPOSED OF AT THE END OF EACH WORKING DAY OR MORE FREQUENTLY AS NECESSARY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING CONSTRUCTION VEHICLES LEAVING THE SITE ON A DAILY BASIS TO PREVENT DUST, SILT, AND DIRT FROM BEING RELEASED OR TRACKED OFFSITE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AT THE END OF EACH WORKING DAY OR MORE OFTEN AS NECESSARY.
7. ALL DISTURBED AREAS SHALL BE PROTECTED BY USING EROSION PREVENTION MEASURES TO THE MAXIMUM EXTENT PRACTICABLE, SUCH AS ESTABLISHING VEGETATION COVERAGE, HYDROSEEDING, STRAW MULCH, BLANKETS OR MATS. TEMPORARY OR PERMANENT REVEGETATION SHALL BE INSTALLED AS SOON AS PRACTICAL AFTER VEGETATION REMOVAL BUT IN ALL CASES PRIOR TO OCTOBER 15. PRIOR TO FINAL INSPECTION, ALL DISTURBED AREAS SHALL BE REVEGETATED OR LANDSCAPING SHALL BE INSTALLED.
8. WHENEVER IT IS NOT POSSIBLE TO USE EROSION PREVENTION MEASURES ON EXPOSED SLOPES, SEDIMENT CONTROL DEVICES SUCH AS FIBER ROLLS AND SILT FENCES SHALL BE INSTALLED TO PREVENT SEDIMENT MIGRATION. FIBER ROLLS AND SILT FENCES SHALL BE TRENCHED AND KEYED INTO THE SOIL AND INSTALLED ON CONTOUR. SILT FENCES SHALL BE INSTALLED APPROXIMATELY 2 TO 5 FEET FROM TOE OF SLOPE.
9. HYDROSEEDING SHALL BE CONDUCTED IN A THREE STEP PROCESS. FIRST, EVENLY APPLY SEED MIX AND FERTILIZER TO THE EXPOSED SLOPE. SECOND, EVENLY APPLY MULCH OVER THE SEED AND FERTILIZER. THIRD, STABILIZE THE MULCH IN PLACE. AN EQUIVALENT SINGLE STEP PROCESS, WITH SEED, FERTILIZER, WATER, AND BONDED FIBERS IS ACCEPTABLE. APPLICATIONS SHALL BE BROADCASTED MECHANICALLY OR MANUALLY AT THE RATES SPECIFIED IN THE PROJECT CONSTRUCTION DOCUMENTS.
10. DUST CONTROL SHALL BE PROVIDED BY CONTRACTOR DURING ALL PHASES OF CONSTRUCTION.
11. STORM DRAIN INLETS SHALL BE PROTECTED FROM POTENTIAL POLLUTANTS UNTIL DRAINAGE CONVEYANCE SYSTEMS ARE FUNCTIONAL AND CONSTRUCTION HAS BEEN COMPLETED.
12. ENERGY DISSIPATERS SHALL BE INSTALLED AT STORM DRAIN OUTLETS WHICH MAY CONVEY EROSIVE STORM WATER FLOW.
13. SOIL AND MATERIAL STOCKPILES SHALL BE PROPERLY PROTECTED TO MINIMIZE SEDIMENT AND POLLUTANT TRANSPORT FROM THE CONSTRUCTION SITE.
14. SOLID WASTE, SUCH AS TRASH, DISCARDED BUILDING MATERIALS AND DEBRIS, SHALL BE PLACED IN DESIGNATED COLLECTION AREAS OR CONTAINERS. THE CONSTRUCTION SITE SHALL BE CLEARED OF SOLID WASTE DAILY OR AS NECESSARY. REGULAR REMOVAL AND PROPER DISPOSAL SHALL BE COORDINATED BY THE CONTRACTOR.
15. A CONCRETE WASHOUT AREA, SUCH AS A TEMPORARY PIT, SHALL BE DESIGNATED TO CLEAN CONCRETE TRUCKS AND TOOLS. AT NO TIME SHALL CONCRETE PRODUCTS AND WASTE BE ALLOWED TO ENTER COUNTY WATERWAYS SUCH AS CREEKS OR STORM DRAINS. NO WASHOUT OF CONCRETE, MORTAR MIXERS, OR TRUCKS SHALL BE ALLOWED ON SOIL.
16. PROPER APPLICATION, CLEANING, AND STORAGE OF POTENTIALLY HAZARDOUS MATERIALS, SUCH AS PAINTS AND CHEMICALS, SHALL BE CONDUCTED TO PREVENT THE DISCHARGE OF POLLUTANTS.
17. TEMPORARY RESTROOMS AND SANITARY FACILITIES SHALL BE LOCATED AND MAINTAINED DURING CONSTRUCTION ACTIVITIES TO PREVENT THE DISCHARGE OF POLLUTANTS.
18. APPROPRIATE VEHICLE STORAGE, FUELING, MAINTENANCE, AND CLEANING AREAS SHALL BE DESIGNATED AND MAINTAINED TO PREVENT DISCHARGE OF POLLUTANTS.

ABBREVIATIONS

AGG	AGGREGATE	LF	LINEAL FEET
BC	BEGIN OF CURVE	MIN	MINIMUM
CDF	CONTROL DENSITY FILL	MAX	MAXIMUM
CO	CLEAN-OUT	MFR	MANUFACTURER
CONC	CONCRETE	(N)	NEW
CL	CENTER LINE	NO.	NUMBER
CMP	CORRUGATED METAL PIPE	O.C.	OFF CENTER
CMU	CONCRETE MASONRY UNIT	POC	POINT OF CONCENTRATION
CT	CLOSURE TURF	PVC	POLY VINYL CHLORIDE
DIA, Ø	DIAMETER	PVI	POINT OF VERTICAL INDEX
(E)	EXISTING	PT	POINT
EA	EACH	R.C.	RELATIVE COMPACTION
EG	EXISTING GROUND	REIN	REINFORCED
EC	END OF CURVE	S	SLOPE
EOR	EDGE OF ROAD	SCH	SCHEDULE
FL	FLOW LINE	SO	SIDE OPENING
FG	FINISH GRADE	SS	STAINLESS STEEL
GB	GRADE BREAK	TOB	TOP OF BANK
HDPE	HIGH DENSITY POLYETHYLENE	TW	TOP OF WALL
INV	INVERT ELEVATION	TYP	TYPICAL
LCS	LEACHATE COLLECTION SYSTEM	W/	WITH
LCRS	LEACHATE COLLECTION & REMOVAL SYSTEM	WMU	WASTE MANAGEMENT UNIT
LDS	LEAK DETECTION SYSTEM	WWF	WELDED WIRE FABRIC

LEGEND

350	DESIGN CONTOUR (MAJOR)
348	DESIGN CONTOUR (MINOR)
350	EXISTING CONTOUR (MAJOR)
348	EXISTING CONTOUR (MINOR)
OH OH OH OH OH	EXISTING OVERHEAD ELECTRIC
	EPHEMERAL CREEK
	EXISTING FENCE
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
	PROPOSED GRADING LIMITS OR LIMIT OF WORK
	PROPOSED GRADE BREAK, TOE OF SLOPE, BENCH, OR ACCESS ROAD
	EXISTING LIMITS OF REFUSE
	PROPOSED CLOSURE TURF LIMIT
	PROPOSED DITCH AND FLOW LINE
	PROPERTY LINE (APPROXIMATE)
	SUBGRADE / FOUNDATION LAYER / EXISTING INTERIM COVER
	ENGINEERED FILL / TRENCH BACKFILL
	REFUSE
	ACCESS ROAD OR PAD CLASS II AGGREGATE BASE
	CLOSURE TURF/ HYDROBINDER TURF INFILL (SEE SHEETS 200-202)
	CLOSURE TURF ACCESS ROAD WITH 1.5FT OF ENGINEERED FILL AND 0.5FT OF CLASS II AGGREGATE BASE (SEE SHEETS 200-202)
	CLASS II AGGREGATE BASE ROCK
	ROCK RIPRAP (GROUTED OR LOOSE)
	EROSION MAT
	CLOSURE TURF SWALE WITH ROCK RIPRAP
	CONCRETE
90-1	DETECTION GROUNDWATER MONITORING WELL
90-3	CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1	SURFACE WATER SAMPLING STATION
GAS-1	PERIMETER LANDFILL GAS MONITORING POINT
	PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1	LEACHATE WELL
	CONTROL POINT
×325.84 G	SPOT ELEVATION (EXISTING GROUND)

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REGISTERED GEOLOGIST
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CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

NOTES, LEGEND AND ABBREVIATIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By:	DFB
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Xrefs: X-Ref - Title Block.dwg
Path: U:\2002\907\Civil\Ukiah LF Cover - (C000-1) Title Sheet & Notes.dwg Plot Date: Apr 30, 2019 at 16:14

LEGEND

- 90-1 ● DETECTION GROUNDWATER MONITORING WELL
- 90-3 ● CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 ▲ SURFACE WATER SAMPLING STATION
- GAS-1 ◆ PERIMETER LANDFILL GAS MONITORING POINT
- ■ PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 ⊞ LEACHATE WELL

EXISTING LEACHATE STORAGE TANK
FORMER LEACHATE POND
EXISTING GRAVEL ACCESS ROAD
APPROXIMATE LOCATION OF 4" LEACHATE FORCE MAIN
APPROXIMATE LIMITS OF REFUSE (TYP)
EPHEMERAL CREEK (TYPICAL)
EXISTING DRAIN PIPE (TYPICAL)
EXISTING DIRT ACCESS ROAD (TYP)
APPROXIMATE LOCATION OF EXISTING LEACHATE COLLECTION SYSTEM (TYP)
EXISTING 115 KV OVERHEAD POWER LINES
EXISTING GRAVEL ACCESS ROAD (TYP)
POND
SITE ENTRANCE
VICHY SPRINGS ROAD

PONTE 1 CP-9 (KRNL PANEL) N=2180775.45000 E=4228910.05000 699.24
PONTE 2 CP-13 (KRNL PANEL) N=2191586.17000 E=4233004.13000 821.22
PONTE 3 CP-10 (KRNL PANEL) N=2190210.05000 E=4230967.65000 747.26
PONTE 4 CP-8 (KRNL PANEL) N=2189397.55000 E=4230936.37000 835.33
PONTE 5 CP-11 (KRNL PANEL) N=2189527.11000 E=4231994.14000 837.02
PONTE 6 CP-21 (KRNL PANEL) N=2190653.58000 E=4233316.70000 810.18
PONTE 7 CP-22 (KRNL PANEL) N=2190963.74000 E=4233314.42000 1018.90

150 0 150
SCALE : 1" = 150'

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SITE MAP (EXISTING CONDITIONS)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Xrefs: X-Ref - EC - 2019\eng\1-Ref - Finished Grade - Design\eng\1-Ref - Finished Grade - Hatching\eng\1-Ref - Turf - Hatching\eng\1-Ref - Title Block.dwg
Plotted By: CHRISTOPHER\Plotted At: Apr 30, 2019 at 16:41

LEGEND

- 90-1 ● DETECTION GROUNDWATER MONITORING WELL
- 90-3 ● CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 ▲ SURFACE WATER SAMPLING STATION
- GAS-1 ◆ PERIMETER LANDFILL GAS MONITORING POINT
- ■ PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 ⊞ LEACHATE WELL

PROPOSED FLARE SYSTEM
EXISTING SEDIMENTATION BASIN TO REMAIN
EXISTING LEACHATE POND TO BE FILLED
PROPOSED ACCESS ROAD AND BENCH SYSTEM
PROPOSED DRAINAGE SYSTEM (TYP)
EPHEMERAL CREEK (TYPICAL)
PROPOSED LIMITS OF CLOSURE TURF (TYPICAL)
PROPOSED LIMITS OF GRADING (TYPICAL)
APPROXIMATE LOCATION OF EXISTING 4" LEACHATE FORCE MAIN
EXISTING SEDIMENTATION BASIN TO REMAIN
"CAUTION" EXISTING 115 KV OVERHEAD POWER LINES. CONTACT PG&E PRIOR TO START OF WORK FOR SAFETY PRECAUTIONS
PROPOSED ROCK LINED SWALE (TYPICAL)
APPROXIMATE LIMITS OF REFUSE (TYP)
PROPOSED BENCH (TYPICAL)
PROPOSED BORROW AREA
PROPOSED ACCESS ROAD GRADING
EXISTING NATIVE GRASS PRESERVATION AREA (TYP)
EXISTING WETLAND PRESERVATION AREA (TYP)
EXISTING SEDIMENTATION BASIN TO REMAIN
SITE ENTRANCE
VICHY SPRINGS ROAD

SCALE : 1" = 150'

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STATE OF CALIFORNIA

SITE MAP (FINISHED GRADE)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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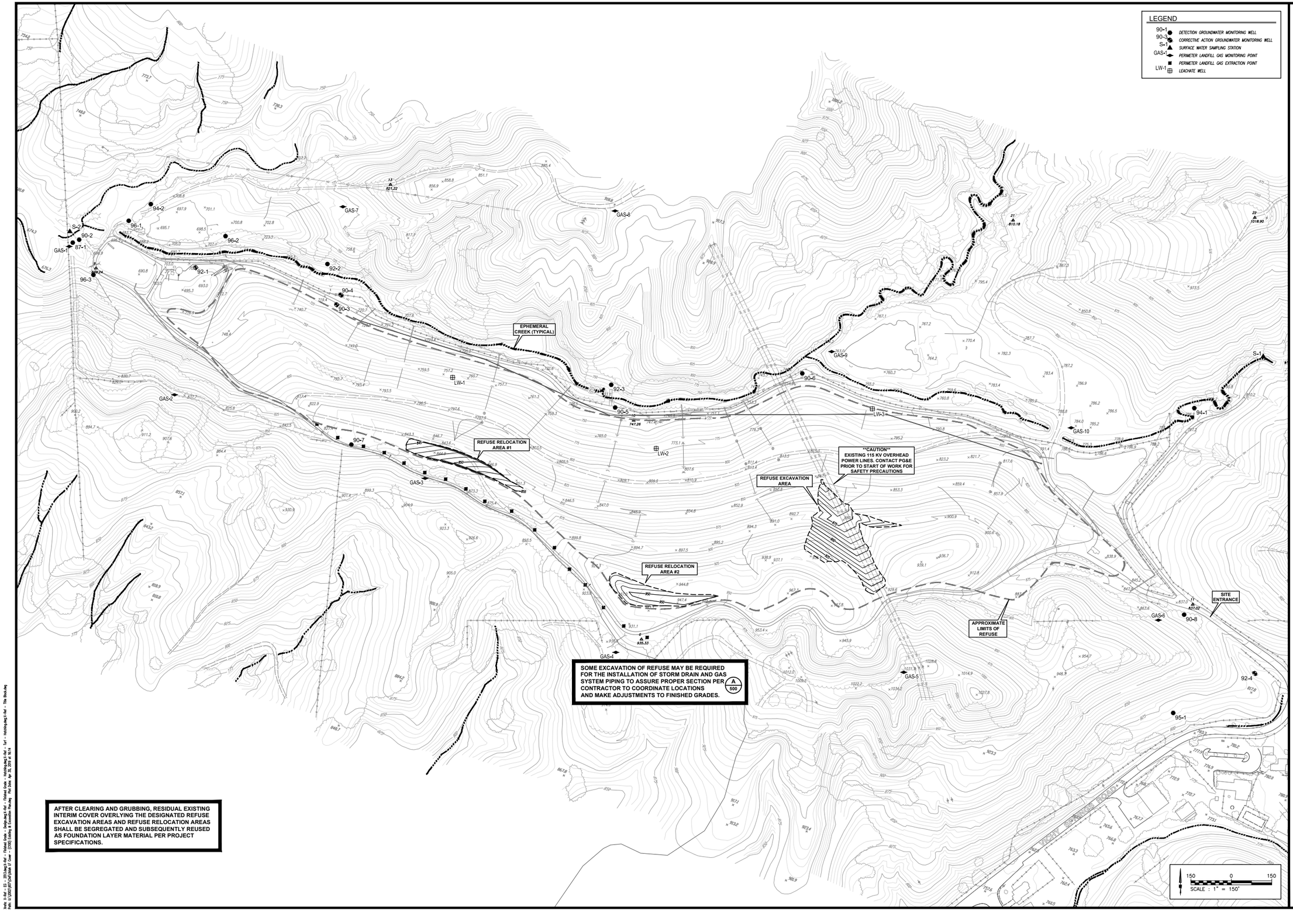
Date: 2-Mar - 22 - 2019 by: Will Clark - Plotted: Grade - Drawing: Layout Tab - Plotted: Grade - Hatching: Layer: Tab - Turf - Hatching: Layer: Tab - Turf - Title Block: Layer: Tab - Turf - Drawing: Layout



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REGISTERED GEOLOGIST
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STATE OF CALIFORNIA

REFUSE RELOCATION PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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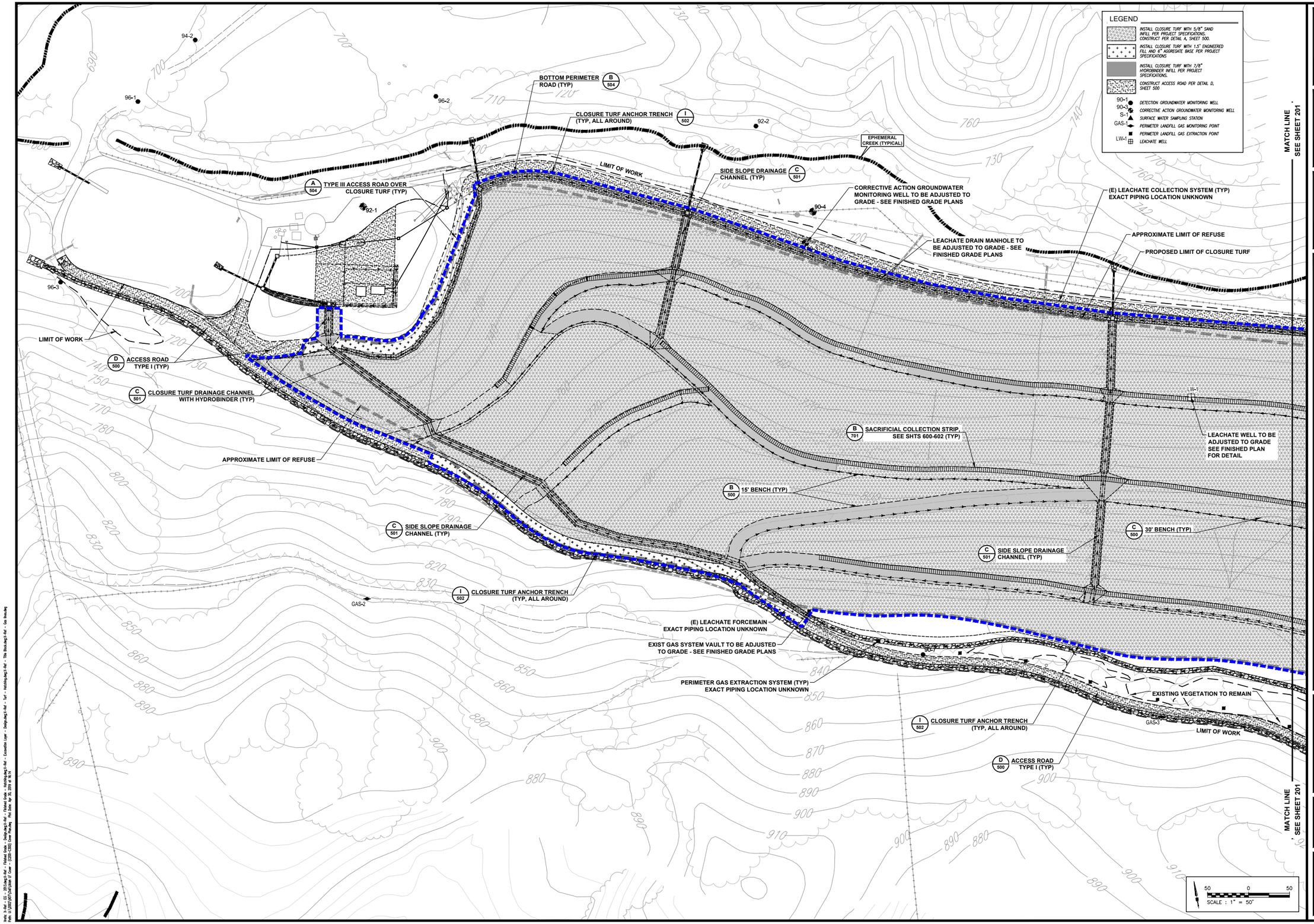

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LANDFILL COVER MATERIALS PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Xrefs: S-Ref - C3 - 2015.dwg C-Ref - Finished Grade - 3dgPolygons C-Ref - Finished Grade - Hatching.dwg C-Ref - Excavation Layer - Design.dwg C-Ref - Turf - Hatching.dwg C-Ref - Title Block.dwg C-Ref - Geo Boundary
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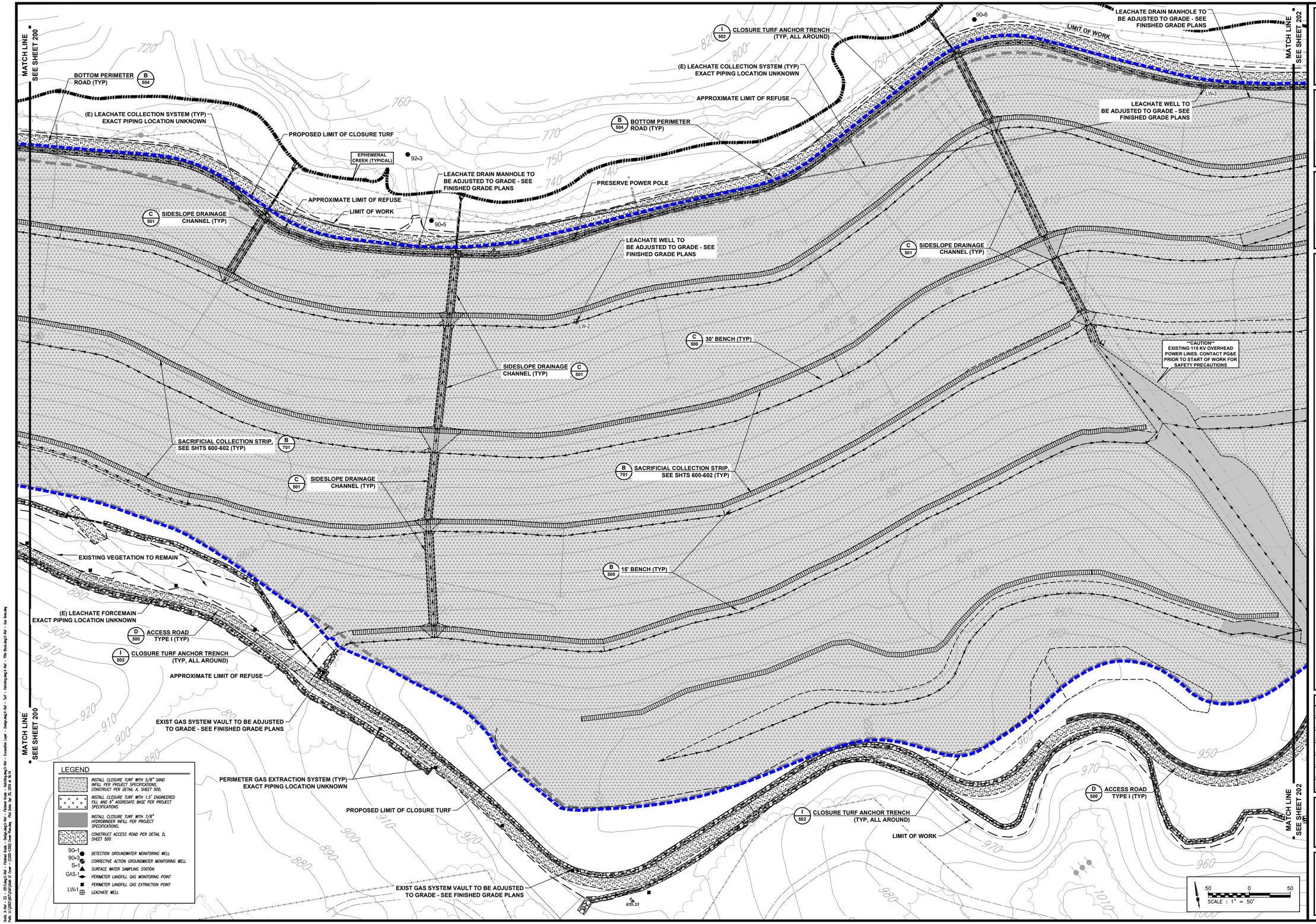

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REGISTERED GEOLOGIST
DAMON F. BROWN
No. 7
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LANDFILL COVER MATERIALS PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By: DFB
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Xrefs: S:\2002\907\Cad\Sheet L Cover - (2004-2006) Cover Working Pad Sheet Ref: 36, 37, 38 & 40
Xrefs: S:\2002\907\Cad\Sheet L Cover - (2004-2006) Cover Working Pad Sheet Ref: 36, 37, 38 & 40

MATCH LINE
SEE SHEET 303

MATCH LINE
SEE SHEET 201

MATCH LINE
SEE SHEET 303

BOTTOM PERIMETER ROAD (TYP) B 504

(E) LEACHATE COLLECTION SYSTEM (TYP)
EXACT PIPING LOCATION UNKNOWN

LIMIT OF WORK

PROPOSED LIMIT OF CLOSURE TURF

LW-3

GAS-10

EPHEMERAL CREEK (TYPICAL)

LEACHATE DRAIN MANHOLE TO BE ADJUSTED TO GRADE - SEE FINISHED GRADE PLANS

EXISTING SEDIMENTATION POND TO REMAIN

PRESERVE POWER POLE E 501

CLOSURE TURF ANCHOR TRENCH (TYP, ALL AROUND) I 502

30' BENCH (TYP) C 500

C 501 SIDESLOPE DRAINAGE CHANNEL (TYP)

15' BENCH (TYP) B 500

ACCESS ROAD TYPE II (TYP) D 500

B 500 15' BENCH (TYP)

PROPOSED LIMIT OF CLOSURE TURF

APPROXIMATE LIMITS OF REFUSE (TYP)

PRESERVE POWER POLE

LIMIT OF WORK

B 701 SACRIFICIAL COLLECTION STRIP, SEE SHTS 600-602 (TYP)

ACCESS ROAD TYPE II (TYP) D 500

D 500 ACCESS ROAD TYPE I (TYP)

90-8

GAS-8

"CAUTION"
EXISTING 115 KV OVERHEAD POWER LINES. CONTACT PG&E PRIOR TO START OF WORK FOR SAFETY PRECAUTIONS

LIMIT OF WORK

APPROXIMATE LIMIT OF REFUSE

I 502 CLOSURE TURF ANCHOR TRENCH (TYP, ALL AROUND)

ACCESS ROAD TYPE I (TYP) D 500

95-1

GAS-5

LEGEND

- INSTALL CLOSURE TURF WITH 5/8" SAND INFILL PER PROJECT SPECIFICATIONS. CONSTRUCT PER DETAIL A, SHEET 500.
- INSTALL CLOSURE TURF WITH 1.5" ENGINEERED FILL AND 6" AGGREGATE BASE PER PROJECT SPECIFICATIONS
- INSTALL CLOSURE TURF WITH 7/8" HYDROBINDER INFILL PER PROJECT SPECIFICATIONS.
- CONSTRUCT ACCESS ROAD PER DETAIL D, SHEET 500
- 90-1 DETECTION GROUNDWATER MONITORING WELL
- 90-2 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S- SURFACE WATER SAMPLING STATION
- GAS- PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 LEACHATE WELL

50 0 50
SCALE : 1" = 50'

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STATE OF CALIFORNIA

FOUNDATION LAYER GRADING PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Checked By:	DFB
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Xrefs: X:\Ref - GS - 2013.dwg>X:\Ref - Finished Grade - Daily.dwg>X:\Ref - Finished Grade - Matching.dwg>X:\Ref - Excavation Layer - Daily.dwg>X:\Ref - Turf - Matching.dwg>X:\Ref - Title Block.dwg>X:\Ref - Gas Area.dwg
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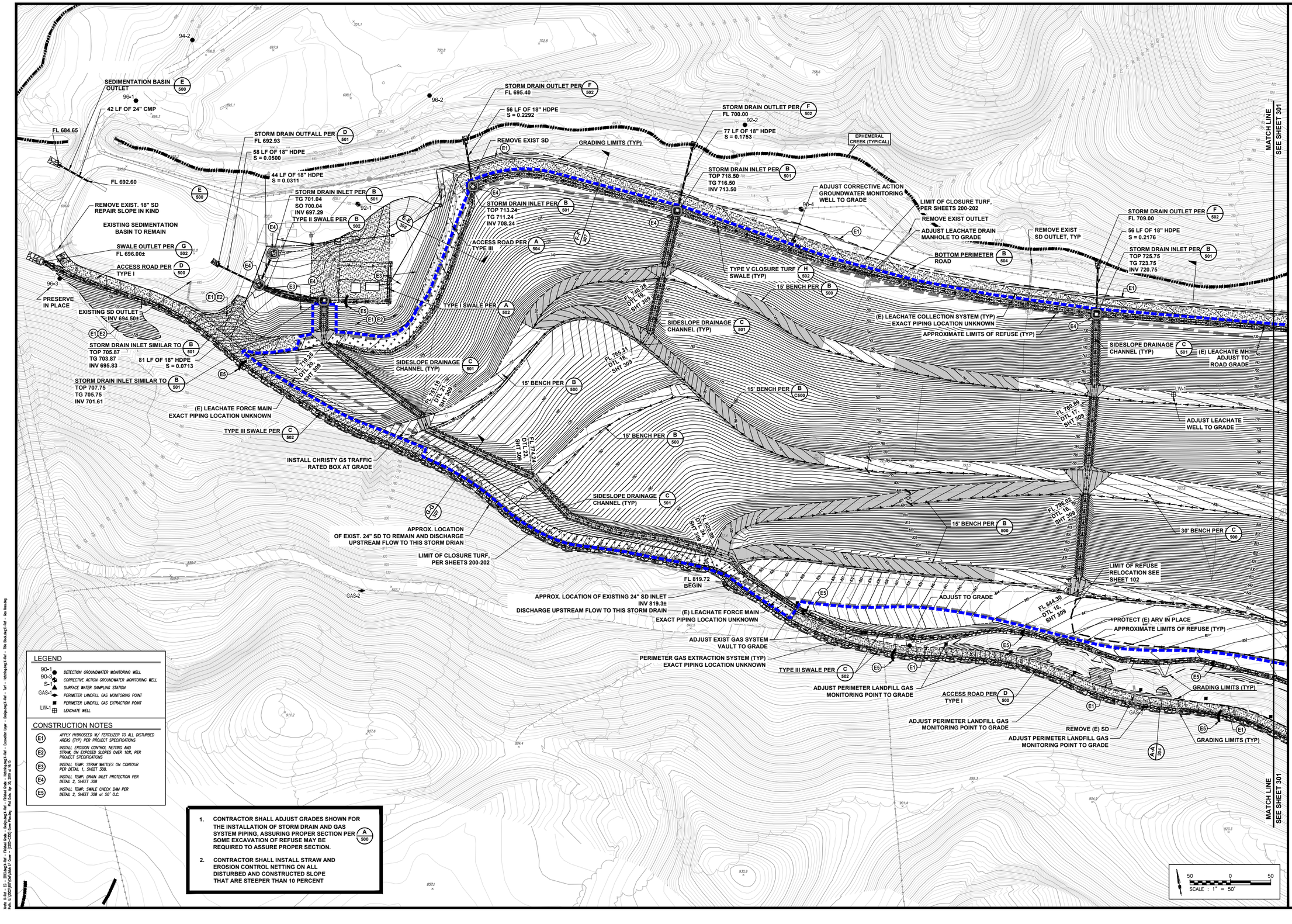

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REGISTERED GEOLOGIST
No. 9
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CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

FINISHED GRADE (LANDFILL)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Job No: 02-907
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Checked By: DFB
Date: 2019-04-30

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MATCH LINE SEE SHEET 300

MATCH LINE SEE SHEET 302

REMOVE EXIST OUTLET

GRADING LIMITS (TYP)

STORM DRAIN OUTLET PER F 502 FL 724.26

72 LF OF 18" HDPE S = 0.1408

TYPE V CLOSURE TURF SWALE (TYP) H 502

(E) LEACHATE COLLECTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

(E) MONITORING WELL ADJUST TO GRADE

(E) BRIDGE DTL 25 SHT 309

92-3

90-5

ADJUST LEACHATE DRAIN MANHOLE TO GRADE

STORM DRAIN OUTLET PER F 502 FL 733.50; D_{50} = 9"

71 LF OF 18" HDPE S = 0.1166

EPHEMERAL CREEK (TYPICAL)

REMOVE EXIST OUTLET

STORM DRAIN OUTLET PER F 502 FL 743.20; D_{50} = 12"

50 LF OF 18" HDPE S = 0.1828

B 504 BOTTOM PERIMETER ROAD

90-6

(E) MONITORING WELL ADJUST TO GRADE

ADJUST LEACHATE WELL TO GRADE

STORM DRAIN INLET PER B 501 TOP 757.34 TG 755.34 INV 752.34

ADJUST LEACHATE DRAIN MANHOLE TO GRADE

(E) LEACHATE COLLECTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

SHT 312

FL 786.35 DTL 6 SHT 309

TYPE V CLOSURE TURF SWALE (TYP) H 502

PRESERVE (E) POWER POLE AND GUY WIRES E 501

APPROXIMATE LIMITS OF REFUSE (TYP)

STORM DRAIN INLET PER B 501 TOP 739.40 TG 737.40 INV 734.40

C 501 SIDESLOPE DRAINAGE CHANNEL (TYP)

REMOVE (E) STORM DRAIN

FL 767.10 DTL 14 SHT 309

STORM DRAIN INLET PER B 501 TOP 746.78 TG744.78 INV 741.78

15' BENCH PER B 500

FL 816.12 DTL 7 SHT 309

SIDESLOPE DRAINAGE CHANNEL (TYP) C 501

ADJUST LEACHATE WELL TO GRADE

FL 767.55 DTL 13 SHT 309

SIDESLOPE DRAINAGE CHANNEL (TYP) C 501

30' BENCH PER C 500

GB 824.35 HP

"CAUTION" EXISTING 115 KV OVERHEAD POWER LINES. CONTACT PG&E PRIOR TO START OF WORK FOR SAFETY PRECAUTIONS

FL 847.80 DTL 6 SHT 309

LIMIT OF EXCAVATION SEE SHEET 102

GB 880.75

15' BENCH PER B 500

FL 874.91 DTL 5 SHT 309

L-L 308

GB 858.93 HP

LIMIT OF EXCAVATION SEE SHEET 102

FL 841.05 DTL 11 SHT 308

GB 889.16 HP

15' BENCH PER B 500

MATCH LINE SEE SHEET 300

GRADING LIMITS (TYP)

GB 861.62

GB 904.41 HP

(E) LEACHATE FORCE MAIN EXACT PIPING LOCATION UNKNOWN

TYPE III SWALE PER C 502

FL 898.40 DTL 9 SHT 309

15' BENCH PER B 500

STORM DRAIN OUTLET PER F 502 FL 891.61

82 LF OF 18" CMP S = .0474

STORM DRAIN INLET PER B 501 TOP 901.00 TG 899.00 INV 895.50

APPROXIMATE LIMITS OF REFUSE (TYP)

LIMIT OF REFUSE RELOCATION SEE SHEET 102

FL 957.40 DTL 4 SHT 309

FL 958.20

FL 957.67

GB/HP 959.45

GB/FL 958.00

REMOVE EXISTING BOX AND INSTALL CHRISTY B2426 TRAFFIC RATED BOX WITH CHECKER PLATE TOP. INSTALL RISERS WHERE NEEDED.

FL 922.95 RAISE (E) ARV TO GRADE

LIMIT OF CLOSURE TURF, PER SHEETS 200-202

ACCESS ROAD PER D 500 TYPE I

TYPE II SWALE PER B 502

TYPE III SWALE PER C 502

GRADING LIMITS (TYP)

GRADING LIMITS (TYP)

PERIMETER GAS EXTRACTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

LIMIT OF WORK

TYPE III SWALE PER C 502

REMOVE EXISTING BOX AND INSTALL CHRISTY B2426 TRAFFIC RATED BOX WITH CHECKER PLATE TOP. INSTALL RISERS WHERE NEEDED.

SWALE OUTLET PER G 502 FL 932.74±

SCALE : 1" = 50'

MATCH LINE SEE SHEET 302

LEGEND

- 90-1 DETECTION GROUNDWATER MONITORING WELL
- 90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 SURFACE WATER SAMPLING STATION
- GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 LEACHATE WELL

CONSTRUCTION NOTES

- E1 APPLY HYDROSEED W/ FERTILIZER TO ALL DISTURBED AREAS (TYP) PER PROJECT SPECIFICATIONS
- E2 INSTALL EROSION CONTROL NETTING AND STRAW, ON EXPOSED SLOPES OVER 10%, PER PROJECT SPECIFICATIONS
- E3 INSTALL TEMP. STRAW WATTLES ON CONTOUR PER DETAIL 1, SHEET 308.
- E4 INSTALL TEMP. DRAIN INLET PROTECTION PER DETAIL 2, SHEET 308
- E5 INSTALL TEMP. SWALE CHECK DAM PER DETAIL 2, SHEET 308 at 50' O.C.

1. CONTRACTOR SHALL ADJUST GRADES SHOWN FOR THE INSTALLATION OF STORM DRAIN AND GAS SYSTEM PIPING, ASSURING PROPER SECTION PER A 500. SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE PROPER SECTION.
2. CONTRACTOR SHALL INSTALL STRAW AND EROSION CONTROL NETTING ON ALL DISTURBED AND CONSTRUCTED SLOPE THAT ARE STEEPER THAN 10 PERCENT

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

FINISHED GRADE (LANDFILL)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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MATCH LINE
SEE SHEET 303

MATCH LINE
SEE SHEET 301

MATCH LINE
SEE SHEET 303

MATCH LINE
SEE SHEET 301

GRADING LIMITS (TYP)

TYPE V CLOSURE TURF SWALE (TYP) (H 502)

LIMIT OF WORK

B 504 BOTTOM PERIMETER ROAD

(E) LEACHATE COLLECTION SYSTEM
EXACT PIPING LOCATION UNKNOWN

LW-3

E1

E1 E2

FL 783.19

2 / 18

GB 826.33 HP

FL 820.00
DTL 3,
SHT 309

15' BENCH PER B 500

C 501 SIDESLOPE DRAINAGE CHANNEL (TYP)

GB 962.88 HP

FL 868.56
DTL 2,
SHT 309

15' BENCH PER B 500

GB 868.15 HP

FL 902.30
DTL 1,
SHT 309

15' BENCH PER B 500

GB 868.55 HP

FL 840.00

FL 867.12

GAS-10

E 500 SEDIMENTATION BASIN OUTLET STRUCTURE
FL 782.70

24 LF OF 24" CMP
S = 0.0500

EPHEMERAL CREEK (TYPICAL)

FL 783.90

ACCESS ROAD PER TYPE I (D 500)

STORM DRAIN OUTFALL (D 501)
FL 785.00
REMOVE (E) OUTLET

EXISTING SEDIMENTATION BASIN TO REMAIN

58 LF OF 18" HDPE
S = 0.0402

STORM DRAIN INLET PER (B 501)
TOP 792.33
TG 790.33
INV 787.33

ADJUST HDPE LEACHATE DRAIN MANHOLE TO GRADE

PRESERVE (E) POWER POLE AND GUY WIRES (E 501)

E1

ACCESS ROAD PER TYPE II (D 500)

PRESERVE EXISTING 12" SD INLET
INV. UNKNOWN

APPROXIMATE LIMITS OF REFUSE (TYP)
GRADING LIMITS (TYP)

PRESERVE (E) PP AND GUYS

TYPE V CLOSURE TURF SWALE (TYP) (H 502)

E1 E3

TYPE II SWALE PER (B 502)

ACCESS ROAD PER TYPE I (D 500)

TYPE V CLOSURE TURF SWALE (H 502)

KEY (A 505)

E5

E1 E2

UPPER LINER TERMINATION (A 505) (TYP)

APPROX. LOCATION OF EXISTING 24" SD INLET INV 846.0±

SWALE OUTLET PER (G 502)
FL 836.04±

CONFORM TO EXIST ROAD

837.02

90-8

GAS-6

SWALE OUTLET PER (G 502)
FL 836.04±

"CAUTION"
EXISTING 115 KV OVERHEAD POWER LINES. CONTACT PG&E PRIOR TO START OF WORK FOR SAFETY PRECAUTIONS

TYPE V CLOSURE TURF SWALE (TYP) (H 502)

TYPE III SWALE PER (C 502)

STORM DRAIN INLET PER (B 501)
TOP 916.30
TG 914.30
INV 911.30

TYPE IV SWALE PER (D 502)

GB 915.97

GB 871.00 HP

FL 930.00

FG 932.50

E4

E5

67 LF OF 18" CMP
S = .0269

STORM DRAIN OUTLET PER (F 502)
FL 909.50

ACCESS ROAD PER TYPE I (D 500)

LIMIT OF WORK

GRADING LIMITS (TYP)

TYPE II SWALE PER (B 502)

STORM DRAIN OUTLET PER (F 502)
FL 928.00

77 LF OF 18" CMP
S = .0300

STORM DRAIN INLET PER (B 501)
TOP 935.00
TG 933.00
INV 930.30

TYPE II SWALE PER (B 502)

TYPE III SWALE PER (C 502)

E1 E3

E5

GAS-5

95-1

LEGEND

- 90-1 DETECTION GROUNDWATER MONITORING WELL
- 90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 SURFACE WATER SAMPLING STATION
- GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 LEACHATE WELL

CONSTRUCTION NOTES

- E1 APPLY HYDROSEED W/ FERTILIZER TO ALL DISTURBED AREAS (TYP) PER PROJECT SPECIFICATIONS
- E2 INSTALL EROSION CONTROL NETTING AND STRAW, ON EXPOSED SLOPES OVER 10%, PER PROJECT SPECIFICATIONS
- E3 INSTALL TEMP. STRAW WATTLES ON CONTOUR PER DETAIL 1, SHEET 308.
- E4 INSTALL TEMP. DRAIN INLET PROTECTION PER DETAIL 2, SHEET 308
- E5 INSTALL TEMP. SWALE CHECK DAM PER DETAIL 2, SHEET 308 at 50' O.C.

1. CONTRACTOR SHALL ADJUST GRADES SHOWN FOR THE INSTALLATION OF STORM DRAIN AND GAS SYSTEM PIPING, ASSURING PROPER SECTION PER (A 500) SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE PROPER SECTION.
2. CONTRACTOR SHALL INSTALL STRAW AND EROSION CONTROL NETTING ON ALL DISTURBED AND CONSTRUCTED SLOPE THAT ARE STEEPER THAN 10 PERCENT

SCALE : 1" = 50'

EBA ENGINEERING
825 SONOMA AVENUE
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TEL: (707) 544-0784

REGISTERED GEOLOGIST
DAMON F. BROWN
No.
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

FINISHED GRADE (LANDFILL)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No:	02-907
Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

Sheet Number

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Date: 2-Apr — 05 - 2019.dwg X-Ref — Finished Grade — Display.dwg X-Ref — Finished Grade — Hatching.dwg X-Ref — Excavation Layer — Design.dwg X-Ref — Turf — Hatching.dwg X-Ref — Title Block.dwg X-Ref — Gas Area.dwg
Plot By: Wendy Cartagena-Jr Eng — C:\2019\907\pdf\plan\ 07 Final — (22x34 (1:50)) User Defined — Plot Date: Apr 30, 2019 at 8:53

LEGEND

- 90-1 — DETECTION GROUNDWATER MONITORING WELL
- 90-3 — CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 — SURFACE WATER SAMPLING STATION
- GAS-1 — PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 — LEACHATE WELL

CONSTRUCTION NOTES

- (E1) APPLY HYDROSEED W/ FERTILIZER TO ALL DISTURBED AREAS (TYP) PER PROJECT SPECIFICATIONS
- (E2) INSTALL EROSION CONTROL NETTING AND STRAW, ON EXPOSED SLOPES OVER 10%, PER PROJECT SPECIFICATIONS
- (E3) INSTALL TEMP. STRAW WATTLES ON CONTOUR PER DETAIL 1, SHEET 308.
- (E4) INSTALL TEMP. DRAIN INLET PROTECTION PER DETAIL 2, SHEET 308
- (E5) INSTALL TEMP. SWALE CHECK DAM PER DETAIL 2, SHEET 308 at 50' O.C.

1. CONTRACTOR SHALL INSTALL STRAW AND EROSION CONTROL NETTING ON ALL DISTURBED AND CONSTRUCTED SLOPE THAT ARE STEEPER THAN 10 PERCENT

CONFORM TO EXIST
GRADING LIMITS (TYP)
ACCESS ROAD TYPE I (TYP) (D 500)
CONFORM TO EXIST
GRADING LIMITS (TYP)
(D 502) BENCH SWALE
CMP DRAIN INLET (B 503) TG 882.73 SO 881.23 INV 878.23
FL 882.79
(D 502) BENCH SWALE
GRADING LIMITS (TYP)
135 LF OF 18" CMP
(D 502) TYPE IV BENCH SWALE (TYP)
FL 835.93
37 LF OF 18" CMP S = 0.0500
11.25" EL INV 876.38
CMP DRAIN INLET (B 503) TG 835.34 SO 833.84 INV 830.84
41 LF OF 18" CMP S = 0.0500
11.25" EL INV 828.79
LIMIT OF WORK
CONFORM TO EXIST
GRADING LIMITS (TYP)
FL 788.47
78 LF OF 18" CMP S = 0.0212
FL 787.55
CMP DRAIN INLET (B 503) TG 791.50 SO 790.00 INV 785.95
CMP DRAIN INLET (B 503) TOP 788.90 TG 787.40 INV 784.30
TYPE I SWALE (A 502) (TYP)
(E5) (TYP)
(D 501) STORM DRAIN OUTFALL FL 761.00
267 LF OF 18" CMP S = 0.0869
GRADING LIMITS (TYP)
(D 500) ACCESS ROAD TYPE I (TYP)
EXISTING SEDIMENTATION BASIN (TO REMAIN)
122 LF OF 18" CMP S = 0.0446
(D 501) STORM DRAIN OUTFALL FL 776.50
FL 761.70
REMOVE EXIST OVERFLOW PIPE AND INSTALL NEW CMP OVERFLOW PIPE PER (E 500)
FL 759.90
GAS-9
37 LF OF 18" HDPE S = 0.0500
GRADING LIMITS (TYP)
MATCH LINE SEE SHEET 302
LW-3
GRADING LIMITS (TYP)
CMP DRAIN INLET (B 503) TG 917.18 SO 915.68 INV 912.68
FL 918.33
151 LF OF 18" CMP
11.25" EL INV 910.05
52 LF OF 18" CMP S = 0.0500
TYPE IV BENCH SWALE (TYP) (D 502)
TYPE IV BENCH SWALE (TYP) (D 502)
15' ACCESS ROAD TYPE I (TYP) (D 500)
FL 932.49
GRADING LIMITS (TYP)
15' BENCH (D 500)
FL 893.03
15' ACCESS ROAD TYPE I (TYP) (D 500)
FL 853.82
LIMIT OF WORK
EXISTING PURPLE NEEDLE GRASS TO BE PRESERVED (TYP.)
CMP DRAIN INLET (B 503) TOP 785.94 TG 783.94 INV 781.94
FL 787.53
EXIST. WETLAND TO REMAIN, PROTECT IN PLACE (TYP.)
CONFORM TO EXIST.
GAS-10
EPHEMERAL CREEK (TYPICAL)
MATCH LINE SEE SHEET 302
94-1
SCALE : 1" = 50'

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

FINISHED GRADE (BORROW AREA)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Checked By: DFB
Date: 2019-04-30

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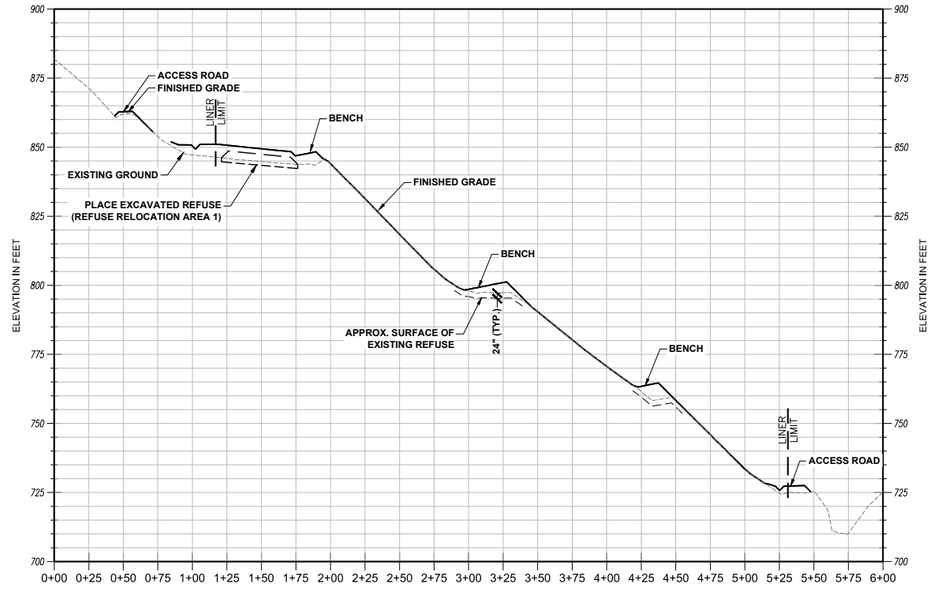
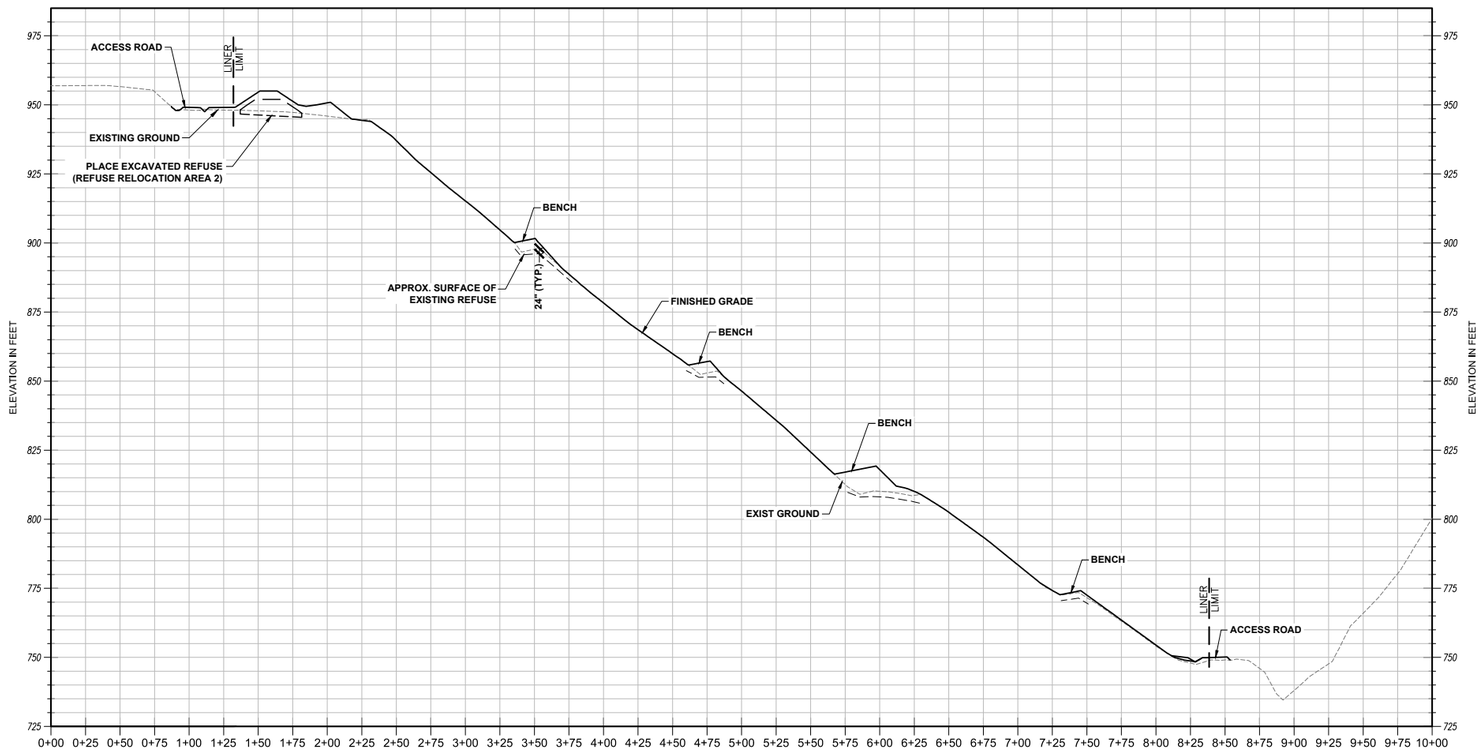


SECTION A-A

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'



SECTION B-B

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'

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REGISTERED GEOLOGIST
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CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Index 2.Ref - GS - 2013.dwg|x-Ref - Finished Grade - 2ndQtr.dwg|x-Ref - Finished Grade - 2ndQtr.dwg|x-Ref - Excavation Layer - 2ndQtr.dwg|x-Ref - Turf - Hatching.dwg|x-Ref - Title Block.dwg|x-Ref - Geo Detail.dwg
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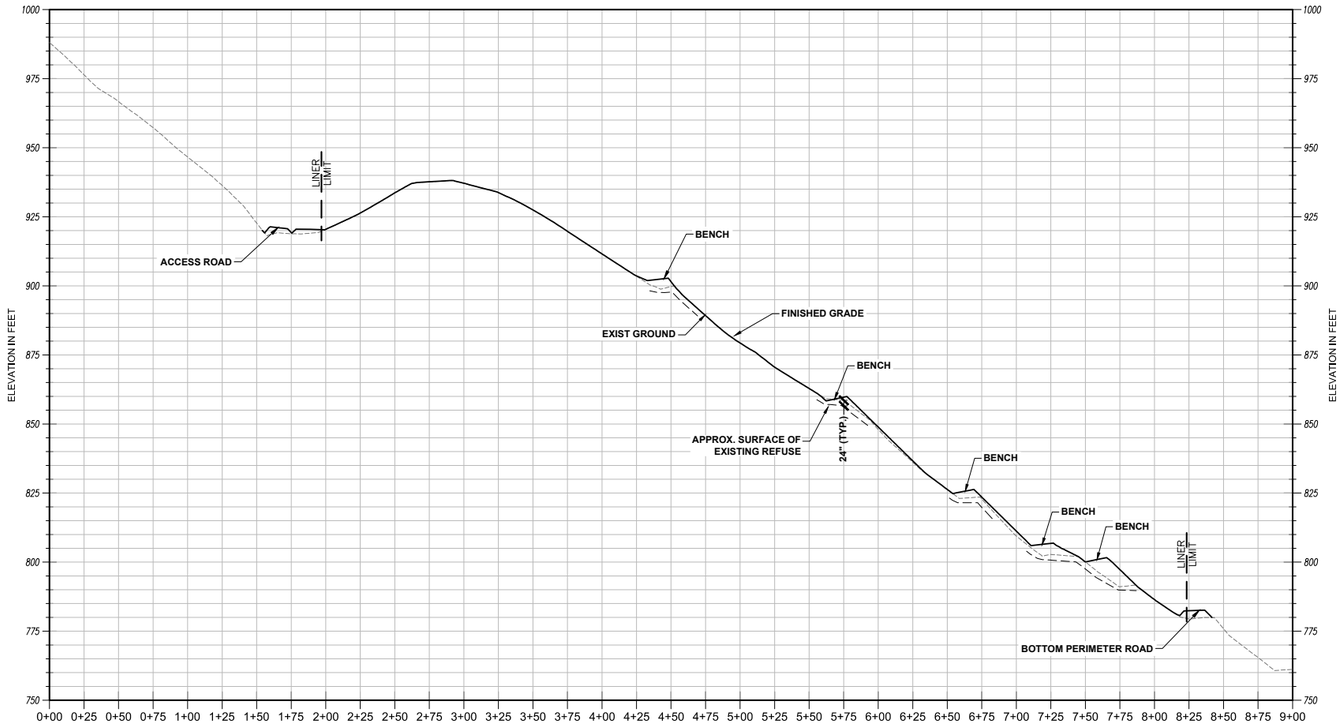

SECTION C-C

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'

EBA ENGINEERING
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REGISTERED GEOLOGIST
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STATE OF CALIFORNIA

SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By: DFB
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Date: 4/30 - 12:7 - 2019 Author: Chad Fisher - Drawing: Dwg-1.dwg Ref: - Plotted: Grade - Drawing: Dwg-1.dwg Ref: - Xrefs: Hatching-Dwg-1.dwg Ref: - Excavation Layer - Drawing: Dwg-1.dwg Ref: - Turf - Hatching: Dwg-1.dwg Ref: - Title Block: Dwg-1.dwg Ref: - Geo Area: Dwg
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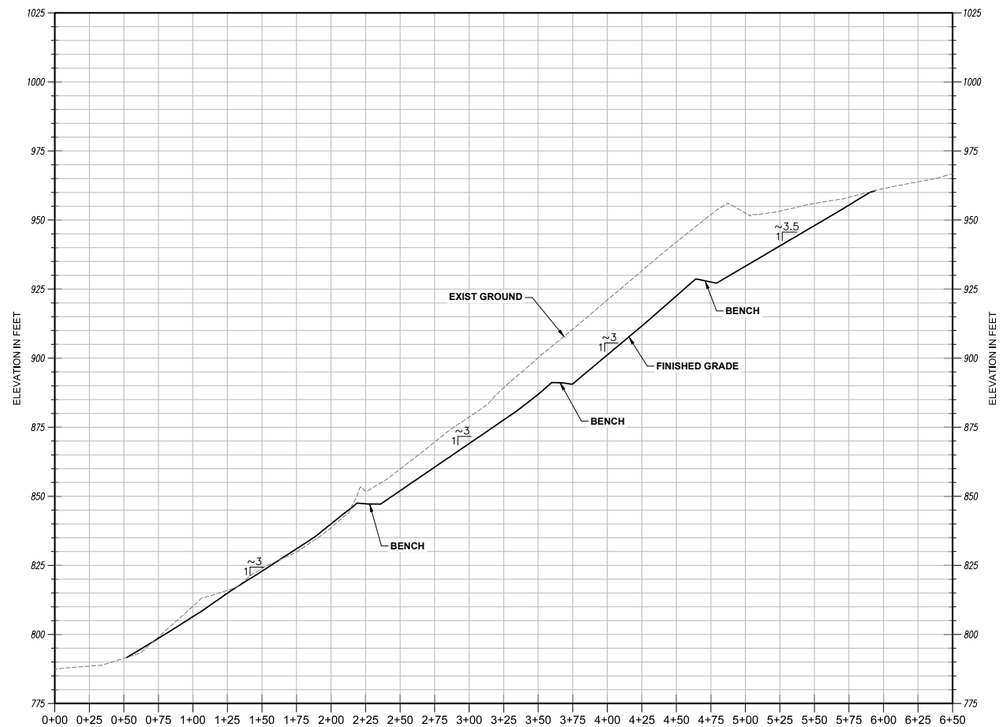

SECTION D-D

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'

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STATE OF CALIFORNIA

SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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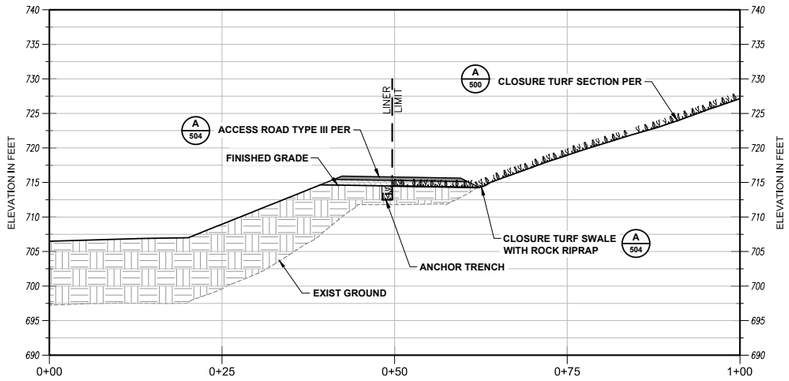

SECTION E-E

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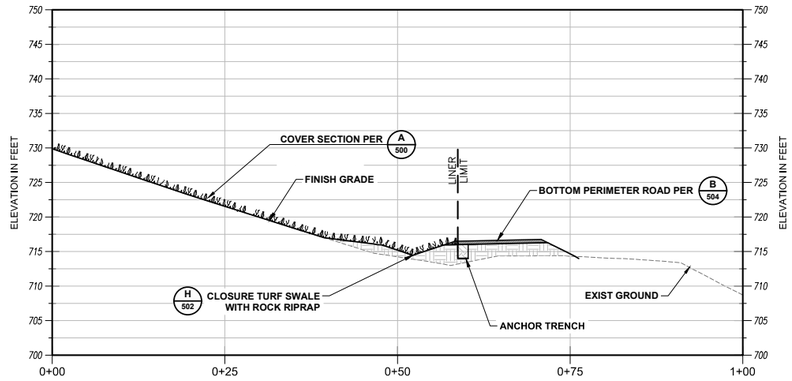
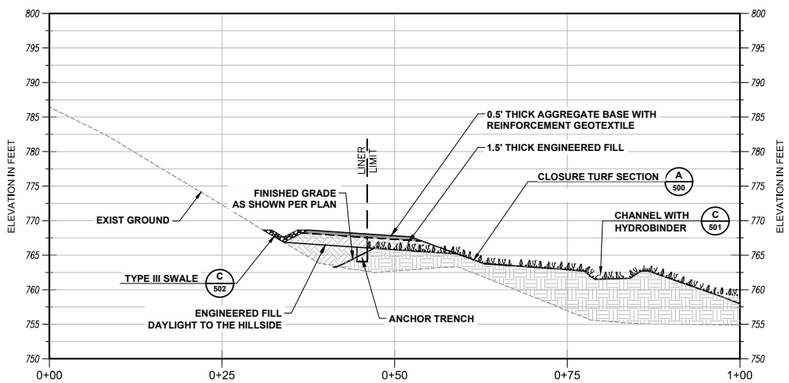
VERTICAL: 1" = 10'



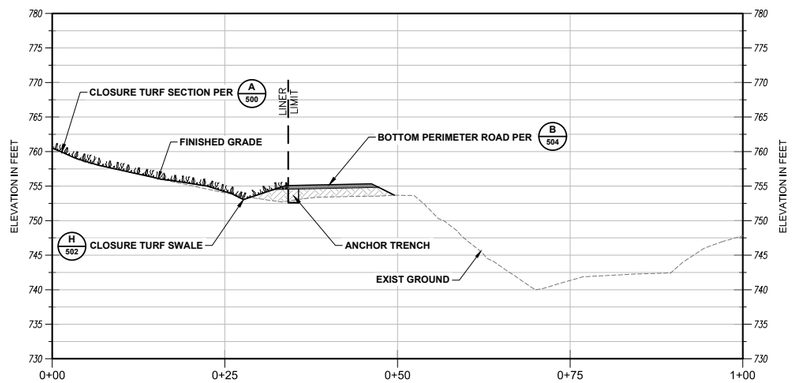
SECTION F-F

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



SECTION G-G

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



SECTION H-H

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'

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REGISTERED GEOLOGIST
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DAMON F. BROWN
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Date: 2-Apr - 03 - 2019 Acad Ref - Plotted Date - Dwg Name: Dwg Ref - Plotted Date - Xref Dwg Ref - Location Layer - Dwg Name: Dwg Ref - Xref - Hatch Dwg Ref - Title Block Dwg Ref - Gas Boundary
File: G:\proj\907\CAD\Sheet Files\Sections.dwg Plot Date: Apr 30, 2019 at 14:48
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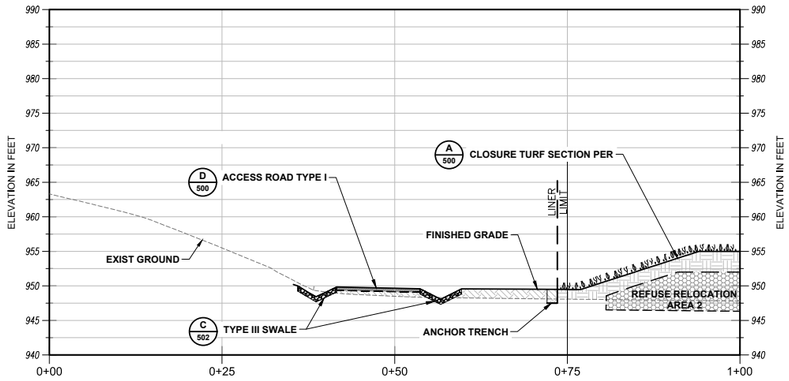
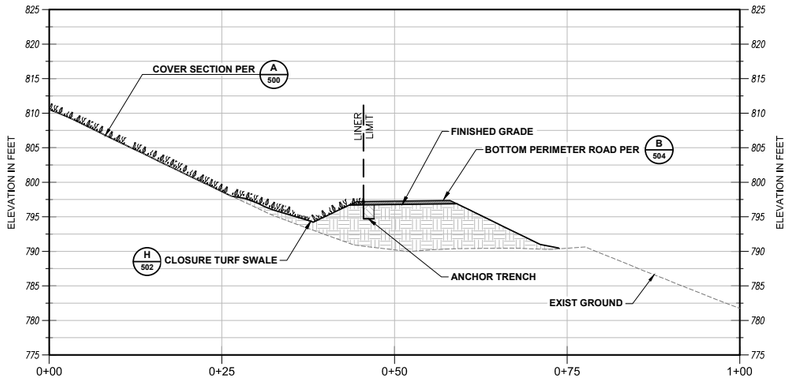


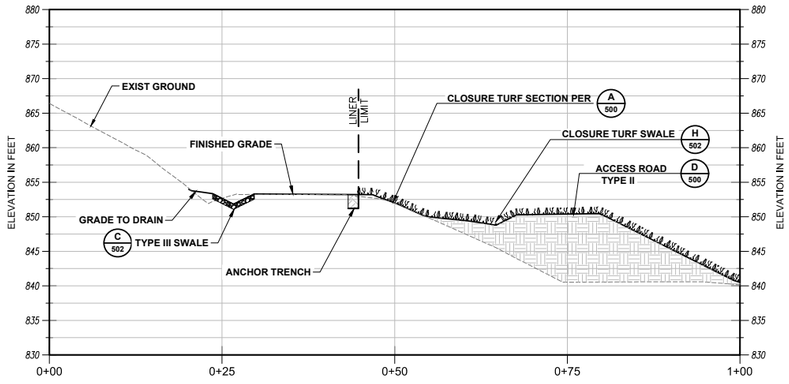
SECTION I-I

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



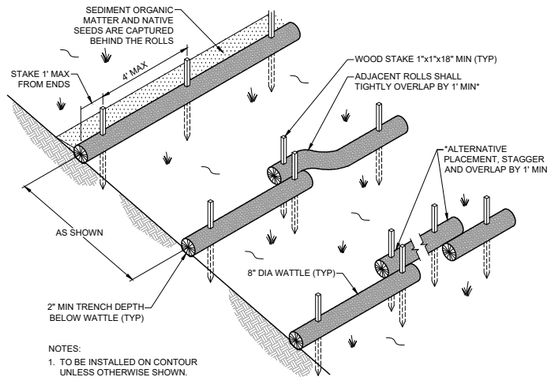
SECTION J-J

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



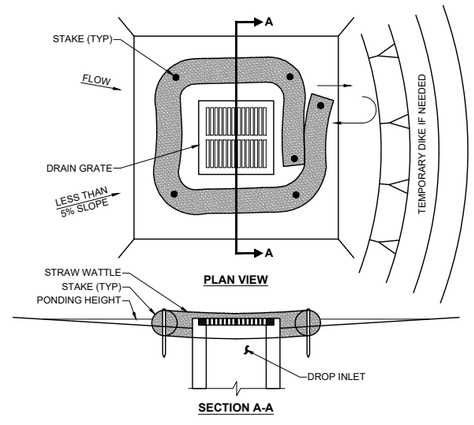
SECTION K-K

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



1 STRAW WATTLE DETAIL

NOT TO SCALE



NOTES:

1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)

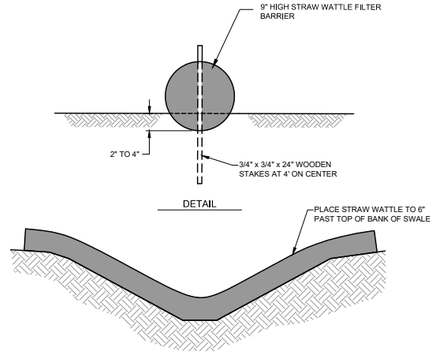
2. USE 1X4 WOOD OR EQUIVALENT METAL STAKES, (3FT. MIN. LENGTH)

3. THE TOP OF THE FRAME (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BY-PASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

4. WATTLES SHALL BE COMPOSED OF COMPOSTABLE FILTER MATERIAL SUCH AS SILTSOXX AS MANUFACTURED BY FILTREXX (440-926-2067) OR EQUIVALENT

2 DRAIN INLET PROTECTION

NOT TO SCALE



3 CHECK DAM AT SWALE

NOT TO SCALE

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REGISTERED GEOLOGIST
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No. 1500
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STATE OF CALIFORNIA

SECTIONS & EROSION CONTROL DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Drawn By:	WC
Checked By:	DFB
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Date: 4/30/2019 2:49:43 PM Plotted By: Will Cook
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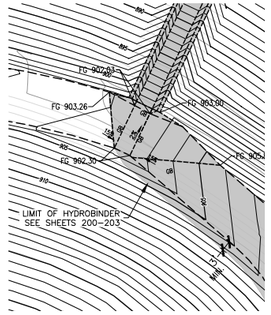
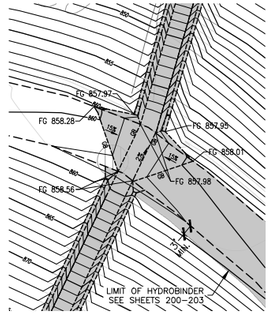


1 CHANNEL AT POC #2 1"=20'



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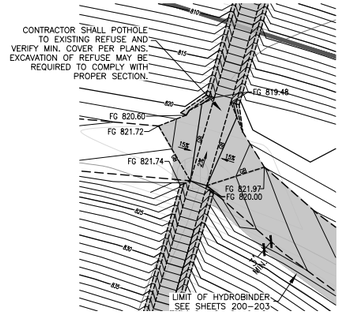

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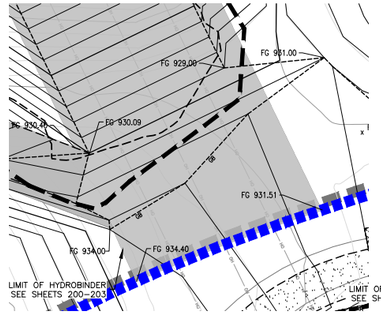
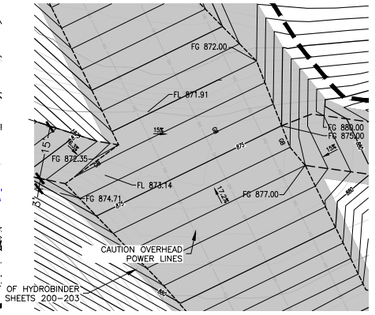
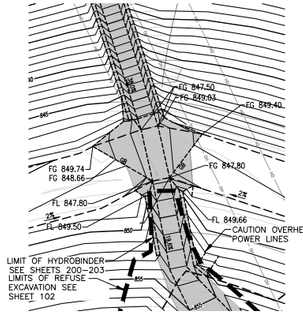


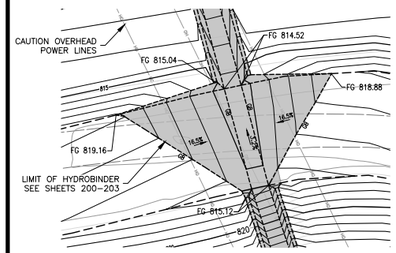
4 CHANNEL AT POC #7A 1"=20'



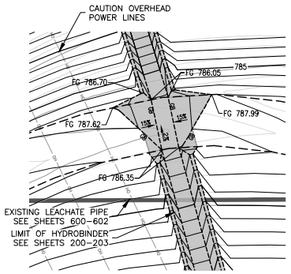
5 CHANNEL AT POC #8 1"=20'



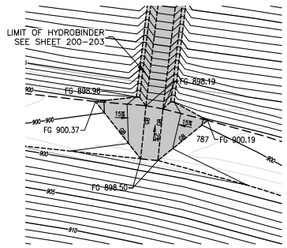
6 CHANNEL AT POC #9 1"=20'



7 CHANNEL AT POC #10 1"=20'

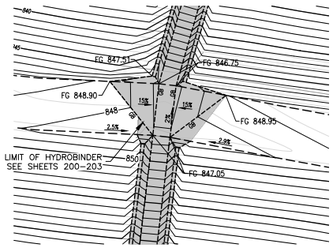


8 CHANNEL AT POC #11 1"=20'



9 CHANNEL AT POC #14 1"=20'

10 NOT USED 1"=20'



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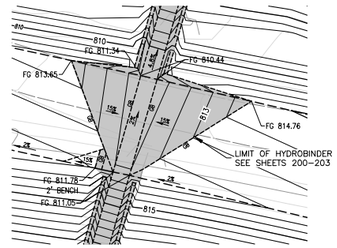
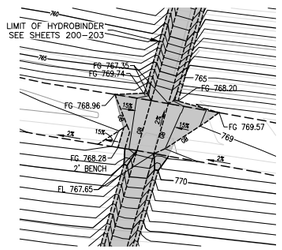


12 CHANNEL AT POC #17 1"=20'



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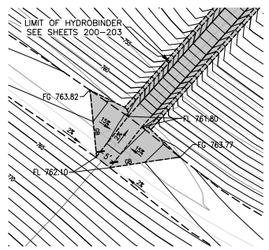

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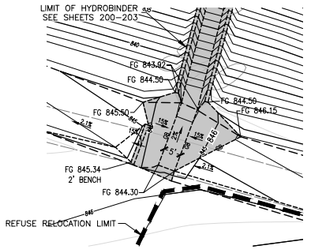
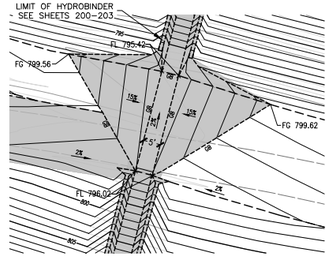
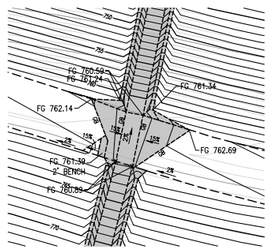


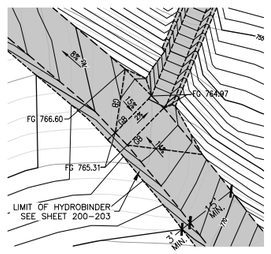
15 CHANNEL AT POC #24 1"=20'



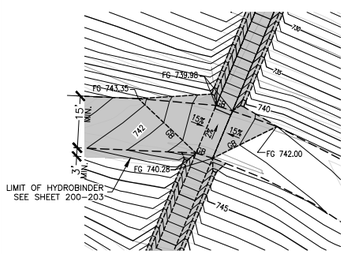
16 CHANNEL AT POC #25 1"=20'



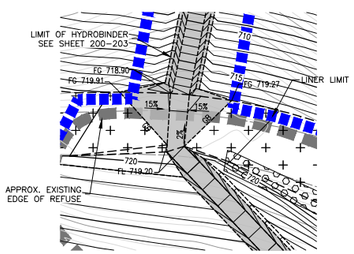
17 CHANNEL AT POC #26 1"=20'



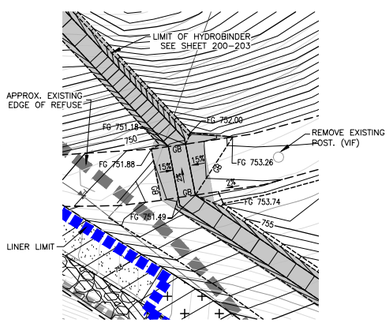
18 CHANNEL AT POC #29 1"=20'



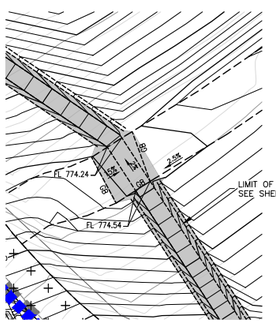
19 CHANNEL AT POC #30 1"=20'



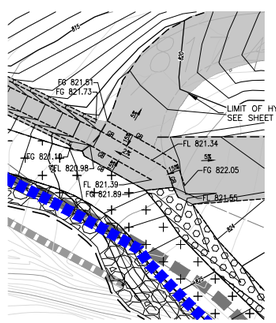
20 CHANNEL AT POC #37 1"=20'



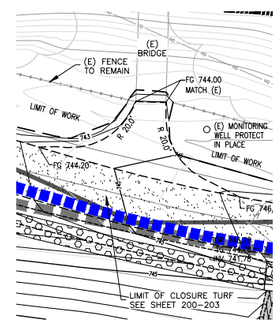
21 CHANNEL AT POC #36 1"=20'



23 CHANNEL AT POC #35 1"=20'



24 CHANNEL AT POC #34 1"=20'



24 (E) BRIDGE ACCESS AT POC #19 1"=20'

EBA ENGINEERING
825 SONOMA AVENUE
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TEL: (707) 544-0784

REGISTERED GEOLOGIST
DAMON F. BROWN
No. 7
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

PLAN ENLARGEMENTS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Drawn By:	WC
Checked By:	DFB
Date:	2019-04-30

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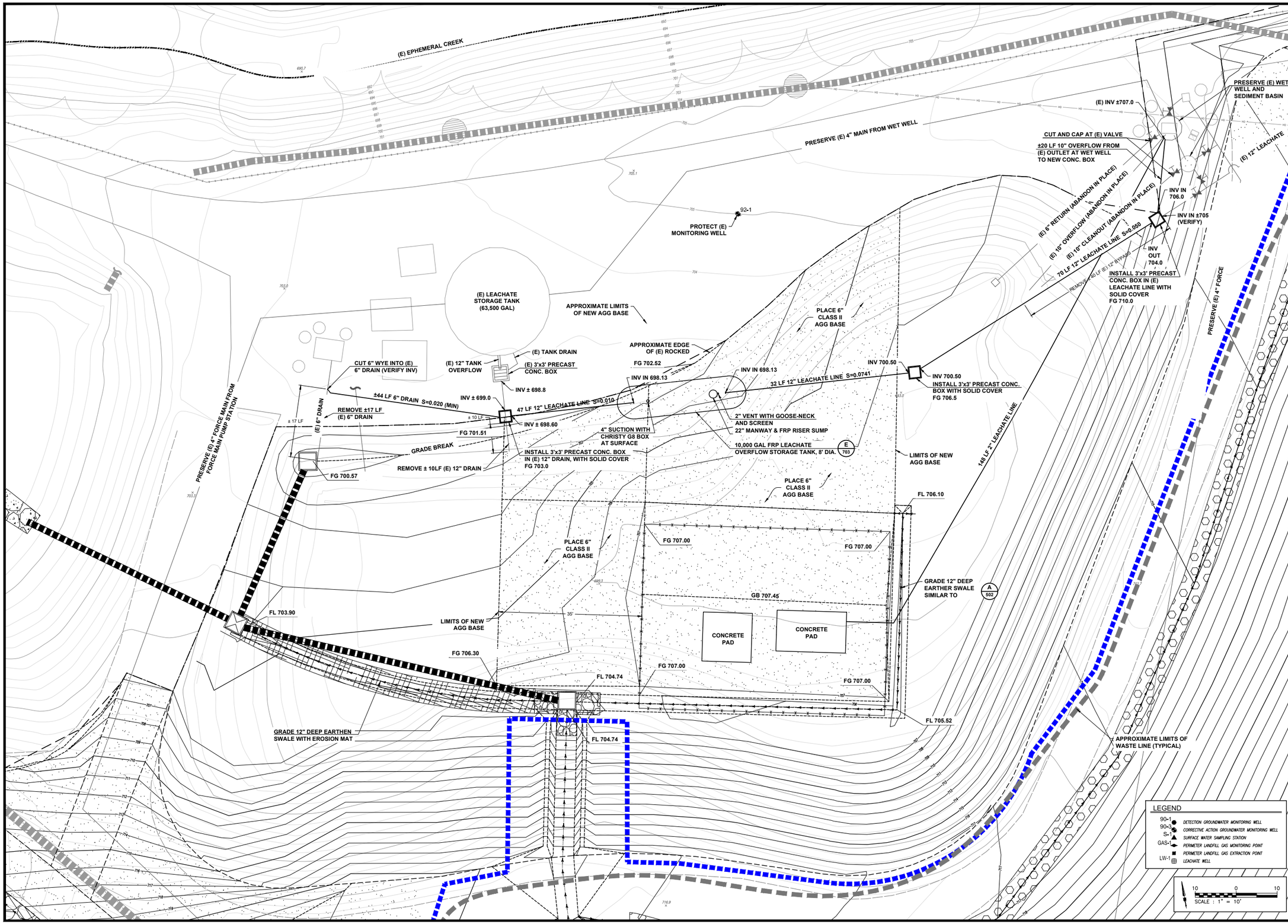

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TEL: (707) 544-0784

REGISTERED GEOLOGIST
DAMON F. BROWN
No.
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

FLARE STATION AREA BLOW UP

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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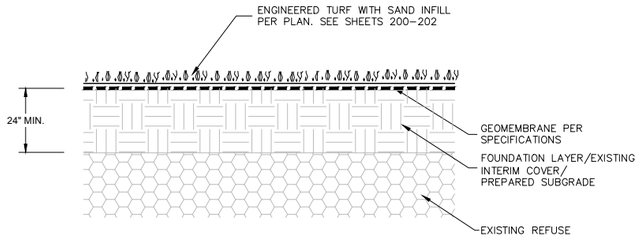

A TYPICAL CLOSURE TURF SECTION

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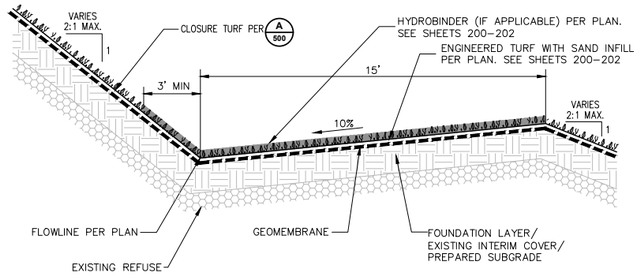
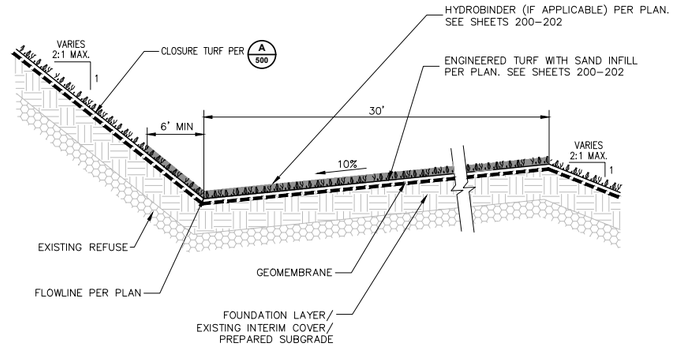


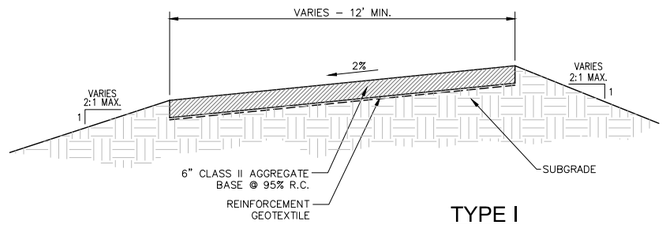
B TYPICAL 15' BENCH SECTION

NOT TO SCALE



C TYPICAL 30' BENCH SECTION

NOT TO SCALE



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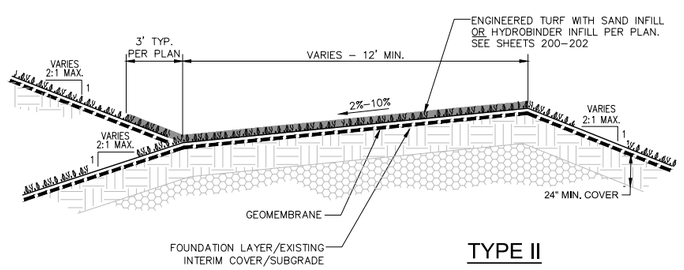

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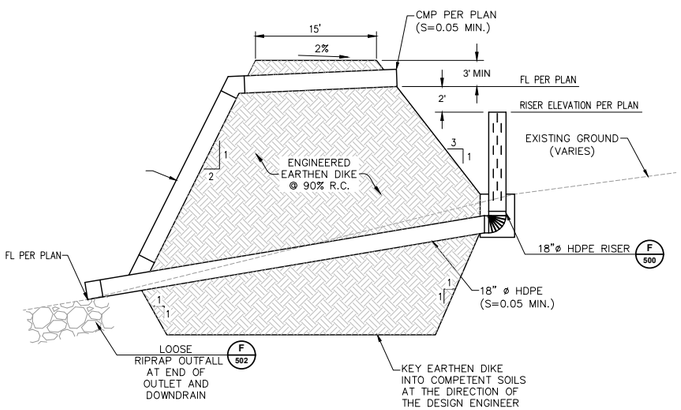
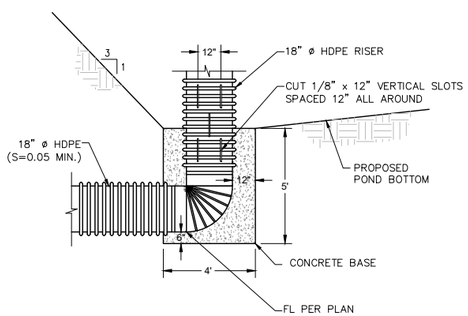
D TYPICAL ACCESS ROAD SECTION

NOT TO SCALE



E SEDIMENTATION BASIN OUTLET STRUCTURE

NOT TO SCALE



F DRAINAGE RISER DETAIL

NOT TO SCALE

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SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

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3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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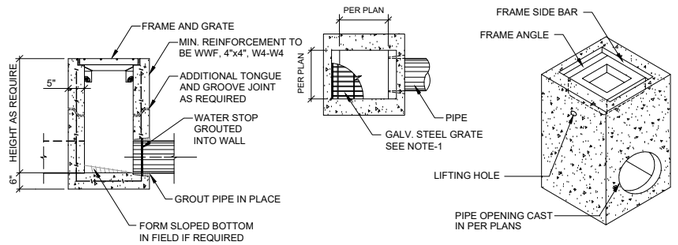
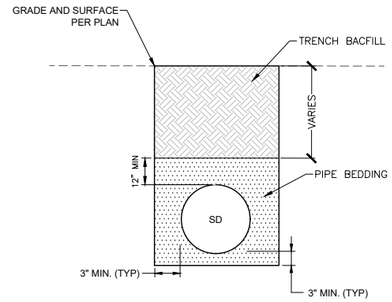


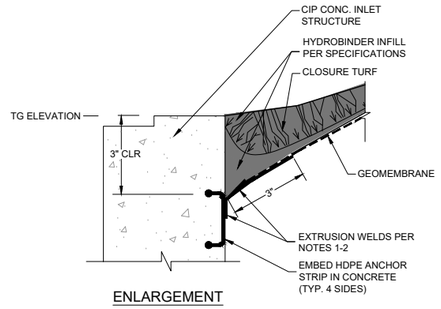


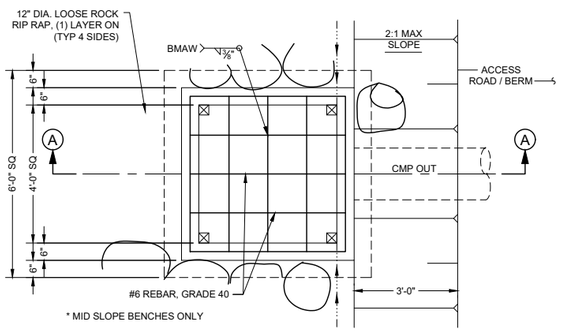
NOTE:
1. FRAMES SHALL BE HEAVY DUTY FOR H20 TRAFFIC LOADING.

A 2'x2' CONCRETE DRAINAGE INLET

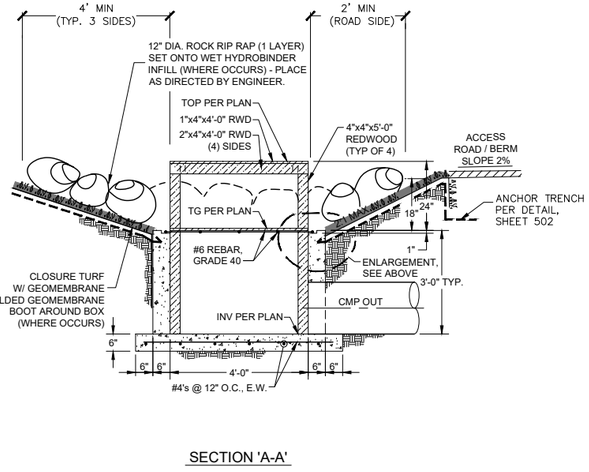
(NON-CLOSURE TURF AREAS)

NOT TO SCALE



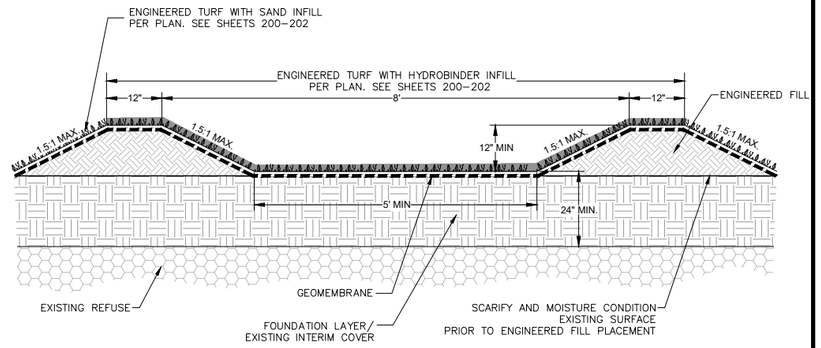


NOTES:
1. HDPE EMBEDMENT STRIP TO FORM BOOT AROUND INLET STRUCTURE. ALL CORNER SEEMS TO BE WELDED TO FORM IMPERVIOUS SEAL.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO HDPE EMBEDMENT STRIP USING EXTRUSION WELD METHOD, 3"MIN. OVERLAP.
3. CONTRACTOR TO CONSTRUCT REDWOOD (RWD) TOP USING #8 EPOXY COATED WOOD SCREWS



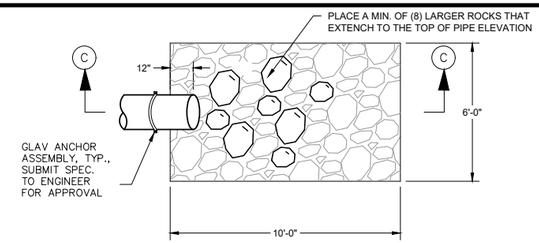
B 4'x4' CONCRETE DRAINAGE INLET IN CLOSURE TURF

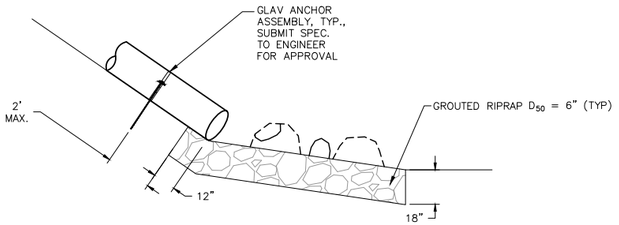
SCALE: 1/2" = 1'-0"



C SIDESLOPE DRAINAGE CHANNEL WITH HYDROBINDER

NOT TO SCALE

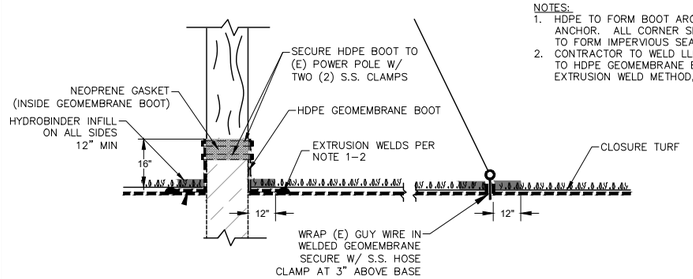




SECTION 'C-C'

D GROUTED RIPRAP OUTFALL

NOT TO SCALE



NOTES:
1. HDPE TO FORM BOOT AROUND POLE OR ANCHOR. ALL CORNER SEEMS TO BE WELDED TO FORM IMPERVIOUS SEAL.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO HDPE GEOMEMBRANE BOOT USING EXTRUSION WELD METHOD, 3"MIN. OVERLAP.

E POWER POLE PENETRATION

NOT TO SCALE

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GRADING DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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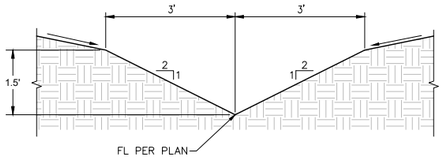
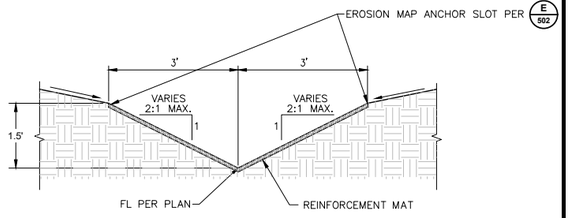


A TYPE I SWALE - EARTHEN

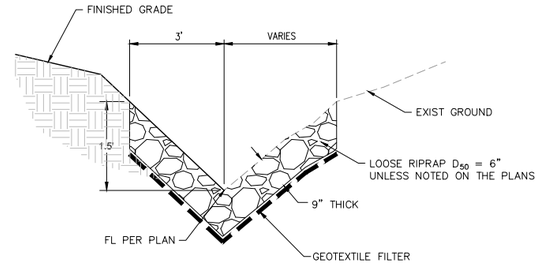
NOT TO SCALE



B TYPE II SWALE - EARTHEN W/ EROSION MAT

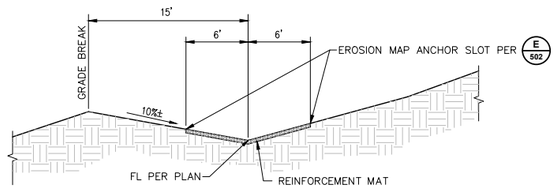
(NON-CLOSURE TURF AREAS)

NOT TO SCALE



C TYPE III SWALE - EARTHEN W/ ROCK RIPRAP

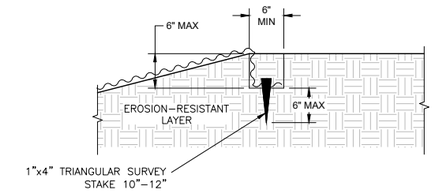
NOT TO SCALE



D TYPE IV BENCH SWALE- EARTHEN W/ EROSION MAT

(NON-CLOSURE TURF AREAS)

NOT TO SCALE

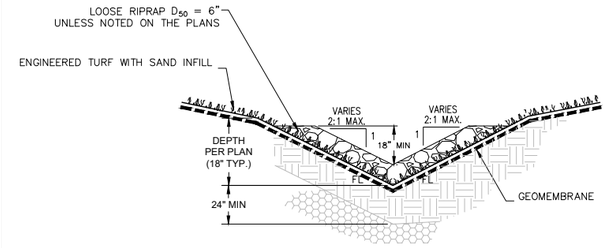


NOTE:
STAKES TO BE PLACED AT 3 FEET ON CENTER EACH WAY PER ENTIRE TURF REINFORCEMENT MAT

E REINFORCEMENT MAT: ANCHOR SLOT

(NON-CLOSURE TURF AREAS)

NOT TO SCALE



H TYPE V CLOSURE TURF SWALE W/ ROCK RIPRAP

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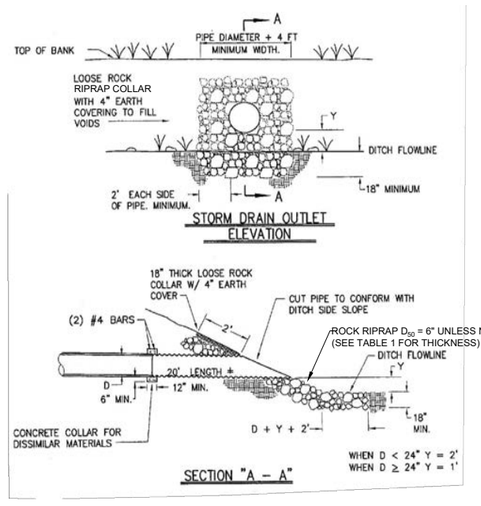


F LOOSE ROCK RIPRAP STORM DRAIN OUTLET

NOT TO SCALE

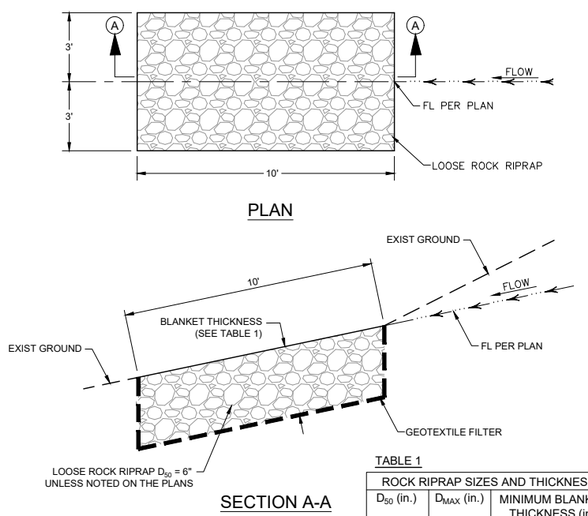
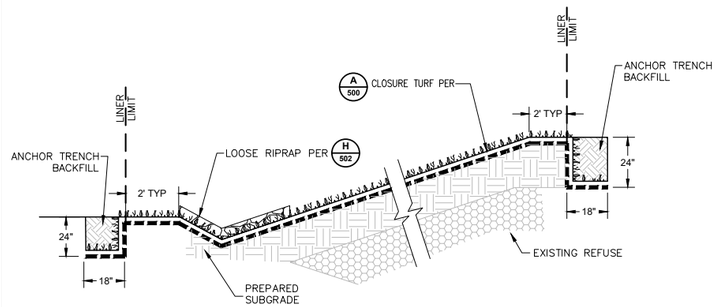


TABLE 1

ROCK RIPRAP SIZES AND THICKNESS		
D_{50} (in.)	D_{MAX} (in.)	MINIMUM BLANKET THICKNESS (in.)
2	4	6
6	9	14
9	14	20
12	18	27

G SWALE OUTLET DETAIL

NOT TO SCALE



I TYP. CLOSURE TURF ANCHOR TRENCH

NOT TO SCALE

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825 SONOMA AVENUE
SUITE C
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TEL: (707) 544-0784

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3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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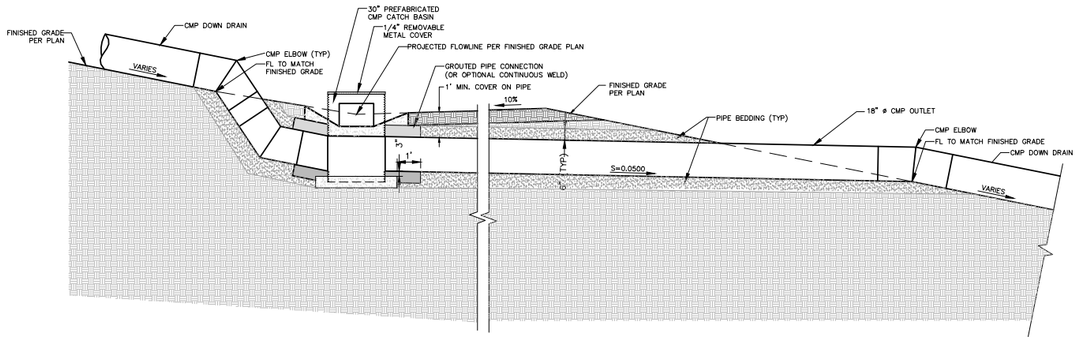
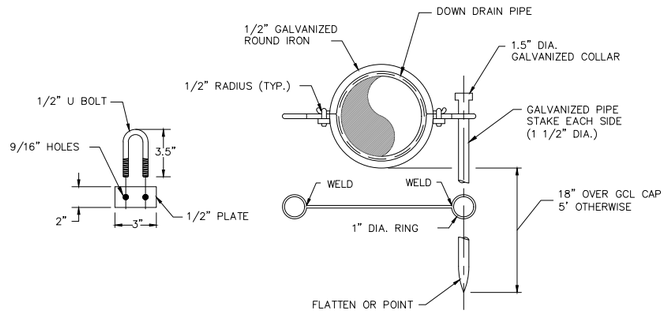


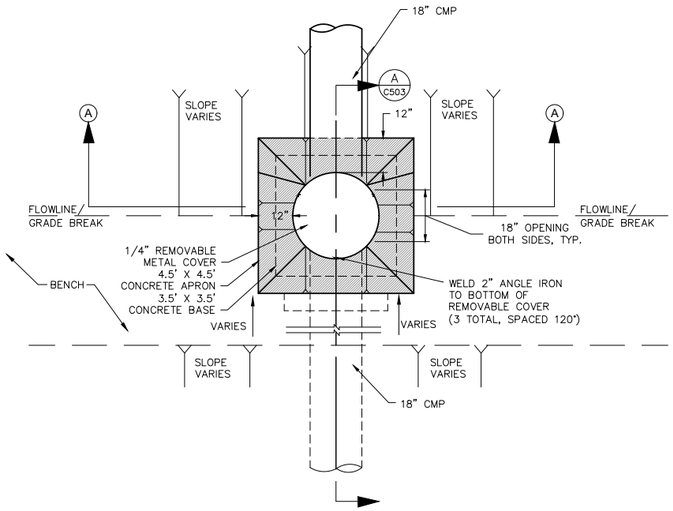
A SECTION - DOWN DRAIN AT CMP CATCH BASIN

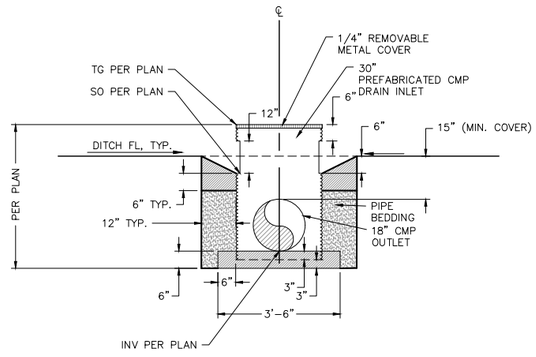
NOT TO SCALE



C DOWN DRAIN ANCHOR ASSEMBLY

NOT TO SCALE





SECTION 'A'

B DOWN DRAIN AT CMP DRAIN INLET

NOT TO SCALE

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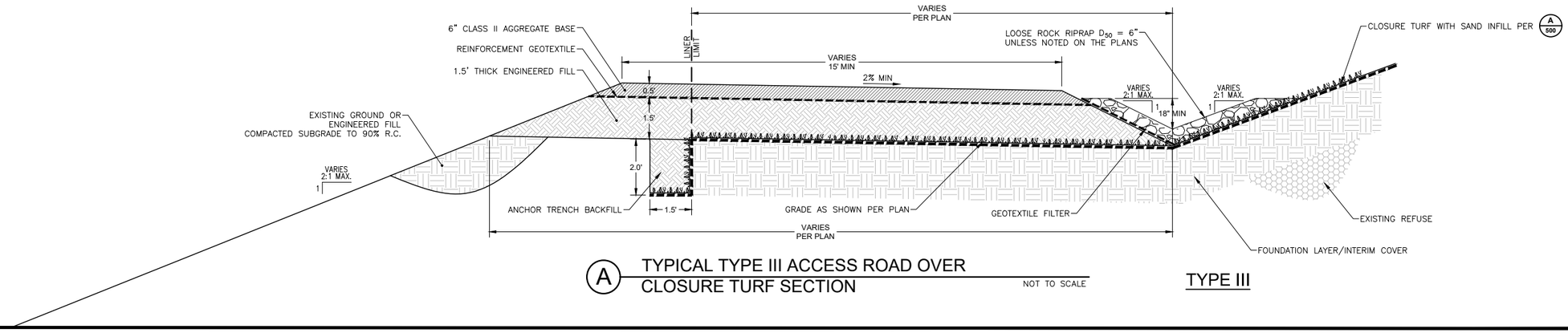
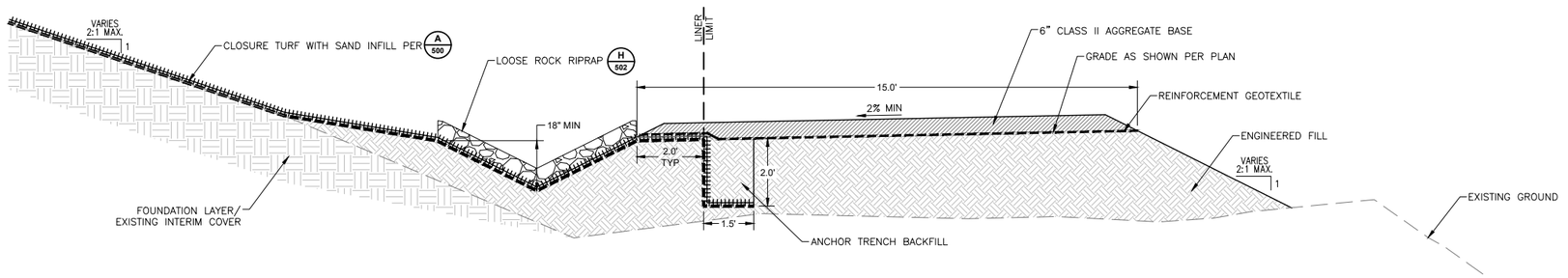


A TYPICAL TYPE III ACCESS ROAD OVER CLOSURE TURF SECTION

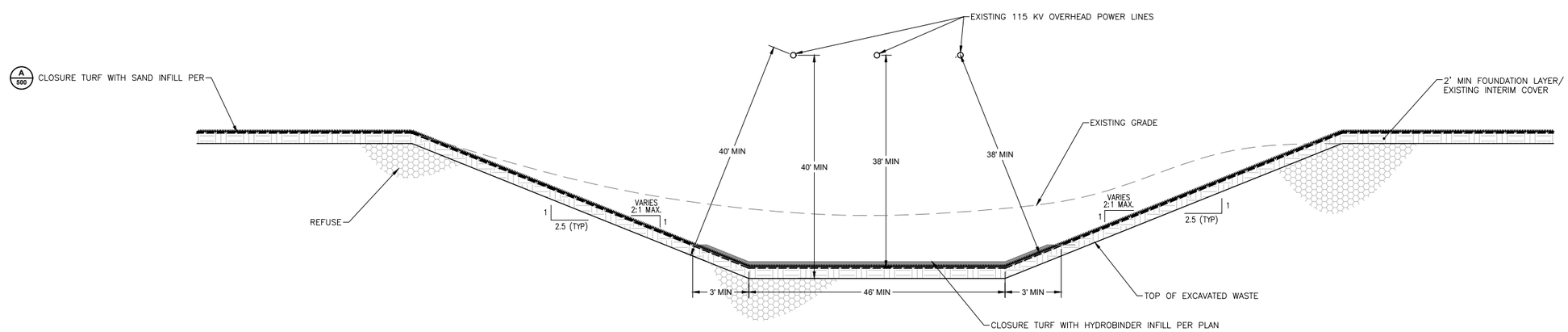
NOT TO SCALE

TYPE III



B TYPICAL BOTTOM PERIMETER ROAD SECTION

NOT TO SCALE



C TYPICAL REFUSE EXCAVATION SECTION UNDER 115KV POWER LINE

NOT TO SCALE

EBA ENGINEERING
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REGISTERED GEOLOGIST
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GRADING DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By:	DFB
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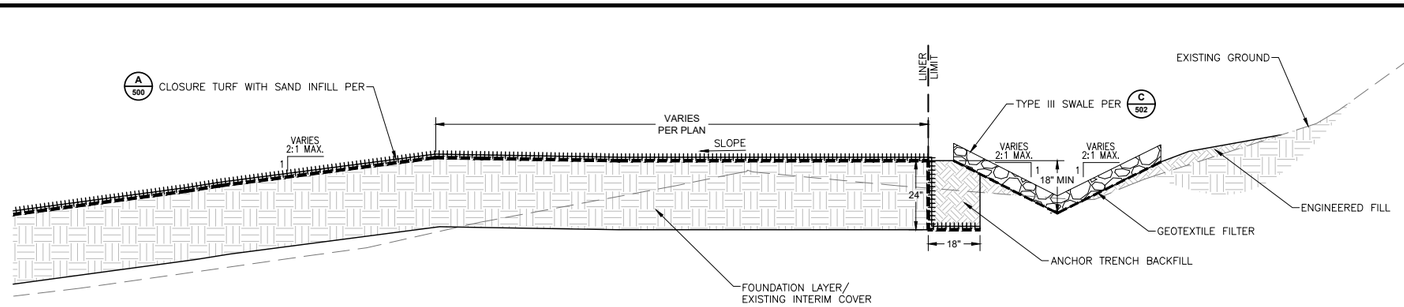
Xrefs: X-Ref — Sheet1.dwg X-Ref — Title Block.dwg
Plot Date: Apr 30, 2019 at 10:18
Path: G:\2019\02-907\Cad\Sht 5 of 6.dwg — [2000] Presley Dunkelberg



A TYPICAL UPPER LINER TERMINATION WITH UPPER DIVERSION SWALE

NOT TO SCALE

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3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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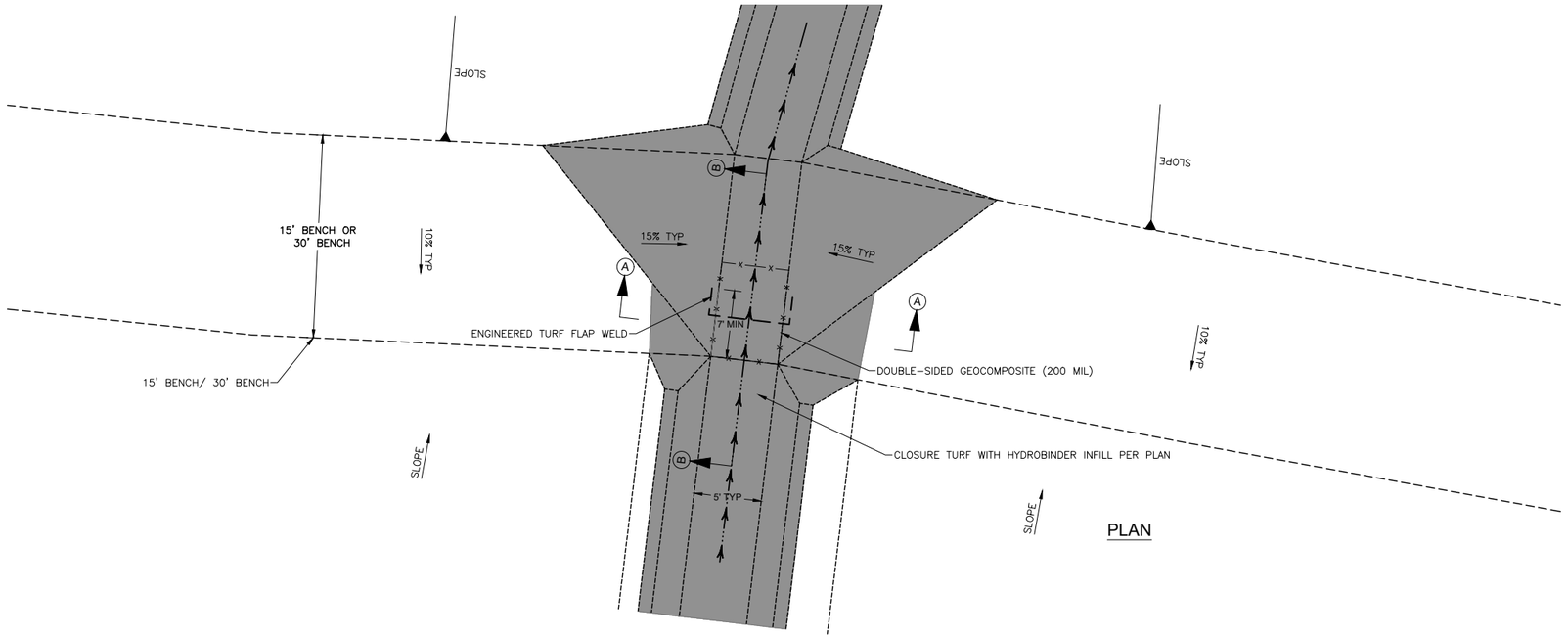
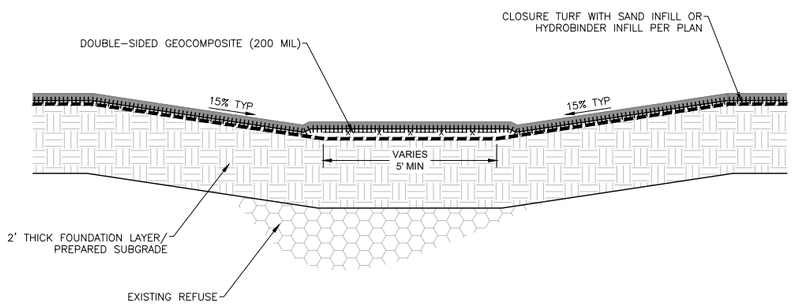
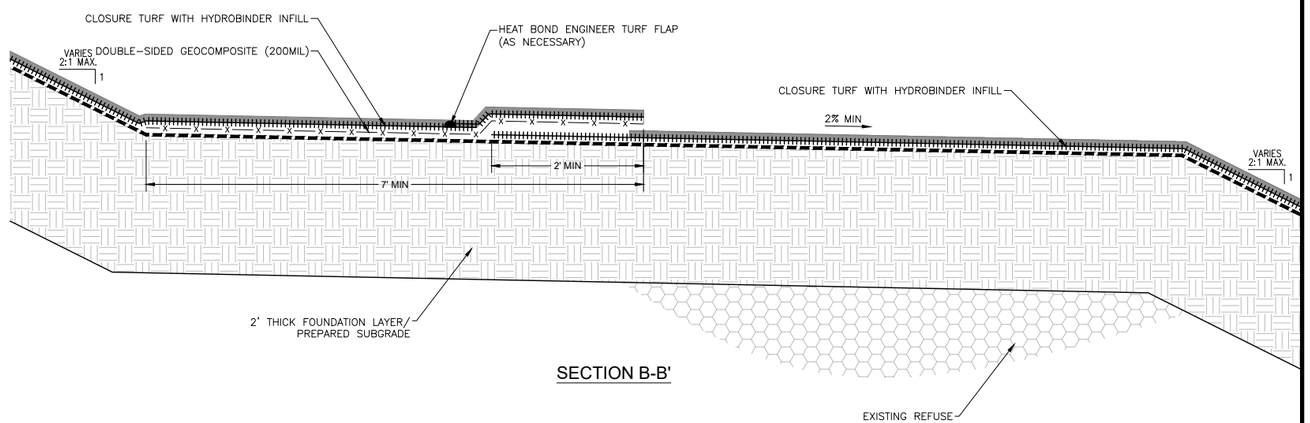


PLAN



SECTION A-A'



SECTION B-B'

A TYPICAL CLOSURE TURF WATER RELEASE VENT ON BENCH

NOT TO SCALE

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REGISTERED GEOLOGIST
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STATE OF CALIFORNIA

GRADING DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By: DFB
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Date: 5 May - Submitted Jeng's Edit - Tim Block.dwg
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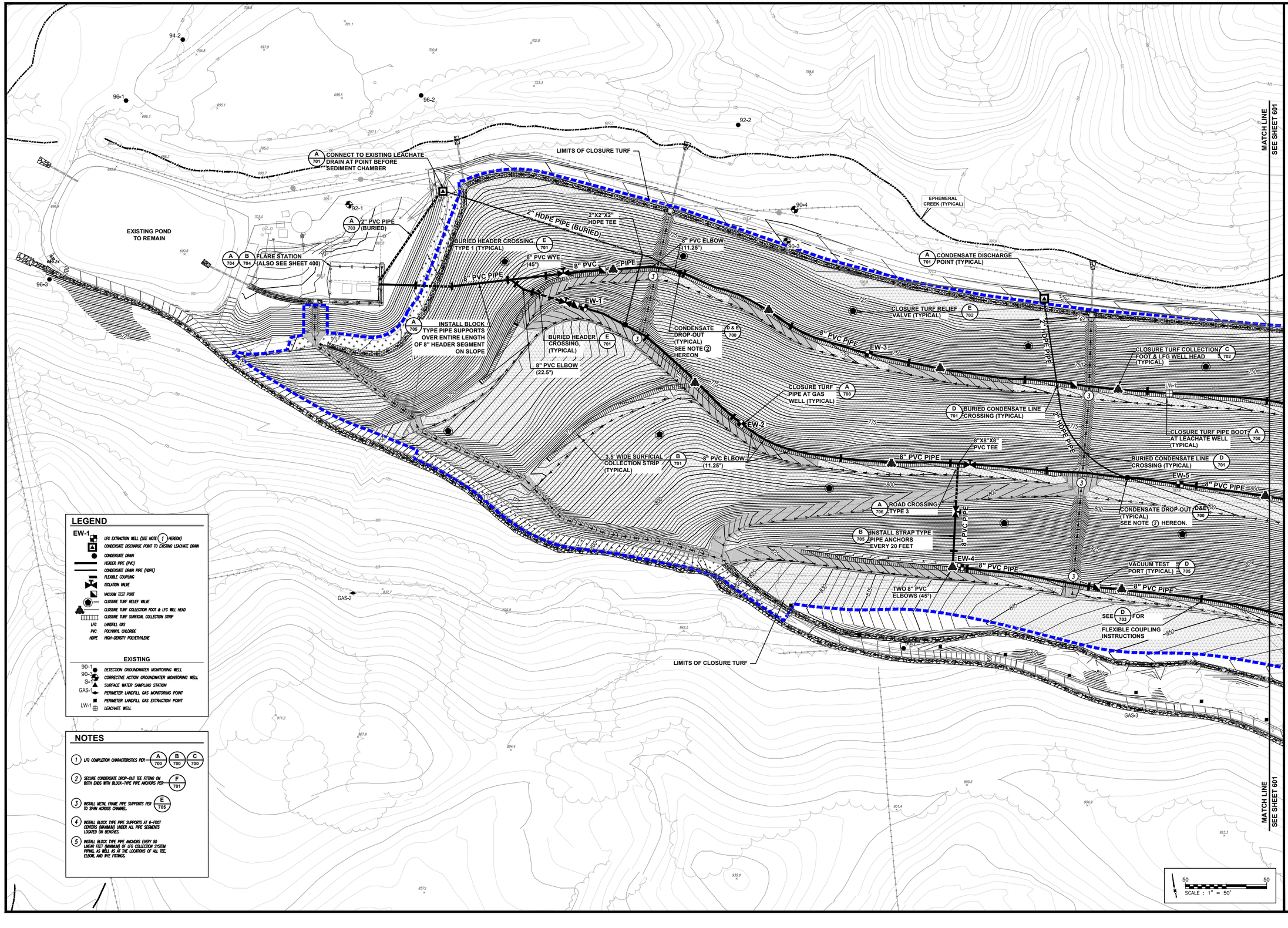

LEGEND

EW-1	LFG EXTRACTION WELL (SEE NOTE 1 HEREON)
	CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
	CONDENSATE DRAIN
	HEADER PIPE (PVC)
	CONDENSATE DRAIN PIPE (HDPE)
	FLEXIBLE COUPLING
	ISOLATION VALVE
	VACUUM TEST PORT
	CLOSURE TURF RELIEF VALVE
	CLOSURE TURF COLLECTION FOOT & LFG WILL HEAD
	CLOSURE TURF SURFICIAL COLLECTION STRIP
LFG	LANDFILL GAS
PVC	POLYVINYL CHLORIDE
HDPE	HIGH-DENSITY POLYETHYLENE

EXISTING

90-1	DETECTION GROUNDWATER MONITORING WELL
90-3	CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1	SURFACE WATER SAMPLING STATION
GAS-1	PERIMETER LANDFILL GAS MONITORING POINT
	PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1	LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER A 700, B 700, C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER F 701
3. INSTALL METAL FRAME PIPE SUPPORTS PER E 705 TO SPAN ACROSS CHANNEL.
4. INSTALL BLOCK TYPE PIPE SUPPORTS AT 6-FOOT CENTERS (MAXIMUM) UNDER ALL PIPE SEGMENTS LOCATED ON BENCHES.
5. INSTALL BLOCK TYPE PIPE ANCHORS EVERY 50 LINEAR FEET (MINIMUM) OF LFG COLLECTION SYSTEM PIPING, AS WELL AS AT THE LOCATIONS OF ALL TEE, ELBOW, AND WYE FITTINGS.

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REGISTERED GEOLOGIST
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LFG COLLECTION SYSTEM LAYOUT - WEST PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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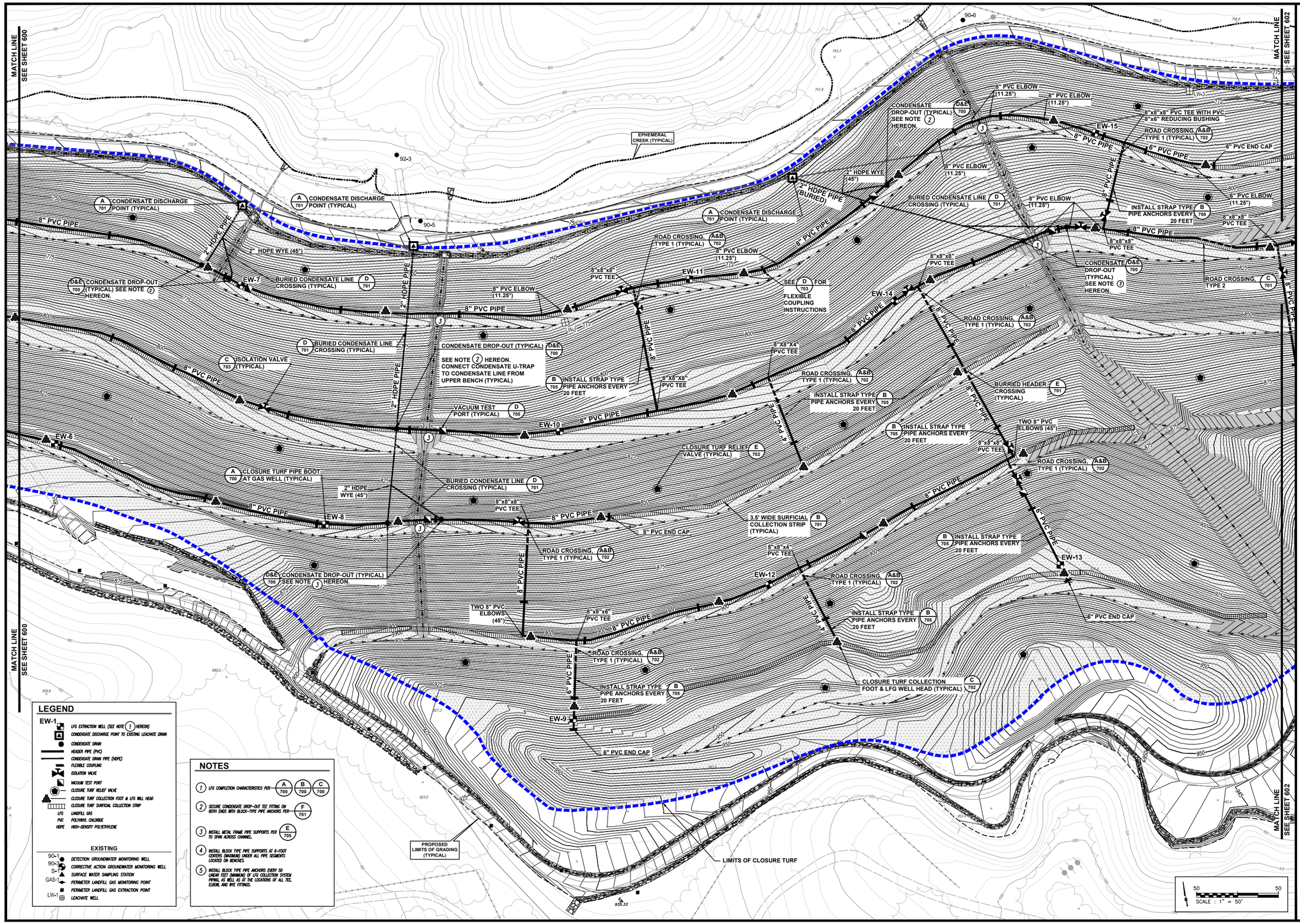

LEGEND

EW-1 LFG EXTRACTION WELL (SEE NOTE 1 HEREON)

A CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN

CONDENSATE DRAIN

HEADER PIPE (PVC)

CONDENSATE DRAIN PIPE (HDPE)

FLEXIBLE COUPLING

ISOLATION VALVE

VACUUM TEST PORT

CLOSURE TURF RELIEF VALVE

CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD

CLOSURE TURF SURFICIAL COLLECTION STRIP

LFG LANDFILL GAS

PVC POLYVINYL CHLORIDE

HDPE HIGH-DENSITY POLYETHYLENE

EXISTING

90-1 DETECTION GROUNDWATER MONITORING WELL

90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL

S-1 SURFACE WATER SAMPLING STATION

GAS-1 PERIMETER LANDFILL GAS MONITORING POINT

PERIMETER LANDFILL GAS EXTRACTION POINT

LW-1 LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER A 700 B 700 C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER F 701
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SYSTEM LAYOUT - CENTRAL PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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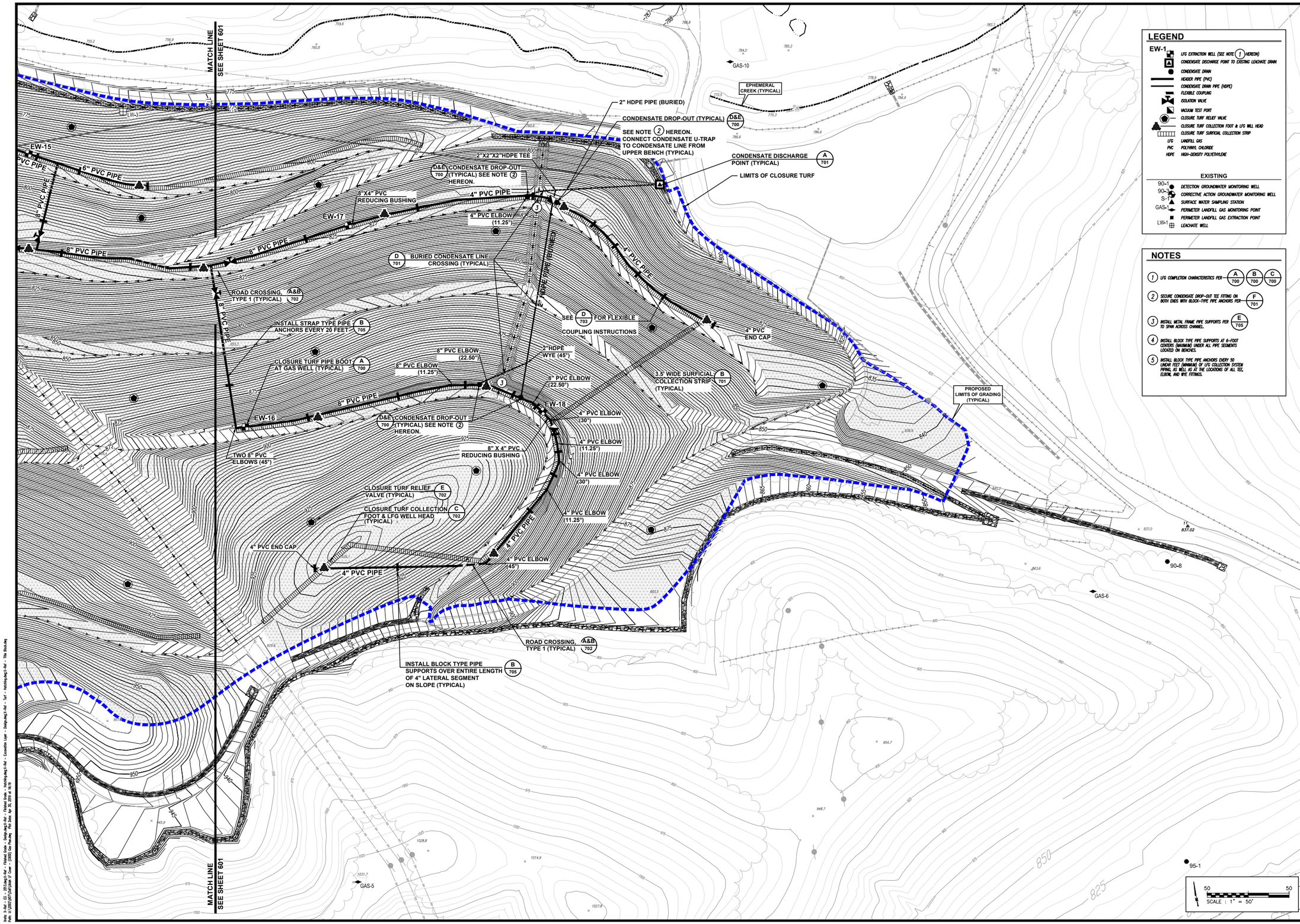

LEGEND

- EW-1 — LFG EXTRACTION WELL (SEE NOTE 1 HEREON)
- CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
- CONDENSATE DRAIN
- HEADER PIPE (PVC)
- CONDENSATE DRAIN PIPE (HDPE)
- FLEXIBLE COUPLING
- ISOLATION VALVE
- VACUUM TEST PORT
- CLOSURE TURF RELIEF VALVE
- CLOSURE TURF COLLECTION FOOT & LFG WILL HEAD
- CLOSURE TURF SURFICIAL COLLECTION STRIP
- LFG — LANDFILL GAS
- PVC — POLYVINYL CHLORIDE
- HDPE — HIGH-DENSITY POLYETHYLENE

EXISTING

- 90-1 — DETECTION GROUNDWATER MONITORING WELL
- 90-3 — CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 — SURFACE WATER SAMPLING STATION
- GAS-1 — PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 — LEACHATE WELL

NOTES

1. LFG COMPLETION CHARACTERISTICS PER A 700, B 700, C 700
2. SECURE CONDENSATE DROP-OUT TEE FITTING ON BOTH ENDS WITH BLOCK-TYPE PIPE ANCHORS PER F 701
3. INSTALL METAL FRAME PIPE SUPPORTS PER E 705 TO SPAN ACROSS CHANNEL.
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REGISTERED GEOLOGIST
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STATE OF CALIFORNIA

SYSTEM LAYOUT - EASTERN PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By:	DFB
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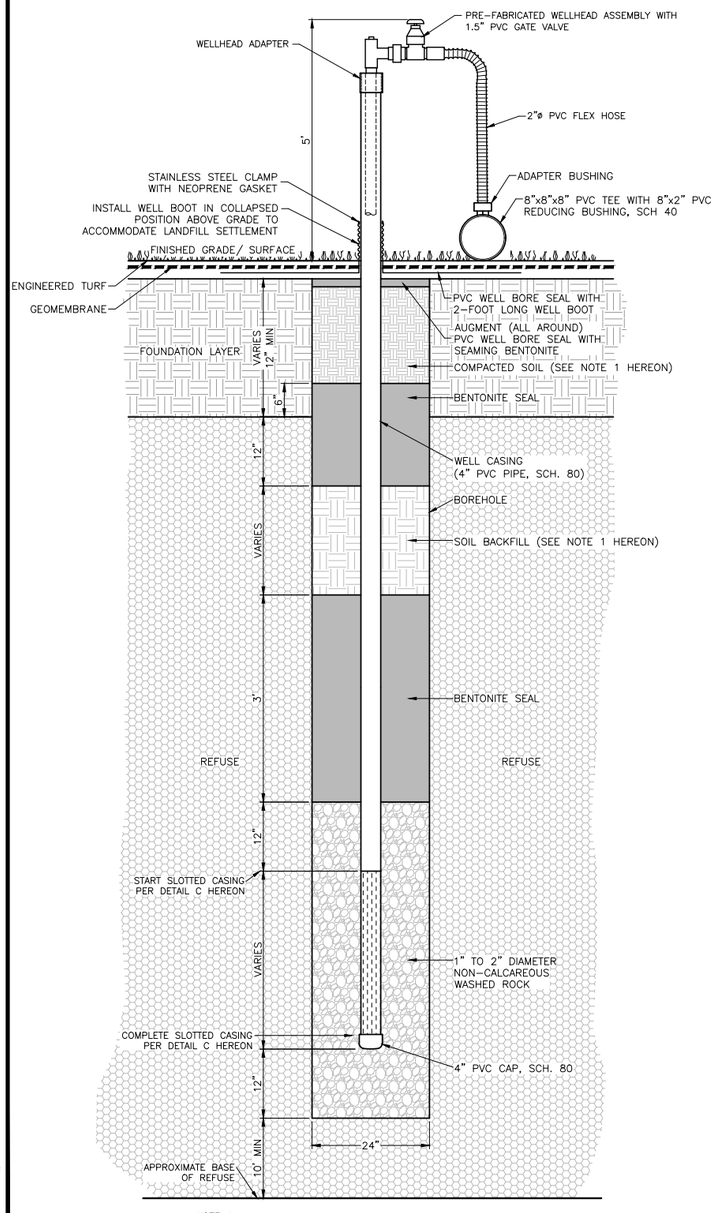
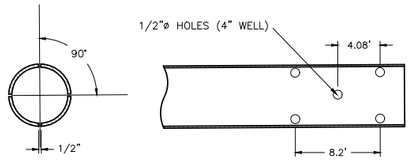


NOTE 1:

SOIL BACKFILL MATERIAL SHALL BE OBTAINED FROM THE BORROW AREA AND MEET THE MATERIAL SPECIFICATIONS FOR ENGINEERED FILL.

A LFG EXTRACTION WELL (TYPICAL)

NOT TO SCALE



B CASING PERFORATIONS FOR LFG EXTRACTION WELLS (TYPICAL)

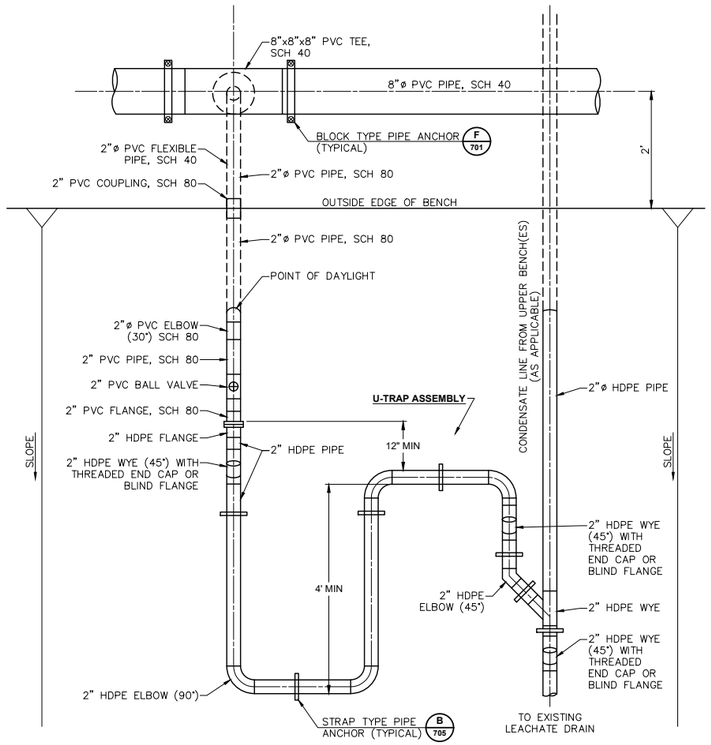
NOT TO SCALE

Extraction Well	Bottom Completion Depth (Feet BGS)	Perforated Interval (Feet BGS)	Gravel Pack Interval (Feet BGS)	Surface Seal Interval (Feet BGS)
EW-1	35	21 - 34	20 - 35	0 - 20
EW-2	45	21 - 44	20 - 45	0 - 20
EW-3	35	21 - 34	20 - 35	0 - 20
EW-4	60	21 - 59	20 - 60	0 - 20
EW-5	70	21 - 69	20 - 70	0 - 20
EW-6	70	21 - 69	20 - 70	0 - 20
EW-7	35	21 - 34	20 - 35	0 - 20
EW-8	70	21 - 69	20 - 70	0 - 20
EW-9	60	21 - 59	20 - 60	0 - 20
EW-10	50	21 - 49	20 - 50	0 - 20
EW-11	25	16 - 25	15 - 25	0 - 15
EW-12	70	21 - 69	20 - 70	0 - 20
EW-13	80	21 - 79	20 - 80	0 - 20
EW-14	45	21 - 44	20 - 45	0 - 20
EW-15	35	21 - 34	20 - 35	0 - 20
EW-16	60	21 - 59	20 - 60	0 - 20
EW-17	35	21 - 34	20 - 35	0 - 20
EW-18	60	21 - 59	20 - 60	0 - 20

BGS: Below Ground Surface (as referenced from top of final grade following placement of final cover system)

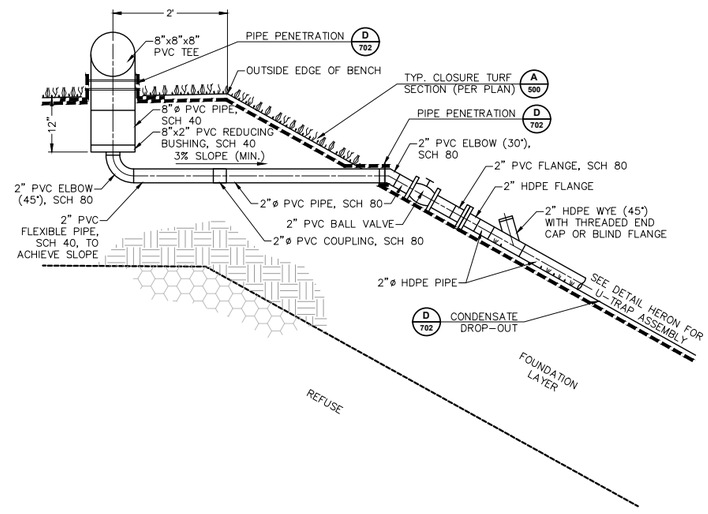
C LFG EXTRACTION WELL COMPLETION CHARACTERISTICS

NOT TO SCALE



D CONDENSATE DROP-OUT - PLAN VIEW (TYPICAL)

NOT TO SCALE



E CONDENSATE DROP-OUT - DETAIL (TYPICAL)

NOT TO SCALE

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REGISTERED GEOLOGIST
No. 2
DAMON F. BROWN
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STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Date: X-Ref: — Title Block.dwg
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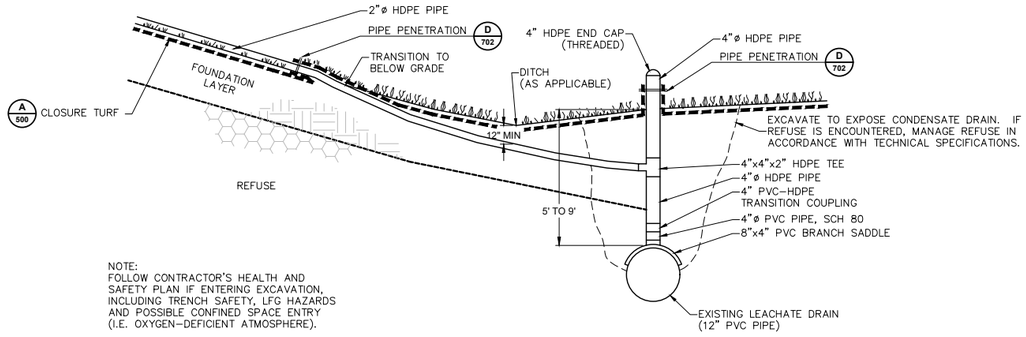
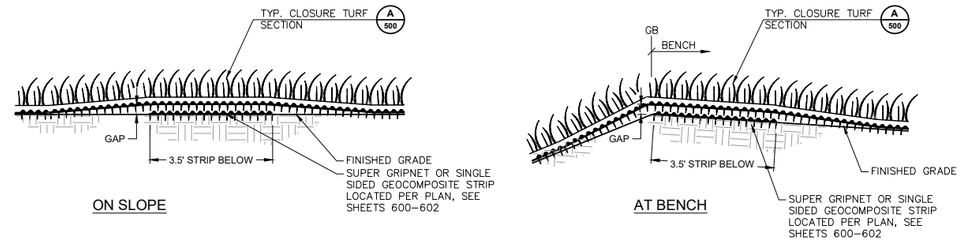


A CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN (TYPICAL)

NOT TO SCALE

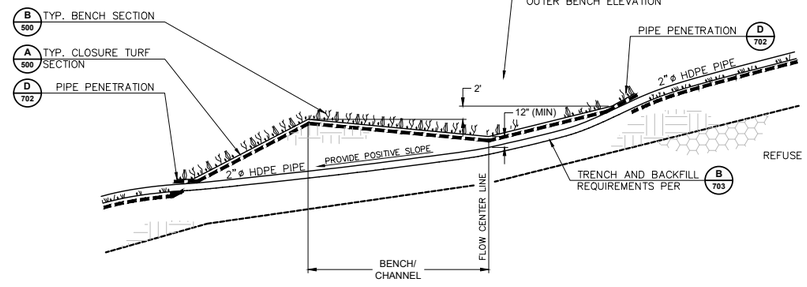


B CLOSURE TURF SURFICIAL COLLECTION STRIP

NOT TO SCALE

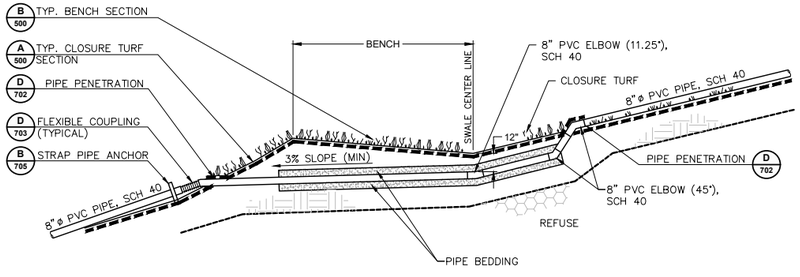
C ROAD CROSSING, TYPE 2 - DETAIL

NOT TO SCALE



D BURIED CONDENSATE LINE CROSSING (TYPICAL)

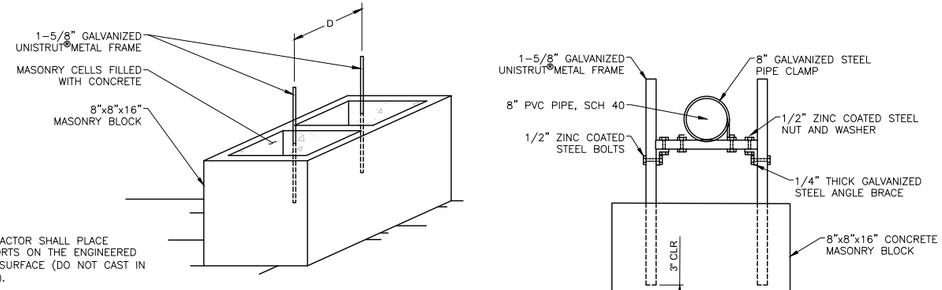
NOT TO SCALE



* CONTRACTOR SHALL ADJUST FOUNDATION GRADE PLAN FOR INSTALLATION OF LFG COLLECTION PIPING, ASSURING PROPER SECTION PER A 500. SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE SECTION.

E BURIED HEADER CROSSING (TYPICAL, TYPE 1)

NOT TO SCALE



F BLOCK TYPE PIPE ANCHOR (TYPICAL)

NOT TO SCALE

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REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Checked By:	DFB
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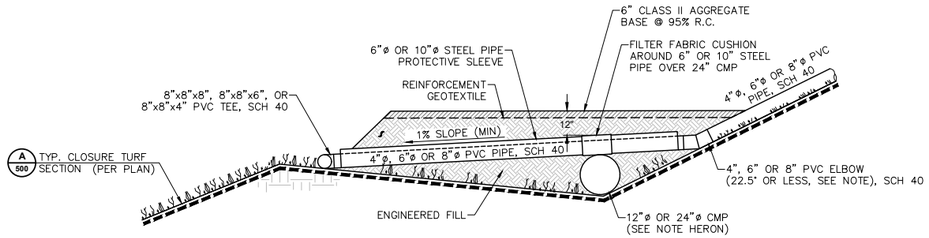
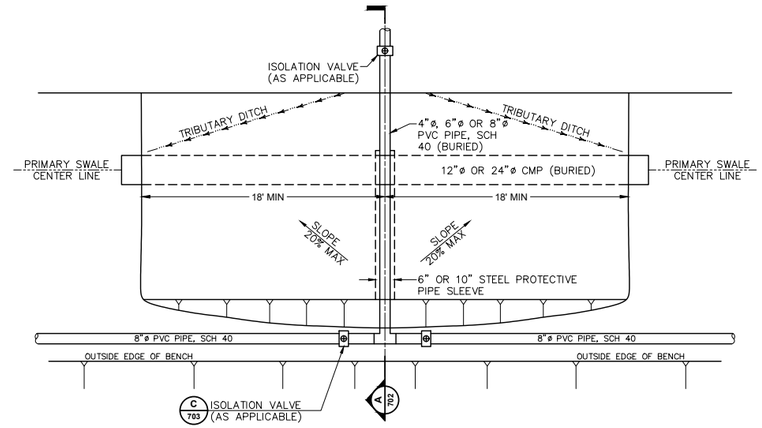


NOTE:
ADJUST AS NECESSARY TO ATTAIN MINIMUM 1 PERCENT PIPE SLOPE WHILE MINIMIZING HEIGHT OF ROAD CROSSING.

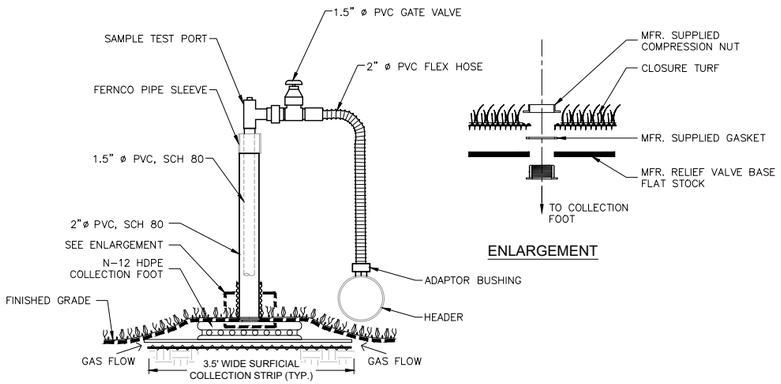
A ROAD CROSSING TYPE 1 - DETAIL (TYPICAL)

NOT TO SCALE



B ROAD CROSSING, TYPE 1 - PLAN VIEW (TYPICAL)

NOT TO SCALE

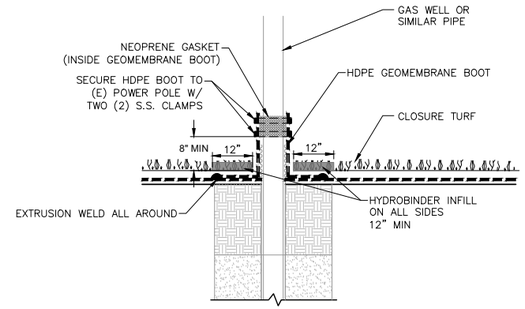


C CLOSURE TURF COLLECTION FOOT & LFG WELLHEAD

NOT TO SCALE

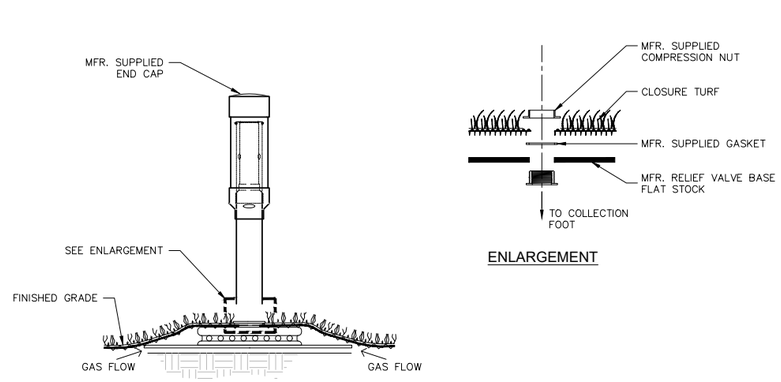
NOTES:

1. PIPE AND GEOMEMBRANE SHALL BE CLEAN TO PROVIDED AIRTIGHT CONNECTION.
2. CONTRACTOR SHALL TIGHTEN HOSE CLAMP TO ENSURE PROPER SEAL OF GEOMEMBRANE AROUND PIPE WHILE PREVENTING PIPE DAMAGE.



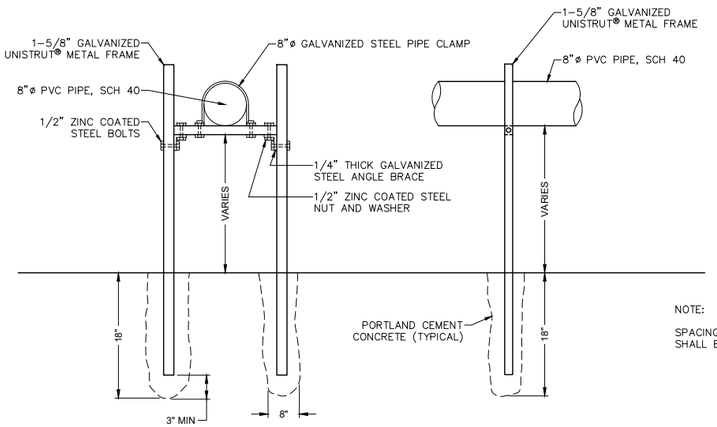
D PIPE PENETRATION (TYPICAL)

NOT TO SCALE



E CLOSURE TURF RELIEF VALVE

NOT TO SCALE



NOTE:

SPACING OF PIPE SUPPORTS SHALL BE 6 FEET ON CENTER.

F METAL FRAME PIPE SUPPORT OUTSIDE WASTE BOUNDARY (TYPICAL)

(NON-CLOSURE TURF AREAS)

NOT TO SCALE

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

REGISTERED GEOLOGIST DAMON F. BROWN No. CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:
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Job No:	02-907
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Checked By:	DFB
Date:	2019-04-30

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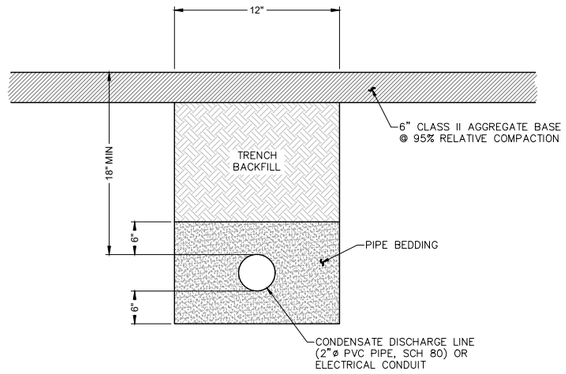
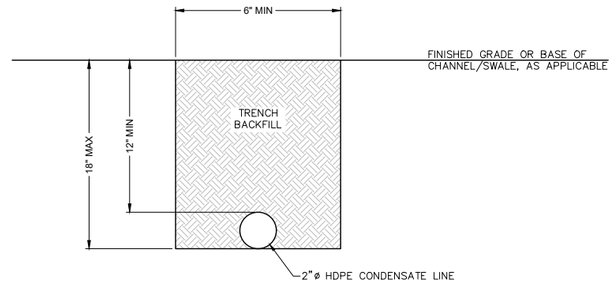


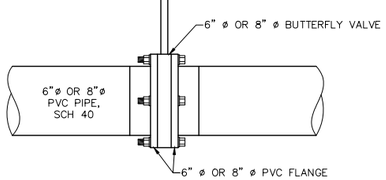
A FLARE STATION TRENCH DETAIL

NOT TO SCALE



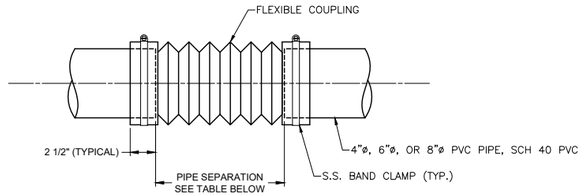
B BURIED CONDENSATE LINE TRENCH DETAIL (TYPICAL)

NOT TO SCALE



C ISOLATION VALVE ASSEMBLY (TYPICAL)

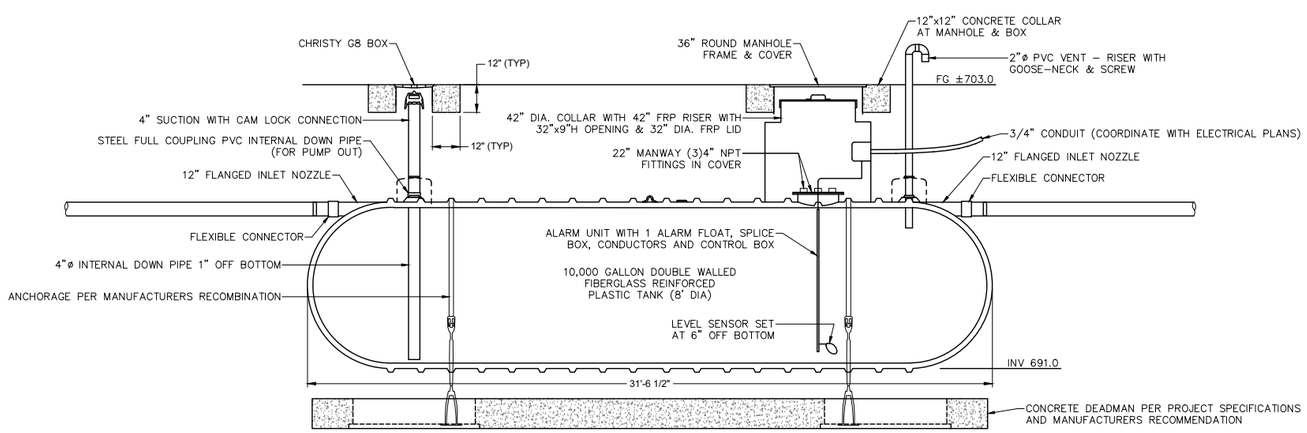
NOT TO SCALE



PIPE SEPARATION TABLE								
INSTALLATION TEMPERATURE (F°)	30	40	50	60	70	80	90	100
PIPE SEPARATION (in)	13	12	12	11	11	10	10	9

D FLEXIBLE COUPLING (TYPICAL)

NOT TO SCALE



E LEACHATE OVERFLOW STORAGE TANK-ELEVATION

NOT TO SCALE

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CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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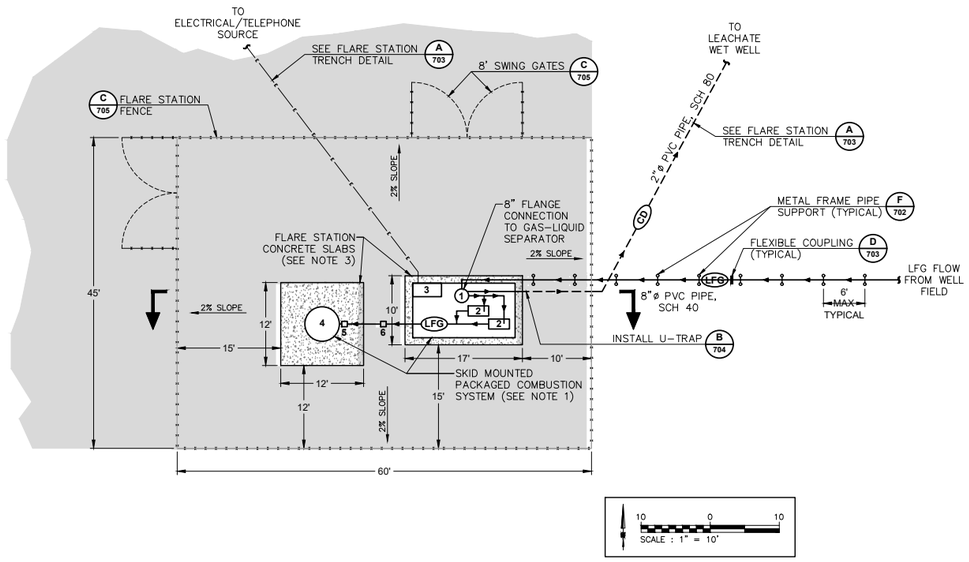


A FLARE STATION - PLAN VIEW

SCALE: 1"=10'

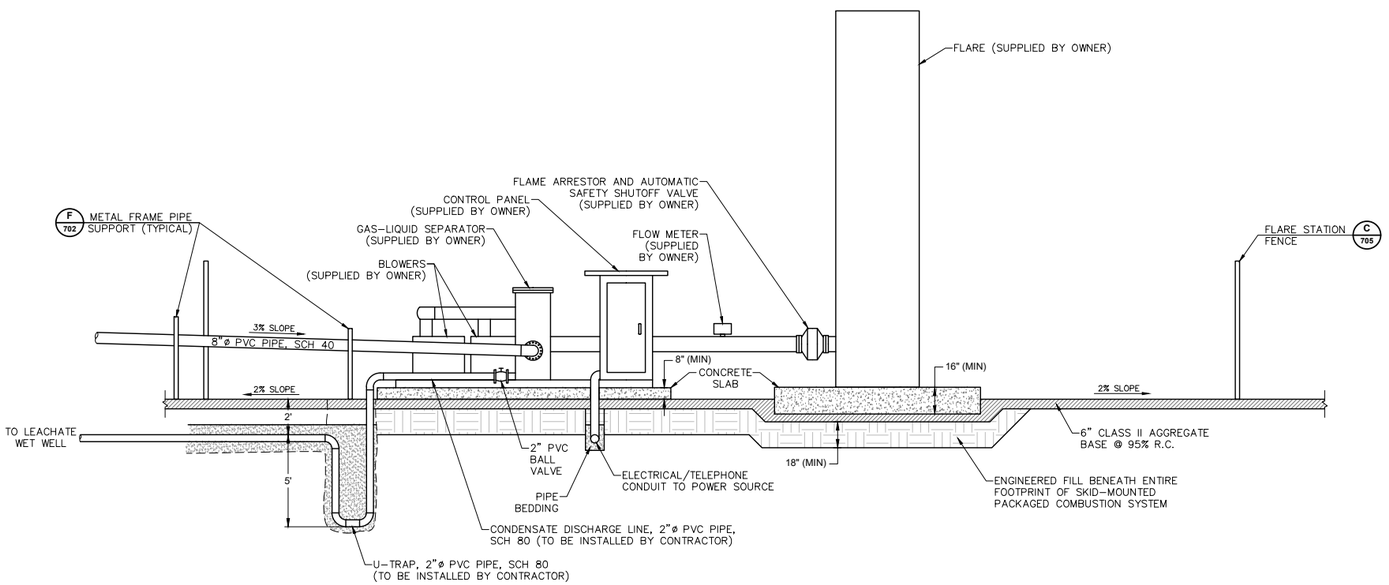
LEGEND

1 GAS–LIQUID SEPARATOR (SUPPLIED BY OWNER)
2 BLOWER (SUPPLIED BY OWNER)
3 CONTROL PANEL (SUPPLIED BY OWNER)
4 FLARE (SUPPLIED BY OWNER)
5 FLAME ARRESTOR AND AUTOMATIC SAFETY SHUTOFF VALVE (SUPPLIED BY OWNER)
6 FLOW METER (SUPPLIED BY OWNER)
CD CONDENSATE DISCHARGE LINE, 2" PVC PIPE, SCH 80
LFG LANDFILL GAS PRIMARY HEADER PIPE

ABOVE GROUND LINE/PIPE
UNDERGROUND LINE/PIPE
ELECTRICAL/TELEPHONE LINE
8' HIGH CHAIN LINK FENCE
FLEXIBLE COUPLING
PIPE SUPPORT

NOTES

1. THE ORIENTATION OF THE SKID–MOUNTED PACKAGED COMBUSTION SYSTEM COMPONENTS SHOWN HEREON ARE FOR ILLUSTRATION PURPOSES ONLY. THE ACTUAL ORIENTATION OF THESE COMPONENTS ON THE CONCRETE SLAB ARE SUBJECT TO CHANGE BASED ON MANUFACTURER'S FINAL DESIGN.
2. ALL CONDUIT AND PIPING OUTSIDE LIMITS OF FLARE STATION CONCRETE SLAB SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR.
3. THE CONCRETE SLAB FOR THE FLARE (12'x12') SHALL BE 16" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY AT TOP AND BOTTOM OF SLAB. THE OTHER SLAB (10'x17') SHALL BE 8" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY.
4. COMPLETION HEIGHTS OF PIPE SUPPORTS SHALL BE ADJUSTED ACCORDINGLY TO MAINTAIN POSITIVE SLOPE (3% MINIMUM) OF LFG COLLECTION SYSTEM PIPING TOWARDS THE GAS–LIQUID SEPARATOR.



B FLARE STATION - SECTION VIEW

SCALE: 1"=4'

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3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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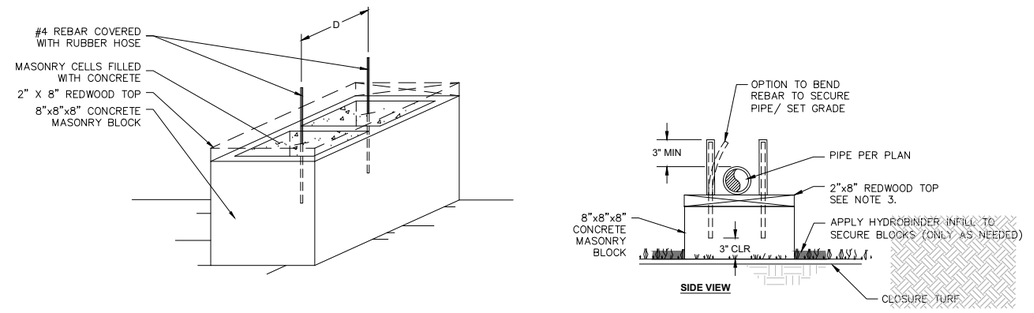
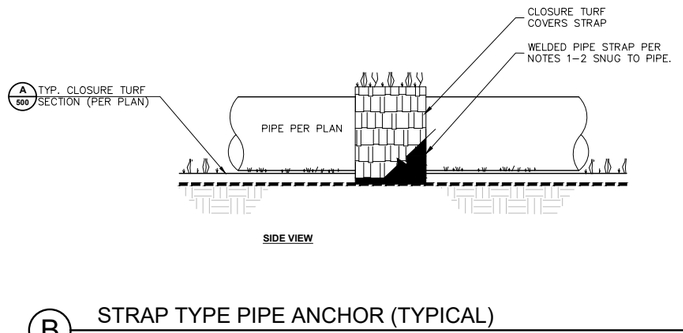


NOTES:

1. CONTRACTOR SHALL PLACE SUPPORTS ON THE ENGINEERED TURF SURFACE (DO NOT CAST IN PLACE).
2. D = 11" FOR 8" PVC
   D = 9" FOR 6" PVC
   D = 7" FOR 4" PVC
3. 6" HEIGHT CONCRETE MASONRY BLOCK OR ADDITIONAL 1X REDWOOD TOP MAY BE USED TO ADJUST SUPPORT HEIGHT.
4. PIPE SUPPORTS SHALL BE SPACED AT 6 FEET ON CENTERS FOR ALL PIPING INSTALLED ON BENCHES.

A BLOCK TYPE PIPE SUPPORT (TYPICAL)

NOT TO SCALE

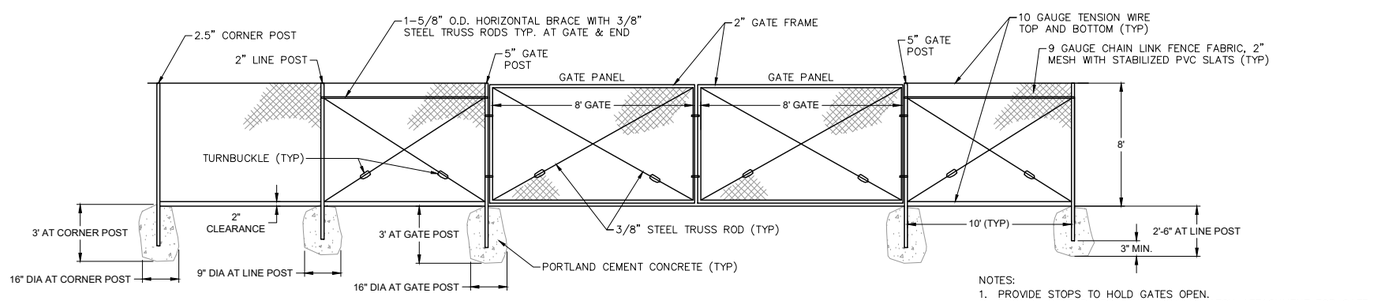


NOTES:

1. HDPE OR LLDPE (GEOMEMBRANE) MATERIAL STRIP TO CROSS PIPE PERPENDICULAR AND FORM SNUG FIT PREVENTING MOVEMENT.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO STRAP USING EXTRUSION WELD METHOD, 3"MIN. OVERLAP.
3. CONTRACTOR TO ENSURE NO PENETRATION OF THE GEOMEMBRANE. ANY DAMAGE TO THE GEOMEMBRANE SHALL BE REPARED AT CONTRACTOR'S EXPENSE.

B STRAP TYPE PIPE ANCHOR (TYPICAL)

NOT TO SCALE



NOTES:
1. PROVIDE STOPS TO HOLD GATES OPEN.
2. PROVIDE CENTER REST AND LOCKING LATCH ATTACHMENT FOR GATE.
3. LINE POST SPACING SHALL NOT EXCEED 10 FEET.

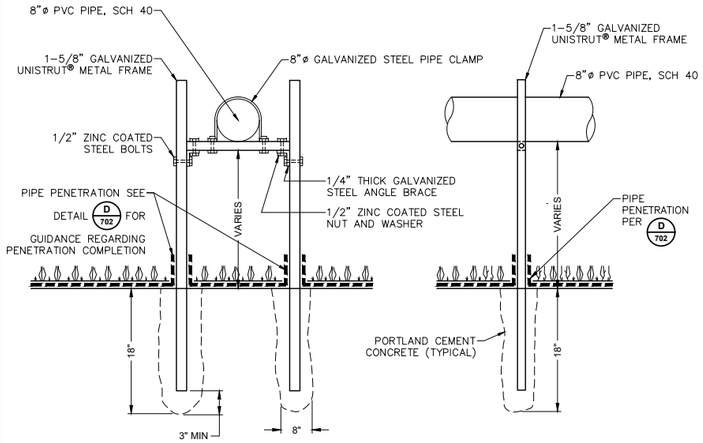
C FLARE STATION FENCE AND GATES

NOT TO SCALE



D VACUUM TEST PORT (TYPICAL)

NOT TO SCALE



NOTE:

SPACING OF PIPE SUPPORTS SHALL BE 6 FEET ON CENTER.

E METAL FRAME PIPE SUPPORT WITHIN WASTE BOUNDARY (TYPICAL)

NOT TO SCALE

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3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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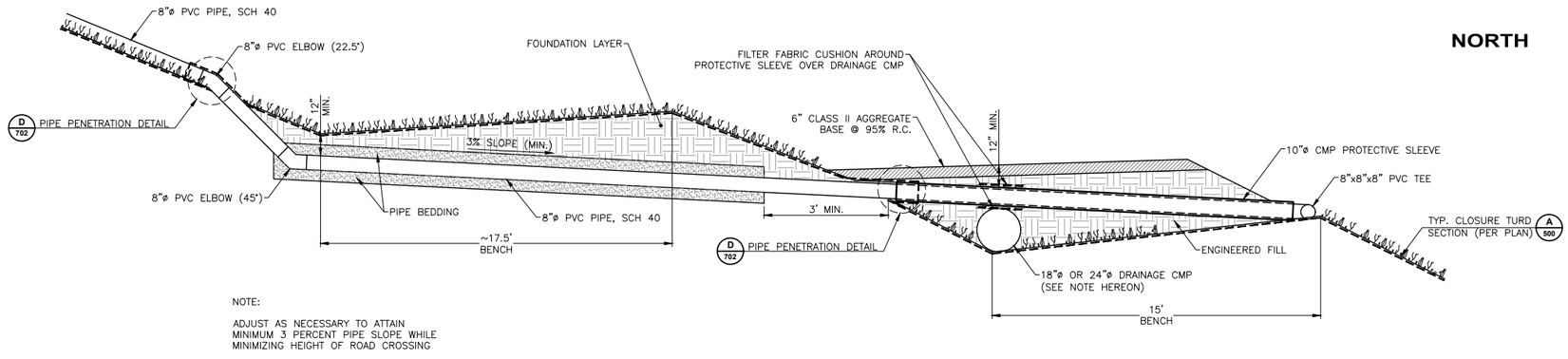
SOUTH **NORTH**



NOTE:

ADJUST AS NECESSARY TO ATTAIN MINIMUM 3 PERCENT PIPE SLOPE WHILE MINIMIZING HEIGHT OF ROAD CROSSING

A ROAD CROSSING, TYPE 3

NOT TO SCALE

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APPENDIX K

EMERGENCY RESPONSE PLAN

Emergency Response Plan

City of Ukiah Landfill

Mendocino County, California

April 2019

Prepared For:

City of Ukiah
Public Works Department
Ukiah, California

Prepared By:

EBA ENGINEERING
825 Sonoma Avenue
Santa Rosa, California
EBA Job No. 02-907

1.0 INTRODUCTION

Division 2, Title 27, Article 2, Section 21130 of the California Code of Regulations (effective date: 7/18/98) requires the development of an Emergency Response Plan at landfill closure to address potential events that could impact the integrity of the landfill cover and related appurtenances resulting in the release of waste products. These regulations are included here for review.

27CCR, §21130

(a) the operator shall maintain a written postclosure Emergency Response Plan at the facility or at an alternate location as approved by the EA. The Emergency Response Plan must identify occurrences that may exceed the design of the site and endanger public health or the environment. The plan shall describe specific procedures that minimize these hazards to protect public health and safety. The events that the plan shall address include, but are not limited to: vandalism, fires, explosions, earthquakes, floods, the collapse or failure of artificial or natural dikes, levees or dams; surface drainage problems; and other waste releases.

(b) The Emergency Response Plan shall contain the following:

(1) identification of events which could require the implementation of emergency response actions: This section shall not apply to the gas monitoring provisions;

(2) a description of the actions to be taken, and the sequence and implementation timetable needed to mitigate the conditions;

(3) a statement regarding the general availability of equipment required to mitigate each type of emergency.

(c) The operator shall amend the Emergency Response Plan under the following conditions:

(1) whenever a failure or release occurs for which the plan did not provide an adequate response;

(2) when the postclosure land use and/or structures on the site change and these changes are not addressed in the existing plan; or

(3) if the EA notifies the operator in writing that the current Emergency Response Plan is inadequate under the provision of this section. The notifying agency shall include within the written notice the items that plan needs to consider for it to comply with this section. The operator shall submit an amended Emergency Response Plan to the EA within thirty (30) days of notification of an inadequacy.

(d) Whenever the operator amends the Emergency Response Plan pursuant to (c) (1 or 2), the operator shall submit a written copy of the amended plan to the EA.

2.0 SPECIFIC EVENTS AND RESPONSES

The following presents a summary of specific events requiring correction action at the City of Ukiah Landfill (Landfill) and actions to be taken to minimize the release of waste products.

Earthquake

Given the final closure configuration of the Landfill, a seismic event within the area should not result in slope failure or a release of waste products; however, such an event could impact the integrity of the final cover, drainage conveyance systems, or monitoring systems. The following is the sequence and schedule of actions to be taken in the event of an earthquake to minimize potential hazards.

- In event of an earthquake, the site will be inspected by a qualified engineer within 24-hours to evaluate the integrity of the landfill cover, ancillary facilities and the potential for hazardous conditions.
- Within 5 days, notify the Local Enforcement Agency (LEA), the Sheriff's Department, California Regional Water Quality Control Board – North Coast Region (RWQCB), and the California Department of Resources Recycling and Recovery (CalRecycle) of any failure.
- Contact with areas of damaged landfill cover or potentially hazardous areas/conditions will be limited.
- Areas of concern will be stabilized pending reconstruction activities.
- Reconstruction requirements and construction scheduling will be evaluated and prepared for submittal to the LEA, RWQCB, and CalRecycle within 7 days.
- Areas requiring repair will be reconstructed in accordance with the Construction Quality Assurance Plan to original design specifications and contours, or the Final Closure Plan will be amended/revised and approved by the LEA, CalRecycle, and RWQCB.
- The LEA, RWQCB, and CalRecycle will be notified as to completion of construction activities.

Fires, Subsurface Fire, or Explosion

The potential for fire, subsurface fire, and/or explosion exists due to the presence of landfill gas. In the event of a fire or explosion, mitigative actions, sequence of actions, and timetable to minimize potential hazards will include the following:

- Immediately make a determination of the severity of the fire or explosion.

- If the fire or explosion is deemed severe, the Sheriff's Department and the Fire Department will be immediately notified. Also notify CalRecycle, RWQCB, LEA, and Mendocino County Air Quality Management District, and other authorities necessary to evaluate extent of damage.

- In the case of a surface fire or explosion, an area will be cordoned off from the incident and personnel will be retained on-site until the area has been declared safe.

- In the case of a subsurface fire that is not deemed severe, within 24 hours, turn off extraction wells in the adjoining area, then proceed with locating the source of the oxygen infiltration and repair the breach accordingly. If repair of breach will take longer than 48 hours, temporarily cover area of breach with soil to minimize further oxygen intrusion.

- If a subsurface fire is deemed severe:

    A. Secure the services of a consultant experienced in subsurface fires.

    B. Identify surface fractures, geologic features, or other cover features which may act as a conduit for oxygen infiltration.

    C. Determine the extent of subsurface fire through subsurface vapor and temperature monitoring.

    D. Cordon off area affected by fire.

    E. Evaluate the feasibility of extinguishing the fire by 1) remediation of conduits of air infiltration, 2) excavation of affected areas and extinguishing the fire using conventional means (water or foam vapor suppressant), 3) extinguishing the fire through CO2 injection, or 4) other methods identified by the consultant.

    F. Implement procedures to extinguish the fire.

- Repairs shall be made in accordance with the Construction Quality Assurance Plan.

- The LEA, RWQCB, and CalRecycle will be notified as to completion of construction activities.

Wild fires also represent a potential hazard. Whereas the ClosureTurf material should provide greater protection against flame propagation than a vegetative cover, the potential remains for damage to occur. Thus, a post-fire inspection will

be performed following such an incident to evaluate the integrity and potential damage to pertinent site components, including the ClosureTurf final cover system, landfill gas collection system (including the totally-enclosed vertical ground flare), leachate management system, monitoring system components, and perimeter security fencing and signage. Any damaged components identified by the inspection will be recorded and provisions made to implement the repairs accordingly.

Surface Drainage Failures and Floods

In the event of a wash out due to a surface drainage failure or flood, mitigative actions, sequence of actions, and timetable to minimize potential hazards will include the following:

- Inspection and evaluation of any damage incurred to the landfill cover and determination of the potential for hazardous conditions.
- Areas identified as potentially hazardous will be cordoned off.
- The LEA, RWQCB, and CalRecycle will be notified of the failure.
- Reconstruction requirements and construction scheduling will be evaluated and prepared for submittal to the LEA, RWQCB, and CalRecycle within 7 days.
- Repairs will be made in accordance with the Construction Quality Assurance Plan.
- The LEA, RWQCB, and CalRecycle will be notified as to completion of construction activities.

Vandalism

In the event that vandalism occurs that impacts the integrity of landfill closure facilities, mitigative actions, sequence of actions, and timetable to minimize potential hazards include the following:

- Inspection and evaluation of any damage incurred to the landfill cover and determination of the potential for hazardous conditions.
- Areas identified as potentially hazardous will be cordoned off.
- The LEA, RWQCB, and CalRecycle will be notified of the vandalism.
- Reconstruction requirements and construction scheduling will be evaluated and prepared for submittal to the LEA, RWQCB, and CalRecycle within 7 days.

- Repairs will be made in accordance with the Construction Quality Assurance Plan.
- The LEA, RWQCB, and CalRecycle will be notified as to completion of construction activities.

3.0 AVAILABLE EQUIPMENT

Standby equipment is available from the City of Ukiah Public Works Department on a priority basis.

4.0 EMERGENCY CONTACTS AND TELEPHONE NUMBERS

City of Ukiah Public Works Department:	(707) 463-6280
Fire Department:	911
Mendocino County Sheriff's Department:	911
Ambulance Service:	911
RWQCB:	(707) 576-2220
CalRecycle:	(916) 341-6360
LEA:	(707) 234-6625
Mendocino County Air Quality Management District:	(707) 463-4354

APPENDIX L

CLOSURE AND POSTCLOSURE MAINTENANCE COST ESTIMATES

CLOSURE

UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION COST ESTIMATE

The objective is to determine the estimated total cost of closure activities at the Ukiah Landfill. Costs are based on the plans prepared by EBA Engineering titled: Construction Drawings for City of Ukiah Landfill Final Closure Construction. Individual cost items were determined as bid items for the construction contract and include:

- Miscellaneous items for mobilization, removal, adjustments, and demolition;
- Final cover items;
- Drainage system items;
- Access road items;
- Landfill gas extraction system items;
- Landfill leachate collection system items; and
- Revegetation.

In addition, costs are provided for design support engineering services during construction and construction quality assurance during construction that includes inspections, testing, and reporting.

References used to estimate construction costs included the following:

- Contractor bids and contracts for previous landfill closure projects that have recently been completed, adjusted for inflation. These previously completed landfill closure projects were all subject to the prevailing wage requirements.

- Manufacturers and suppliers/installers information for specialized items such as the Engineered Turf product for material and installation costs.

- General Prevailing Wage Determination Made by the Director of Industrial Relations Pursuant to California Labor Code Part 7, Chapter 1, Article 2, Section 1770, 1773, and 1773.1, current edition.

- Labor Surcharge and Equipment Rental Rates, State of California Business, Transportation, and Housing Agency, Department of Transportation Division of Construction, Effective April 1, 2019 through March 31, 2020.

- Discussions with local contractors and suppliers for actual material and installation costs.

The following tables present a summary of the final closure costs, a breakdown of individual cost items (bid items) including reference footnotes for each cost item, a breakdown of the inspection, testing, reporting, and design support engineering costs during construction (CQA), and the applicable Prevailing Wage and Labor Surcharge and Equipment Rental Rate tables. For those cost items where previous contractor costs were not available or not applicable, unit costs were determined by estimating the production rate, labor, and equipment that would be needed and applying the prevailing wage rates and the labor surcharge and equipment rental rates referenced above. The worksheets for these items are included.

FINAL CLOSURE COST ESTIMATE WORKSHEET
CITY OF UKIAH LANDFILL

PROJECT DESCRIPTION

The information presented herein provides an itemized breakdown of costs to implement the final closure construction activities summarized in the Construction Drawings for the Final Closure of the City of Ukiah Landfill

PREPARED BY:	EBA ENGINEERING		
GENERAL SITE INFORMATION			
Name of Solid Waste Landfill:	City of Ukiah Landfill		
Solid Waste Facilities Permit No.:	23-AA-0019		
Facility Operator:	City of Ukiah, Department of Public Works		
Site Owner:	City of Ukiah, Department of Public Works		
Site Location (CA coordinates, township & range or longitude/latitude, preferred)	SE 1/4, Section 10 Township 15 North, Range 12 West		
Assessors Parcel Number:	178-130-010		
Site Address :	3100 Vichy Springs Road Ukiah, CA		

FINAL CLOSURE COSTS

1. Final Closure Costs			
a. Miscellaneous - Mobilization, Removal, Adjustment, Demolition	$	137,676	See Cost Estimate Worksheet - Item 1-13
b. Final Cover	$	6,871,169	See Cost Estimate Worksheet - Items 14-20, 37-44, 46 and 52
c. Drainage Facilities	$	656,766	See Cost Estimate Worksheet - Items 23-36
d. Access Roads	$	233,360	See Cost Estimate Worksheet - Items 21 and 22
e. Landfill Gas Extraction System	$	620,168	See Cost Estimate Worksheet - Items 47-51 and 53-77
f. Landfill Leachate Collection System Modifications	$	55,954	See Cost Estimate Worksheet - Items 78-82
g. Revegetation	$	26,435	See Cost Estimate Worksheet - Item 45
h. Signage	$	1,680	See Cost Estimate Worksheet -Item 83
Contractor Bid Subtotal	$	8,603,207	
2. Design Support Engineering	$	18,600	
3. Construction Quality Assurance for Closure Construction	$	534,740	
4. Landfill Structure Removal	$	-	Included in Above
5. Groundwater Monitoring Installations	$	-	None
6. Security	$	-	Included in Above
Final Closure Subtotal	$	9,156,547	
Final Closure Subtotal 20% Contingency	$	1,831,309	
TOTAL FINAL CLOSURE	$	10,987,856	

ENGINEER'S COST ESTIMATE
FINAL CLOSURE CONSTRUCTION
CITY OF UKIAH LANDFILL

ITEM No.	*ITEM*	*UNIT*	*UNIT PRICE*	*SOURCE (Footnote)*	*QTY*	*TOTAL PRICE*
1	Mobilization	LS	$ 106,000.00	1	1	$ 106,000
2	Adjust Existing Groundwater Monitoring Well to Grade	EA	$ 530.00	2	3	$ 1,590
3	Adjust Existing Leachate Wells to Grade	EA	$ 530.00	2	2	$ 1,060
4	Remove Existing CMP and HDPE Downdrains and Drain Outlets	LS	$ 5,151.00	3	1	$ 5,151
5	Remove Existing Leachate Piping	LS	$ 2,575.00	3	1	$ 2,575
6	Adjust Existing Leachate Manholes To Grade	EA	$ 1,130.00	3	5	$ 5,650
7	Install G5 Traffic Vault with Checker Plate Top	EA	$ 1,100.00	2	1	$ 1,100
8	Adjust Existing Gas Vault to Grade	EA	$ 530.00	2	2	$ 1,060
9	Install B2436 Gas Extraction Vault with Checker Plate Top	EA	$ 1,100.00	2	5	$ 5,500
10	Adjust Existing ARV and Vault to Grade	EA	$ 530.00	2	1	$ 530
11	Adjust Existing LFG Perimeter Monitoring Wells to Grade	EA	$ 530.00	2	4	$ 2,120
12	Remove Existing Fencing	LF	$ 2.10	2	90	$ 189
13	Structure Demolition	LS	$ 5,151.00	3	1	$ 5,151
14	Clearing and Grubbing	AC	$ 900.00	2	58.4	$ 52,533
15	Refuse Excavation and Relocation	CY	$ 11.00	2	6,700	$ 73,700
16	Refuse Disposal	TON	$ 130.00	4	75	$ 9,750
17	Subgrade Preparation	SF	$ 0.11	2	1,887,100	$ 207,581
18	Excavation	CY	$ 1.60	2	1,630	$ 2,608
19	Fill (Refuse Excavation Interim Cover Soils)	CY	$ 4.00	2	5,600	$ 22,400
20	Fill (Foundation Layer and Engineered Fill)	CY	$ 3.70	2	91,200	$ 337,440
21	Access Roads	SF	$ 1.40	2	135,400	$ 189,560
22	Access Roads over Engineered Turf	SF	$ 3.00	2	14,600	$ 43,800
23	Concrete Drain Inlets (4' x 4')	EA	$ 2,650.00	2	13	$ 34,450
24	30" CMP Drain Inlets	EA	$ 1,100.00	2	5	$ 5,500
25	CMP Drain Pipe (Above Ground)	LF	$ 43.00	2	840	$ 36,120
26	CMP Drain Pipe (Buried)	LF	$ 58.00	2	280	$ 16,240
27	HDPE Drain Pipe (Buried)	LF	$ 58.00	2	620	$ 35,960
28	Sedimentation Basin Outlet Structures	EA	$ 7,500.00	2	3	$ 22,500
29	Side Slope Drainage Channel Grading	LF	$ 11.00	2	2,530	$ 27,830
30	Type I Swales	LF	$ 1.60	2	630	$ 1,008
31	Type II Swales	LF	$ 6.40	2	1,020	$ 6,528
32	Type III Swales	LF	$ 37.00	2	6,520	$ 241,240
33	Type IV Swales	LF	$ 8.50	2	1,030	$ 8,755
34	Type V Swales	LF	$ 37.00	2	3,500	$ 129,500
35	Grouted Riprap Outlets	EA	$ 2,110.00	2	4	$ 8,440
36	Loose Rock Riprap Inlets and Outlets	SF	$ 37.00	2	2,235	$ 82,695
37	Erosion Control	SF	$ 0.24	2	253,465	$ 60,832
38	Geomembrane	SF	$ 1.10	5	1,885,100	$ 2,073,610
39	Geomembrane Surficial Strips	LF	$ 3.70	5	10,861	$ 40,186
40	Engineered Turf with 5/8" Sand Ballast Infill	SF	$ 2.00	5	1,734,100	$ 3,468,200
41	Engineered Turf without Sand Ballast Infill	SF	$ 1.60	5	11,500	$ 18,400
42	Engineered Turf with HydroBinder Infill	SF	$ 2.80	5	139,600	$ 390,880
43	Engineered Turf/Geomembrane Anchor Trench	LF	$ 5.30	5	8,500	$ 45,050
44	Water Release Vents	EA	$ 500.00	5	20	$ 10,000
45	Seeding and Fertilizing	AC	$ 2,650.00	2	10.0	$ 26,435
46	Temporary Erosion and Sediment Control	LS	$ 16,000.00	2	1	$ 16,000
47	Flare Station Concrete Slabs	CY	$ 845.00	2	11.5	$ 9,718
48	LFG Extraction Wells	VLF	$ 95.00	2	940	$ 89,300
49	Prefabricated Wellhead Assemblies	EA	$ 790.00	2	18	$ 14,220
50	Additional Borehole Setup	EA	$ 370.00	2	3	$ 1,110
51	Borehole Abandonment	VLF	$ 48.00	2	100	$ 4,800
52	LFG Collection Foot Assembly	EA	$ 1,000.00	5	42	$ 42,000
53	8" PVC Pipe and Fittings	LF	$ 17.00	2	8,750	$ 148,750
54	6" PVC Pipe and Fittings	LF	$ 16.00	2	410	$ 6,560
55	4" PVC Pipe and Fittings	LF	$ 15.00	2	1,175	$ 17,625
56	8" Isolation Valves	EA	$ 1,600.00	2	14	$ 22,400
57	6" Isolation Valve	EA	$ 1,265.00	2	1	$ 1,265
58	8" Flexible Couplings	EA	$ 265.00	2	63	$ 16,695
59	6" Flexible Couplings	EA	$ 225.00	2	2	$ 450

ENGINEER'S COST ESTIMATE
FINAL CLOSURE CONSTRUCTION
CITY OF UKIAH LANDFILL

ITEM No.	*ITEM*	*UNIT*	*UNIT PRICE*	*SOURCE (Footnote)*	*QTY*	*TOTAL PRICE*
60	4" Flexible Couplings	EA	$ 172.00	2	12	$ 2,064
61	Vacuum Test Ports	EA	$ 53.00	2	12	$ 636
62	Block Type Pipe Supports	EA	$ 40.00	2	1,230	$ 49,200
63	Block Type Pipe Anchors	EA	$ 110.00	2	248	$ 27,280
64	Strap Type Pipe Anchors	EA	$ 50.00	2	45	$ 2,250
65	Metal Frame Pipe Supports - Within Waste Boundary	EA	$ 250.00	2	67	$ 16,750
66	Metal Frame Pipe Supports - Outside Waste Boundary	EA	$ 160.00	2	11	$ 1,760
67	Buried Header Crossing	EA	$ 1,250.00	3	2	$ 2,500
68	Road Crossing - Type 1	EA	$ 6,050.00	3	10	$ 60,500
69	Road Crossing - Type 2	EA	$ 4,405.00	3	1	$ 4,405
70	Road Crossing - Type 3	EA	$ 7,260.00	3	1	$ 7,260
71	Condensate Drain Piping	LF	$ 16.00	2	2,275	$ 36,400
72	Condensate Drop Outs	EA	$ 2,110.00	2	14	$ 29,540
73	Condensate Discharge Points	EA	$ 1,055.00	2	5	$ 5,275
74	Flare Station Assembly	LS	$ 11,805.00	3	1	$ 11,805
75	Security Fencing	LF	$ 27.00	2	210	$ 5,670
76	Flare Station Aggregate Base	SF	$ 1.40	2	9,600	$ 13,440
77	Electrical and Telephone Feed	LS	$ 10,540.00	6	1	$ 10,540
78	12" Leachate Collection Piping	LF	$ 48.00	2	149	$ 7,152
79	6" Leachate Collection Piping	LF	$ 43.00	2	44	$ 1,892
80	Concrete Junction Boxes	EA	$ 2,110.00	2	3	$ 6,330
81	Leachate Sediment Chamber/Wet Well Lining	LS	$ 3,690.00	5	1	$ 3,690
82	Leachate UST	LS	$ 36,890.00	2	1	$ 36,890
83	Signage - Perimeter (Methane Hazard)	EA	$ 105.00	2	16	$ 1,680
	TOTAL					**$8,603,207**

LS	Lump Sum	EA	Each
CY	Cubic Yard	PVC	Polyvinyl Chloride
AC	Acre	HPDE	High-Density Polyethylene
SF	Square Feet	LFG	Landfill Gas
LF	Linear Feet	UST	Underground Storage Tank
VLF	Vertical Linear Feet		

SOURCE (FOOTNOTES)	
1	Mobilization lump sum cost estimated to be no more than 1.2% of the estimated construction cost.
2	Based on previous construction costs for actual or similar item of similar size and/or physical configuration.
3	Estimate based on prevailing wage rates and equipment rental rates with estimated production rate, labor and equipment. See worksheet for item.
4	Estimate based on actual cost as verified with provider.
5	This is a specialized item and the unit cost is based on the manufacture's/installer's cost estimate that is from actual construction at similar sites.
6	Estimated based on discussions with contractors and providers.

CONSTRUCTION LABOR RATES
PREVAILING WAGE AND APPLICABLE SURCHARGES
CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS

Description	*Group [A]*	*Basic Hourly Rate [A]*	*11% Labor Surcharge [B]*	*33% Overhead and Profit [C]*	*Extended Hourly Rate*
General Laborer	3	$ 53.49	$ 5.88	$ 17.65	$ 77.03
Excavator Operator	3	$ 74.79	$ 8.23	$ 24.68	$ 107.70
Spreading Dozer Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Push Dozer Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Grading Dozer Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Loader Operator	3	$ 74.79	$ 8.23	$ 24.68	$ 107.70
Scraper Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Compactor Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Grader Operator	4	$ 73.41	$ 8.08	$ 24.23	$ 105.71
Backhoe Operator	3	$ 74.79	$ 8.23	$ 24.68	$ 107.70
Water Truck Operator	3	$ 53.49	$ 5.88	$ 17.65	$ 77.03
Dump Truck Operator	3	$ 53.49	$ 5.88	$ 17.65	$ 77.03
Foreman	----	$ 70.00	$ 7.70	$ 23.10	$ 100.80
Supervisor	----	$ 90.00	$ 9.90	$ 29.70	$ 129.60
Crane Operator	3	$ 74.79	$ 8.23	$ 24.68	$ 107.70

EQUIPMENT RENTAL RATES
CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)[B]

Description	*CALTRANS Code*	*Basic Rental Hourly Rate*	*15% Overhead and Profit*	*Extended Unit Hourly Rate*	*Extended Unit Daily Rate*
Excavator - CAT 320C	0312C	$ 93.76	$ 14.06	$ 107.82	$ 862.59
Scraper - CAT 631E	2185	$ 245.29	$ 36.79	$ 282.08	$ 2,256.67
Loader - CAT 938F	2130	$ 82.80	$ 12.42	$ 95.22	$ 761.76
Backhoe - CAT 426	1862	$ 39.87	$ 5.98	$ 45.85	$ 366.80
Grader - CAT 140G	3260	$ 82.74	$ 12.41	$ 95.15	$ 761.21
Spreading Dozer - CAT D-6D	3720	$ 76.35	$ 11.45	$ 87.80	$ 702.42
Push Dozer - CAT D-8N	4864	$ 165.43	$ 24.81	$ 190.24	$ 1,521.96
Grading Dozer - CAT D-6N XL	3755	$ 87.97	$ 13.20	$ 101.17	$ 809.32
Compactor - CAT 815B	2310	$ 134.17	$ 20.13	$ 154.30	$ 1,234.36
Compactor - Hand Guided	250	$ 9.43	$ 1.41	$ 10.84	$ 86.76
Water Truck - 4,000 Gallons	48-60	$ 61.92	$ 9.29	$ 71.21	$ 569.66
Dump Truck - 5 axles/on-Highway	5AXL	$ 87.29	$ 13.09	$ 100.38	$ 803.07
Pickup Truck - Light	00-06	$ 26.15	$ 3.92	$ 30.07	$ 240.58
Concrete Mixer - Portable	16-Nov	$ 6.14	$ 0.92	$ 7.06	$ 56.49
Generator	025-050	$ 14.42	$ 2.16	$ 16.58	$ 132.66
Crane-Link Belt HTS 35	4509	$ 101.17	$ 15.18	$ 116.35	$ 930.76

(A): General Prevailing Water Determination Made by the Director of Industrial Relations (current edition).

(B): Caltrans Labor Surcharge and Equipment Rental Rates (April 1, 2019 through March 31, 2020).

(C): Caltrans Specifications.

ITEM #4 - REMOVE EXISTING CMP AND HDPE DOWNDRAINS AND DRAIN OUTLETS

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Removal of downdrains and inlets	LS	days			1
Item Duration:					1

NOTES:
1. Production rate based on an estimate of 1 day for removal of existing downdrains and drain inlets

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	10	$ 1,541
Backhoe operator	1	$ 107.70	/hr.	10	$ 1,077
Dump truck operator	1	$ 77.03	/hr.	10	$ 770
Labor Total:					$ 3,388

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	10	$ 459
Pickup truck	1	$ 30.07	/hr.	10	$ 301
Dump truck	1	$ 100.38	/hr.	10	$ 1,004
Equipment Total:					$ 1,763

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total Lump Sum Cost for Labor, Equipment, and Materials: $ 5,151

ITEM #5 - REMOVE EXISTING LEACHATE PIPING

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Removal of existing leachate piping	LS	days			0.5
Item Duration:					0.5

NOTES:
1. Production rate based on an estimate of 0.5 day for removal of existing downdrains and drain inlets

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	5	$ 770
Backhoe operator	1	$ 107.70	/hr.	5	$ 539
Dump truck operator	1	$ 77.03	/hr.	5	$ 385
Labor Total:					$ 1,694

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	5	$ 229
Pickup truck	1	$ 30.07	/hr.	5	$ 150
Dump truck	1	$ 100.38	/hr.	5	$ 502
Equipment Total:					$ 882

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total Lump Sum Cost for Labor, Equipment, and Materials: $ 2,575

ITEM #6 - ADJUST EXISTING LEACHATE MANHOLES TO GRADE

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Adjust existing leachate manholes	5	ea	3	/day	1.7
Item Duration:					1.7

NOTES:
1. Production rate based on an estimate of 3 manhole adjustments per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	17	$ 2,568
Backhoe operator	1	$ 107.70	/hr.	17	$ 1,795
Labor Total:					$ 4,363

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	17	$ 764
Pickup truck	1	$ 30.07	/hr.	17	$ 501
			/hr.	17	$ -
Equipment Total:					$ 1,265

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total for Labor, Equipment, and Materials:	$	5,628
Quantity of Unit Item		5
Unit Cost:	$	1,130

ITEM #13 - STRUCTURE DEMOLITION

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Removal of structures	LS	days			1
Item Duration:					1

NOTES:
1. Production rate based on an estimate of 1 day for removal of existing structure.

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	10	$ 1,541
Backhoe operator	1	$ 107.70	/hr.	10	$ 1,077
Dump truck operator	1	$ 77.03	/hr.	10	$ 770
Labor Total:					$ 3,388

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	10	$ 459
Pickup truck	1	$ 30.07	/hr.	10	$ 301
Dump truck	1	$ 100.38	/hr.	10	$ 1,004
Equipment Total:					$ 1,763

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total Lump Sum Cost for Labor, Equipment, and Materials: $ 5,151

ITEM #67 - BURIED HEADER CROSSING

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Construction of buried header crossings	2	ea	2	/day	1
Item Duration:					1

NOTES:
1. Production rate based on an estimate of 2 buried header crossing constructions per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	8	$ 1,232
Backhoe operator	1	$ 107.70	/hr.	8	$ 862
Labor Total:					$ 2,094

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	8	$ 367
Equipment Total:					$ 367

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Pipe Bedding	2	$ 17.25	/ton	1	$ 34.50
Materials Total:					$ 34.50

Total for Labor, Equipment, and Materials:	$ 2,495
Quantity of Unit Item	2
Unit Cost:	$ 1,250

ITEM #68 - ROAD CROSSING - TYPE 1

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Construction of Type 1 road crossings	10	ea	1	/day	10
Item Duration:					10

NOTES:

1. Production rate based on an estimate of 1 Type 1 road crossing constructions per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	80	$ 12,325
Backhoe operator	1	$ 107.70	/hr.	80	$ 8,616
Labor Total:					$ 20,941

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	80	$ 3,668
Hand Guided Compactor	1	$ 10.84	/hr.	80	$ 867
Equipment Total:					$ 4,535

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
10" Steel Pipe Protective Sleeve	10	$ 85.10	/LF	20	$ 17,020.00
12 HDPE Corrugated Pipe	10	$ 26.45	/LF	40	$ 10,580.00
Aggregate Base	10	$ 1.37	/SF	540	$ 7,398.00
Materials Total:					$ 34,998.00

Total for Labor, Equipment, and Materials:	$ 60,474
Quantity of Unit Item	10
Unit Cost:	$ 6,050

ITEM #69 - ROAD CROSSING - TYPE 2

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Construction of Type 2 road crossing	1	ea	1	/day	1
Item Duration:					1

NOTES:

1. Production rate based on an estimate of 1 Type 2 road crossing construction per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	8	$ 1,232
Backhoe operator	1	$ 107.70	/hr.	8	$ 862
Labor Total:					$ 2,094

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	8	$ 367
Hand Guided Compactor	1	$ 10.84	/hr.	8	$ 87
Equipment Total:					$ 454

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
12" RCP Protective Sleeve	1	$ 20.70	/LF	50	$ 1,035.00
Aggregate Base	1	$ 1.37	/SF	600	$ 822.00
Materials Total:					$ 1,857.00

Total for Labor, Equipment, and Materials:	$ 4,405
Quantity of Unit Item	1
Unit Cost:	$ 4,405

ITEM #70 - ROAD CROSSING - TYPE 3

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Construction of Type 3 road crossing	1	ea	0.67	/day	1.5
Item Duration:					1

NOTES:

1. Production rate based on an estimate of 0.67 Type 3 road crossing construction per day

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	12	$ 1,840
Backhoe operator	1	$ 107.70	/hr.	12	$ 1,286
Labor Total:					$ 3,125

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Backhoe	1	$ 45.85	/hr.	12	$ 547
Hand Guided Compactor	1	$ 10.84	/hr.	8	$ 87
Equipment Total:					$ 634

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
10" Steel Pipe Protective Sleeve	1	$ 85.10	/LF	20	$ 1,702.00
12 HDPE Corrugated Pipe	1	$ 26.45	/LF	40	$ 1,058.00
Aggregate Base	1	$ 1.37	/SF	540	$ 739.80
Materials Total:					$ 3,499.80

Total for Labor, Equipment, and Materials:	$	7,260
Quantity of Unit Item		1
Unit Cost:	$	7,260

ITEM #74 - FLARE STATION ASSEMBLY

ESTIMATED DURATION					
Item	Quantity	Units	Production Rate		Days
Flare station assembly	LS	days			5
Item Duration:					5

NOTES:
1. Production rate based on an estimate of 5 days to assembly flare station

LABOR COSTS					
Personnel	Number	Wage Rate	Units	Quantity	Subtotal
Laborer	2	$ 77.03	/hr.	50	$ 7,703
Crain Operator	1	$ 107.70	/hr.	8	$ 862
Foreman	1	$ 100.80	/hr.	8	$ 806
Labor Total:					$ 9,371

EQUIPMENT COSTS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
Crain	1	$ 116.35	/hr.	8	$ 931
Pickup truck	1	$ 30.07	/hr.	50	$ 1,504
			/hr.	50	$ -
Equipment Total:					$ 2,434

MATERIALS					
Item	Number	Rate per Unit	Units	Quantity	Subtotal
					$ -
					$ -
Materials Total:					$ -

Total Lump Sum Cost for Labor, Equipment, and Materials: $ 11,805

POSTCLOSURE MAINTENANCE

FINAL POSTCLOSURE MAINTENANCE COST ESTIMATE WORKSHEET
CITY OF UKIAH LANDFILL

PROJECT DESCRIPTION

The information presented herein provides an itemized breakdown of costs to implement postclosure maintenance activities for the City of Ukiah Landfill during the 30-year postclosure maintenance period.

PREPAREAD BY: EBA ENGINEERING

GENERAL SITE INFORMATION

Name of Solid Waste Landfill: City of Ukiah Landfill

Solid Waste Facilities Permit Number: 23-AA-0019

Facility Operator: City of Ukiah, Department of Public Works

Site Owner: City of Ukiah, Department of Public Works

Site Location (CA coordinates, township & range or longitude/latitude, preferred): SE 1/4, Section 10 Township 15 North, Range 12 West

Assessors Parcel Number: 178-130-010

Site Address: 3100 Vichy Springs Road
Ukiah, CA

FINAL POSTCLOSURE MAINTENANCE COSTS

1. Revegetation		
a. Regrading / Erosion Control / Reseeding	$	2,795
2. Leachate Management		
a. Leachate System Maintenance	$	2,750
b. Leachate/Condensate Disposal	$	822
c. Leachate Monitoring and Reporting	$	2,596
d. Leachate 5-year Constituents of Concern Testing (normalized to cost per year)	$	435
3. Environmental Monitoring		
a. LFG Collection System Operation, Monitoring and Maintenance	$	39,033
b. Annual Source Testing of Flare	$	4,459
c. AB32 Surface Emissions Monitoring and Reporting	$	13,657
d. Perimeter LFG Monitoring and Reporting	$	5,932
e. Perimeter Monitoring Probe Replacement (normalized to cost per year)	$	4,163
f. Perimeter Monitoring Probe Maintenance	$	465
g. Groundwater Monitoring and Reporting	$	47,306
h. Groundwater 5-year Constituents of Concern Testing (normalized to cost per year)	$	4,081

3. Environmental Monitoring *(continued)*		
i. Monitoring Well Replacement (normalized to cost per year)	$	6,744
j. Monitoring Well Maintenance	$	570
k. Surface Water Monitoring and Reporting	$	1,803
l. Surface Water 5-year Constituents of Concern Testing (normalized to cost per year)	$	484
4. Drainage Maintenance	$	3,034
5. Security	$	1,462
6. Inspection	$	3,884
7. Other		
a. ClosureTurf - Sand Ballast Infill Maintenance	$	2,393
b. 5-year Iso-Settlement Analysis (normalized to cost per year)	$	4,151
c. Geomembrane Replacement (normalized to cost per year)	$	86,715
Final Postclosure Maintenance Subtotal	$	239,731
Subtotal x 30 years Postclosure Care	**$**	**7,191,931**

LEACHATE MONITORING & MAINTENANCE
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

LEACHATE MAINTENANCE AND MONITORING

LEACHATE SYSTEM MAINTENANCE

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Annual Maintenance	$ 2,750.00	LS	1.00	$ 2,750.00	Assumed.
			Extended Total:	*$ 2,750.00*	

LEACHATE DISPOSAL

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Leachate Disposal (per day)	$ 0.0044	/gal.	300	$ 1.32	
			Subtotal (per day):	$ 1.32	
			Extended Subtotal (per year):	$ 481.80	
Sr. Hydrogeologist - Mgmt	$ 170.00	/hr.	2.00	$ 340.00	Engineering consultant wage rate.
			Extended Total:	*$ 821.80*	

SEMI-ANNUAL LEACHATE LEVEL MONITORING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00	/hr.	0.50	$ 52.50	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58	/mi.	0.00	$ -	Included under GW monitoring.
Water Level Meter	$ 33.00	/day	0.00	$ -	Included under GW monitoring.
			Subtotal:	$ 52.50	
			Extended Total (2 Events):	*$ 105.00*	

QUARTERLY LEACHATE MONITORING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00	/hr.	0.50	$ 52.50	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58	/mi.	0.00	$ -	Included under GW monitoring.
Parameter Meter	$ 33.00	/day	0.00	$ -	Included under GW monitoring.
Materials - Disposable Bailer	$ 12.00	ea.	1.00	$ 12.00	Engineering consultant equipment/material rate.
Total Dissolved Solids	$ 15.00	ea.	1.00	$ 15.00	Lab Quote
Chloride	$ 18.00	ea.	1.00	$ 18.00	Lab Quote

QUARTERLY LEACHATE MONITORING *(Continued)*

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Sulfate	$ 18.00	ea.	1.00	$ 18.00	Lab Quote
Nitrate as N	$ 18.00	ea.	1.00	$ 18.00	Lab Quote
COD	$ 30.00	ea.	1.00	$ 30.00	Lab Quote
BOD	$ 33.00	ea.	1.00	$ 33.00	Lab Quote
Total Ammonia	$ 25.00	ea.	1.00	$ 25.00	Lab Quote
Total Alkalinity	$ 15.00	ea.	1.00	$ 15.00	Lab Quote
VOCs (8260)	$ 140.00	ea.	1.00	$ 140.00	Lab Quote
Total Purgeable/Extractable Petroleum Hydrocarbons	$ 100.00	ea.	1.00	$ 100.00	Lab Quote
QA/QC - Trip Blank for VOCs (8260)	$ 140.00	ea.	0.00	$ -	Included under GW monitoring.
Geotracker EDD File	10 Percent of Total Lab Cost			$ 41.20	
Project Manager - Mgmt	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
			Subtotal:	$ 517.70	
			Extended Total (4 Events):	*$ 2,070.80*	

ANNUAL LEACHATE TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Inorganics	$ 370.00	ea.	1.00	$ 370.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	1.00	$ 50.00	Lab Quote
			Extended Total:	*$ 420.00*	

LEACHATE REPORTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
Drafting	$ 100.00	/hr.	0.00	$ -	Included under GW monitoring.
Sr. Hydrogeologist (MD) - Mgmt & Review	$ 170.00	/hr.	0.00	$ -	Included under GW monitoring.
Clerical	$ 65.00	/hr.	0.00	$ -	Included under GW monitoring.
			Extended Total:	***$ -***	

5-YEAR CONSTITUENTS OF CONCERN TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
SVOCs (8270)	$ 295.00	ea.	1.00	$ 295.00	Lab Quote
Organochlorine Pesticides + PCBs	$ 130.00	ea.	1.00	$ 130.00	Lab Quote
Organophosphorus Compounds	$ 190.00	ea.	1.00	$ 190.00	Lab Quote
Chlorophenoxy Herbicides	$ 175.00	ea.	1.00	$ 175.00	Lab Quote
			Testing Subtotal:	$ 790.00	

5-YEAR CONSTITUENTS OF CONCERN TESTING *(Continued)*

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Additional Report Prep / Mgmt	$ 105.00	/hr.	8.00	$ 840.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Additional Report Review	$ 170.00	/hr.	3.00	$ 510.00	Engineering consultant wage rate.
Clerical - Additional Clerical	$ 65.00	/hr.	0.50	$ 32.50	Engineering consultant wage rate.
			Reporting Subtotal:	$ 1,382.50	
			Extended Subtotal:	$ 2,172.50	
Total 5-year COC Testing Costs:	$ 2,172.50	/ea.	6.00	$ 13,035.00	6 events during 30-year PM period.
			Normalized 5-year COC Testing Costs per Year:	*$ 434.50*	
TOTAL ANNUAL COST				***$ 6,602.10***	

LANDFILL GAS MONITORING
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

LFG COLLECTION SYSTEM

WELLHEAD MONITORING & SYSTEM MAINTENANCE

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Field Technician - Well Field Tuning	$ 105.00	/hr.	8.00	$ 840.00	Engineering consultant wage rate. Assumes once per month.
Mileage (1 Round Trip)	$ 0.58	/mi.	130.00	$ 75.40	Engineering consultant equipment/material rate.
Meter	$ 100.00	/day	1.00	$ 100.00	Engineering consultant equipment/material rate.
Field Technician - Data Entry/Management	$ 105.00	/hr.	1.00	$ 105.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt	$ 170.00	/hr.	2.00	$ 340.00	Engineering consultant wage rate.
			Subtotal:	$ 1,460.40	
Annual Maintenance	$ 3,200.00	LS	1.00	$ 3,200.00	Assumed.
			Extended Total (12 Events):	*$ 20,724.80*	

UTILITIES

Description	Unit Rate		Hours	Extended Cost	Source / Assumptions
Electricity (assume 10 HP)	$ 0.22	/kw-hr.	8760.00	$ 18,308.40	Assumes unit power use of 9.5 kw
			Extended Total:	*$ 18,308.40*	

ANNUAL SOURCE TEST

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Source Testing - Contractor	$ 3,000.00	LS	1.00	$ 3,000.00	Contactor Quote
Hydraulic Personnel Lift (Boom Type - Code 50-74)	$ 413.76	LS	1.00	$ 413.76	Equipment Rental Rates - California Department of Transportation.
Field Technician - Well Field Support	$ 105.00	/hr.	6.00	$ 630.00	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58	/mi.	130.00	$ 75.40	Engineering consultant equipment/material rate.
Sr. Hydrogeologist - Mgmt	$ 170.00	/hr.	2.00	$ 340.00	Engineering consultant wage rate.
			Extended Total:	*$ 4,459.16*	

AB32 SURFACE EMISSIONS MONITORING & REPORTING

FIELD MONITORING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Field (Travel)	$ 105.00	/hr.	2.00	$ 210.00	Engineering consultant wage rate.
Staff Geologist - Field (Set-up Windlog)	$ 105.00	/hr.	1.00	$ 105.00	Engineering consultant wage rate.
Staff Geologist - Field (Emissions Monitoring)	$ 105.00	/hr.	8.00	$ 840.00	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58	/mi.	130.00	$ 75.40	Engineering consultant equipment/material rate.
FID Rental + Shipping	$ 575.00	LS	1.00	$ 575.00	Contactor Quote

FIELD MONITORING *(Continued)*

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Windlog Rental	$ 100.00 /ev.	1.00	$ 100.00	Engineering consultant equipment/material rate.
Staff Geologist - Data Reduction	$ 105.00 /hr.	1.00	$ 105.00	Engineering consultant wage rate.
Staff Geologist - Mgmt	$ 105.00 /hr.	3.00	$ 315.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt	$ 170.00 /hr.	3.00	$ 510.00	Engineering consultant wage rate.
Clerical	$ 65.00 /hr.	1.00	$ 65.00	Engineering consultant wage rate.
		Subtotal:	$ 2,900.40	
		Extended Total (4 Events):	*$ 11,601.60*	

ANNUAL REPORTING

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00 /hr.	12.00	$ 1,260.00	Engineering consultant wage rate.
Drafting	$ 100.00 /hr.	0.50	$ 50.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt & Review	$ 170.00 /hr.	4.00	$ 680.00	Engineering consultant wage rate.
Clerical	$ 65.00 /hr.	1.00	$ 65.00	Engineering consultant wage rate.
		Extended Total:	*$ 2,055.00*	

QUARTERLY PERIMETER MONITORING & REPORTING

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Field Monitoring	$ 105.00 /hr.	6.00	$ 630.00	Engineering consultant wage rate.
RKI Eagle Meter	$ 100.00 /day	1.00	$ 100.00	Engineering consultant equipment/material rate.
Mileage (1 Round Trip)	$ 0.58 /mi.	130.00	$ 75.40	Engineering consultant equipment/material rate.
Staff Geologist - Mgmt	$ 105.00 /hr.	1.00	$ 105.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt	$ 170.00 /hr.	0.50	$ 85.00	Engineering consultant wage rate.
Staff Geologist - Report Preparation	$ 105.00 /hr.	2.00	$ 210.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Report Review	$ 170.00 /hr.	1.00	$ 170.00	Engineering consultant wage rate.
Drafting	$ 100.00 /hr.	0.75	$ 75.00	Engineering consultant wage rate.
Clerical	$ 65.00 /hr.	0.50	$ 32.50	Engineering consultant wage rate.
		Subtotal:	$ 1,482.90	
		Extended Total (4 Quarters):	*$ 5,931.60*	

MONITORING PROBE REPLACEMENT

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Work Plan	$1,500 LS	1	$ 1,500.00	Engineering consultant wage rates.
Permitting	$600 LS	1	$ 600.00	Assumes average completion depth of 115 feet BGS.
Drill Rig - Mobilization / Drilling	$475 /hr.	12	$ 5,700.00	Contactor Quote
Materials	$13 /ft.	115	$ 1,495.00	Contactor Quote
Staff Geologist - Installation / Management	$105 /hr.	16	$ 1,680.00	Engineering consultant wage rate.
Surveying	$650 LS	1	$ 650.00	Engineering consultant wage rate.

MONITORING PROBE REPLACEMENT *(Continued)*

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$105 /hr.	6	$ 630.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Report Review	$170 /hr.	1	$ 170.00	Engineering consultant wage rate.
Clerical	$65 /hr.	1	$ 65.00	Engineering consultant wage rate.
		Subtotal:	$ 12,490.00	
Total Monitoring Network Replacement Cost:	$ 12,490.00 /ea.	10.00	$ 124,900.00	Assumes each probe replaced once in 30 years.
		Normalized Cost per Year:	*$ 4,163.33*	

MONITORING PROBE MAINTENANCE

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Field Technician - Maintenance	$105 /hr.	3	$315	Engineering consultant wage rate.
Materials	$150 LS	1	$150	Assumes $15 per probe.
		Extended Total:	*$465*	

TOTAL ANNUAL COST ***$ 67,708.89***

GROUNDWATER MONITORING & MAINTENANCE
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

GROUNDWATER MAINTENANCE AND MONITORING

QUARTERLY GROUNDWATER MONITORING

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00 /hr.	8.00	$ 840.00	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58 /mi.	20.00	$ 11.60	Engineering consultant equipment/material rate.
Water Level Meter	$ 33.00 /day	1.00	$ 33.00	Engineering consultant equipment/material rate.
Parameter Meter	$ 50.00 /day	1.00	$ 50.00	Engineering consultant equipment/material rate.
Sample Rental Equipment	$ 310.00 /event	1.00	$ 310.00	Contactor Quote
Materials - Disposable Bailers	$ 12.00 ea.	5.00	$ 60.00	Engineering consultant equipment/material rate.
Total Dissolved Solids	$ 15.00 ea.	5.00	$ 75.00	Lab Quote
Chloride	$ 18.00 ea.	5.00	$ 90.00	Lab Quote
Sulfate	$ 18.00 ea.	5.00	$ 90.00	Lab Quote
Nitrate as N	$ 18.00 ea.	5.00	$ 90.00	Lab Quote
Manganese	$ 30.00 ea.	5.00	$ 150.00	Lab Quote
Boron	$ 33.00 ea.	5.00	$ 165.00	Lab Quote
Total Ammonia	$ 25.00 ea.	5.00	$ 125.00	Lab Quote
Total Alkalinity	$ 15.00 ea.	5.00	$ 75.00	Lab Quote
VOCs (8260)	$ 140.00 ea.	5.00	$ 700.00	Lab Quote
Total Purgeable/Extractable Petroleum Hydrocarbons	$ 100.00 ea.	5.00	$ 500.00	Lab Quote
QA/QC - Trip Blank for VOCs (8260)	$ 140.00 ea.	1.00	$ 140.00	Lab Quote
Geotracker EDD File	10 Percent of Total Lab Cost		$ 220.00	Lab Quote
Project Manager - Mgmt	$ 105.00 /hr.	2.00	$ 210.00	Engineering consultant wage rate.
		Subtotal:	$ 3,934.60	
		Extended Total (2 Events):	*$ 7,869.20*	

SEMI-ANNUAL GROUNDWATER MONITORING

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00 /hr.	24.00	$ 2,520.00	Engineering consultant wage rate.
Mileage (3 Round Trips)	$ 0.58 /mi.	60.00	$ 34.80	Engineering consultant equipment/material rate.
Parameter Meter	$ 50.00 /day	3.00	$ 150.00	Engineering consultant equipment/material rate.
Sample Rental Equipment	$ 310.00 /event	1.00	$ 310.00	Contactor Quote
Materials - Disposable Bailers	$ 12.00 ea.	16.00	$ 192.00	Engineering consultant equipment/material rate.
Total Dissolved Solids	$ 15.00 ea.	16.00	$ 240.00	Lab Quote
Chloride	$ 18.00 ea.	16.00	$ 288.00	Lab Quote

SEMI-ANNUAL GROUNDWATER MONITORING ***(Continued)***

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Sulfate	$ 18.00	ea.	16.00	$ 288.00	Lab Quote
Nitrate as N	$ 18.00	ea.	16.00	$ 288.00	Lab Quote
Manganese	$ 30.00	ea.	16.00	$ 480.00	Lab Quote
Boron	$ 33.00	ea.	16.00	$ 528.00	Lab Quote
Total Ammonia	$ 25.00	ea.	16.00	$ 400.00	Lab Quote
Total Alkalinity	$ 15.00	ea.	16.00	$ 240.00	Lab Quote
VOCs (8260)	$ 140.00	ea.	16.00	$ 2,240.00	Lab Quote
Total Purgeable/Extractable Petroleum Hydrocarbons	$ 100.00	ea.	16.00	$ 1,600.00	Lab Quote
QA/QC - Trip Blank for VOCs (8260)	$ 140.00	ea.	1.00	$ 140.00	Lab Quote
Geotracker EDD File	10 Percent of Total Lab Cost			$ 673.20	Lab Quote
Project Manager - Mgmt	$ 105.00	/hr.	2.00	$ 210.00	Engineering consultant wage rate.
			Subtotal:	$ 10,822.00	
			Extended Total (2 Events):	*$ 21,644.00*	

ANNUAL GROUNDWATER TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Inorganics	$ 370.00	ea.	16.00	$ 5,920.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	16.00	$ 800.00	Lab Quote
			Extended Total:	*$ 6,720.00*	

SEMI-ANNUAL GROUNDWATER REPORTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00	/hr.	20.00	$ 2,100.00	Engineering consultant wage rate.
Statistical Analysis	$ 960.00	/event	1.00	$ 960.00	Contactor Quote
Drafting	$ 100.00	/hr.	3.00	$ 300.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt & Review	$ 170.00	/hr.	4.00	$ 680.00	Engineering consultant wage rate.
Clerical	$ 65.00	/hr.	4.00	$ 260.00	Engineering consultant wage rate.
			Extended Total:	*$ 4,300.00*	

ANNUAL GROUNDWATER REPORTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00	/hr.	40.00	$ 4,200.00	Engineering consultant wage rate.
Statistical Analysis	$ 960.00	/event	1.00	$ 960.00	Contactor Quote
Drafting	$ 100.00	/hr.	3.00	$ 300.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Mgmt & Review	$ 170.00	/hr.	6.00	$ 1,020.00	Engineering consultant wage rate.
Clerical	$ 65.00	/hr.	4.50	$ 292.50	Engineering consultant wage rate.
			Extended Total:	*$ 6,772.50*	

5-YEAR CONSTITUENTS OF CONCERN TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
SVOCs (8270)	$ 295.00	ea.	16.00	$ 4,720.00	Lab Quote
Organochlorine Pesticides + PCBs	$ 130.00	ea.	16.00	$ 2,080.00	Lab Quote
Organophosphorus Compounds	$ 190.00	ea.	16.00	$ 3,040.00	Lab Quote
Chlorophenoxy Herbicides	$ 175.00	ea.	16.00	$ 2,800.00	Lab Quote
Inorganics	$ 370.00	ea.	16.00	$ 5,920.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	16.00	$ 800.00	Lab Quote
			Testing Subtotal:	$ 19,360.00	
Staff Geologist - Additional Report Prep / Mgmt	$ 105.00	/hr.	8.00	$ 840.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Additional Report Review	$ 170.00	/hr.	1.00	$ 170.00	Engineering consultant wage rate.
Clerical - Additional Clerical	$ 65.00	/hr.	0.50	$ 32.50	Engineering consultant wage rate.
			Reporting Subtotal:	$ 1,042.50	
			Extended Subtotal:	$ 20,402.50	
Total 5-year COC Testing Costs:	$ 20,402.50	/ea.	6.00	$ 122,415.00	6 events during 30-year PM period.
			Normalized Cost per Year:	*$ 4,080.50*	

MONITORING WELL REPLACEMENT

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Work Plan	$1,500	LS	1	$ 1,500.00	Engineering consultant wage rates.
Permitting	$600	LS	1	$ 600.00	Assumes 2" well with average completion depth of 50 feet BGS.
Drill Rig - Mobilization / Drilling	$475	/hr.	8	$ 3,800.00	Contactor Quote
Materials	$10	/ft.	50	$ 500.00	Contactor Quote
Staff Geologist - Installation / Management	$105	/hr.	12	$ 1,260.00	Engineering consultant wage rate.
Well Development Rig	$100	/hr.	8	$ 800.00	Contactor Quote
Materials + Equipment	$125	LS	1	$ 125.00	Contactor Quote
Surveying	$650	LS	1	$ 650.00	Engineering consultant wage rate.
Staff Geologist - Reporting	$105	/hr.	13	$ 1,365.00	Engineering consultant wage rate.
Sr. Hydrogeologist - Report Review	$170	/hr.	3	$ 510.00	Engineering consultant wage rate.
Clerical	$65	/hr.	2	$ 130.00	Engineering consultant wage rate.
			Subtotal:	$ 11,240.00	
Total Monitoring Network Replacement Cost:	$ 11,240.00	/ea.	18.00	$ 202,320.00	Assumes each well replaced once in 30 years.
			Normalized Cost per Year:	*$ 6,744.00*	

MONITORING WELL MAINTENANCE

Description	Unit Rate	Quantity	Extended Cost	Source / Assumptions
Field Technician - Maintenance	$105 /hr.	2	$210	Engineering consultant wage rate.
Materials	$360 LS	1	$360	Assumes $20 per well.
		Extended Total:	*$570*	

TOTAL ANNUAL COST ***$ 58,700.20***

SURFACE WATER MONITORING & MAINTENANCE
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

SURFACE WATER MONITORING

SEMI-ANNUAL SURFACE WATER MONITORING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Field Technician - Sampling	$ 105.00	/hr.	0.75	$ 78.75	Engineering consultant wage rate.
Mileage (3 Round Trips)	$ 0.58	/mi.	0.00	$ -	Included under GW monitoring.
Parameter Meter	$ 50.00	/day	0.00	$ -	Included under GW monitoring.
Total Dissolved Solids	$ 15.00	ea.	2.00	$ 30.00	Lab Quote
Chloride	$ 18.00	ea.	2.00	$ 36.00	Lab Quote
Sulfate	$ 18.00	ea.	2.00	$ 36.00	Lab Quote
Total Nitrogen	$ 45.00	ea.	2.00	$ 90.00	Lab Quote
Total Ammonia	$ 25.00	ea.	2.00	$ 50.00	Lab Quote
COD	$ 30.00	ea.	2.00	$ 60.00	Lab Quote
Total Suspended Solids	$ 17.00	ea.	2.00	$ 34.00	Lab Quote
Total Settleable Solids	$ 15.00	ea.	2.00	$ 30.00	Lab Quote
Geotracker EDD File	10 Percent of Total Lab Cost			$ 36.60	Lab Quote
Project Manager - Mgmt	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
			Subtotal:	$ 481.35	
			Extended Total (2 Events):	*$ 962.70*	

ANNUAL SURFACE WATER TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Inorganics	$ 370.00	ea.	2.00	$ 740.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	2.00	$ 100.00	Lab Quote
			Extended Total:	*$ 840.00*	

SEMI-ANNUAL SURFACE WATER REPORTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
Staff Geologist - Reporting	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
Drafting	$ 100.00	/hr.	0.00	$ -	Included under GW monitoring.
Sr. Hydrogeologist - Mgmt & Review	$ 170.00	/hr.	0.00	$ -	Included under GW monitoring.
Clerical	$ 65.00	/hr.	0.00	$ -	Included under GW monitoring.
			Extended Total:	*$ -*	

5-YEAR CONSTITUENTS OF CONCERN TESTING

Description	Unit Rate		Quantity	Extended Cost	Source / Assumptions
SVOCs (8270)	$ 295.00	ea.	2.00	$ 590.00	Lab Quote
Organochlorine Pesticides + PCBs	$ 130.00	ea.	2.00	$ 260.00	Lab Quote
Organophosphorus Compounds	$ 190.00	ea.	2.00	$ 380.00	Lab Quote
Chlorophenoxy Herbicides	$ 175.00	ea.	2.00	$ 350.00	Lab Quote
Inorganics	$ 370.00	ea.	2.00	$ 740.00	Lab Quote
Extractable Oil and Grease	$ 50.00	ea.	2.00	$ 100.00	Lab Quote
			Testing Subtotal:	$ 2,420.00	
Staff Geologist - Additional Report Prep / Mgmt	$ 105.00	/hr.	0.00	$ -	Included under GW monitoring.
Sr. Hydrogeologist - Additional Report Review	$ 170.00	/hr.	0.00	$ -	Included under GW monitoring.
Clerical - Additional Clerical	$ 65.00	/hr.	0.00	$ -	Included under GW monitoring.
			Reporting Subtotal:	$ -	
			Extended Subtotal:	$ 2,420.00	
Total 5-year COC Testing Costs:	$ 2,420.00	/ea.	6.00	$ 14,520.00	6 events during 30-year PM period.
			Normalized Cost per Year:	*$ 484.00*	

TOTAL ANNUAL COST ***$ 2,286.70***

MISCELLANEOUS POSTCLOSURE MAINTENANCE ITEMS
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

REVEGETATION

Regrading / Erosion Control / Reseeding

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Coordination and Management	$105 /hr.	2	$210	Engineering consultant wage rate.
Backhoe (CAT 426)	$45.85 /hr.	8	$367	Equipment Rental Rates - California Department of Transportation.
Backhoe Operator	$107.70 /hr.	8	$862	General Prevailing Wage - California Department of Industrial Relations.
General Laborer	$77.03 /hr.	8	$616	General Prevailing Wage - California Department of Industrial Relations.
Pickup Truck - Light	$30.07 /hr.	8	$241	Equipment Rental Rates - California Department of Transportation.
Materials	$500 LS	1	$500	Assumed.
		Extended Total:	*$2,795*	

DRAINAGE MAINTENANCE

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Coordination and Management	$105 /hr.	2	$210	Engineering consultant wage rate.
General Laborer	$77.03 /hr.	8	$616	General Prevailing Wage - California Department of Industrial Relations.
Pickup Truck - Light	$30.07 /hr.	8	$241	Equipment Rental Rates - California Department of Transportation.
Materials	$450 LS	1	$450	Assumed.
		Subtotal per Event:	$1,517	
		Number of Events per Year:	2	
		Extended Total:	*$ 3,034*	

SECURITY

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Coordination and Management	$105 /hr.	1	$105	Engineering consultant wage rate.
General Laborer	$77.03 /hr.	8	$616	General Prevailing Wage - California Department of Industrial Relations.
Pickup Truck - Light	$30.07 /hr.	8	$241	Equipment Rental Rates - California Department of Transportation.
Materials	$500 LS	1	$500	Assumed.
		Extended Total:	*$1,462*	

INSPECTION

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Inspections	$105 /hr.	4	$420	Engineering consultant wage rate.
Mileage (1 Round Trip)	$ 0.58 /mi.	20.00	$12	Engineering consultant equipment/material rate.
		Subtotal per Event:	$432	
		Number of Events per Year:	9	
		Extended Total:	*$3,884*	

ClosureTurf - SAND BALLAST INFILL MAINTENANCE

Description	Unit Rate	Quantity	Extended Cost	
Project Manager - Coordination and Management	$105 /hr.	4	$420	Engineering consultant wage rate.
General Laborer (2 labors, one 8-hr work day)	$77.03 /hr.	16	$1,232	General Prevailing Wage - California Department of Industrial Relations.
Pickup Truck - Light	$30.07 /hr.	8	$241	Equipment Rental Rates - California Department of Transportation.
Materials	$500 LS	1	$500	Quote for purchase and delivery of 10 cubic yards of sand ballast material.
		Extended Total:	*$2,393*	

5-YEAR ISO-SETTLEMENT ANALYSIS

Description	Unit Rate	Quantity	Extended Cost	
Aerial Topographic Survey	$16,500 LS	1	$16,500	Contactor Quote
Staff Engineer - Data Reduction / Calculations	$105 /hr.	24	$2,520	Engineering consultant wage rate.
Senior Engineer - Report Preparation / Management	$170 /hr.	10	$1,700	Engineering consultant wage rate.
Clerical	$65 /hr.	0.5	$33	Engineering consultant wage rate.
		Subtotal:	$20,753	
		Frequency Interval:	5	
		Normalized Cost per Year:	*$4,151*	

GEOMEMBRANE REPLACEMENT

Description	Unit Rate	Quantity	Extended Cost	
Geomembrane - Material and Installation	$1.38 /sf	1,885,100	$2,601,438	Contactor Quote
	Duration of Postclosure Maintenance Period (years):		30	
		Normalized Cost per Year:	*$86,715*	

APPENDIX M

FUND DISBURSEMENT SCHEDULE

FUND DISBURSEMENT SCHEDULE
FINAL CLOSURE CONSTRUCTION PROJECT
CITY OF UKIAH LANDFILL

Payment	*Task*	*Description*	*Completion Date*	*Disbursement Cost*
I	1	Mobilization	5/31/20	$ 106,000
	2	Removal / Adjustment of Existing Components	5/31/20	$ 31,676
	3	Clearing and Grubbing	5/31/20	$ 52,533
	4	Temporary Erosion Control Provisions	5/31/20	$ 16,000
	5	Refuse Excavation and Relocation / General Excavation	5/31/20	$ 86,056
	6	Subgrade Preparation	5/31/20	$ 207,581
	7	Fill Placement (Refuse Excavation Interim Cover Soils)	5/31/20	$ 22,400
	8	Fill Placement (Foundation Layer and Engineered Fill)	5/31/20	$ 168,720
	9	Landfill Gas Extraction System Installation	5/31/20	$ 86,824
	10	Engineering / CQA Inspection / Testing	5/31/20	$ 75,348
			Payment I Subtotal:	**$ 853,138**
II	8	Fill Placement (Foundation Layer and Engineered Fill)	6/30/20	$ 168,720
	11	ClosureTurf Installation	6/30/20	$ 1,461,198
	9	Landfill Gas Extraction System Installation	6/30/20	$ 117,832
	10	Engineering / CQA Inspection / Testing	6/30/20	$ 100,464
			Payment II Subtotal:	**$ 1,848,214**
III	11	ClosureTurf Installation	7/31/20	$ 1,582,965
	9	Landfill Gas Extraction System Installation	7/31/20	$ 117,832
	10	Engineering / CQA Inspection / Testing	7/31/20	$ 100,464
			Payment III Subtotal:	**$ 1,801,261**
IV	11	ClosureTurf Installation	8/31/20	$ 1,582,965
	12	Drainage Facilities	8/31/20	$ 197,030
	9	Landfill Gas Extraction System Installation	8/31/20	$ 117,832
	10	Engineering / CQA Inspection / Testing	8/31/20	$ 100,464
			Payment IV Subtotal:	**$ 1,998,291**
V	11	ClosureTurf Installation	9/30/20	$ 1,461,198
	12	Drainage Facilities	9/30/20	$ 394,060
	13	Access Roads	9/30/20	$ 233,360
	14	Leachate Collection System Modifications	9/30/20	$ 55,954
	9	Landfill Gas Extraction System Installation	9/30/20	$ 117,832
	15	Final Erosion Control / Revegetation	9/30/20	$ 43,634
	10	Engineering / CQA Inspection / Testing	9/30/20	$ 100,464
			Payment V Subtotal:	**$ 2,406,502**

(Continued)

FUND DISBURSEMENT SCHEDULE
FINAL CLOSURE CONSTRUCTION PROJECT
CITY OF UKIAH LANDFILL
(Continued)

Payment	*Task*	*Description*	*Completion Date*	*Disbursement Cost*
VI	12	Drainage Facilities	10/31/20	$ 65,676
	15	Final Erosion Control / Revegetation	10/31/20	$ 43,633
	16	Sign Installation	10/31/20	$ 1,680
	9	Landfill Gas Extraction System Installation	10/31/20	$ 62,016
	10	Engineering / CQA Inspection / Testing	10/31/20	$ 25,116
			Payment VI Subtotal:	**$ 198,121**
VII	17	CQA Certification Report	1/31/21	$ 32,420
			Payment VII Subtotal:	**$ 32,420**
			TOTAL	***$ 9,137,947***

CQA: Construction Quality Assurance

Appendix B

2016 Initial Study/Mitigated Negative Declaration

INITIAL STUDY
PROPOSED MITIGATED NEGATIVE DECLARATION

PROPOSED FINAL CLOSURE/ POST-CLOSURE MAINTENANCE PLAN
UKIAH LANDFILL

Prepared for:

City of Ukiah
Department of Public Works
300 Seminary Avenue
Ukiah, CA 95482

Prepared by:

EBA Engineering
825 Sonoma Avenue, Suite C
Santa Rosa, California 95404

January 2016

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CHAPTER 1.0 – INTRODUCTION AND PURPOSE

1.0 INTRODUCTION

1.1 CEQA Compliance

The City of Ukiah Department of Public Works Solid Waste Division is the lead agency under the California Environmental Quality Act (CEQA) for the proposed Ukiah Landfill Final Closure Plan (Project) located at 3100 Vichy Springs Road in Ukiah, California. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01. In accordance with Section 15070 through Section 15075, Negative Declaration Process, of the CEQA Guidelines, this Initial Study/Proposed Mitigated Negative Declaration (IS/PMND) has been prepared by the City of Ukiah. Section 15070 of the CEQA Guidelines states the following with respect to the preparation of a Mitigated Negative Declaration:

"A public agency shall prepare or have prepared a proposed negative declaration or mitigated negative declaration for a project subject to CEQA when:

(a) The initial study shows that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, or

(b) The initial study identifies potentially significant effects, but:

(1) Revisions in the project plans or proposals made by, or agreed to by the applicant before a proposed mitigated negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effect would occur, and

(2) There is no substantial evidence, in light of the whole record before the agency that the project as revised may have a significant effect on the environment.

As prescribed in Section 15070, an Initial Study has been prepared that analyzes the potential project-related impacts anticipated to occur as a result of implementing the Final Closure and Post Closure Maintenance Plan for the Ukiah Landfill as proposed by the City of Ukiah. Pursuant to Section 15071 of the CEQA Guidelines, the Initial Study/Proposed Mitigated Negative Declaration includes:

- A description of the proposed project (refer to Section 2.0);
- The location of the project (refer to Section 2.1);
- A list of the environmental factors potentially affected by project implementation (Refer to Section 3.0);
- A comprehensive analysis of each environmental topic included in the County's environmental checklist (refer to Chapter 4.0);
- A proposed finding that the project will not have a significant effect on the environment (refer to Section 5.1); and
- Mitigation measures (refer to Section 5.2).

1.2 Incorporation by Reference

As allowed under by Section 15150 of the State CEQA Guidelines, this initial study incorporates the Final Closure Plan for the Ukiah Landfill by reference. The closure plan and technical appendices were utilized during the preparation of the Initial Study. The relevant information and/or analysis that has been incorporated by reference into this initial study has been summarized. The Final Closure Plan is available for review at the City of Ukiah Department of Public Works located at 300 Seminary Avenue in Ukiah, California 95482.

1.3 Purpose

The Final Closure and Post Closure Maintenance Plan (Closure Plan) for the Ukiah Landfill was prepared for the City of Ukiah by EBA Engineering (EBA) for submittal to the California Department of Resources Recycling and Recovery (CalRecycle), the Mendocino County Department of Public Health Environmental Health Division acting as the Local Enforcement Agency (LEA), and the North Coast Regional Water Quality Control Board (NCRWQCB) for the final closure of the Ukiah Landfill. The City of Ukiah is the owner of the Ukiah Landfill.

The environmental document that follows is an Initial Study and Mitigated Negative Declaration (IS/MND) for the Ukiah Landfill Closure Plan project as proposed by the City of Ukiah. An initial study is a preliminary analysis that is completed as part of the project design and assessment to determine whether an environmental impact report or negative declaration must be prepared to assess potential environmental impacts in accordance with the California Environmental Quality Act (CEQA) and State CEQA Guidelines (Section 15000 *et seq*.). The initial study is intended to determine if the project may have a significant effect on the environment. A negative declaration is a written statement that briefly describes the reasons why a proposed project will not have a significant effect on the environment and, therefore, does not require the preparation of an EIR.

As indicated above, the City of Ukiah is proposing to implement the final closure of the Ukiah Landfill, which will be implemented upon the adoption of this document by the City of Ukiah City Council. This study has been prepared in accordance with the CEQA, Public Resources Code 21000 *et seq*., and the State CEQA Guidelines, California Code of Regulations, Section 15000 *et seq*. This document provides a description of the project setting and characteristics and includes an environmental evaluation and checklist that identifies the potential environmental impacts associated with implementation of the Closure Plan and includes a discussion of the checklist responses and findings.

1.4 Determination of No Significant Impacts

This Initial Study/Mitigated Negative Declaration has been prepared pursuant to Section 15070 through Section 15075 of the CEQA Guidelines as prescribed in Section 1.1, above. As indicated in Chapter 5.0 of the document, no significant impacts will occur as a result of project implementation with the incorporation of appropriate mitigation measures and conditions of approval that will be incorporated into the project design. The City of Ukiah City Council and, if necessary, other responsible agencies identified in the Initial Study will consider the information contained in this document prior to making a final decision on the proposed Final Closure Plan.

CHAPTER 2.0 – PROJECT DESCRIPTION

2.0 PROJECT DESCRIPTION

2.1 Project Location

The Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The landfill is part of a 283.5 acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01.

2.2 Environmental Setting

The Ukiah Landfill is located at 3100 Vichy Springs Road, approximately three miles east of Ukiah in Mendocino County, California. The property is identified as Mendocino County Assessor's Parcel number 178-130-01. The landfill occupies approximately 40 acres of permitted landfill area on a 283.5-acre parcel having a maximum width of approximately 1,000 feet in the north-south direction and a maximum length of about 3,500 feet in the east-west direction. Existing ground surface elevations at the landfill range from approximately 710 feet above mean sea level (MSL) near the western footprint, to about 970 feet MSL along the southeast footprint. The landfill has been graded to form a series of flat terraces stepping down from south to north. The landfill surface is covered with seasonal grasses. A City-owned shooting range is situated on the Landfill property approximately 2,000 feet northeast of the waste management unit footprint. Zoning for the project site is designated as Public Facilities by the Mendocino County General Plan.

Land adjacent to the landfill property is zoned primarily as rangeland and is used for grazing. Dwellings within 1,000 feet of the landfill property include a group of structures owned by the Vichy Springs Investment Group that are located within 500 feet of the landfill's south property line and a single-family residence located approximately 900 feet west of the landfill's western property boundary. A rural residential development is located approximately one-quarter mile west of the landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000 feet southward of the landfill property boundary and is separated from the Landfill by an intervening ridge.

It should be noted that the City owns an approximate 97-acre parcel (Assessor's Parcel No. 178-210-01) that adjoins a portion of the landfill's southern property boundary. This property, which has been previously identified as the "Gun Club Parcel", was purchased as a buffer zone to limit future development adjacent to the Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the landfill property.

The Ukiah Landfill is located in the foothills along the eastern margin of Ukiah Valley, which is a fault-bound, structural basin in the Northern Coast Range Geologic province. Virtually the entire northern portion of the Coast Range Geologic province east of the San Andreas Fault is underlain by Franciscan assemblage bedrock. The landfill site is located near the boundary of the Coastal and Central belts of the Franciscan assemblage. The Central belt is largely composed of a tectonic melange composed of numerous large, discontinuous bodies of graywacke sandstone, metagraywacke, greenstone, chert, and serpentinite in a highly sheared and deformed shale matrix.

During Miocene time (approximately 23 million years before present; m.y.b.p) a relatively large elongate basin began subsiding in the vicinity of Ukiah, in response to extensional stresses associated with translational displacement along the north-northwest trending Maacama Fault, and less obvious sub-parallel strike-slip faults to the west. Erosion of the surrounding Franciscan basement, and continued basin subsidence throughout Pliocene-Pleistocene time (from ~5 m.y.b.p. to 10,000 years ago), has resulted in the accumulation

of a thick section of alluvial, fluvial and lacustrine deposits. The alluvial and fluvial deposits are represented by lenticular bodies of orange-brown to brown clayey and silty sands and gravels. Alternatively, the lucustrine deposits are represented by thick blue-gray claystone and siltstone units with occasional sand and gravel lenses. The maximum thickness of the continental basin deposits is estimated to be in excess of 2,000 feet (Cardwell, 1965).

Other geologic units in the Ukiah area include older Pleistocene continental terrace deposits, younger Pleistocene continental terrace deposits, and Holocene alluvium. The older Pleistocene continental terrace deposits consist of heavily dissected, partially consolidated or cemented, lenticular beds of gravel, sand, silt, and clay. These deposits are lithologically similar to the underlying continental basin deposits; however, the terrace deposits generally contain less silt and clay-sized material. The older continental terraces are typically found at higher elevations along the margins of the Ukiah basin. The younger terrace deposits consist of similar materials. However, they are typically present at lower elevations, and are less consolidated, less cemented, and less dissected than the older terrace deposits. The Holocene alluvial deposits consist of unconsolidated sand, gravel, silt, and clay units that were deposited along active stream channels and flood plains during the last 10,000 years. The alluvial deposits are present in all major valleys and many of the minor stream courses.

A regional seismicity and faulting study was conducted to develop estimates of Holocene fault potential at the site and maximum probable earthquakes which could affect the project site. The nearest known Holocene faults are those associated with the Maacama fault zone, located approximately 1 kilometer west of the project site. There are no known Holocene faults within the site boundaries.

Groundwater conditions at the project site is well defined and has been monitored for many years pursuant to regulatory requirements in accordance with Monitoring and Reporting Order No. R1-2002-0061. Currently there are 18 groundwater monitoring wells that are used to perform compliance monitoring in both the alluvial deposits and the continental basin deposits.

Groundwater elevation data was used to evaluate groundwater flow direction and gradient conditions within the respective water-bearing zones. Since the Quaternary alluvial deposits are confined to the unnamed ephemeral creek's depositional channel, the direction of groundwater flow within these deposits generally coincides with the axis of the creek. This translates to an overall westerly groundwater flow component with a hydraulic gradient of approximately 0.03 feet/foot.

Groundwater flow conditions within the Plio-Pleistocene continental basin deposits exhibit converging groundwater flow components on either side of the unnamed ephemeral creek. In general, a northwesterly groundwater flow component predominates on the south side of the creek (i.e., beneath the landfill), whereas a south-southwesterly groundwater flow component is present north of the creek. These flow components appear to converge in proximity of the creek, whereupon groundwater flows westerly down the axis of the canyon. These potentiometric surface conditions generally mimic the topography, which is fairly typical in mountainous terrain. The hydraulic gradient along the flanks of the creek ranges from approximately 0.1 feet/foot on the north flank to approximately 0.04 to 0.06 feet/foot on the south flank, whereas the gradient along the axis of the creek is approximately 0.02 feet/foot.

2.3 Background and History

Waste disposal operations at the Landfill began in 1955 at the eastern end of the landfill footprint and progressed upslope and westward. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the landfill to separate the waste from the realigned creek channel. The method of operation during the Landfill's development was a fill and cover approach in a canyon/gully terrain. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing the City of Ukiah and the surrounding area. The types of waste

received included garbage, rubbish, demolition and construction waste, brush, stumps, large appliances diverted as scrap metal and street refuse. The Landfill ceased operations in September 2001.

Environmental monitoring at the Landfill was originally regulated under Order 75-43 in conformance with Title 23 of the California Code of Regulations (23 CCR). In September 1993, Order 75-43 was amended by Order 93-83 as a mechanism to implement State Water Resources Control Board Resolution No. 93-62 and federal municipal solid waste regulations (i.e., "Subtitle D") per Title 40 of the Code of Federal Regulations (40 CFR), Parts 257 and 258. Concurrent with this amendment was the preparation of a Report of Waste Discharge for the purpose of formally updating the Landfill's WDRs and to address groundwater impacts previously identified at the site. The combination of these two documents was subsequently used by the NCRWQCB to issue new WDRs (Order 94-123) for the site in October 1994.

In the Fall of 1995, an Engineering Feasibility Study (EFS) was conducted by Dames & Moore to evaluate corrective action alternatives for the mitigation of groundwater impacts and to assess potential leachate management options. Findings from the EFS included recommendations to upgrade the groundwater monitoring network, performance of a health-based risk assessment, and modification of the leachate collection/management facilities. The monitoring system upgrades and health-based risk assessment were subsequently completed in the Fall of 1996. Modifications to the leachate collection/management facilities, which included the diversion of collected leachate to an aboveground storage tank and pumping to the City's sewer piping system via a combination force main/gravity drain, were also completed in the Fall of 1996.

Following completion of the respective corrective action measures, the site was monitored on a quarterly basis in accordance with Order 94-123. On June 27, 2002, the NCRWQCB adopted the current WDRs (Order R1-2002-0061) for the site to address interim closure, corrective action needs, and submittal of plans to complete cap construction in accordance with 27 CCR. Order R1-2002-0061 is the currently monitoring document for the project site.

2.4 Existing Environmental Control Systems

Landfill Gas Collection and Monitoring

Landfill Gas Control

The Landfill currently includes a partial perimeter LFG collection system that was installed between the southwestern edge of the Landfill and the property line. In general, the system consists of 17 vertical extraction points installed in native geologic materials and completed at depths ranging from 35 to 133 feet below ground surface. The extraction points are connected to a buried 6-inch diameter, high-density polyethylene (HDPE) header pipe that leads to a vacuum blower located at the western end of the Landfill. The vacuum blower creates a vacuum in the header pipe that draws the LFG from the soil through the extraction points and header pipe, whereupon the collected LFG (diluted) is vented to the atmosphere via a 4-foot tall, 4-inch diameter stack. The system works on the premise that the extraction well field creates a barrier against migration while simultaneously mixing the collected LFG with "clean" soil pore gas that dilutes the LFG to concentrations that can be discharged directly to the atmosphere.

As part of final closure, a LFG extraction, collection, and control system will be installed that will replace the partial perimeter collection system. The design for the system has been developed to meet the requirements of 17 CCR, §95464(b). The design flow rate for the system has been established at 35 to 210 SCFM (at 50 percent methane). This range covers the highest anticipated LFG recovery rate based on the most conservative generation model (180 SCFM), as well as some excess to allow for extraction from the final cover system's gas relief layer. In addition, the design range can accommodate lower flows to account for future operations as the generation rate continues to decreases over time. Overall, the LFG extraction, collection, and control system will consist of a series of perimeter and interior LFG extraction wells, associated above ground collection system piping, condensate collection provisions, and a flare station for destruction of the LFG.

LFG Monitoring

There is currently ten (10) LFG monitoring points (GAS-1 through GAS-10) located at various locations along the landfill property boundary. These points are used to monitor methane concentrations at the property boundary as required by 27CCR, §20921. The regulatory compliance level for methane along the landfill property boundary is 5 percent by volume.

Each of the LFG monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter polyvinyl chloride (PVC) casing and capped with labcock valves. The monitoring probes range in depth from approximately 9 to 250 feet BGS. The number and depth of monitoring probes at each location are based on site lithology (i.e., permeable zones) and the maximum depth of refuse as measured within 1,000 feet of the monitoring point in question. The scope of monitoring at each probe included measuring static pressure and methane concentration

Landfill Leachate Control

The Landfill is unlined and is not equipped with an engineered or traditional blanket leachate collection and removal system (LCRS). Instead, leachate collection at the Landfill consists of a series of polyvinyl chloride (PVC) piping and French drain systems installed to collect leachate from seeps occurring along the completed slope faces. Leachate collected by these components is then conveyed by gravity flow to a primary buried pipeline located along the northern toe of the Landfill. The buried pipeline, in turn, drains the leachate westward and ultimately discharges to the leachate management facilities located at the western toe of the Landfill. A description of the leachate management facilities is as follows:

- Discharge from the primary buried pipeline is diverted to a subsurface concrete sedimentation chamber equipped with a valved sediment drain at its base. The clarified leachate within the chamber is then discharged (by gravity flow) to an adjacent pump station wet well (identified herein as the "leachate wet well") via a 10-inch diameter overflow line.

- Clarified leachate discharged to the leachate wet well is then pumped to a leachate storage tank for temporary storage. The leachate wet well is equipped with two (2) 25-gallon per minute (gpm), low-head, submersible pumps that are actuated by high/low water level controls. If the clarified leachate discharge rate exceeds the leachate wet well's pumping capacity (50 gpm), the excess leachate will be diverted to an underground storage tank to be installed as part of final closure.

- As noted above, leachate from the leachate wet well is diverted to the leachate storage tank for temporary storage. The leachate storage tank has a 63,500-gallon volumetric capacity and is constructed of AWWA factory epoxy lined and coated bolted steel. As was the case for the leachate wet well, the leachate storage tank is also equipped with a 10-inch diameter overflow line that will divert leachate to the underground storage in the case of an emergency.

- Leachate stored in the leachate storage tank is subsequently pumped to a sewer line connection located on Vichy Springs Road via a force main/gravity drain. The force main/gravity drain is constructed of 4-inch diameter PVC and is approximately 5,200 feet in length. The pump lift station for the leachate storage tank is equipped with two (2) 45-gpm pumps (one duty, one standby), thereby giving the system a total pumping capacity of 90 gpm.

Groundwater Monitoring Network

The existing groundwater monitoring network consists of 18 groundwater monitoring wells primarily concentrated along the northern and western margins of the Landfill. Groundwater monitoring well 87-1 was installed in 1987 and was subsequently used as part of the Water Quality Solid Waste Assessment Test (SWAT) conducted at the Landfill during the late 1980's. The remaining groundwater monitoring wells were installed over the period of 1990 through 1996 as a mechanism to characterize groundwater impacts at the site and to upgrade the Landfill's detection monitoring network. In accordance with the criteria specified in

Section D(3)(b) of M&RP R1-2002-0061, the respective groundwater monitoring wells have the following use designation:

- *Detection Monitoring Wells*:

  87-1, 90-1, 90-2, 90-5, 90-6, 90-7, 90-8, 92-2, 92-3, 94-1, 94-2, 96-1, 96-2 and 96-3

- *Corrective Action Monitoring Wells*:

  90-3, 90-4, 92-1 and 92-4

- *Points of Compliance Wells*:

  87-1, 90-2, 90-3, 90-4, 90-5, 90-7 and 90-8

The two (2) primary water-bearing formation deposits underlying the site correspond to Quaternary alluvial deposits and Plio-Pleistocene upper/lower continental basin deposits. Groundwater monitoring wells completed within the Quaternary alluvial deposits include 87-1, 90-1, 90-3, 90-4, 92-1 and 94-1. These groundwater monitoring wells range in depth from approximately 12 to 35 feet BGS. The remaining groundwater monitoring wells are completed in the Plio-Pleistocene upper or lower continental basin deposits and range in depth from approximately 23 to 160 feet BGS.

Stormwater Monitoring and Reporting

The City of Ukiah conducts monitoring and reporting for storm water discharges in accordance with the General Industrial Permit that is administered by the State Water Resources Control Board. Stormwater sampling is performed at the two surface water discharge locations as noted above during the first significant storm and at the end of the rainy season in accordance with the permit requirements.

2.5 Project Characteristics/Description

Closure of the Ukiah Landfill will be performed in accordance with the applicable regulatory standards. The components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water monitoring systems, and site security. A description of each of these closure components proposed is presented below.

Final Cover Design

As outlined in 27 CCR, §20950, the primary performance goal for final closure is to minimize the infiltration of water into the waste, thereby minimizing the production of leachate and LFG. The proposed final cover design for the Landfill areas will consist of the following layers, from top to bottom:

- Synthetic erosion-resistant layer;
- A structured geomembrane low hydraulic-conductivity layer that includes a drainage layer; and
- A minimum one foot thick foundation layer.

This final cover design for the Landfill areas is an engineered alternative final cover consistent with 27 CCR, §20080. A copy of the Final Grade Construction Plans are included in Appendix B.

Several factors were taken into consideration is establishing the proposed final cover design for the Landfill, including the geometry of the existing landfill, local climatic conditions, final cover material availability, slope stability, erosion protection, and construction cost.

Final Grading, Drainage, and Erosion Control

The limits of refuse were established from record information and by a field investigation. The proposed final cover system will cover all areas within the limits of refuse. Due to clearance requirements under existing power lines that run through the Landfill area, excavation and relocation of refuse will be required to maintain clearance between the finish surface and the power lines. The excavated refuse will be placed on other (flatter) sections of the Landfill.

The Final Grading Plan as shown on Figure 3 (Appendix A) illustrates the final landfill footprint and shows the Landfill configuration following foundation layer grading. Final refuse slopes will have a maximum gradient no steeper than 2:1 (horizontal to vertical). The synthetic erosion-resistant layer will essentially eliminate the discharge of sediment from the Landfill surface as no soil component will be utilized in the final cover design.

Proposed drainage facilities consist of a network of benches, ditches and storm drain that drain to 18- and 24-inch diameter corrugated metal pipe (CMP) discharge culverts. These CMP culverts discharge to the unnamed ephemeral creek channel at various locations along the length of the Landfill's northern boundary. In general, the drainage system is designed to intercept run-off at intervals along the inside edge of berms, benches or access roads. A sedimentation pond is located at the western end of the Landfill to control sediment run-off from slope areas along the western and southern fill boundaries. Three (3) additional sedimentation ponds are also located at the northeastern end of the Landfill to contain sediment run-off from soil borrow areas. Please refer to Figure 2 (Appendix A) for the locations of the respective sedimentation ponds.

Access improvements will include placing aggregate base over portion of the existing perimeter road and along benches to provide all-weather access.

The soil borrow area will be reclaimed by re-grading and re-vegetating (hydroseeding) with native grasses.

Landfill Gas Control

The Landfill currently includes a partial perimeter LFG collection system that was installed between the southwestern edge of the Landfill and the property line. In general, the system consists of 17 vertical extraction points installed in native geologic materials and completed at depths ranging from 35 to 133 feet below ground surface. The extraction points are connected to a buried 6-inch diameter, high-density polyethylene (HDPE) header pipe that leads to a vacuum blower located at the western end of the Landfill. The vacuum blower creates a vacuum in the header pipe that draws the LFG from the soil through the extraction points and header pipe, whereupon the collected LFG (diluted) is vented to the atmosphere via a 4-foot tall, 4-inch diameter stack. The system works on the premise that the extraction well field creates a barrier against migration while simultaneously mixing the collected LFG with "clean" soil pore gas that dilutes the LFG to concentrations that can be discharged directly to the atmosphere.

As part of final closure, a LFG extraction, collection, and control system will be installed that will replace the partial perimeter collection system. The design for the system has been developed to meet the requirements of 17 CCR, §95464(b). The design flow rate for the system has been established at 35 to 210 SCFM (at 50 percent methane). This range covers the highest anticipated LFG recovery rate based on the most conservative generation model (180 SCFM), as well as some excess to allow for extraction from the final cover system's gas relief layer. In addition, the design range can accommodate lower flows to account for future operations as the generation rate continues to decreases over time. Overall, the LFG extraction, collection, and control system will consist of a series of perimeter and interior LFG extraction wells, associated above ground collection system piping, condensate collection provisions, and a flare station for destruction of the LFG, see Figure 4 (Appendix A).

Landfill Leachate Control

The Landfill is unlined and is not equipped with an engineered or traditional blanket leachate collection and removal system (LCRS). Instead, leachate collection at the Landfill consists of a series of polyvinyl chloride (PVC) piping and French drain systems installed to collect leachate from seeps occurring along the completed

slope faces. Leachate collected by these components is then conveyed by gravity flow to a primary buried pipeline located along the northern toe of the Landfill. The buried pipeline, in turn, drains the leachate westward and ultimately discharges to the leachate management facilities located at the western toe of the Landfill. A description of the leachate management facilities is as follows:

- Discharge from the primary buried pipeline is diverted to a subsurface concrete sedimentation chamber equipped with a valved sediment drain at its base. The clarified leachate within the chamber is then discharged (by gravity flow) to an adjacent pump station wet well (identified herein as the "leachate wet well") via a 10-inch diameter overflow line.

- Clarified leachate discharged to the leachate wet well is then pumped to a leachate storage tank for temporary storage. The leachate wet well is equipped with two (2) 25-gallon per minute (gpm), low-head, submersible pumps that are actuated by high/low water level controls. If the clarified leachate discharge rate exceeds the leachate wet well's pumping capacity (50 gpm), the excess leachate will be diverted to an underground storage tank to be installed as part of final closure.

- As noted above, leachate from the leachate wet well is diverted to the leachate storage tank for temporary storage. The leachate storage tank has a 63,500-gallon volumetric capacity and is constructed of AWWA factory epoxy lined and coated bolted steel. As was the case for the leachate wet well, the leachate storage tank is also equipped with a 10-inch diameter overflow line that will divert leachate to the underground storage in the case of an emergency.

- Leachate stored in the leachate storage tank is subsequently pumped to a sewer line connection located on Vichy Springs Road via a force main/gravity drain. The force main/gravity drain is constructed of 4-inch diameter PVC and is approximately 5,200 feet in length. The pump lift station for the leachate storage tank is equipped with two (2) 45-gpm pumps (one duty, one standby), thereby giving the system a total pumping capacity of 90 gpm.

Construction Quality Assurance

The implementation of the Construction Quality Assurance (CQA) Plan will provide documentation that suitable materials and standard construction practices are used to place the final cover and to document that placement is consistent with the closure plan design specifications in 27 CCR, §20323 and §20324. Elements of the CQA Plan include a project description and definitions, qualifications and responsibilities, requirements for the final cover evaluation, inspection standards, testing frequencies, meetings, and documentation. This information will be collected during construction of the final closure and incorporated into the project's final closure construction CQA Certification Report, which will be submitted to the appropriate agencies for recording and reporting purposes.

Post Closure Maintenance Plan

After closure activities are completed, the Final Post Closure Maintenance Plan (FPCMP) for the Landfill will be implemented by the City of Ukiah in accordance with 27 CCR, Chapters 3 and 4, and 40 CFR, §258.61. Post closure maintenance activities for the Landfill will consist of the following:

- Final cover inspection and maintenance;
- Landfill settlement monitoring and maintenance;
- LFG monitoring and maintenance;
- Groundwater systems monitoring and maintenance;
- Storm water monitoring;
- Access road/bench maintenance;
- Drainage systems inspection and maintenance; and
- Site security inspection and maintenance.

Detection Monitoring Program

A Detection Monitoring Program (DMP) is currently implemented at the Landfill in accordance with 27 CCR, §20420 and Waste Discharge Requirements Order No. R1-2002-0061 issued by the North Coast Regional Water Quality Control Board and is anticipated to continue through the post closure maintenance period. The scope of the DMP includes the following monitoring and sampling activities:

- Monthly monitoring and recording of leachate discharge volumes.
- Quarterly sampling and analysis of leachate samples from the leachate wet well. The scope of analytical testing is in accordance with Table I of Monitoring and Reporting Program No. R1-2002-0061 (M&RP).
- Quarterly monitoring and recording groundwater elevations and groundwater flow directions.
- Quarterly sampling and analysis of groundwater samples from detection monitoring wells and points of compliance monitoring wells. The scope of analytical testing is in accordance with Table II of the M&RP.
- Performance of quarterly statistical analyses of groundwater chemistry data to identify exceedances of applicable concentration limits.
- Quarterly sampling and analysis of surface water samples, including semi-quantitative comparisons between upstream and downstream water chemistry data to identify potential landfill-related surface water quality impacts. The scope of analytical testing is in accordance with Table III of the M&RP.
- Performance of monthly standard observations to monitor the conditions of the WMU, the landfill perimeter, and receiving waters.

Results and findings from the aforementioned activities are summarized in a Detection Monitoring Report and submitted to the North Coast Regional Water Quality Control Board on a quarterly basis. Standard quarterly report submittals include a presentation of the sampling and monitoring procedures (including Standard Operating Procedures), tabulated summaries of leachate, groundwater, and surface water field and laboratory data, statistical analysis results and supporting calculations, groundwater potentiometric surface map, results of standard observations, and copies of Certified Analytical Reports (CARs) and associated chain-of-custody documentation. Annual reports are also prepared that include (in addition to the above information) graphical summaries of monitoring data, an evaluation of the findings.

Landfill Gas Monitoring Program

A perimeter LFG monitoring program is currently implemented at the Landfill to fulfill monitoring requirements set forth in 27 CCR, §20921. This perimeter monitoring program will continue through the post closure maintenance period in accordance with the FPCMP. The system consists of ten LFG monitoring points (GAS-1 through GAS-10). The locations of the LFG monitoring points are shown on Figure 4 (Appendix A). Each of the LFG monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter polyvinyl chloride (PVC) casing and capped with labcock valves. The monitoring probes range in depth from approximately 9 to 250 feet below ground surface BGS.

In addition to fulfilling the aforementioned regulatory requirements, the monitoring of perimeter probes will provide pertinent information regarding the overall performance of the LFG collection and control system. As the installation of the final cover system could increase lateral and vertical pressures within the Landfill, thereby potentially inducing subsurface migration of LFG, the perimeter monitoring will assist in determining whether the LFG collection and control system is providing adequate subsurface migration control, including whether ongoing operation of the existing partial perimeter LFG collection system is necessary if the historical LFG migration in that area can be abated by the new system. In accordance with 27 CCR, §20934, the results of the monitoring will be reported within 90 days from when the monitoring is performed and submitted to the

Local Enforcement Agency (LEA), Mendocino County Air Quality Management District (MCAQMD) and the NCRWQCB.

The LFG collection and control system and landfill surface will also be monitored to comply with AB32 requirements in accordance with 17 CCR, §95469. The scope of monitoring will include the following:

- Instantaneous surface monitoring will be conducted on a quarterly basis to determine if surface emissions of 500 ppmv or greater, other than non-repeatable, momentary readings, are present at any location on the WMU surface. The monitoring will be accomplished using a portable gas detector while walking in a designated 25-foot spacing interval pattern where practical.

- Integrated surface monitoring will be conducted on a quarterly basis to determine if the average methane concentration within the individual grids exceeds 25 ppmv.

- Any components of the LFG control and collection system that are under positive pressure will be monitored on a quarterly basis to determine if any leaks are present at methane concentrations exceeding 500 ppmv.

- The wellhead for each extraction well will be monitored on a monthly basis to determine whether the extraction well is being operated under vacuum conditions (i.e., negative pressure).

- The flare will be monitored for temperature and flow rate using dedicated instrumentation and the corresponding data documented using a continuous recorder. In addition, the flare will be source tested on an annual basis to verify compliance with emissions and destruction efficiency criteria.

The test methods and procedures employed to perform the respective monitoring provisions outlined above will be in accordance with the applicable subsections of 17 CCR, §95471. This includes portable gas meter instrumentation and calibration, emissions monitoring procedures, wind speed data collection, and precipitation documentation (i.e., no measurable precipitation 72 hours prior to emissions monitoring).

2.6 Project Timing

As indicated above, landfill operations at the Ukiah Landfill ceased in 2001. The City of Ukiah has commenced the final closure process with preparation of submittal of the Final Closure Post Closure Maintenance Plan. The final closure date is contingent upon approval of the Final Closure Plan by applicable agencies. Each of the phases of the work is identified and described below.

Final Closure Schedule

The closure implementation schedule for the Ukiah landfill includes the estimated time frame to complete the closure tasks associated with each component of closure. The closure construction process will begin upon completion of final closure design and preparation and approval of the plan, selection of a qualified contractor and the subsequent issuance of a Notice to Proceed. This construction schedule may differ from the selected Contractor's schedule based on the Contractor's equipment and personnel resources. For purposes of evaluating different components of the project, the following estimate of equipment type and hours have been generated. These estimates of manpower and equipment needs have been used for purposes of evaluating several components of this study including greenhouse gas generation estimates, impacts from noise, traffic and other components. Please note that this information is used for estimating project requirements only and actual project needs will be based on contractor bid estimates. Using the following information it is projected that the project duration will be approximately six months. Please also note that several of the project components will be conducted in parallel and coordinated with the overall project efforts.

Final Closure Schedule Ukiah Landfill

Estimate of Landfill Project Manpower and Equipment

Qty	**Demolition**	**Total days:**	5			Demolition includes removal of above ground piping
						and drain inlets
					0	
1	Tractors/Loaders/Backhoes	4	5	4	20	
1	Rubber-Tired Dozers	4	5	4	20	
	Site Preparation	**Total days:**	10			Site preparation includes clearing, stripping, scarifying approx.
						50 acres of landfill and borrow area surfaces
1	Rubber Tired Dozers	8	10	8	80	
1	Tractors/Loaders/Backhoes	8	10	8	80	
	Grading / Excavation	**Total days:**	20			Grading/Excavation includes excavating and relocation of refuse,
						grading and placement of foundation layer material from
1	Excavators	8	2	0.8	16	onsite borrow area, placement miscellaneous engineered fill
1	Graders	8	10	4	80	Excavation quantity = 13,500 CY
1	Rubber Tired Dozers	8	20	8	160	Foundation layer quantity = 61,500 CY
2	Tractors/Loaders/Backhoes	8	20	8	320	Engineered fill quantity = 8,850 CY
2	Scrapers	8	10	4	160	
	Well Drilling	**Total days:**	10			Well drilling includes drilling for the LFG extraction wells
						Vertical lineal feet = 940
1	Tractor/Loader/Backhoe	4	10	4	40	
1	Bore/Drill Rigs	8	10	8	80	
	Final Cover	**Total days:**	40			Final cover includes placement of the synthetic turf material
						that includes a geomenbrane, drainage layer, turf, and sand
2	Tractor/Loader/Backhoe	4	40	4	320	ballast
2	Welders	6	40	6	480	
2	Generator Sets	6	40	6	480	
	Utilities (Storm Drain, LFG Pipe)	**Total days:**	20			Utilities includes storm drain culverts and inlets, and installation
						of above ground LFG piping that is butt welded
1	Tractor/Loader/Backhoe	4	20	4	80	
1	Excavators	6	10	3	60	
1	Welder	4	15	3	60	
1	Generator Sets	4	15	3	60	
	LFG Flare Station	**Total days:**	15			LFG flare station includes setting flare and blower skids,
						preparation of foundation and placement of concrete (8 CY),
1	Cranes	4	3	0.8	12	installation of underground storage tank, and
2	Tractors/Loaders/Backhoes	4	8	2.1	64	placement of aggregate base
1	Excavator	8	2	1.1	16	Electric available
	Roads	**Total days:**	15			Roads include placement of aggregate base on perimeter
						access road and benches
1	Rollers	8	15	8	120	
2	Tractors/Loaders/Backhoes	8	15	8	240	

The type of equipment and required personnel expected to be utilized during closure construction includes, but is not limited to, the following:

Types of Equipment

- Scrapers
- Dozers
- Loaders
- Compactors
- Dump Trucks (or End Dump Trailers)
- Water Pulls
- Soil Conditioning and Screening Equipment (Grizzlies)
- Forklift
- Weeding Machine
- Pickup Trucks

Personnel

- Construction Manager
- Field Inspector(s)
- Field Engineer(s)
- Geotechnical Technician(s)
- Labor Crews (including qualified geosynthetics welders)
- Equipment Operators
- Surveyors
- Fabricators
- Mechanics

Once enough equipment is on-site, clearing and grubbing of the landfill surface can begin, as mobilization continues. Rough grading can then begin in those areas that have been cleared and grubbed. During preparation of the site for final cover placement, foundation layers for the final cover materials will be placed. In addition there are several areas within the landfill that will require the grading, removal and final placement of refuse to provide clearance of electrical transmission lines that traverse over the landfill. The waste removal and reconsolidation activities will be conducted concurrent with clearing and grubbing and preliminary grading.

Placement of the final cover materials will begin after grading of the site. As placement of the final cover progresses, the LFG wells and collection system and drainage system required for closure can be integrated and constructed. The drainage facilities to be constructed during final cover placement will include the perimeter access road drainage systems, removal and relocation of the existing drainage components and outfalls and any ancillary drainage facilities including the desilting basin structures. The drainage facilities and the LFG collection system components will be completed in conjunction with the final cover construction. Placement of erosion control best management practices can begin upon completion of the final cover installation.

The estimated time frame for completion of all closure construction activities for the site is estimated to be 6 months which complies with the 180 day standard time frame required by 27 CCR, Section 21110 (e).

2.7 Project Objectives

The Final Closure and Post-Closure Maintenance Plan for the Ukiah Landfill has been prepared for submittal to the following agencies:

- California Department of Resources Recycling and Recovery (CalRecycle)

- Mendocino County Department of Public Health
- North Coast Regional Water Quality Control Board
- Mendocino County Air Quality Management District

The plan has been prepared in accordance with Title 27 of the California Code of Regulations (27 CCR), Chapters 3 and 4 and the Code of Federal Regulations (CFR) 40, Subpart F. The objectives of the plan are identified below.

Project Objectives

- To provide a basis for the establishment of an accurate detailed cost estimate for closure and post-closure maintenance.

- To provide a detailed plan and schedule for closure implementation.

- To provide a plan and schedule for the inspection, maintenance and monitoring procedures to be implemented during the post-closure maintenance period.

- To allow the applicable agencies to monitor closure and post-closure activities to determine that all landfill closure and post-closure maintenance and monitoring requirements are being followed in accordance with the approved plan.

2.8 Regulatory Permits/Approvals

The following permits are required for the closure activities at the Ukiah Landfill:

- North Coast Regional Water Quality Control Board: Approval of the Final Construction Plans, Technical Specifications, and CQA Plan.

- California Department of Resources Recycling and Recovery (CalRecycle): Approval of the Final Construction Plans, Technical Specifications, and CQA Plan.

- Mendocino County Health & Human Services Agency (LEA): Approval of the Final Construction Plans, Technical Specifications, and CQA Plan.

- Mendocino County Air Quality Management District: Approval of the Authority to Construct and Permit to Operation for the LFG extraction and control system.

- North Coast Regional Water Quality Control Board: Approval of an updated Storm Water Pollution Prevention Plan (SWPPP) for Industrial Activities.

- California Department of Fish and Game: Approval of a 1602 Streambed Alteration Agreement for construction of storm drain outfalls in the adjacent stream.

- North Coast Regional Water Quality Control Board: Approval of a 401 permit for construction of storm drain outfalls in the adjacent stream.

- U.S. Army Corps of Engineers: Approval of a 404 permit for construction of storm drain outfalls in the adjacent stream.

CHAPTER 3.0 – ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED AND DETERMINATION

3.0 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED AND DETERMINATION

3.1 Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact," as indicated by the checklist on the following pages.

	Aesthetics		Land Use and Planning
	Agriculture and Forest Resources		Mineral Resources
	Air Quality		Noise
	Biological Resources		Population and Housing
	Cultural Resources		Public Services
	Geology and Soils		Recreation
	Greenhouse Gas Emissions		Transportation/Traffic
	Hazards and Hazardous Materials		Utilities and Service Systems
	Hydrology and Water Quality		Mandatory Findings of Significance

Chapter 4.0 (Environmental Analysis) analyzes the potential environmental impacts associated with the proposed Final Closure/Post-Closure Maintenance Plan project. The issue areas evaluated in this Initial Study include:

- Aesthetics
- Agriculture and Forest Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems
- Mandatory Findings of Significance

The environmental analysis in Section 4.0 is patterned after the Initial Study Checklist recommended by the *CEQA Guidelines*, as amended, and used by the City of Ukiah in its environmental review process. For the preliminary environmental assessment undertaken as part of this Initial Study's preparation, a determination that there is a potential for significant effects indicates the need to more fully analyze the development's impacts and to identify mitigation.

For the evaluation of potential impacts, the questions in the Initial Study Checklist are stated and an answer is provided according to the analysis undertaken as part of the Initial Study. The analysis considers the long-term, direct, indirect, and cumulative impacts of the development. To each question, there are four possible responses:

▪ **No Impact.** The development will not have any measurable environmental impact on the environment.

▪ **Less Than Significant Impact.** The development will have the potential for impacting the environment, although this impact will be below established thresholds that are considered to be significant.

▪ **Less Than Significant Impact With Mitigation Incorporated.** The development will have the potential to generate impacts, which may be considered as a significant effect on the environment, although mitigation measures or changes to the development's physical or operational characteristics can reduce these impacts to levels that are less than significant.

▪ **Potentially Significant Impact.** The development could have impacts, which may be considered significant, and therefore additional analysis is required to identify mitigation measures that could reduce potentially significant impacts to less than significant levels.

Where potential impacts are anticipated to be significant, mitigation measures will be required, such that impacts may be avoided or reduced to insignificant levels.

3.2 Environmental Determination

On the basis of this initial evaluation:

_____ I find that the proposed use **COULD NOT** have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

__**X**__ I find that although the proposal could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

_____ I find that the proposal **MAY** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

_____ I find that the proposal **MAY** have a significant effect(s) on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets, if the effect is a "potentially significant impact" or "potentially significant unless mitigated." An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

_____ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effect (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION, pursuant to all applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures are imposed upon the proposed project, nothing further is required.

Signature	Agency
Printed Name/Title	Date

CHAPTER 4.0 – ENVIRONMENTAL ANALYSIS

4.0 ENVIRONMENTAL ANALYSIS

The purpose of this Initial Study/Proposed Mitigated Negative Declaration for the proposed Ukiah Landfill Final Closure Plan to provide an analysis of the potential environmental consequences that are anticipated to occur as a result of implementation of the project in accordance with the environmental review process as implemented by the City of Ukiah. The analysis contained in this chapter includes a discussion of the anticipated impacts associated with the implementation of the Ukiah Landfill Final Closure Plan and any impacts that result from that development, as described in Chapter 2.0 (Project Description).

4.1 Aesthetics

Would the project:	**Potentially Significant Impact**	**Less Than Significant With Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Have a substantial adverse effect on a scenic vista?			X	
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?			X	
c. Substantially degrade the existing visual character or quality of the site and its surroundings?			X	
d. Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?				X

Significance Criteria:

A project may be deemed to have a significance adverse aesthetic impact if it results in any of the following:

- Changes at the site substantially degrade the character of the site, degrade an existing public view shed, or alter the character of a public view shed by the introduction of anomalous structures or elements.

- Changes at the site would result in changes in the expectations of viewers (measured against the relative importance of those views) and would result in a negative impression of the view shed. (The emphasis of this criterion is on views from public areas, not views from individual lots unless view easements are involved.)

- Changes at the site substantially conflict with and/or do not uphold the scenic and visual quality objectives for development, as articulated in the County's General Plan goals, objectives and policies.

Analysis:

a. Have a substantial adverse effect on a scenic vista?

Less Than Significant Impact. As indicated in the Mendocino County Resources Management Element,

Mendocino County is a predominantly rural county. Most of the land in the county is in forest or in agricultural production. Both forest and agricultural lands are considered open spaces that add to the quality of life of county residents and attract tourists. The various state and county parks protect areas with scenic value, particularly redwood groves. The coast is considered a scenic resource, and policies in the County's Coastal Element are designed to protect its scenic value. Areas such as the forest lands and other open space areas have been identified as scenic resources in the County's Resource Management Element.

The project site property consists of a 283.5 acre rural parcel of land of which approximately 40 acres of the property is occupied by the landfill unit. The Ukiah Landfill began refuse disposal operations in 1955 and ceased operations in 2001. As discussed herein the landfill property is surrounded by rural agricultural and undeveloped lands that are typically large in size with very limited to no public access. The project site property has been significantly altered by past landfilling activities and is not considered to be a scenic or aesthetic resource in its altered condition. The proposed project includes the closure of the landfill that consists of the placement of a final cover material with the sequential installation of grading and drainage improvements and landfill gas collection and control equipment. The final cover element of the proposed project includes no structures on the surface of the final closure project, with the exception of the landfill gas flare station located on the northwest portion of the site, which would create a visual element that would adversely affect the visual/aesthetic character of the project area, including the adjacent forestland.

Other features of the landfill include a landfill gas monitoring and control system, surface water control system, a groundwater and stormwater monitoring and reporting system/program, and a leachate collection and removal system. These environmental control systems are composed of minor surface and subsurface features, including monitoring wells, pipes, a landfill gas flare and related features. As indicated above, no significant vertical elements that would be visually obtrusive are proposed on the site, with the exception of the landfill gas flare, as part of the final closure process. Therefore, no significant visual impacts will occur as a result of project implementation and no associated mitigation measures are required.

The project site is located at the end of Vichy Springs Road which is not identified in the Mendocino County General Plan as a Scenic Resource.

As a result, project implementation will not affect existing views from scenic corridors/roads.

b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

Less than Significant Impact. The project site property is located in an area of Mendocino County that is removed from any scenic highways and is not identified as a scenic amenity or resources. The site has been substantially altered by past landfilling activities and is not characterized by any important or significant aesthetic resources. Furthermore, the project site is not located adjacent to or within the view shed of any designated highways/roadways as designated by the Mendocino County General Plan.

Current closure and post-closure requirements significantly limit future land uses over the refuse footprint in order to maintain the integrity of the final cover surface. The proposed post-closure end use for the Ukiah Landfill refuse footprint will be non-irrigated vegetated open space. The landfill surface will consist of a geosynthetic final cover layer. In addition, implementation of the proposed final closure plan and subsequent post-closure maintenance activities includes environmental control systems and related features that are intended to meet current closure requirements so that the project site does not pose a health hazard or other adverse effects to the environment. No significant above-ground structures or other features are proposed, other than the landfill gas flare station, are proposed that would either affect the existing site characteristics or the visual/aesthetic character of the site and/or area. As a result, no significant impacts are anticipated and no mitigation measures are required.

c. Substantially degrade the existing visual character or quality of the site and its surroundings?

Less than Significant Impact. As indicated above, no development (i.e., structures or vertical features) are proposed for the project, other than the landfill gas flare station, that would affect the aesthetic character either of the project site or the surrounding area. Furthermore, the proposed project is consistent with Policy RM-128 of the Resources Management Element (i.e., protect the scenic values of the county's natural and rural landscapes, scenic resources, and areas of significant natural beauty). Therefore, no significant impacts will occur either to the aesthetic character of the site or to that of the surrounding area and no mitigation measures are required.

d. Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?

No Impact. The subject property is located in a remote area of Mendocino County and is removed from urban areas. Project implementation does not include any new lighting sources and/or features that would result in the creation of new lighting either on the site or in the project area. All construction activities will occur during the daylight hours, which would not require lighting. Upon completion of the final closure construction activities, site activities would then be limited to routine maintenance, monitoring, and repair of site features/facilities; however, no new lighting would be required and, therefore, is not incorporated into the project. As a result, no lighting impacts will occur and no mitigation measures are required.

Cumulative Impacts

As indicated in Chapter 2.0 (Project Description), no development is proposed that would result in either short- or long-term visual impacts. Closure of the Ukiah Landfill encompasses excavation and earthwork that is short term in nature and the relocation of refuse from a portion of the landfill to provide vertical clearance for electrical power lines that traverse the project site property. No structures, other than the landfill gas flare, are proposed over the limits of the refuse footprint or in close proximity to the refuse limits that would contribute to the degradation of the aesthetic character of the area. Once completed, the project site would be characterized by native grasses and shrubs as well as the environmental control system features that are intended to address groundwater/leachate and air emissions. These systems and features would not contribute to the cumulative degradation of the visual/aesthetic character of the area; no significant cumulative impacts will occur as a result of project implementation.

Mitigation Measures

Project implementation will not result in any potentially significant visual impacts. Therefore, no mitigation measures are required.

4.2 Agriculture and Forest Resources

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:	**Potentially Significant Impact**	**Less Than Significant With Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				X
d. Result in the loss of forest land or conversion of forest land to non-forest use?				X
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?				X

Significance Criteria:

A project may be deemed to have a significance adverse impact on agricultural soils if it results in any of the following:

- Loss or elimination of "prime" agricultural lands as designated by the State of California and/or County of Mendocino and such designated soils are capable of sustained, viable agricultural production.

- Loss or elimination of forest land or conversion of forest land and/or timberland to non-forest uses.

Analysis:

a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. The project site has designated zoning by the Mendocino County General Plan as Public Facilities. The California Department of Conservation Division of Land Resource Protection Farmland Mapping and Monitoring Program identifies the project site as Urban and Built-Up Land which includes properties Land that is occupied by structures with a building density of at least one unit to 1.5 acres, or approximately 6 structures to a 10 acre parcel. Common examples include residential, industrial, commercial, institutional facilities, cemeteries, airports, golf courses, sanitary landfills, sewage treatment plants and water control structures. The project site is not identified as Prime Farmland, Unique Farmland or Farmland of Statewide Importance. The proposed project is the final closure of the Ukiah Landfill and will not result in a conversion of any prime farmland or farmland of State-wide importance. Therefore, no significant impacts to existing farmland resources will occur; no mitigation measures are required.

b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. The subject property is not zoned for agricultural uses and, furthermore, is not bound by a Williamson Act contract. The site encompasses a closed Class III landfill and does not support any existing agricultural uses. Implementation of the proposed Final Closure Post-Closure Maintenance Plan will not result in any conflicts with either the zoning or long-range land use plans adopted by the County of Mendocino for the site. No significant impacts to agricultural soils will occur as a result of the proposed project and no mitigation measures are required.

c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

No Impact. The project site is zoned by the County of Mendocino General Plan as Public Facilities and therefore is not zoned or designated as forest land. The area surrounding the project site are zoned as rangeland with limited residential zoning to the south and no direct or indirect impacts would occur as a result of the proposed landfill closure. Formal closure of the landfill will not result in any infrastructure extensions and/or future urban development that would encroach into the neighboring lands adjacent to the subject property. Therefore, project implementation would not result in the conversion of any forest land subject to the Public Resources Code. No impacts are anticipated and no mitigation measures are required.

d. Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. The proposed project includes the final closure of the Ukiah Landfill. As discussed above, the project site is zoned as Public Facilities by the Mendocino General Plan. The project site is a 283.5 acre property that is characterized by oak woodlands and chaparral vegetation. The proposed project implementation will not result in a loss of forest land to non-forest uses or convert forest lands to non-forest use. No impacts are anticipated and no mitigation measures are required.

e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. Implementation of the project will result in the closure of the Ukiah Landfill. Because the site does not contain Prime Farmland, Unique Farmland or Farmland of Statewide Importance or support any agricultural resources, project implementation will not result in the conversion of existing important, designated agricultural resources for non-agricultural purposes or the conversion of forest land to non-forest land. The surrounding properties located in the vicinity of the project site are zoned as Rangeland by the Mendocino County General Plan. The proposed project is completely confined within the boundaries of the 283.5 acre property parcel and is not expected to affect the surrounding properties other than short term disturbances during construction.

Cumulative Impacts

Because the project site and surrounding area is not designated as Prime Farmland, Unique Farmland or Farmland of Statewide Importance or forest resources, no conversion or loss of such resources will occur as a result of the project. Therefore, implementation of the proposed project will not contribute to the cumulative loss of either important agricultural soils or forest resources. No significant cumulative impacts will occur.

Mitigation Measures

Project implementation will not result in any potentially significant impacts to either agricultural source or forestry resources. Therefore, no mitigation measures are required.

4.3 Air Quality

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:	**Potentially Significant Impact**	**Less Than Significant Impact With Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Conflict with or obstruct implementation of the applicable air quality plan?			X	
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?			X	
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?			X	
d. Expose sensitive receptors to substantial pollutant concentrations?			X	
e. Create objectionable odors affecting a substantial number of people?			X	

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if any of the following occur:

- The project could interfere with the attainment of the federal or state ambient air quality standards by either violating or contributing to an existing or projected air quality violation.
- The project could result in population increases within the regional statistical area that would be in excess of that projected in the Air Quality Management Plan (AQMP).
- The project could generate vehicle trips that cause a localized violation of carbon monoxide (CO) standards.
- The project might have the potential to create or be subjected to objectionable odors.
- The project could have hazardous materials on-site and could result in an accidental release of air toxic emissions.

- The project could be occupied by sensitive receptors near a facility that emits air toxics or near CO "hot spots."

- The project could emit carcinogenic air contaminants that could pose a cancer risk.

Analysis:

Illingworth and Rodkin prepared an air quality assessment that evaluated the potential air quality impacts of the proposed project based on the anticipated final closure construction activities. The findings and recommendations of the Gas Emissions Assessment are summarized in this section of the initial study and are contained in Appendix C.

In addition, permitting is in process for the installation of the landfill gas collection and control system. This system includes LFG extraction wells that will be placed in and around the landfill footprint and the installation of a flare compound on the northwest side of the landfill that will include a LFDG flare and blower system for the collection destruction of LFG. The Mendocino County Air Quality Management District (MCAQMD) is the permitting and oversight agency for the installation and operation of the flare system. Design and permitting documentation has been submitted to the Mendocino County Air Quality Management District which is in process.

a. Conflict with or obstruct implementation of the applicable air quality plan?

Less than Significant Impact. The project area is located on the southeastern portion of Mendocino County and designated Inland South. The Inland South area includes the City of Ukiah and Willits and much of the surrounding areas. The MCAQMD maintains a network of five air quality monitoring stations within its jurisdiction, several of which are located in the Inland South area. The Inland South area includes the cities of Ukiah and Willits which are both major population centers in the county. These cities both also have the Highway 101 corridor that runs south to north through Mendocino County and through both Ukiah and Willits.

The air quality within Mendocino County is generally good and generally complies with established air quality standards. The Inland South area, like the rest of Mendocino County, is non-attainment for the state particulate matter 10 microns (PM-10) standard. The primary sources of PM-10 have been identified as wood combustion emissions, fugitive dust from construction projects, automobile emissions and industry. Some of the automobile emissions are the result of pass-through traffic on 101 because of its nature as a major transportation corridor in the state. The MCAQMD has full monitoring stations (NOx, Ozone, CO and PM-10) in both Ukiah and Willits. A PM-2.5 monitor has been established in Ukiah. Both Ukiah and Willits have had PM-10 exceedances in the past. Winter cold-air inversions are common in the valleys from November to February.

The MCAQMD is currently identified as "non-attainment" for the PM_{10} standard. The primary sources of particulate matter are identified as wood smoke, fugitive dust and automotive emissions. Although project implementation will result in short-term impacts, once the final cover and related closure plan features are completed, no additional air pollutant emissions will occur. An exception is the operation of the LFG flare which is permitted for operation by the MCAQMD. The short-term construction related emissions required to implement the proposed project would not exceed thresholds established by the Mendocino County Air Quality Management District (refer to Table 4.3-1) below. The proposed project is consistent with Policy RM-37 of the Mendocino County General Plan Resource Management Element (i.e., public and private development shall not exceed MCAQMD emissions standards) and Policy RM-41 (i.e., reduce dust generation from unpaved roads). The proposed project will be required to implement dust control management practices to comply with all regulatory requirements to reduce and control particulate emissions and therefore project implementation would not conflict with adopted plans and programs; no significant impacts would occur.

b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Less than Significant Impact With Mitigation. The proposed project will result in the emission of exhaust gases and has the potential to generate dust emissions if unmitigated. Exhaust emissions during construction will result from the operation of heavy equipment. It should be noted that the emissions estimates have been calculated using standard assumptions of equipment type and project duration. The threshold for pollutant generation is Table 4.3.1 summarizes the project related construction impacts for the proposed project.

Table 4.3.1

Emissions Summary - Construction
Ukiah Landfill Closure

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
Total	0.339	2.9636	3.1892	5.0300e-003	80.0951	0.0968	80.192	8.0441	0.0905	8.1346	0	459.9091	459.9091	0.0261	0	460.4567

Source: Illingsworth & Rodkin - Ukiah Landfill Closure May 2015

MCAQMD CEQA significance thresholds for construction activities were adopted in June 2010. There are no construction related thresholds established for greenhouse gas emissions. Thresholds are established for criteria pollutants including apply only to particulate exhaust. The project-related construction particulate emissions would be substantially below the emissions thresholds established by the MCAQMD. Emission levels of criteria pollutants will also be below MCAQMD significance thresholds. Thresholds for fugitive dust are set at 54 and 82 pounds per day for indirect emissions. No emission thresholds are established for construction related fugitive dust emissions which are set at levels that are controllable with the implementation of best management practices. It is noted that surface disturbances from the proposed project may create dust that would require mitigation and control. It should further be noted that PM10 total is estimated to be 80.1 tons per year from the project if unmitigated while PM 2.5 total is estimated to be 8.0 tons per year if unmitigated. Mitigation for exhaust emissions will include using modern equipment that is compliant with current regulatory emission standards. Mitigation for dust will include using and maintaining dust control measures during all phases of the project.

c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Less than Significant Impact. Criteria pollutants include Reactive Organic Gases, Oxides of Nitrogen and particulate matter that is defined as PM2.5 and PM10. Emission levels of these criteria pollutants will be below the MCAQMD significance thresholds. In addition only PM10 is in non-attainment for the MCAQMD and the estimated emissions of PM10 for the proposed project are well below the established threshold values. Therefore the impact is less than significant.

d. Expose sensitive receptors to substantial pollutant concentrations?

Less than Significant Impact. The proposed project has the potential to generate pollutant sources from several sources including fugitive dust and exhaust emissions. Diesel exhaust is a concern and has been identified as a toxic air contaminant. The exhaust from diesel engines includes hundreds of different gaseous and particulate components, many of which are toxic. Many of these toxic compounds adhere to the diesel particles, which are very small and can penetrate deeply into the lungs. Diesel engine particulate matter has been identified as a human carcinogen. Mobile sources such as trucks, heavy equipment and automobiles are some of the primary sources of diesel emissions. Diesel exhaust contains both pulmonary irritants and hazardous compounds that can affect sensitive receptors such as young children, senior citizens, or those susceptible to chronic respiratory disease such as asthma, bronchitis, and emphysema.
In 2005, the California Air Resources Board (CARB) approved a regulatory measure to reduce emissions of

toxic and criteria pollutants by limiting the idling of new heavy-duty diesel vehicles, which altered five sections of Title 13 of the California Code of Regulations. The changes relevant to the proposed project are in Section 2485, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, which limit idling of a vehicle's primary diesel engine for greater than five minutes in any location (with some exceptions) or operation of a diesel-fueled auxiliary power system within 100 feet of residential areas.

Implementation of the proposed project would result in the use of diesel trucks to transport equipment and construction materials as well as diesel-powered construction equipment would be operated on site. Combustion emissions include suspended fine particulates ($PM_{2.5}$). When these emissions are generated by diesel-powered equipment, they are referred to as diesel particulate matter (DPM), which contain substances that are known carcinogens. DPM is classified by the Bay Area Air Quality Management District (BAAQMD) as a toxic air contaminant (TAC) and the BAAQMD CEQA Guidelines include quantitative thresholds to determine the significance of the project's construction-related emissions, both on a project-specific and cumulative basis. In 2010, the BAAQMD adopted updated CEQA significance thresholds, including health risk exposure guidelines. The MCAQMD has elected to adopt these guidelines.

It is anticipated that implementation of the proposed project will require the importation of up to 3,500 cubic yards of sand as part of the final cover which could generate approximately 200 truck trips. The remaining soil will be used from an onsite source within the project site boundaries. The public exposure risk from this truck traffic is seen as minimal and the pass-by exposure health risk during soil hauling would be negligible at the edge of the selected haul route. Therefore, no significant impacts are anticipated to occur as a result of the proposed project and no mitigation measures are required.

e. Create objectionable odors affecting a substantial number of people?

Less than Significant Impact. The proposed project is designed to minimize local odor risk by insuring long-term landfill cover integrity. No substantial quantities of buried refuse will be disturbed by the proposed project. Furthermore, sensitive receptors such as residential development are located greater than 500 feet from the property boundary. Therefore, no significant odor impacts would occur.

Cumulative Impacts

As indicated in the preceding analysis, project implementation will not result in an exceedance of the construction emissions threshold adopted by the MCAQMD; no long-term (i.e., operational) impacts will occur and, therefore, implementation of the proposed project would not result in potentially significant cumulative impacts. Compliance with the applicable MCAQMD and policies and programs of the County as articulated in the General Plan will ensure that dust emissions are minimized during construction to further reduce short-term cumulative impacts. Furthermore, the project is consistent with the County's long-range plans for the subject property. Therefore, potential cumulative air quality impacts are less than significant.

Mitigation Measures

As indicated in the preceding discussion the proposed project implementation has the potential to generate fugitive dust which is predicted as a contributor to particulate matter impacts from the construction activities if unmitigated. Control of fugitive dust is mandated by MCAQMD rules and shall be implemented during all phases of the project. The required dust control mitigation measures include:

MM 4.3-1 Water shall be applied by means of truck(s), hoses, and/or sprinklers as needed prior to any land clearing or earth movement to minimize dust emissions.

MM 4.3-2 All material excavated, stockpiled, or graded shall be sufficiently watered to prevent fugitive dust from leaving the property boundaries or causing a public nuisance. Watering should occur at least twice daily, however frequency of watering shall be based on the type of operation, soil, and wind exposure

MM 4.3-3 All on-site vehicles traffic shall be limited to 15 miles per hour (mph) on unpaved roads.

MM 4.3-4 All trucks hauling soil, sand, or other loose material on public roads will be covered or required to maintain at least two feet of freeboard.

MM 4.3-5 All land clearing, grading, or earth moving activities shall be suspended as necessary, based on site conditions, to prevent excessive windblown dust when winds are expected to exceed 20 mph.

MM 4.3-6 All inactive portions of the construction site shall be covered, seeded, or watered until a suitable cover is established. Alternatively nontoxic soil stabilizers can be applied to all inactive construction areas.

MM 4.3-7 Paved areas adjacent to construction sites shall be swept or washed as required to remove excess accumulations of silt and/or mud, which may have results from grading and construction activities.

MM 4.3-8 A publically visible sign shall be posted with the telephone number and person to contact regarding dust complaints.

4.4 Biological Resources

Would the project:	**Potentially Significant Impact**	**Less Than Significant With Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X		
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X		
c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			X	
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			X	
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?			X	

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if one or more of the following conditions occur as a result of implementation of the proposed project:

- Direct or indirect loss of individuals of a state- or federal-listed threatened or endangered species.
- Substantial adverse effect on a rare plant or animal species.
- Substantial adverse effect on a species or native plant or animal community.
- Substantial adverse effect on a habitat of concern.
- Substantial adverse effect on a critical, yet limited, resource utilized by state or federal listed threatened or endangered species.
- Substantial adverse effect on the movement of any resident or migratory fish or wildlife species.

Analysis:

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Less than Significant with Mitigation Incorporated. A Biological Resource Assessment was prepared for the project site by Wildlife Research Associates. In addition a Special Status Plant Survey Report was prepared by Jane Valerius Environmental Consulting and Geri Hulse-Stephens Botanical Consulting for the project site. And finally a Delineation of Waters of the United States, Including Wetlands was prepared by Jane Valerius Environmental Consulting. These studies were performed to attain a baseline assessment of the project site property to identify flora and fauna species that are or reasonably could be expected to be present at the project site and to evaluate the potential impacts associated with the implementation of the project. It should be noted that the project includes the landfill closure process which will include the removal and replacement of drainage structures within an unnamed tributary of Sulfur Creek which is tributary to the Russian River which will require permitting and mitigation measures by applicable regulatory agencies.

The following provides a summary of the findings and recommendations of these studies.

Wildlife
Wildlife Research Associates and Jane Valerius Environmental Consulting were contracted by the City of Ukiah to perform this Biological Resources Assessment for the federally listed Threatened California red-legged frog (*Rana draytonii*) and the federal and State listed threatened Central Coast steelhead (*Oncorhynchus mykiss irideus*).

The project site is dominated by non-native grassland on the landfill with blue oak woodland and mixed chaparral along the edges. The creeks support a riparian tree and shrub cover dominated by willows. Ponds on the site support cattail marsh or spikerush marsh vegetation and there are several small seasonal wetlands within the grassland at the borrow area on the east side. Potential jurisdiction wetlands and waters was delineated for the site.

The Biological Resource Assessment evaluated the potential for occurrence of 35 special-status plant species, and 19 special-status wildlife species, as well as the potential for California red-legged frog to occur on the

site.
There is potential habitat on site for several special status plants to occur. Focused, seasonal special status plant surveys were conducted in April and May with a third and final survey completed in July. No special status plants have been observed within the project study area.

Steelhead are known to occur within Sulphur Creek and the Russian River. The ephemeral tributary on-site does not support suitable habitat in terms of pool depth and the tributary dries by the end of the summer. In addition, a barrier to fish passage occurs in the ephemeral creek crossing at Redeemer Road (CNDDB 2015). As a result, no steelhead occur within the ephemeral tributary on site.

No California red-legged frog adults or larvae were detected during the field surveys, although suitable potential habitat for California red-legged frogs occurs on the site. The project site is located outside the range of California red-legged frogs in Mendocino County (USFWS 2009).

Foothill yellow legged frog (*Rana boylii*), a California Species of Special Concern, was observed within the ephemeral tributary within the proposed project area during the survey.

Several nesting passerines (perching birds), such as grasshopper sparrow (*Ammodramus savannarum*) were observed nesting within the project area.

For a complete discussion of the biological survey please refer to the Biological Resource Assessment that is included in Appendix E.

Plants
As required by the California Department of Fish and Wildlife (CDFW), plant surveys were conducted during the time of year when special status plants are most identifiable, which is typically when they are in flower. Prior to the site visit a search of the U. S. Fish & Wildlife Service (USFWS) quadrangle species lists (USFWS 2015), California Natural Diversity Data Base (CNDDB) (CNDDB 2015) and the California Native Plant Society (CNPS) (CNPS 2015) on-line electronic inventory was conducted for the 9-quadrangle search around the Ukiah 7.5-minute USGS quadrangle.

Surveys were conducted throughout the 2015 blooming window, capturing an entire blooming season. Site visits were conducted from spring to early summer, a period broad enough to include know blooming and fruiting times of potentially occurring special status plant species and also encompassing the blooming period of early annuals, wetland plants and late blooming herbaceous perennial species. These surveys took place on April 15, 21 and 29, May 19 and 22 and June 30, 2015. The survey was floristic in nature and took into account all vascular plant species, lichens and mosses encountered. The entire project area was covered on foot as thoroughly as possible so that all representative habitat types, topographic features and aspects were investigated. Material that could not be identified in the field was collected so that a determination could be made at a later time using a dissecting scope and reference materials. Mosses were collected and sent to a moss expert for identification. Sensitive plant communities were identified mapped and described. A complete list of vascular plant species, mosses and lichens were recorded along with habitat and plant community characteristics.

Plant Communities
Nomenclature for vegetation types follows *The Manual of California Vegetation* Second Edition (Sawyer, et. al. 2009) where applicable. Nine vegetation communities occur within the project study area. These are: 1) *Avena (barbata, fatua)* semi-natural herbaceous stands or wild oats grasslands; 2) ruderal forbs; 3) *Nasella pulchra* herbaceous alliance or purple needle grass grassland; 4) *Quercus douglasii* woodland alliance or blue oak woodland; 5) *Arctostaphylos manzanita* provisional shrubland alliance or manzanita chaparral; 6) *Salix exigua* shrubland alliance or sandbar willow thickets; 7) *Eleocharis macrostachya* herbaceous alliance or pale spike rush marshes; 8) *Typha angustifolia* herbaceous alliance or cattail marshes; and 9) seasonal wetlands.

1) Wild oats grasslands is the dominant vegetation type within the project study area as this type covers most of the landfill area, borrow area and roadsides. The wild oats grassland is mixed in with the ruderal forbs type. The revegetated portions of the landfill have a mixture of non-native grasses and in some areas non-native forbs (ruderal forbs) are dominant.

2) Ruderal forbs dominate the area on northeastern portion of the project study area in the flat area of the former borrow pit. This area is dominated primarily by non-native forb species.

3) Purple needle grass grassland was mapped in several locations in the borrow pit area. Small areas of purple needlegrass occur in other locations on the site but are not large enough to map separately as a stand along grassland community. The areas on the borrow site were large enough to map and identify as a separate plant community.

4) Blue oak woodland occurs along the southern portion of the project study area and also occurs along the northern bank of the unnamed creek that forms the northern boundary of the study area.

5) Manzanita chaparral occurs primarily on the northern portion of the study area along the north bank of the unnamed creek.

6) Sandbar willow thickets occur along unnamed creek that forms the northern boundary of the study area.

7) Pale spike rush marshes occur along the pond margins along with the cattail marsh types and also within vegetated sections of the unnamed creek channel in the eastern portion of the study area.

8) Cattail marshes occur in conjunction with the pale spike rush vegetation type and include the same species.

9) Seasonal wetlands were mapped in four areas in the eastern portion of the study area. Three seasonal wetlands were mapped in the borrow area and one occurs along the entrance road on the southeastern side of the project study area. Seasonal wetlands occur as relatively small depressions in the flatter areas of the borrow area. The one along the road appears to have developed as a result of water flowing along the inside portion of the roadway.

Special Status Plants

Review of the USFWS, the CDFW, and the CNDDB revealed that nine (9) federally listed plant species, one (1) federal candidate, three (3) state-listed species and twenty-two (22) CNPS ranked species have potential to occur in the area. There are no coastal dunes, coastal prairie, coastal scrub, coastal bluff scrub, volcanic ash flow vernal pools, lower montane coniferous forest, upper montane coniferous forest, North Coast coniferous forest, or closed-cone coniferous forest and no serpentinite within the project area that would provide habitat for many of these species. Although potential habitat occurs in the project area for many of the special status plant species known to occur in the area none were found during the protocol level seasonal plant surveys.

A total of 255 vascular plants and 41 mosses and lichens were observed during the April, May and June 2015 plant surveys. These 296 species represent 73 plant families. There was a high diversity of species even within the grassland areas of the landfill. The pond wetland areas actually have a low diversity of species, most of which are native species, but the ponds provide aquatic habitat which has high wildlife value. The creeks on the site have a diversity of both wetland and non-wetland species, most of which are native species, and also provide valuable wildlife habitat including habitat for the state listed foothill yellow-legged frog.

Findings

No special status plant species were found during the seasonal and protocol level plant surveys conducted for the project study area. In spite of the drought occurring in the region plants were in flower and 255 vascular plants were recorded along with 41 mosses and lichens. The surveys were conducted during the time of year

when special status plants would have been identifiable. Based on the surveys the site does not support any special status plants are none are expected to occur on the site.

The purple needle grass grassland is a special status vegetation community. This type occurs on the slopes of the existing former borrow area in the northeast portion of the study area. The sandbar willow thickets, cattail marsh, pale spike rush marshes and seasonal wetland areas are wetland vegetation types and even though they do not have a special status designation they are regulated by the US Army Corps of Engineers, North Coast Regional Water Quality Control Board and CDFW and therefore are considered to be sensitive natural communities and any impacts to these communities type will require mitigation if any impacts occur to these vegetation types.

For a complete discussion of the survey please refer to the Special Status Plant Survey Report that is included in Appendix F.

The project includes grading and drainage improvements as shown on the Construction Drawings in Appendix B. The construction activities have the potential to generate excessive turbidity by generation of sediment from ground disturbances. The actions of grading, capping and restoration activities as proposed for the project which includes erosion control measures being implemented during and following the project, will minimize the introduction of fine sediments to the stream channel. Several mitigation measures have been prescribed so that impacts to the stream channel and aquatic life are reduced to a less than significant level.

It should also be mentioned that during the construction phases of the landfill closure, the potential introduction of pollutants to the stream channel (e.g., gasoline, oil, lubricants of the heavy machinery to be used for grading, compaction, transportation of materials, etc.) may also occur, which could result in potential impacts to the aquatic life. Although the potential for such an impact is low, several mitigation measures have been identified for implementation during construction to ensure that the introduction of such pollutants does not occur.

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Less Than Significant With Mitigation Incorporated. As discussed, the project includes the removal and replacement of five storm drain outlets, installation of five new outlets and abandonment of six outfalls that discharge to the unnamed tributary to Sulfur Creek located directly adjacent to the landfill footprint. The work associated with these structures is subject to permitting by the California Department of Fish & Wildlife, the North Coast Regional Water Quality Control Board and the US Army Corps of Engineers. Due to the fact that no federally listed species present at the project site it is not expected that a Section 7 consultation will be required with the US Fish & Wildlife Service.

The work related to the storm drain outfalls is to occur within the bed and bank of the unnamed tributary of Sulfur Creek. While this work is relatively minor with a total of approximately 30 cubic yards of fill materials within the bed of the waterway, there will be disturbance to the bed and bank of the waterway during the construction activities.
Mitigation measures for the protection of the riparian corridor including plants and animals will be implemented as part of the work. In addition erosion control measures and restoration of the disturbed areas will be conducted as part of the work.

c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less Than Significant With Mitigation Incorporated. A wetlands delineation was completed for the project site by Jane Valerius. There are two unnamed creek drainages within the project study. The eastern tributary

drainage is an ephemeral drainage and is mapped as vegetated other waters. The upper portion of the main drainage that forms the northern boundary of the study area is dry with no wetland vegetation in the creek channel. The lower portion of the northern creek channel from the bridge to the western end of the study area has wetland vegetation within the creek bed and within the ordinary high water mark. The northern creek channel varies in width but has an average width of between 15 to 20 feet within the ordinary high water mark. The eastern tributary channel is more narrow and incised and varies from 8 to 10 feet in width. Areas mapped as potential jurisdictional wetlands also include the three former sediment ponds that occur within the study area. A fourth pond, identified as the leachate pond, has not been identified as jurisdictional because this pond is part of the treatment system for the landfill, even though it supports wetland vegetation. Seven small seasonal wetland were also mapped.

A total of 32,623 square feet (sf) or 0.75 acres of non-vegetated other waters were mapped for the two unnamed tributary creek drainages, along with 44,383 sf (1.02 acres) of vegetated other waters, 119,010 sf (2.73 acres) of vegetated ponds and 6,130 sf (0.14 acres). The total potential jurisdictional area is 202,146 sf or 4.64 acres. The three sedimentation ponds at the project site are identified as jurisdictional wetlands. The creek is identified as vegetated other waters and other waters which lack wetland vegetation. Isolated seasonal wetlands are also present in several areas located off the landfill footprint. The work related to the replacement of old storm drains and installation of new drains will work within limited areas of the bed and bank of the channel of the seasonal creek. This work will require permitting and mitigation from applicable agencies. Avoidance and mitigation measures will be implemented to protect jurisdictional waters and sensitive habitat areas.

d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less than Significant Impact. The project site footprint for the landfill is approximately 40 acres. With the exception of temporary, construction-related activities that would occur during the closure construction activities, the project implementation would not result in any significant changes to the landfill or physical environment beyond the limits of the landfill footprint. The area surrounding the project site encompasses open space and rangelands on all sides with some residential development to the south. The project as proposed would not result in any direct long-term impacts to wildlife movement in the area. With the final cover of the landfill surface being a geosynthetic material that is ballasted with sand is not expected to produce sediment that would impact the creek and associated aquatic processes. In addition, the proposed drainage system would be expected to reduce the amount of sedimentation that may enter the creek. No significant impacts are anticipated either to wildlife movement and project implementation would not adversely affect any native wildlife nursery sites. No mitigation measures are required.

e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Less than Significant Impact. The proposed project is located in an area that is comprised generally of grasslands and oak woodlands with some chaparral. There are no trees that exist within the refuse footprint of the landfill. The proposed project will include earthwork and grading that will occur almost exclusively within the limits of the existing landfill footprint. Project implementation will include the replacement and abandonment of several storm drain outlets located on the bed of the unnamed tributary stream that does include limited riparian vegetation. The wetland delineation and biological survey indicated no presence of listed and protected plant and animal species within the area of the proposed project. Potential impacts to trees located along the periphery of the landfill footprint that may be affected by the project activities within the landfill or any of the environmental control systems such as the landfill gas flare compound would not be significant because they do not support sensitive species and are not otherwise protected. Therefore, potential impacts are less than significant; no mitigation measures are required.

f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Less than Significant Impact. There are no known Habitat Conservation Plans in effect for the project site property or surrounding area As a result, potential impacts will be less than significant.

Cumulative Impacts

Project implementation will result in some temporary impacts during the final closure activities, including potential erosion and sedimentation. In addition, noise and dust generated during the construction of the final cover and related environmental control systems could also affect some avian and small animal species in the project area. In order to ensure that such impacts are avoided or reduced, several mitigation measures must be implemented, which will also minimize the potential for significant cumulative effect to occur as well. Once final closure of the Ukiah Landfill has been completed, no significant long-term (i.e., operational) impacts will occur. With the exception of regular maintenance that will take place on the site, no activities will occur that would affect either sensitive habitat or species in the project area. Therefore, potentially significant project-related cumulative impacts would be less than significant.

Mitigation Measures

Potential project-related impacts to terrestrial and aquatic biological resources will be reduced to a less than significant level through the implementation of the measures prescribed below.

<u>Construction Related Mitigation Measures</u>

MM 4.4-1 Work is proposed to be conducted outside the rainy season (defined as October 15-April 15), primarily between June 15 and October 15, after the summer season when the creek flows are low, therefore no erosion or sediment control is expected to be necessary. To avoid debris contamination in the creek, a silt fence will be placed parallel to the project area in the creek to contain spoils from drilling and any concrete that may inadvertently drop into the creek during construction. All debris will be cleared out of the creek before the silt fence is removed.

MM 4.4-2 Prior to the start of construction, a Service-approved biologist will train all construction personnel regarding habitat sensitivity, identification of special status species, and required practices before the start of construction. The training will include the general measures that are being implemented to conserve the species as they relate to the project, the penalties for non-compliance, and the boundaries of the project area. If new construction personnel are added to the project, the contractor will ensure that the personnel receive the mandatory training before starting work. A fact sheet or other supporting materials containing this information will be prepared and distributed to all construction personnel. Upon completion of training, construction personnel will sign a form stating that they attended the training and understand all the conservation and protection measures.

MM 4.4-3 No project related activities will occur outside the exclusion fence.

MM 4.4-3 Appropriate dust abatement measures (e.g., spraying exposed areas) shall be implemented during construction if airborne dust appears to be significant.

MM 4.4-4 During grading, avoid side-casting excess material downslope towards the stream channel.

MM 4.4-5 All on-site storage of fuels, oils, and lubricants shall be located in an area where an accidental spill prevents this material from flowing downslope towards the stream.

MM 4.4-6 All equipment that uses fuels, oils, and/or lubricants, when not in use, shall be stored in areas where leakage and spills do not flow downslope toward the creek.

MM 4.4-7 Regular inspections of all equipment fuel lines, connections, filters, etc., shall be performed to ensure that leaks are detected and treated in a timely fashion.

MM 4.4-8 All refueling of machinery shall occur in an area where accidental spills will not flow toward the stream channel. Fuel absorbent matting and other spill containment materials shall be stored on-site and all operators shall be familiar with their proper use.

MM 4.4-9 The project site shall be restored to pre-construction condition or better. Streambank, ground and/or soil exposed as a result of construction, and soil within and above toe-rock shall be revegetated by live planting, seed casting, or hydroseeding prior to November 30 of the project year. All debris, sediment, rubbish, vegetation or other material removed from waterway shall be removed to a location where it will not re-enter the waters of the state.

Wildlife Related Mitigation Measures

MM 4.4-10 Roosting and Nesting surveys for special-status species (i.e., bats and birds) by a qualified biologist shall be conducted at the appropriate times before construction starts to determine occupancy at the site. If no special-status species are found, no further action other than the Best Management Practices identified above are required. If individuals are found, including nesting birds, a buffer zone around the species or nest will be required at a sufficient distance to prevent take of individual plants, or until after the nesting season.

MM 4.4-11 Due to the potential for special-status species to occur, move through, or into the ephemeral tributary portion of the project area, an on-site monitor, shall at a minimum, check the ground beneath all equipment and stored materials each morning before construction starts to prevent take of individuals. All pipes or tubing 4 inches or greater shall be sealed by the relevant contractor with tape at both ends to prevent animals from entering the pipes at night. All trenches and other excavations shall be backfilled the same day they are opened, or shall have an exit ramp built into the excavation to allow animals to escape.

MM 4.4-12 For all areas where rock is to be placed and pools are present, the applicant will capture and relocate any native amphibians found at pools nearest to the rock base placement (within 35 feet or based on a biologist recommendation). Captured native animals will be relocated to the closest pool.

MM 4.4-13 The proposed project could result in “take” of individual foothill yellow-legged frog known to occur within this portion of the ephemeral tributary. There is potential for both adults and tadpoles to be affected by the proposed project. Construction will occur above any existing water. If this is not possible, measures will be taken to isolate the workspace from flowing water to prevent stream sedimentation and turbidity. To prevent take of individuals a pre-construction survey of the ephemeral tributary shall be conducted 3 months in advance of work proposed for the ephemeral tributary. The surveys will determine if individuals are present. If no individuals (e.g., adults, juveniles or tadpoles) are present, no further action is required. If adults are present work in the creek shall occur after the metamorph stage of development, typically after August. This timing will ensure that individuals can leave an area of the own volition.

MM 4.4-14 The proposed project could result in “take” of individual western pond turtle that may move along this portion of the ephemeral tributary and may use the ponds on the site. To prevent take of individuals a pre-construction survey of the ephemeral tributary and the ponds shall be conducted 3 months in advance of work proposed for either water body. The surveys will determine if individuals are present. If no individuals (e.g., adults, or juveniles) are present, no further action is required. If individuals are present measures to prevent take of individual foothill yellow-legged frog will address concerns for western pond turtle.

MM 4.4-15 The proposed project could result in the removal of occupied passerine nests in the trees and

shrubs on the project site. Disturbance during the nesting season may result in nest abandonment and mortality of young. Bird species not protected under CESA or FESA, such as some passerines (including mourning dove and scrub jays) are protected under the Fish and Game Code 3503 and the MBTA, and some raptors (including American kestrel) are protected under Fish and Game Code 3503.5 and the MBTA. These aforementioned species may potentially be impacted by the removal of potential nesting habitat in the trees within the project area. Disturbance during the nesting season (February 15- August 15) may result in the potential nest abandonment and mortality of young, which is considered a "take" of an individual. This is a potentially significant impact. To avoid "take" and/or further evaluate presence or absence of passerines, the following measures are recommended:

1. Grading or removal of nesting trees should be conducted outside the nesting season, which occurs between approximately March 1 and August 15.
2. If grading between August 15 and March 1 is infeasible and groundbreaking must occur within the breeding season, a pre-construction nesting bird (both passerine and raptor) survey of the grasslands and adjacent trees shall be performed by a qualified biologist within 7 days of ground breaking. If no nesting birds are observed no further action is required and grading shall occur within one week of the survey to prevent "take" of individual birds that could begin nesting after the survey.
3. If bird nests (either passerine and/or raptor) are observed during the pre-construction survey, a disturbance-free buffer zone shall be established around the nest tree(s) until the young have fledged, as determined by a qualified biologist.
4. The radius of the required buffer zone can vary depending on the species, (i.e., 75-100 feet for passerines and 200-300 feet for raptors), with the dimensions of any required buffer zones to be determined by a qualified biologist in consultation with CDFG.
5. To delineate the buffer zone around a nesting tree, orange construction fencing shall be placed at the specified radius from the base of the tree within which no machinery or workers shall intrude.
6. After the fencing is in place there will be no restrictions on grading or construction activities outside the prescribed buffer zones.

Plant Related Mitigation Measures

MM 4.4-16 The project shall either avoid take or obtain formal incidental take coverage with the required compensatory measures where avoidance cannot be achieved for the affected categories: state and federally listed or proposed species, state candidates for listing, and California Native Plant Society (CNPS) Rank 1B species.

MM 4.4-17 For species that do not have formal take protection (e.g., CNPS Rank 1B plants and federally-listed plants where there is no federal nexus), the City shall avoid, minimize, and/or compensate (in that order of preference) at the same level of mitigation as those species that are afforded formal take protection.

MM 4.4-18 If listed plant species are found on the project site, then the project applicant shall prepare a mitigation plan that describes the avoidance or compensatory mitigation measures that would be implemented for these populations. As a performance standard, the plan shall provide for no net loss in the quantity or quality of plant populations. The mitigation plan shall be submitted to the USFWS and/or CDFW for approval for federal and state-listed plants, respectively. The mitigation plan shall include the mitigation measures, which are adopted from the CNPS Policy on *Mitigation Guidelines Regarding Impacts to Rare, Threatened and Endangered Plants* (CNPS 1998), described below, or equally effective alternative measures:

1. Mitigation for impacts to listed plants would include avoidance measures, when feasible, and compensatory mitigation when avoidance is not possible. Avoidance measures shall include buffer zones to avoid impacting listed plants; installing exclusion fencing around the existing plant populations prior to and during construction. Compensatory mitigation shall include replanting on site or propagation of plants at a nearby conservation site through seeding or translocation. Mitigation

ratios shall be sufficient to achieve performance criteria of no net loss of plants. Post-project monitoring shall verify that avoidance and mitigation measures are successful.

2. If mitigation for impacts to listed or List 1B plants occurs at a non-bank site, preference would be given to locating the mitigation site in an area as close to the project site as possible. If mitigation sites are not available in the vicinity of the project site, mitigation for listed plants may be accomplished at any site in Mendocino County that is suitable and supports the impacted plant population.

3. A long-term mitigation, monitoring, and management plan shall be developed for plant mitigation and submitted to the USFWS and/or CDFW for approval prior to initiation of construction activities. Mitigation sites shall be monitored for five years after installation. Depending on the actual case-by-case circumstances listed plants within the Project footprint may be salvaged and/or transplanted to a mitigation site approved by the CDFG and/or USFWS. When feasible, seed from plants unavoidably impacted shall be collected and preserved for planting on an approved mitigation site.

4. Impacted plants shall be mitigated at the ratio of 2:1, or as required by resources agencies, for both individuals and area.

5. All storage and staging areas shall be located outside of stands of listed plants.

MM 4.4-19 The project shall avoid significant loss of individuals of a CNPS Rank 2, 3, or 4 (sensitive) plant species, to the extent feasible. Avoidance measures shall include, but not be limited to, buffer zones, to avoid impacting special status plants and installation of exclusion fencing around the existing plant populations prior to and during construction. If the impacts from the project exceed 15% of the known occurrences or populations in Mendocino County, then plants shall be relocated or compensatory mitigation shall occur. The project applicant shall prepare a mitigation plan that describes the avoidance or compensatory mitigation measures that would be implemented for these populations. The mitigation plan would be submitted to the CDFW for approval and include the following, or equally effective alternative measures:

1. Prior to the initiation of construction, Rank 2, 3 or 4 plants that would be unavoidably impacted during construction shall be salvaged and transplanted or their seeds shall be collected and preserved for subsequent re-planting. The transplanted plants or seeds shall be reestablished on site if possible; otherwise, they shall be established on a mitigation parcel. Mitigation sites shall be monitored for five years after installation.

2. Impacted Rank 2, 3 or 4 plants shall be mitigated at a ratio of 1:1, or as required by resources agencies, for both individuals and area.

MM 4.4-20 Removal of trees containing suitable bat roosting habitat comprised of cavities, crevices, and/or exfoliating bark, may cause direct mortality of roosting bats if removed during maternity season prior to self-sufficient volancy of pups, or in winter during torpor or hibernation. Removal of larger mature trees has the potential of causing direct mortality of solitary tree-roosting species such as western red bat or hoary bat. Presence/absence surveys for bats in trees are extremely problematic for several reasons. First, only a small percentage of trees can be effectively surveyed by inspecting crevices or cavities due to limited physical access to the roost features, or complete visual access of the feature. As a result, in most cases, trees must be surveyed at night using night vision and bioacoustic equipment to observe any bats emerging from roost features. Typically, only one, or two adjacent trees can be surveyed by each observer each night. In addition, bats are less site-faithful to trees than other roost types like caves, mines, bridges or buildings, and switch tree roosts frequently when active. Therefore, trees must be removed no more than 24-48 hours after each night emergence survey, to ensure the tree is removed prior to bats moving in subsequent to surveys. Because of these logistical limitations, it is rarely safe to rely on emergence surveys of trees if more than a few are present on a project site. Instead, it is generally more cost-effective to presume presence of roosting bats, then conduct two-step tree removal during seasonal periods of bat activity, so that bats can safely abandon

the tree prior to removal. These dates are:

A) Between March 1 (or after evening temperatures rise above 45F and 72 hours after rains fall to less than 0.5" in 24 hours) and April 15 (maternity season), after which time non-volant pups are present in maternity roosts, and;

B) Between September 1, after young are self-sufficiently volant, and October 15, or before evening temperatures fall below 45F, and 72 hours prior to onset of rains greater than 0.5" in 24 hours.

4.5 Cultural Resources

Would the project:	**Potentially Significant Impact**	**Less than Significant With Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines §15064.5?				X
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5?				X
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X
d. Disturb any human remains, including those interred outside of formal cemeteries?				X

Significance Criteria:

As part of the determination made pursuant to the Public Resources Code (PRC) Section 21080.1, the lead agency must also determine whether a project may have a significant effect on "unique" archaeological resources. As defined in PRC Section 21083.2(g), an archaeological resource will be "unique" if it:

- Is associated with an event or person of recognized significance in California or American history or recognized scientific importance in prehistory

- Can provide information that is of demonstrable public interest and is useful in addressing scientifically consequential and reasonable research questions.

- Has a special or particular quality such as oldest, best example, largest, or last surviving example of its kind.

- Is at least 100 years old and possesses substantial stratigraphic integrity.

- Involves important research questions that historical research has shown can be answered only with archaeological methods.

- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; and/or

- Directly or indirectly destroy fossils that have potential to increase scientific knowledge, including all identifiable vertebrate remains, corals, and plants

Analysis:

a. Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines §15064.5?

No Impact. The site is a closed landfill that has been significantly altered as a result of grading and excavation and the deposition of refuse into the Class III landfill. There are no identified historical structures and/or other historical resources currently known to exist either on the site or within the project area, which is characterized by grassland and devoid of any development. Project implementation will include grading and site alteration in order to implement the proposed final closure plan, including environmental control systems. However, it is not anticipated that any historic resources will be affected, either directly or indirectly as a result of the construction activities, which would not affect any area within the project site property that has not already been altered or areas off-site that have not been altered. Therefore, no impacts to historical resources will occur as a result of project implementation and no mitigation measures are required.

b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5?

No Impact. The subject property was utilized as a Class III municipal landfill between 1955 and 2001. Approximately 40 acres of the 283.5 acre property encompass the project area. The landfill activities that occurred at the property extensively altered the property as a result of the landfilling and related activities necessary to maintain the project site property. The proposed project includes the construction of the final cover for the landfill as well as associated activities such as groundwater quality monitoring and site maintenance. Cover materials for the final cover will consist of a geosynthetic membrane that is ballasted with sand. Some excavation of the existing borrow site located within the limits of the site will occur as necessary which would result in additional site disturbance; however, it is important to note that these areas have been previously altered by past grading activities conducting at the project site. As a result, it is not likely that significant archaeological resources would be encountered during the proposed final closure and post closure activities. Therefore, potential impacts are anticipated to be less than significant. Nonetheless, because surface disturbance is proposed, a measure has been proposed that includes on-site monitoring during grading to ensure that if any artifacts are uncovered, they can be properly evaluated and appropriate mitigation action(s) implemented, if necessary, prior to proceeding with grading.

c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No Impact. As previously indicated, the subject property has been significantly altered as a result of prior grading and landfill activities that have occurred on the site between 1955 and 2001. Implementation of the final closure plan, which includes some additional excavation within the project site property and placement of final cover over the landfill as well as installation/modification of the environmental control systems will not result in any potentially significant impacts to paleontological resources because the areas that will be altered by the proposed project have already been altered; no paleontological resources are known to existing within the affected areas and, therefore, no impacts to such resources would occur. Therefore, no significant impacts are anticipated and no mitigation measures are required.

d. Disturb any human remains, including those interred outside of formal cemeteries?

No Impact. The project will not encompass any sites or properties that possess known cultural values. Specifically, no formal cemeteries are located either on the project site in the vicinity of the project area, and no human remains are known to exist within the project site area. Although project implementation will require grading and limited excavation to implement the proposed project, the discovery of human remains is not anticipated. As a result, no significant impacts are anticipated. However, in the unlikely event that human remains would be encountered, compliance with the State Health and Safety Code and Public Resources Code (refer to SC 4.5-2) will ensure that they are properly treated, if found on the site. Therefore, no impacts are anticipated.

Cumulative Impacts
As indicated above, the subject property has been extensively altered as a result of prior excavation associated with the operation of the landfill. As a result, no cultural and/or paleontological resources are expected to occur that would result in significant cumulative impacts.

Mitigation Measures
No significant impacts are anticipated to occur to cultural/archaeological, paleontological and/or historic resources; no mitigation measures are required.

MM 4.5-1 Prior to the approval of the project Plans and Specifications, the City of Ukiah Public Works Department shall confirm that the plans and specifications stipulate that if evidence of subsurface archaeological resources are found during construction, excavation and other construction activity in that area shall cease and the contractor shall contact the Construction Engineer, who will then contact a county certified archaeologist to determine the extent of the find and take proper actions.

MM 4.5-2 If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC. The City of Ukiah Public Works shall consult with the MLD regarding treatment and disposition of the human remains and items associated with Native American burials.

4.6 Geology and Soils

Would the project:	**Potentially Significant Impact**	**Less than Significant With Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.			X	
2) Strong seismic ground shaking?			X	

3) Seismic-related ground failure, including liquefaction?			X	
4) Landslides?			X	
b. Result in substantial soil erosion or the loss of topsoil?			X	
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?			X	
d. Be located on expansive soil, as defined in Table 18-1-B of the California Building Code (2001), creating substantial risks to life or property?			X	
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				X

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if one or more of the following conditions occur as a result of implementation of the proposed project:

• Ground shaking and/or secondary seismic effects (i.e., liquefaction, slope failure, etc.) could cause substantial structural damage and/or an unmitigated risk to human safety, even after implementation of the recommended geotechnical measures, required local and State seismic design parameters, and common engineering practices for seismic hazard abatement.

• Adverse soil conditions such as compressible, expansive, or corrosive soils are not mitigated and present a damage hazard to occupied structures or infrastructure facilities.

Analysis:

a.1. **Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving r*upture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.***

Less than Significant Impact. The project site is located approximately one mile east of the Maacama Fault Zone as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. There are no mapped faults located on the project site property. As previously indicated, the proposed project is to construct the final cover and environmental control systems for the Ukiah Landfill and no structures are proposed with the exception of landfill gas flare. Scheduled maintenance of the flare and compliance monitoring of groundwater and landfill gas will occur following final closure; however there would be no occupants on the project site that would be exposed to the effects of fault rupture.

The final closure design includes an analysis of stability that includes earthquakes and ground shaking. Since the landfill is positioned near the Maacama Fault Zone, in the event of a large earthquake whose focal mechanism is close to the project site, ground rupture could occur. The probability of such an occurrence is regarded as considerably smaller than the possibility of a maximum probably earthquake (MPE) event, and would be largely mitigated by the elastic properties of the refuse and cover materials. While such an event could still result in distress to the final cover, inspection of the project site and repair of the geosynthetic cover could be employed to mitigate this condition. The site has been designed in accordance with the applicable design standards and the potential adverse effects associated with fault rupture as well as other secondary

seismic effects would be reduced to a less than significant level as a result of the design and no additional mitigation is required.

a.2. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

Less than Significant Impact. The project site is located in the northern portion of the Coast Ranges geomorphic province, which is characterized by a series of northwest-southeast trending ridges and valleys that are associated with faults and folds that follow the same trend. The project site is located approximately one mile east of the Maacama Fault Zone which is identified as a Holocene Fault and mapped as a Special Studies Zone by the State of California.

The proposed project is to include the final closure of the landfill and there will be no occupants at the property. A seismic hazard review was completed to evaluate the earthquake parameters that could affect slope stability conditions at the project site in the event of an earthquake event. The final closure design of the landfill was engineered to accommodate the design parameters of a Maximum Probable Event in order to minimize potential damage pursuant to all applicable regulatory requirements. While the project site is seen as being minimally susceptible to potentially strong seismic shaking, no structures are proposed on the landfill and, with the exception of regular monitoring and maintenance of the environmental control systems that would be periodically conducted no workers or occupants would occupy the project site. Based on these factors no significant impacts are anticipated and no additional mitigation measures are required.

a.3. ***Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?***

Less than Significant Impact. Although the project site is located approximately one mile from the Maacama Fault Zone and would be subject to potentially strong seismic ground shaking and related secondary effects, the proposed project does not include the construction of any buildings and/or structures and, furthermore, would not be occupied by workers that would be subjected to the effects of seismic-related ground failure. As previously indicated, the landfill closure has been designed in accordance with all applicable regulatory requirement prescribed in Title 27, which are intended to reduce the potential for losses of both property and life. As a result, potential impacts will be less than significant; no mitigation measures are required.

a.4. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

Less than Significant Impact. As indicated the proposed project does not include the construction of any buildings or related structures that would be occupied with workers. As a result, project implementation would not subject either people or structures to the potential adverse effects of landsliding. The closure plan has been designed to ensure that the potential for slope failure is minimized. The stability of the proposed final cover system addressed both the steepest and highest slopes that will exist on the landfill. The construction specifications for final closure construction will specify the minimum material strength and other performance criteria required to meet the design standards

b. Result in substantial soil erosion or the loss of topsoil?

Less than Significant Impact. Grading and excavation of the landfill during the closure construction phase will expose soils temporarily and result in potential erosion from the action of both water and wind. In order to ensure that potential erosion is minimized, the landfill closure design incorporates erosion control measures that will reduce the potential for soil erosion. These features include landfill grading, vegetation, and a slope bench system. The decks will be graded in such a way as to allow for sheet flow run-off over a minimum slope of approximately three percent. In addition, any large erosion gullies formed during storm events on the deck

and slopes will be filled and the area track walked by a crawler tractor to replace and recompact the soil as part of post-closure maintenance activities. The erosion control plan is incorporated into the final design plans and specifications that is included in Appendix B. In addition a Construction Stormwater Permit will be obtained and implemented to control erosion during the construction phase of the project. Therefore, project design with the erosion control measures identified above will avoid potentially significant erosion impacts. No additional mitigation measures are required.

c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Less than Significant Impact. As discussed previously the closure design of the landfill has been designed to provide and maintain slope stability to minimize the potential for slope failure. As a result, potential impacts associated with landsliding and/or slope failure is reduced to a less than significant level. Furthermore, the landfill appears to be founded on stable geologic formation with no indication of active or recent landsliding activity. As expected, the greatest settlement of the landfill is expected to occur in areas where refuse thicknesses are greatest; however, no significant settlement of the foundation subgrade underlying the landfill anticipated.

d. Be located on expansive soil, as defined in Table 18-1-B of the California Building Code (2001), creating substantial risks to life or property?

Less than Significant Impact. The project encompasses an approximate 40 acre landfill footprint that is underlain by native soil consisting of alluvium and continental terrace deposits. As previously indicated, no structures are proposed that would be exposed to potential expansive soils. Therefore, project implementation would not result in substantial risks to either life or property. No mitigation measures are required.

e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No Impact. The proposed project does not include any development that would require sewage disposal. Final closure of the SCL includes the construction of a top deck and related environmental control systems that neither generate raw sewage nor create a need for sewage disposal, including the use of septic tanks or alternative waste water disposal system. No significant impacts will occur and no mitigation measures are required.

Cumulative Impacts

Project implementation will not result in any significant cumulative impacts associated with site soils or geology because the final cover and environmental control systems proposed for the SCL have been designed to meet all applicable regulatory requirements prescribed in Title 27 of the California Code of Regulations (27 CCR), Chapters 3 and 4 and the Code of Federal Regulations (CFR) 40, Subpart F to ensure that loss of property and life is minimized on the subject property. Therefore, cumulative soils and geologic impacts are anticipated to be less than significant.

Mitigation Measures

As indicated in the analysis presented in this section, the site has been designed based on the results of the detailed soils and geologic testing and investigation conducted for the proposed project. The project as designed complies with all applicable regulatory requirements, including Title 27. As a result, potential soils and geologic impacts have been avoided or reduced to a less than significant level through project design. Therefore, no mitigation measures are required.

4.7 Greenhouse Gas Emissions

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			X	
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			X	

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if one or more of the following conditions occur as a result of implementation:

- The project generates GHG emissions, directly or indirectly that may have a significant impact on the environment, or,

- The project conflicts with an applicable plan, policy or regulation adopted to reduce GHG emissions.

Analysis:

Illingworth and Rodkin prepared a Construction Greenhouse Gas Emissions Assessment for the proposed project (Appendix C). The assessment analyzed potential climate change/greenhouse gas impacts. The analysis presented below summarizes the findings and recommendations of that analysis and addresses the initial study checklist issues noted above.

a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less than Significant Impact. Global temperatures are affected by naturally occurring and anthropogenic-generated atmospheric gases, such as water vapor, carbon dioxide, methane, and nitrous oxide. Gases that trap heat in the atmosphere are called greenhouse gases. Solar radiation enters the earth's atmosphere from space, and a portion of the radiation is absorbed at the surface. The earth emits this radiation back toward space as infrared radiation. Greenhouse gases, which are mostly transparent to incoming solar radiation, are effective in absorbing infrared radiation and redirecting some of this back to the earth's surface. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This is known as the greenhouse effect. The greenhouse effect helps maintain a habitable climate. Emissions of GHGs from human activities, such as electricity production, motor vehicle use and agriculture, are elevating the concentration of GHGs in the atmosphere, and are reported to have led to a trend of unnatural warming of the earth's natural climate, known as global warming or global climate change. The term "global climate change" is often used interchangeably with the term "global warming," but "global climate change" is preferred because it implies that there are other consequences to the global climate in addition to rising temperatures. Other than water vapor, the primary GHGs contributing to global climate change include the following gases:

- Carbon dioxide (CO2), primarily a byproduct of fuel combustion;

- Nitrous oxide (N2O), a byproduct of fuel combustion; also associated with agricultural operations such as the fertilization of crops;

- Methane (CH4), commonly created by off-gassing from agricultural practices (e.g. livestock), wastewater treatment and landfill operations;

- Chlorofluorocarbons (CFCs) were used as refrigerants, propellants and cleaning solvents, but their production has been mostly prohibited by international treaty;

- Hydrofluorocarbons (HFCs) are now widely used as a substitute for chlorofluorocarbons in refrigeration and cooling; and

- Perfluorocarbons (PFCs) and sulfur hexafluoride (SF6) emissions are commonly created by industries such as aluminum production and semiconductor manufacturing.

These gases vary considerably in terms of Global Warming Potential (GWP), a term developed to compare the propensity of each GHG to trap heat in the atmosphere relative to another GHG. GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and the length of time of gas remains in the atmosphere. The GWP of each GHG is measured relative to CO2. Accordingly, GHG emissions are typically measured and reported in terms of equivalent CO2 (CO2e). For instance, SF6 is 22,800 times more intense in terms of global climate change contribution than CO2. The State of California is addressing the issue of GHG through legislation, policy guidance, and outreach programs. CO2 is the primary GHG emitted from land use and industrial projects. In 2006 California enacted AB 32 – the Global Warming Solutions Act, which requires that statewide GHG emissions be reduced to 1990 levels by 2020. In 2008, the California Air Resources Board (CARB) adopted the Climate Change Scoping Plan in response to AB 32. This plan describes the strategies that the State will implement to reduce future emissions by 28% to meet the 1990 target goal in 2020.

Per Appendix G of the CEQA Guidelines, greenhouse gas emissions are considered significant if implementation of the proposed projects would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Mendocino County Air Quality Management District has published CEQA thresholds of significance. However, there are no established thresholds of significance for GHG emissions during temporary construction.

Construction Emissions
CalEEMod was used to predict construction emissions in the form of CO2e. CalEEMod is a computer model developed by the South Coast Air Quality Management District (SCAQMD) with cooperation of other California Air Districts to estimate air pollutant and GHG emissions. The model is recommended by MCAQMD for use in quantifying construction and development project GHG emissions. The project applicant provided the anticipated construction schedule and proposed construction equipment, which were input to the model. An approximate 6-month construction schedule was entered in the model based on project-specific information. See *Attachment 1* for the project construction schedule. Construction phases included the following:

- Demolition and removal of piping and drain inlets;

- Site preparation;

- Grading/excavation;

- Well drilling;

- Final cover;
- Utilities (storm drain, LFG pipe);
- Construction of the LFG flare station; and
- Paving of roads.

In addition, the project size (50 acres including borrow area surfaces) was input to the model. The anticipated soil hauling volumes (114,500 cubic yards (cy) foundation layer, 3,500 cy of sand and site excavation excavation) were also input. Preparation of the LFG flare station foundation would require approximately 8 cy of concrete.

Results of modeling indicate that construction of the project would emit 460 metric tons of CO2e. As mentioned above, neither Mendocino County nor the MCAQMD have quantified thresholds for construction activities. For comparison, the emissions would be below the lowest threshold (1,100 metric tons of C02e per year for land use development projects) adopted by MCQMD and would be considered less-than significant.

It should be noted that the project applicant is encouraged to incorporate best management practices to reduce GHG emissions during construction, where feasible and applicable. Best management practices may include, but are not limited to, using alternative-fueled (e.g., biodiesel, electric) construction vehicles/equipment for at least 15 percent of the fleet, using at least 10 percent local building materials, and recycling or reusing at least 50 percent of construction waste or demolition materials.

b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less than Significant Impact. While explicit thresholds and requirements for greenhouse gas emissions have yet to be developed by Mendocino County, various state agencies have begun to examine proposed land use plans and specific projects for their potential GHG impacts. Because Mendocino County is primarily rural, the amount of greenhouse gases generated by human activities (primarily the burning of fossil fuels for vehicles, heating, and other uses) is small in total compared to other, more urban counties (although higher per capita due to the distances involved in traveling around the County) and miniscule in statewide or global terms. However, like all other areas worldwide that contribute to global warming, Mendocino County will be affected by climate change and shares a responsibility to address this issue. Long-term efforts will focus on reductions in the sources of greenhouse gases in the county through a comprehensive greenhouse reduction plan for both County operations and the broader area governed by Mendocino County. In the near term, this Mendocino County General Plan identifies energy-reducing policies that will also lower overall CO_2 emissions.

The County's Resource Management Element has identified several policies that address GHG, including Policy RM 50 to implement existing strategies to reduce GHG emissions and incorporate future measures adopted by the State in the future. The Policy identifies several action items, including;

- RM 50.1 to inventory existing and historical sources of GHG in the County and coordinate with other jurisdictions to ensure completeness,
- RM 50.2 To create a GHG reduction plan for the unincorporated areas of the County that sets specific reduction strategies and targets, and
- RM 50.3 To reduce the County's GHG emissions by adopting measures that reduce the consumption

of fossil fuel.

As indicated above, the proposed project encompasses only short-term, construction impacts required to implement the final closure plan. Because the MCAQMD has not adopted a significance threshold, the significance of the project-related CO2(e) emissions, which was based on the Bay Area Air Quality Management District threshold of 1,100 MT/year for operational CO2(e) emissions, was determined to be less than significant. Furthermore, no operational GHG emissions would occur and, therefore, none of the policies adopted by the County would apply to the proposed project. Thus, the proposed project would not conflict with any long-range policy and/or program of the County.

Cumulative Impacts
Project-related cumulative impacts will not be significant because the MCAQMD does not have a threshold for construction emissions. Nonetheless, the short-term (i.e., construction) emissions of GHG will not exceed the 1,100 MT/Year threshold for operational emissions adopted by the Bay Area Air Quality Management District.

Mitigation Measures:
No significant GHG impacts will occur as a result of project implementation and no mitigation measures are required.

4.8 Hazards and Hazardous Materials

Would the project:	**Potentially Significant Impact**	**Less than Significant With Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			X	
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d. Be located on a site, which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, and, as a result, would it create a significant hazard to the public or the environment?			X	

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?			X	
f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if one or more of the following conditions occur as a result of implementation of the proposed project:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment.
- Result in a safety hazard for people residing or working in the project area if located within two miles of a public airport or public use airport.

Analysis:

a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less than Significant Impact. The proposed project does not include any operations that would result in the transport of hazardous materials, either to or from the project site property. Final closure of the landfill includes grading and excavation associated with relocating some refuse that is located under existing power transmission lines to other locations of the landfill; however, no refuse would be transported off the site. No significant impacts are anticipated and no mitigation measures will be required.

b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Less than Significant Impact. Toxic air contaminants could have a substantial exposure risk if they were generated by site activities, and if there was a sensitive population in the project vicinity. Any temporary

surface disturbance of the landfill could create dust that contains naturally occurring asbestos and crystalline silica. The possible presence of these materials depends upon the geomorphology of the underlying rock of a given site. Asbestos containing minerals are typically associated with mafic and ultamafic rocks such as serpentine. A review of the geologic map for the project site does not map serpentine soils as being present.

Crystal silicon dust is mainly associated with igneous and metamorphic rock formation. The project site is underlain by alluvial deposits and continental terrace deposits. This lithology contains could contain silicon dust. Dust generation from excavation and placement of final cover will have negligible potential for generation of any hazardous materials. Any public impact potential is further mitigated by the limited duration of the activity, and by the large distance buffer between on-site emissions and the nearest off-site receptors. With the control of fugitive dust the impacts from dust will be insignificant.

c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No Impact. The subject property is located in an area that is rural in nature. No schools exist within one-quarter mile of the project site. As a result, air emissions and other landfill-related emissions would not affect a school within the one-quarter mile radius criterion. No significant impact will occur and no mitigation measures are required.

d. Be located on a site, which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, and, as a result, would it create a significant hazard to the public or the environment?

Less than Significant Impact. The Ukiah Landfill is a Class III landfill that was closed in 2001. The proposed project will result in the construction of the final cover for the landfill as well as related environmental control systems that are intended to minimize the potential for creating a hazard to the public or environment. The environmental control systems include both a landfill gas control system and a landfill gas monitoring system. The landfill gas control system includes a flare that is designed and permitted for maximum destruction of methane and non-methane organic compounds. The gas collection system and flare is designed to prevent potential landfill gas accumulation under the liner system.

In addition, landfill gas monitoring wells have been installed around the perimeter of the landfill within the property limits but outside the limits of refuse at a maximum spacing of 1,000 feet as required by Title 27. Testing of these wells is performed quarterly and the results have continually indicated no presence of landfill gas at concentrations greater than regulatory thresholds at the property boundary.

In addition, a leachate collection and removal system (LCRS) is currently operational on the landfill. The LCRS is designed to collect leachate from the landfill which is then pumped via dedicated pipeline to dispose of the leachate at the Ukiah Wastewater Treatment Facility. This system will continue to operate on the closed landfill to collect and store leachate prior to disposal.

With the incorporation of the proposed environmental control systems and continued operation of the LCRS, no potential significant risk to public health and/or the environment is anticipated. No additional mitigation measures are required.

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

No Impact. There is a municipal airport located within the Ukiah Valley that is located approximately five miles west of the project site. The proposed project is limited in scope and duration and will have impact on

the use of the Ukiah Airport or present a safety hazard to the use of the airport. As a result, no hazards to or from aviation will occur; no mitigation measures are required.

f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

No Impact. No private airfields are known to exist in the vicinity of the Ukiah Landfill property. Therefore, no significant impacts will occur and no mitigation measures are required.

g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No Impact. The County of Mendocino adopted an Emergency Action Plan (EAP) in May 2015 to address emergency response procedures for a wide variety of emergency situations, including hazardous materials emergencies and related events requiring response by emergency personnel and/or emergency evacuation of the population. The EAP is intended to ensure that each County facility has procedures in place to enable effective and efficient response to an emergency. As previously indicated, the proposed project would result only in the construction of the final cover and related environmental control systems at the project site to ensure that the landfill is closed in accordance with all applicable requirements prescribed in Title 27 and that no potential public health hazard remains. Although the proposed project includes the excavation of some solid waste and redisposal at another location within the landfill, potential for public health risk and/or environmental degradation is not anticipated. However, Title 27 requires an operator to prepare an Emergency Response Plan (ERP) as part of a final closure plan. An ERP is included in the Joint Technical Document for the Ukiah Landfill which includes procedures related to catastrophic events.

The ERP identifies occurrences that may exceed the design of the site and endanger public health or the environment. The ERP also sets forth actions which will minimize the effects of these catastrophic events. The provisions of this ERP will be carried out immediately whenever an event occurs such as a fire, explosion, flood, earthquake, vandalism, surface drainage problems or release of any waste product which may threaten public health and/or the environment. The ERP will be kept in the operating record at the City of Ukiah. The ERP includes specific procedures for reporting and responding to emergency situations at the project site. Implementation of the ERP will ensure that appropriate actions will be taken in accordance with the ERP to respond to any emergency situation that may occur at the project site. Therefore, no significant impacts are anticipated and no mitigation measures are required.

h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

Potentially Significant with Mitigation Incorporated. The proposed project is located within a moderate to high fire hazard area as designated by the California Department of Forestry and Fire Protection, the project implementation does not propose any development that would subject either structures or occupants of the site to the potential for loss, injury or death resulting from the potential for wildland fires. Final closure of the landfill will include the construction of the final cover and associated environmental control systems; however, no long-term occupancy of the site by workers or others will occur that would contribute to the potential for wildland fires. It is possible, however, that some risk of fire would exist during the construction phase of the proposed project, when heavy trucks and construction equipment necessary to implement the proposed project are being used. Such potential fire hazard may occur as a result of heavy trucks hauling materials and equipment to the site, which could start a fire. In addition, it is also possible that construction worker vehicles or other heavy equipment parked in grassy areas on the site could also cause a fire. As a result, it will be necessary to incorporate measures to reduce the potential for fires on the site and adjacent roadways. Mitigation measures that include restricting construction vehicles and heavy equipment to designated areas that are free of grass and vegetation, having a water truck present for on-site fire control, and smoking in

designated areas only will mitigate the potential for fire sources from the proposed project to a less than significant level.

Cumulative Impacts
As indicated above, final closure of the landfill will comply with all regulatory requirements in order to eliminate and/or minimize potential hazards associated with the landfill (e.g., air emissions, water quality, etc.). In addition, potential health and safety impacts would also be avoided through the implementation of the environmental control systems proposed to close the landfill. Finally, potential short- term cumulative impacts associated with fire protection would be minimized through the implementation of the mitigation prescribed for the project. No significant long-term cumulative impacts are anticipated upon completion of the final cover and associated environmental control systems because exposure to potentially hazardous conditions will be reduced to a less than significant level.

Mitigation Measures
No significant impacts are anticipated as a result of the proposed project. Potential impacts from a wildland fire should be controlled with the following mitigation measures:

MM 4.8-1 Maintain a water truck on site to control a wild land fie if it were to occur.

MM 4.8-2 Smoking shall be restricted to the controlled areas of the project site working area.

MM 4.8.3 Maintain a designated area for fuel and liquid storage that include fire extinguishers and spill control materials that are suitable for the materials used and stored at the project site.

4.9 Hydrology and Water Quality

Would the project:	**Potentially Significant Impact**	**Less than Significant With Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Violate any water quality standards or waste discharge requirements?			X	
b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?			X	
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site?		X		

d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site?			X	
e. Create or contribute runoff which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?			X	
f. Otherwise substantially degrade water quality?			X	
g. Place housing within a 100-year flood hazard as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation				X
h. Place within a 100-year flood hazard area structures, which would impede or redirect flood flows?				X
i. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				X
j. Inundation by seiche, tsunami, or mudflow?				X
k. Potentially impact stormwater runoff from construction activities?			X	
l. Potentially impact stormwater runoff from post construction activities?			X	
m. Result in a potential for discharge of stormwater pollutants from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas, loading docks or other outdoor work areas?			X	
n. Result in the potential for discharge or stormwater to affect the beneficial uses of the receiving waters?			X	
o. Create the potential for significant change in the flow velocity or volume of stormwater runoff to cause environmental harm?			X	
p. Creates insignificant increases in erosion of the project site or surrounding areas?			X	

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if one or more of the following conditions occur as a result of implementation of the proposed project:

- Substantial and adverse increased inundation, sedimentation and/or damage from water forces to the

subject project and/or other properties are caused by improvements such as grading, construction of barriers or structures.

- Development within the 100-year flood plain as delineated by FEMA that would expose people and/or property to potential serious injury and/or damage.

- Impervious surfaces increase and/or divert storm water runoff that results in the inability of the existing collection and conveyance facilities to accommodate the increased flows.

- Project implementation will cause a violation of water quality objectives for surface and groundwater as established by the Water Quality Control Plan and impede the existing beneficial uses of on-site surface waters or off-site coastal waters as defined in the Water Quality Control Plan.

- A usable groundwater aquifer for municipal, private, or agricultural purposes is substantially and adversely affected by depletion or recharge.

- Storm water and/or induced runoff mixes with a tidal habitat or pond causing instability to the existing water quality (e.g., reduction of salinity below 16 ppm) which, in turn, substantially and adversely affects the sensitive brackish/saltwater marsh habitat by allowing for the introduction and establishment of invasive fresh water species.

- Sediments are increased and/or diverted by proposed improvements and cause sediment deposition in defined sensitive habitat areas (e.g., wetlands, jurisdictional waters) that adversely affect or significantly affect significant habitat and/or sensitive species as recognized by the applicable resource agencies.

Analysis:

a. Violate any water quality standards or waste discharge requirements?

Less than Significant Impact with Mitigation. The project site is located adjacent to an unnamed tributary of Sulfur Creek, a tributary to the Russian River. The Russian River and its tributaries are identified as an impaired waterbody as defined by Section 303(d) of the federal Clean Water Act and 40 CFR §130.7 that identifies waterbodies that do not meet water quality standards and are not supporting their beneficial uses. The entire Russian River watershed is impaired for excessive sediment and temperature and more recently pathogen indicator bacterial impairment. A Total Maximum Daily Load (TMDL) study for sediment and temperature have not been prepared by applicable regulatory agencies. The Russian River and its tributaries support populations of coho salmon, chinook salmon and steelhead trout.

The proposed project will include large scale disturbance of the 39 acre site from activities such as grading and landform alteration necessary to construct the final cover and environmental control systems for the Ukiah Landfill. If not properly addressed, erosion may occur, which may impact water quality in the unnamed tributary. The proposed project design has erosion control features that will control and reduce the potential for soil erosion during and after the completion of the project. Erosion control measures will be implemented at the beginning of the project and maintained throughout the project cycle to maintain control of sediment from the project site area. Post project sedimentation controls are also designed into the project to include slope stabilization and placement of final erosion control features.

A Detection Monitoring Program (DMP) is currently implemented at the Landfill in accordance with 27 CCR, §20420 and Waste Discharge Requirements Order No. R1-2002-0061 issued by the North Coast Regional Water Quality Control Board and is anticipated to continue through the post closure maintenance period. The scope of the DMP includes the following monitoring and sampling activities:

- Monthly monitoring and recording of leachate discharge volumes.

- Quarterly sampling and analysis of leachate samples from the leachate wet well. The scope of analytical testing is in accordance with Table I of Monitoring and Reporting Program No. R1-2002-0061 (M&RP).

- Quarterly monitoring and recording groundwater elevations and groundwater flow directions.

- Quarterly sampling and analysis of groundwater samples from detection monitoring wells and points of compliance monitoring wells. The scope of analytical testing is in accordance with Table II of the M&RP.
- Performance of quarterly statistical analyses of groundwater chemistry data to identify exceedances of applicable concentration limits.

- Quarterly sampling and analysis of surface water samples, including semi-quantitative comparisons between upstream and downstream water chemistry data to identify potential landfill-related surface water quality impacts. The scope of analytical testing is in accordance with Table III of the M&RP.

- Performance of monthly standard observations to monitor the conditions of the WMU, the landfill perimeter, and receiving waters.

Results and findings from the aforementioned activities are summarized in a Detection Monitoring Report and submitted to the North Coast Regional Water Quality Control Board on a quarterly basis. Standard quarterly report submittals include a presentation of the sampling and monitoring procedures (including Standard Operating Procedures), tabulated summaries of leachate, groundwater, and surface water field and laboratory data, statistical analysis results and supporting calculations, groundwater potentiometric surface map, results of standard observations, and copies of Certified Analytical Reports (CARs) and associated chain-of-custody documentation. Annual reports are also prepared that include (in addition to the above information) graphical summaries of monitoring data, an evaluation of the findings.

Landfill Gas Monitoring Program

A perimeter LFG monitoring program is currently implemented at the Landfill to fulfill monitoring requirements set forth in 27 CCR, §20921. This perimeter monitoring program will continue through the post closure maintenance period in accordance with the FPCMP. The system consists of ten LFG monitoring points (GAS-1 through GAS-10). The locations of the LFG monitoring points are shown on Figure 4 (Appendix A). Each of the LFG monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter polyvinyl chloride (PVC) casing and capped with labcock valves. The monitoring probes range in depth from approximately 9 to 250 feet below ground surface BGS.

In addition to fulfilling the aforementioned regulatory requirements, the monitoring of perimeter probes will provide pertinent information regarding the overall performance of the LFG collection and control system. As the installation of the final cover system could increase lateral and vertical pressures within the Landfill, thereby potentially inducing subsurface migration of LFG, the perimeter monitoring will assist in determining whether the LFG collection and control system is providing adequate subsurface migration control, including whether ongoing operation of the existing partial perimeter LFG collection system is necessary if the historical LFG migration in that area can be abated by the new system. In accordance with 27 CCR, §20934, the results of the monitoring will be reported within 90 days from when the monitoring is performed and submitted to the Local Enforcement Agency (LEA), Mendocino County Air Quality Management District (MCAQMD) and RWQCB.

The LFG collection and control system and landfill surface will also be monitored to comply with AB32 requirements in accordance with 17 CCR, §95469. The scope of monitoring will include the following:

- Instantaneous surface monitoring will be conducted on a quarterly basis to determine if surface

emissions of 500 ppmv or greater, other than non-repeatable, momentary readings, are present at any location on the WMU surface. The monitoring will be accomplished using a portable gas detector while walking in a designated 25-foot spacing interval pattern where practical.

- Integrated surface monitoring will be conducted on a quarterly basis to determine if the average methane concentration within the individual grids exceeds 25 ppmv.

- Any components of the LFG control and collection system that are under positive pressure will be monitored on a quarterly basis to determine if any leaks are present at methane concentrations exceeding 500 ppmv.

- The wellhead for each extraction well will be monitored on a monthly basis to determine whether the extraction well is being operated under vacuum conditions (i.e., negative pressure).

- The flare will be monitored for temperature and flow rate using dedicated instrumentation and the corresponding data documented using a continuous recorder. In addition, the flare will be source tested on an annual basis to verify compliance with emissions and destruction efficiency criteria.

The proposed project should not result in a violation of water quality standards or waste discharge requirements. In fact long term protection to surface and groundwater resources are expected from the final closure of the landfill from the increased stability and exposure of the site as well as the collection and control of landfill gas. No significant impacts are anticipated and no mitigation measures are required.

b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

Less than Significant Impact. Final closure and post closure activities will not result in any potential impacts to existing groundwater supplies or groundwater recharge. The construction of a final cover cap is intended to ensure that surface water does not penetrate the final cover and enter the refuse below the cover. Surface water will be directed away from the landfill into designed collection and conveyance systems and will not, adversely affect either groundwater supplies or recharge. With the exception of short term and minor demands for water supplies during the construction phase, project implementation will not result in any long-term, unanticipated demands for potable water that would impacts the County's public water supply. Once construction of the final cover is completed, the post closure maintenance activities will not require any significant amount of water. No significant impacts are anticipated and no mitigation measures are required.

c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site?

Less than Significant with Mitigation Incorporated. Implementation of the proposed project will include mass grading and landform changes that will disturb the 39 acre project site area. The existing grade of the project site has been established through the final operations of the landfill and includes a number of slopes and benches that will be altered to final grade specifications as established in the approved engineering design standards. The proposed project implementation could lead to potential erosion and sediment discharge during the construction phase if not properly addressed in the design of the project and implemented. Design and permitting components are built into the proposed project to control and minimize the impacts to surface water and groundwater during the construction phase of the project. In addition, erosion and sediment discharge is will be minimized through the implementation of best management practices in accordance with

the Stormwater Pollution Prevention Plan.

The proposed project also includes the removal and replacement of a number of stormwater outfalls to the unnamed tributary located directly adjacent to the project area. The changes to these outfalls are very limited in extent of area disturbed as well as the fill quantities that will be required for the structures. The changes to the drainage outfalls are seen as net improvements to the existing drainage system components that were construction during the active landfill operations. The improved drainage outfalls will include minor rock outfalls located within the flow line of the tributary stream and direct stormwater to the existing channel. Engineered drawings and details of the drainage improvements are included in Appendix B.

The proposed project also includes enlarging an existing sedimentation basin located on the eastern side of the project area. The sedimentation basin is an existing structure that has been present for many years and was reportedly constructed as a means to control erosion from the barrow pit area located to the east of the landfill. The maintenance of the structure is being performed to increase the capacity of the structure as part of the proposed project and ensure the long term effectiveness and continued use of the structure. The basin was delineated as part of the wetland delineation and determined to be subject to jurisdiction by applicable agencies. Permitting is being conducted with applicable agencies for the proposed work on the structure.

In addition hydrology calculations have been completed for the proposed drainage improvements that calculate and predict runoff generation and intensity during design storm events. The results of this analysis indicates very minor changed to stream velocity and flow intensity. A copy of the hydrology calculations are included in Appendix H.

Together with the erosion control features identified above, potential erosion and siltation impacts will be reduced to a less than significant level with mitigation.

d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site?

Less than Significant Impact. Existing drainage ditches have been in place for many years and have been constructed as the landfill filling operation proceeded. The proposed project includes drainage improvements that will be installed in the same landfill footprint but as discussed several of the storm drain outfalls will be replaced or upgraded as part of the project. A perimeter ditch exists along the head of the landfill to divert water from running onto the site that is then directed around the existing landfill unit. Benches and culvert drains direct storm water runoff to interior drains and then finally to outfalls located at the toe of the landfill that drain to the unnamed tributary. Hydrology calculations have been prepared to identify runoff intensity and effects of the drainage to the unnamed tributary which are included in Appendix H.

Implementation of the proposed project will not significantly alter the existing drainage pattern of the site and would also not result in significant changes to the hydrology of the unnamed tributary. A hydrology study was prepared for the proposed project that analyzed the potential post-construction runoff that would occur following implementation of the proposed project. The proposed project has been designed to accommodate surface runoff associated with a 100-year storm event. The proposed final drainage system is shown on the Final Grading Plan enclosed in Appendix B. As a result, no significant impacts are anticipated and no mitigation measures are required.

e. Create or contribute runoff which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?

Less than Significant Impact. The proposed project includes the placement of final cover material to close the landfill. The cover materials are essential impermeable and have the potential of increasing peak runoff and intensity. One of the main purposes of the improvement associated with the Final Closure Improvements

is to provide a cover for the waste management unit. When constructed, the cover will provide an impermeable surface protecting the waste management unit from storm water infiltration. As a result, the cover will also increase the amount of storm water leaving the project site. Although there will be an increase in the amount of storm water leaving the project site, when analyzing the watershed upstream of and including the project site, the hydromodification impacts are minimal.

Hydrographs were developed for the pre and post closure construction and when compared, the two showed that there would be an increase in approximately 182,577 cubic feet of storm water in the watershed for a 2 year-24 hour storm event. This is a 5.3% increase. To see how the 5.3% increase would affect the hydrology of the watershed upstream of and including the project site, further calculations were performed. The calculations show that time of concentrations changed from 38.8 minutes to 38.7 minutes or 0.3% increase and for a 2 year storm event, the flows intensities increase from 369.68 cfs to 388.08 cfs or an increase of 5.0%. Further hydraulic calculations were performed to determine the hydraulic capacity of the existing channel. These calculations found that for a 2 year storm event, the flow depth increase from 3.52 feet to 3.60 feet or a 2.2 % increase and the velocity increased from 8.90 feet per second to 8.98 feet per second or a 0.9% increase. All of these increases are considered to have an impact on the overall hydrology/hydraulics of the existing unnamed drainage course.

To help alleviate some of the minor hydromodification impacts of the Final Closure Improvements, the improvements will include post construction best management practices through the use of a synthetic turf liner, routing portions of the surface drainage into an existing retention basin, and improvements to the existing drainage structures out letting into the unnamed drainage course.

The synthetic turf liner will reduce sediment loads by providing an impermeable liner on relatively steep 2:1 slopes (horizontal to vertical). Although the existing slopes are vegetated, the steep slopes provide a mechanism for sediments to enter the unnamed drainage course. This liner will protect the slopes from erosion and reduce the sediments that would come from them.

Since the project site is very congested, the design maximizes the use of storm water detention/retention through the use of an existing storm water retention basin. A portion of the site will be routed to this existing retention basin to provide storm water storage.

The Final Closure Improvements will also improve existing storm drain outlets into the unnamed drainage course. The existing outlets currently “shotgun” into the drainage course at five to six feet above the flow line, providing the potential for significant erosion. These outlets will be replaced with new ones that allow for the storm drain to outlet near the toe of the bank at an elevation of one foot above the flow line and with rock rip rap energy dissipaters at the end. This will reduce the potential for significant erosion at the storm drain outfalls. No additional mitigation measures are required.

f. Otherwise substantially degrade water quality?

Less than Significant Impact. As previously discussed, the proposed project has been designed with protection for water quality features that will effectively minimize potential siltation, the primary pollutant anticipated to occur as a result of the proposed project. Potentially significant impacts would be reduced to a less than significant level with the implementation of the water quality features and erosion control plan.

g. Place housing within a 100-year flood hazard as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

No Impact. The proposed project is not located within the limits of a FEMA-designated 100-year floodplain. Furthermore, no residential development is proposed that would be subjected to inundation resulting from flooding. No impacts will occur.

h. Place within a 100-year flood hazard area structures, which would impede or redirect flood flows?

No Impact. As previously indicated, the subject property is not located within the limits of a 100-year floodplain and is not subject to inundation resulting from flooding. Furthermore, no structures are proposed on the project site or in a 100-year flood hazard area that would impede or redirect flood flows. No impacts will occur as a result of project implementation.

i. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

No Impact. The proposed project includes the construction of the final cover for the landfill and associated environmental control systems; neither structures nor people will be exposed to loss, injury or death resulting from flooding, including that caused by the failure of either a dam or levee. No impacts will occur as a result of project implementation.

j. Inundation by seiche, tsunami, or mudflow?

No Impact. A seiche involves the oscillation of a body of water in an enclosed basin, such as a reservoir, storage tank, or lake. No enclosed bodies of water are located in the immediate vicinity of the project site; therefore, no impacts from seiches are anticipated as a result of project implementation. A tsunami, commonly referred to as a tidal wave, is a sea wave generated by submarine earthquakes, major landslides, or volcanic action. The project site is located well inland, away from the Mendocino County coastline. Due to the elevation and the distance from the coastline, tsunami hazards do not exist for the project site and vicinity. Furthermore, all slopes have been designed to eliminate or minimize the potential of seismic effects that could be undermined by seismic activity or other instability. Implementation of the proposed project will not expose either people or structures to seiches, tsunamis or mudflows. Therefore, no impacts will occur as a result of project implementation.

k. Potentially impact stormwater runoff from construction activities?

Less than Significant Impact. Site preparation activities will result in some grading, including excavation associated with site preparation that would expose native soils to the effects of wind and water; however, the Stormwater Pollution Prevention Plan (SWPPP) and erosion control measures incorporated into the project design will ensure that measures are integrated into the construction activities to minimize the erosion potential and the effect on groundwater and surface water quality. With the implementation of the BMPs prescribed through the SWPPP prepared for the proposed project, potentially significant impacts will be avoided and; no mitigation measures are required.

l. Potentially impact stormwater runoff from post construction activities?

Less than Significant Impact. Post construction activities include only monitoring and maintenance of the project site to ensure that the environmental control systems are properly operating. Although some increase in surface runoff would occur as a result of the final closure plan (e.g., environmental control systems, drainage plan modification, etc.), impervious surfaces would not be increased. No activities are proposed for the project site that would result in stormwater runoff impacts associated with post-closure activities. No mitigation measures are required.

m. Result in a potential for discharge of stormwater pollutants from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas, loading docks or other outdoor work areas?

Less than Significant Impact. As previously discussed, a SWPPP will be prepared that will include appropriate BMPs to ensure that surface water discharges have been adequately controlled to minimize the discharge of sediment and other pollutants. Specifically, the BMPs will include treatment requirements

intended to reduce potential pollutants resulting from vehicle and equipment storage, equipment fueling and/or equipment maintenance and related activities that could affect surface water quality during the construction phase of the proposed project. Implementation of the BMPs will minimize potential impacts to downstream water quality resulting from project-related stormwater discharges. No additional mitigation are required.

n. Result in the potential for discharge or stormwater to affect the beneficial uses of the receiving waters?

Less than Significant Impact. As previously indicated the Russian River and its tributaries support populations of chinook and coho salmon and steelhead trout. The Russian River is listed by applicable regulatory agencies for a variety of water quality impairments. The main water quality impairment in the Russian River is sediment. Sediment sources typically are generated from a variety of natural and anthropogenic sources including road mass wasting, bank erosion, natural mass wasting, surficial road erosion, road gullies and land disturbance activities. Although project implementation could result in potential erosion, the proposed project has been designed to address the potential for the generation of sediment. Sediment control measures have been incorporated into the design of the project to minimize erosion. In addition, preparation of the mandatory SWPPP will require that construction BMPs also be implemented to ensure that potential pollutant loads are eliminated or reduced to an acceptable level. Therefore, potential impacts will be less than significant; no mitigation measures are required.

o. Create the potential for significant change in the flow velocity or volume of stormwater runoff to cause environmental harm?

Less than Significant Impact. Refer to Section 4.9e. The proposed project has been designed to accommodate post- construction surface flows generated by a 100-year storm. The runoff will be directed to drainage and conveyance facilities that have adequate capacity prior to their discharge. No significant impacts are anticipated and no mitigation measures are required.

p. Creates insignificant increases in erosion of the project site or surrounding areas?

Less than Significant Impact. Refer to Section 4.9c. As indicated in that section, project implementation could result in potential on-site erosion if not property addressed. However, the project design includes several measures to minimize both on- and off-site erosion. With the implementation of the erosion control features and erosion control plan, potential erosion impacts will be reduced to a less than significant level.

Cumulative Impacts

As indicated in the preceding analysis, the project has been designed to comply with Title 27 for landfill closures and includes an array of drainage, erosion, and water quality features to ensure that the project will not result in significant impacts within the watershed. These features will avoid or minimize not only project-related impacts but also would avoid contributing to the cumulative degradation of the drainage and water quality regime in the region. Implementation of the proposed project will not, therefore, result in potentially significant cumulative impacts.

Mitigation Measures

MM4.9-1 An erosion control plan shall be included with the project planning and design documentation that sets forth management and project site requirements for the control and minimization of sediment and erosion.

MM 4.9-2 Grading shall be prohibited after October 15 of any year without regulatory agency approval.

MM 4.9.3 Erosion control structures such as sedimentation ponds, energy dissipaters, and silt fences shall be installed prior to the start of the proposed project and maintained until project completion.

MM 4.9-4 A General Construction Storm Water Pollution Prevention Plan shall be prepared and implemented

as part of the project permitting and documentation. The SWPPP will be fully implemented and remain in effect until the completion of the project.

MM 4.9-5 Post closure monitoring and inspection will be implemented to ensure the project site remains stable and free of slope failures or sediment sources.

4.10 Land Use and Planning

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Physically divide an established community?				X
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				X
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if any of the following occur:

- Physically divide an established community.
- Conflict with the County of Mendocino County General Plan or zoning ordinance.
- Conflict with the Habitat Conservation Plan for Mendocino County.
- Be incompatible with adjacent land uses.

Analysis:

a. Physically divide an established community? No Impact.
The proposed project includes the implementation of the final closure plan for the project site which has been closed since 2001. The project site is located in a rural portion of Mendocino County that is surrounded entirely by open space, including forest areas with little residential development or other urban uses are located in the vicinity of the project site that would be affected by the closure or post closure activities. Furthermore, the proposed project does not include any elements or features (e.g., roadways, pipelines, etc.) that would physically divide an existing community. The end use of the landfill is open space, which is consistent and compatible with the open space and forestry uses in the project environs. Therefore, no significant conflicts with existing land uses will occur; no mitigation measures are required.

b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?
No Impact. Project implementation is consistent with relevant development goals and policies as specified in the County of Mendocino General Plan. Implementation of the proposed project does not include any features

that extend beyond the limits of the landfill property. No structures are proposed that would either affect the rural character of the area or directly affect existing resources following the construction of the final cover and environmental control systems. Where potential short-term adverse effects are identified, adequate mitigation measures have been prescribed and will be implemented to ensure that the adverse effects are minimized and reduced to an acceptable level.

The proposed project is also consistent with State and federal requirements for closure of landfills and includes the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water monitoring systems, and site security. Each of these environmental control systems are intended to comply with all applicable regulatory requirements for closure, including public health and safety. In addition, the proposed project will also allow the CalRecycle, the NCRWQCB, and the LEA to monitor closure and post-closure activities to determine that all landfill closure and post-closure maintenance and monitoring requirements are being followed in accordance with the approved plan.

The proposed project is consistent with the applicable policies and programs adopted by the County of Mendocino. No significant land use will occur and no mitigation measures are required.

c. Conflict with any applicable habitat conservation plan or natural community conservation plan?
No Impact. There are no habitat Conservation Plan or Community Conservation Plan in place at the project site. No impacts are anticipated and no mitigation measures are required.

Cumulative Impacts

As indicated in the preceding analysis, the proposed project will not conflict with any adopted policies and/or programs of the County. No development is proposed that would divide an established community and the project does not conflict with an adopted Habitat Conservation Plan or Community Conservation Plan. As a result project implementation would not contribute to potentially significant cumulative land use impacts.

Mitigation Measures
No significant land use impacts are anticipated and no mitigation measures are required.

4.11 Mineral Resources

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if any of the following occur:

• Project implementation will result in the loss of availability of a mineral resource identified on the County's General Plan and/or State of California documents that has economic values both locally and

regionally.

Analysis:

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No Impact. A variety of minerals resources are known to exist in Mendocino County. The most predominant minerals found in Mendocino County are aggregate resources, primarily sand and gravel. Three sources of aggregate materials are present in Mendocino County: quarries, in-stream gravel, and terrace gravel deposits. The project site does not contain any important deposits of aggregate/sand and gravel. Furthermore, neither the Mendocino County General Plan nor the State of California has identified the project area as a potential mineral resource of State-wide or regional significance. No mineral resources are known to exist and, therefore, project implementation will not result in the loss of availability of a known mineral resource that would be important to the state, region or local area. As a result, no significant impacts will occur as a result of project implementation and no mitigation measures are required.

b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. As indicated above, the Mendocino County General Plan does not identify the project site as having potential value as a locally important mineral resource site. The proposed project will not result in the loss of any locally important mineral resource site and, therefore, no impacts will occur.

Cumulative Impacts

The proposed project would not result in the loss of any known important mineral resources. Therefore, project implementation will not result in or contribute to potentially significant cumulative impacts.

Mitigation Measures

No impacts to mineral resources will occur as a result of project implementation and no mitigation measures are required.

4.12 Noise

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			X	
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?			X	
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?			X	
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			X	

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X
f. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if any of the following occur:

• An increase of three dB which creates an area of noise/land use incompatibility; and/or

• The proposed project generates noise that would contribute to noise levels that exceed the State noise/land use compatibility guidelines which allow for exterior noise levels up to 70 dB CNEL; and/or

• The proposed development is exposed to noise levels that exceed the State noise/land use compatibility guidelines, which allow for exterior levels up to 70 dB CNEL; and/or

▪ The proposed development generates noise that exceeds the thresholds prescribed in the Appendix C of the Mendocino County Municipal Code (Title 20); and/or

▪ Exposure of persons to or generation of excessive groundborne vibrations or groundborne noise levels.

Analysis:

a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less than Significant Impact. The Noise Element of the Mendocino County General Plan has identified noise levels for various land uses that are considered compatible with planned uses. These levels are designed to achieve acceptable interior noise levels with standard building practice while maintaining an outdoor environment that can be considered reasonably pleasant. General Plan Table 3-K (August, 2009) establishes the following exterior noise standards:

Residential	60 dB
Commercial	75 dB
Industrial	80 dB

These standards apply to land use exposure from noise sources outside of local control from sources such as transportation from road ways and airports. Noise sources that are controlled by local regulation are generally considered stationary sources. These sources include noise from a variety of sources such as mechanical equipment, amplified music, public events, barking dogs, etc. are most typically regulated by ordinance. In Mendocino County, these standards are found in Appendix C of Title 20 of the County Code Zoning Ordinance. Based on the County's noise regulations, the stationary noise standards for light and heavy industrial uses are established at 70 and 75 dBA. These levels are not to be exceeded for more than 30 minutes in any hour throughout an entire day.

Noise generation from the proposed project would result from construction activities including on-road trucking and from temporary heavy equipment operations such as grading and excavation and work related to placement and construction of the final cover. The on-road noise generation is pre-empted from local control

except for enforcement of the vehicle code for equipment. Noise from the operation of off-road equipment is controllable by ordinance. However, most jurisdictions in California exempt temporary construction equipment operations noise from numerical standards compliance as long as a number of specified conditions are met.

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact. Construction activities that would be expected from the proposed project generate groundborne vibration from the operation of heavy equipment. The effects of groundborne vibration include discernible movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Construction activity impacts are typically highly confined to within a few feet of the noise generating activity. An exception to this may include projects that have very large equipment such as pile drivers. Such equipment will not be used for the proposed equipment. Because vibration is typically not an issue, very few jurisdictions have adopted vibration significance thresholds. Vibration thresholds have been adopted for major public works construction projects, but these relate mostly to structural protection (cracking foundations or stucco) rather than to human annoyance.

The proposed project is located in an area characterized by open space and rangeland with no sensitive land uses within 1,000 feet of the project area. There are several residential properties located to the south and southwest of the project site that include the Vichy Springs property which is greater than 500 feet from the property as well as a residential dwelling that is approximately 900 feet west of the project site area. The remainder of residential dwellings are located greater than one-quarter mile from the project site. The aspect and location of the project site area is such that it is separated by rolling topography with no line of site access to the project site area. The potential vibration levels caused by the equipment utilized for the proposed project would be less than the threshold of perceptibility. As a result, potential vibration effects associated with the use of construction equipment on the site would not result in any potentially significant groundborne vibration impacts either to structures or people. Therefore, no significant impacts will occur and no mitigation measures are required.

c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Less than Significant Impact. The proposed project is expected to be approximately six months in duration. The noise generated by the proposed project would result during the construction period required to construct the final cover and related environmental control systems for the project. With the exception of periodic on-going environmental monitoring and maintenance of the closed landfill and environmental control systems, no other long-term noise would be generated by the landfill closure. Any future noise levels associated with maintenance that may be required in the future would be neither excessive nor long-term. Therefore, no significant impacts would occur and no mitigation measures are required.

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Less than Significant Impact. The proposed project will include the use of various types and sizes of construction equipment that will be utilized during construction of the proposed improvements. Stationary equipment consists of equipment that generates noise from one general area and includes items such as pumps, generators, compressors, etc. These types of equipment operate at a constant noise level under normal operation and are classified as non-impact equipment. Other types of stationary equipment such as pile drivers, jackhammers, pavement breakers, blasting operations, etc., produce variable and sporadic noise levels and often produce impact-type noises. Impact equipment is equipment that generates impulsive noise, where impulsive noise is defined as noise of short duration that is generally less than one second, high intensity, abrupt onset, rapid decay, and often rapidly changing spectral composition. For impact equipment, the noise is produced by the impact of a mass on a surface, typically repeating over time.

Mobile equipment such as bulldozers, excavators, scrapers, graders, etc., may operate in a cyclic fashion in which a period of full power is followed by a period of reduced power. Other equipment such as compressors, although generally considered to be stationary when operating, can be readily relocated to another location for the next operation.

The Federal Highway Administration Construction Noise Handbook identifies equipment and operation noise levels for various types of construction equipment that are expressed in terms of maximum noise levels at a measured distance of 50 feet from the noise source. The noise levels for the types of equipment expected to be used for the proposed project ranges from 60 to 90 decibels. These noise levels exceed the levels as set forth in the Mendocino General Plan; however due to the proximity of the project site in a rural area with greater than 500 feet of separation to residential properties, construction noise levels that exceed 70dB could result in potentially impacts to residences and wildlife. However, maintaining separation from residences and noise-sensitive biotic habitat, plus implementation of the standard measures identified at the end of this section, will maintain construction equipment noise impacts at less than significance levels.

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The proposed project is located approximately three miles northeast of the Ukiah Municipal Airport. The project site is not located within an airport plan and the noise generated by the airport operations does not extend into the area in which the landfill is located.

f. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. There are no private airstrips located within the area of the project site that would either affect or be affected by the proposed project. As a result, no workers or others would be exposed to excessive noise levels associated with a private aviation facility.

Cumulative Impacts

As discussed above, all of the potential noise generated by the proposed project will be short-term in nature, lasting approximately six months during the construction phase of the proposed project. Upon completion of the project and related environmental control systems for the landfill, no long-term noise will be generated on-site. Furthermore, the proposed project is located in an area that is characterized by open space and forestlands. The short-term increase in noise generated on-site during construction as well as that resulting from the heavy truck traffic required for soil import that could adversely affect residential properties and potentially sensitive species in the project area will cease upon completion of the hauling operations. Mitigation measures are prescribed below to address the potential short-term noise impacts that will be adequate to maintain noise levels below significant levels. As a result, cumulative noise impacts caused by the proposed project will be less than significant.

Mitigation Measures

As indicated in the preceding analysis, no significant project-related noise impacts would occur as a result of project implementation. Nonetheless, project activity noise impacts can be maintained at less-than-significant levels with implementation of the following measures:

MM 4.12-1 Construction activities shall comply with standard Mendocino County conditions with respect to hours of lesser noise sensitivity, use of proper mufflers and selection of quieter equipment.

MM 4.12-2 Noise generating activities at the construction site or in areas adjacent to the construction site associated with the project in any way should be restricted to the hours of 7:00 a.m. to 6:00 p.m., Monday through Friday. No construction activities should occur on weekends or holidays.

MM 4.12-3 All internal combustion engine drive equipment should have intake and exhaust mufflers that are in good condition and appropriate for the equipment.

MM 4.12-4 Unnecessary idling of internal combustion engines should be strictly prohibited.

MM 4.12-5 Low noise air compressors and other stationary noise sources should be utilized where technology exists.

4.13 Population and Housing

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if any of the following occur:

- Induce substantial growth or concentration of population.
- Displace a large number of people.
- Disrupt or divide the physical arrangement of an established community.
- Be substantially inconsistent with long-range, adopted County goals and/or policies.

Analysis:

a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. Project implementation includes the final closure of the Ukiah landfill in accordance with local, regional, state and federal requirements. No residential or other development is proposed that would result in additional population growth. No infrastructure is required to be extended to the site that would induce population growth in the area. Therefore, no significant growth-inducing impacts are anticipated and no mitigation measures are required.

b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

No Impact. The proposed project includes the closure of the Ukiah Landfill and does not support any

residential dwelling units. The proposed project would not result in the displacement of any existing housing or other residential development. Therefore no loss of housing stock currently existing in Mendocino County would occur and no impacts are anticipated.

c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

No Impact. As indicated above, the proposed project will not result in the elimination of any existing housing and would not displace or otherwise adversely affect residents living within the unincorporated areas of Mendocino County or other nearby communities. Therefore no impacts are anticipated and no mitigation measures are required.

Cumulative Impacts
Because the proposed project would not result in the loss of any existing housing and/or the displacement of residents, implementation of the proposed project will not contribute to the cumulative impacts to population and housing. Therefore, no significant cumulative impacts to population and housing will occur as a result of project implementation.

Mitigation Measures
Project implementation will not result in any potentially significant impacts to population and housing. No mitigation measures are required.

4.14 Public Services

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
1. Fire protection?		X		
2. Police protection?			X	
3. Schools?				X
4. Parks?				X
5. Other public facilities?			X	

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if any of the following occur:

- An increase in the demand for fire protection services to such a degree that accepted service standards

(e.g., manpower, equipment, response times, etc.) are not maintained.

• The interference with emergency response or evacuation plan(s) in the community or not provide internally consistent analysis or policies to guide future development.

• Expose people or structures to significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

• Result in response times that exceed the County's adopted maximum emergency response criteria.

• An increase in the demand for law enforcement services to such a degree that accepted service standards are not maintained without an increase in manpower and/or equipment.

• Create student enrollments that exceed available capacities of school facilities or educational services and would require the construction of new school facilities.

Analysis:

a.1. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for fire protection?

Less than Significant with Mitigation Incorporated. The project site is located in an unincorporated area of Mendocino County that is designated as having a "high fire hazard" potential. Fire protection and emergency services are provided by the Mendocino County Fire Department in cooperation with the California Division of Forestry (CDF) through contract services. Due to the existing rangelands surrounding the project site, the project site is located in an area that has the potential for wildland fires, particularly during the summer months and dry season when grasses and other vegetation have become overgrown and dry. The proposed project would not affect the existing level of public services provided in the area. No permanent structures and/or occupants will occupy the project site following completion of the final closure components and no increase in the potential for fire would exist. The proposed project will utilize heavy equipment during the final closure activities and a fire potential does exist as a result of sparks that may be created from heavy equipment and/or vehicles that may ignite dry grass or other vegetation. Specifically, heavy trucks hauling materials and equipment to the site could start a fire along the sides of the roadways if hot mufflers and undercarriage components come in contact with dry grass and other overgrown vegetation along the side of the roadways. In addition, it is also possible that construction worker vehicles or other heavy equipment parked in grassy areas on the site could also cause a fire. As a result, it will be necessary to incorporate measures to reduce the potential for fires on the site and adjacent roadways. With the implementation of the mitigation measures prescribed below, potential impacts will be less than significant.

a.2. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for police protection?

Less than Significant Impact. Police protection and law enforcement services in the unincorporated portions of the County are provided by the Mendocino County Sheriff Department. The project site has been inactive for several years and does not pose an existing law enforcement problem for the Sheriff Department. No significant crime or other illegal activities occur on or in the vicinity of the site that adversely affect the ability of the Sheriff Department to provide an adequate level of service. Implementation of the proposed

project will result in some short-term construction activities lasting approximately six months. During that period, increased truck and vehicular activity will occur along the roadways and highways patrolled by the Sheriff Department; however, no significant safety or other law enforcement problems that could adversely impact the existing law enforcement service are anticipated as a result of the increased truck traffic. Upon completion of the final cover construction, all of the heavy truck traffic will cease; only a small number of intermittent project- related traffic will be generated as a result of post-closure maintenance (e.g., site monitoring, etc.). The number of trips is extremely small and will not affect the current level of police protection in the area. In order to facilitate site security, the landfill disposal area has a locking gate at the entrance road.

Access to the project site is restricted with fencing and locked gates that restrict access. Security fencing, access gates and signs will be inspected quarterly to ensure that the integrity of site security has been maintained. All groundwater monitoring wells will have locking well covers. The gates will be inspected to ensure that the locks are intact. Any necessary repairs or replacements will be made during the quarterly inspection. Therefore, no significant impacts will occur as a result of project implementation and no mitigation measures are required.

a.3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools?

No Impact. The proposed project includes the final closure of the Ukiah landfill as well as the post closure maintenance activities that will be conducted at the site. No development (i.e., residential) is proposed that would result in the generation of school-age children that would affect the existing school facilities and services. As a result, no impacts to schools will occur and no mitigation measures are required.

a.4. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for parks?

No Impact. The proposed project includes no new structures or new residential development and implementation of the proposed project will not create any demands for parks and/or recreational facilities and amenities, which are typically associated with increases in population. As a result no impacts are anticipated to parks and/or recreational facilities and no mitigation measures are required.

a.5. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for other public facilities?

Less than Significant Impact. No governmental services would be affected as a result of project implementation. The City of Ukiah is responsible for maintaining and monitoring the project site, which will not adversely impact existing governmental services. The City of Ukiah will be responsible for ensuring that post closure maintenance activities occur pursuant to the final plan requirements. These responsibilities include ensuring that the drainage, groundwater and other environmental control systems are properly operating. These activities are anticipated and will not adversely affect the ability of municipalities to provide adequate post closure maintenance of the project site. As a result, no significant impacts are anticipated and no mitigation measures are required.

Cumulative Impacts

Project implementation would result in the final closure of the Ukiah Landfill. Because the proposed project

does not include a change in land use such as residential development that has a need for and would generate a demand for most public services (e.g., police, parks and recreation, schools, etc.), potential demands on those services are not expected to occur. However, several measures have been prescribed to ensure that any potential impacts to fire protection service and facilities are adequately addressed and would not, therefore, result in potentially significant cumulative impacts. Furthermore, without residential development, no impacts would occur either to public schools or library facilities. Therefore, no significant cumulative impacts will occur.

Mitigation Measures
Project implementation will not result in any significant impacts to police protection, schools, parks and recreational facilities and other government services and/or facilities; however, some potential for wildland fires does exist, which must be addressed. The following mitigation measures shall be incorporated into the project to address the potential wildland fire impacts.

MM 4.14-1 No vehicles, including construction worker vehicles, heavy trucks and/or equipment, shall be parked in areas covered with grass. Parking areas shall be established for all vehicles in an area that is cleared of all grass.

MM 4.14-2 A water truck shall be present on-site for fire control should flammable material ignite during the final closure construction.

4.15 Recreation

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?				X

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if any of the following occur:

- Create a demand for recreation services that exceeds the design or use standards of existing and/or planned facilities on the adopted Recreation Element of the Mendocino County General Plan for the area.

Analysis:

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

No Impact. The project proposes only the final closure of the Ukiah Landfill. No residential development is proposed that would create a demand for neighborhood and/or regional parks or other recreational facilities. Therefore, project implementation would not result in any impacts to parks and/or recreation facilities in the Mendocino County; no mitigation measures are required.

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?

No Impact. As indicated above, the proposed project does not include the residential development that could have a direct impact on the County's inventory of parks and recreational facilities. Because no residential development is proposed, no significant recreation impacts will occur. As a result, no mitigation measures are required.

Cumulative Impacts
Because no residential development that would create a demand for parks and recreational facilities in the County is proposed, the proposed project would not result in any incremental, cumulative impacts to those facilities.

Mitigation Measures
No project-related impacts to recreational facilities in the County of Mendocino are anticipated to occur; therefore, no mitigation measures are required.

4.16 Transportation/Circulation

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?			X	
b. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion			X	
c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?			X	
e. Result in inadequate emergency access?			X	

f. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?				X

Significance Criteria:

A project will normally have a significant adverse impact on traffic and circulation if it results in any of the following:

- An increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections).

- An increase in the level of service standard established by the County Congestion Management agency for designated roads or highways.

- An increase in hazards due to design features (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)

- Inadequate emergency access.

- Inadequate parking capacity.

- A conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks, etc.).

- Hazards or barriers to pedestrians or bicyclists.

Analysis:

a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

Less than Significant Impact. The proposed project is located at the eastern end of Vichy Springs Road. The greatest number of vehicular trips resulting from project implementation will occur during the construction phase. The proposed project will require site workers to travel to the site daily during the duration of the project. The number of workers will be minimal nominal and new traffic trips on Vichy Springs Road will be short-term in duration lasting a maximum of six months during the construction period. In addition to the site worker traffic trips there will be the delivery of equipment and materials to the site. For the purpose of this study we assume that a maximum of 20 workers will be at the project site on a daily basis resulting in 20 traffic trips. It is also anticipated that up to 10 traffic trips a day will occur for delivery of materials and equipment. As a result, it is anticipated that no more than 30 two-way trips per day would be generated by these activities, all of which would be added to the circulation network in the area. The addition of the 30 two-way worker and materials delivery trips would utilize Vichy Springs Road to access the project site.

In addition to worker- and materials delivery-related trips, it will also be necessary to import soils from the an off-site location to construct portions of the final cover. It is anticipated that a maximum of 3,500 cubic yards of material will be imported to the site, resulting in truck traffic during the importation process. The number

and frequency of trips depends on the source and location of the import materials. The remaining materials will be used from onsite sources.

The affected roadways have adequate capacity to accommodate the vehicular trips generated by the proposed project, which will be significantly fewer on a daily basis than the number of trips that occurred when the landfill was an operational landfill prior to 2001. It is important to note that the heavy truck trips will be short in duration depending on the source and location of the import material, which could increase the daily trip rate and reduce the duration. After that, the only project-related trips will be associated with the movement of workers to and from the site and movement of equipment and materials. In addition, these vehicular trips will be temporary in nature and will cease upon completion of the construction of the final cover. The number of vehicular trips associated with the post closure maintenance activities will be significantly less than during construction of the final cover. As a result, no significant impacts are anticipated. The addition of the project-related trips will not significantly affect the operations on existing roadways. As a result, no significant impacts are anticipated and no mitigation measures are required.

Implementation of the proposed project will not result in the generation of a significant number of vehicle trips that would cause traffic congestion beyond adopted policies and/or forecasts. The only project-related vehicular traffic generated by the proposed closure and post-closure maintenance operations would be associated with worker trips and the transport of materials and equipment to the site. The number of trips is related to the number of workers that would be employed to work on the site during closure and post-closure maintenance. It is anticipated that the onsite workers would generate a very small number of vehicular trips (approximately 20 two-way trips per day) as a result of their daily commutes. In addition, approximately ten two-way trips/day would be added to the existing traffic volumes as a result of trucks hauling materials and equipment to the site. Any contribution of trips caused by the few additional workers would be extremely modest and will not adversely affect the level of operations of any of the intersections in the vicinity of project site. Potential project-related impacts will be less than significant.

b. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Less than Significant Impact. Vichy Springs Road provides the only vehicular access to the project site. Due to the limited traffic along Vichy Springs Road, the addition of the haul trucks and construction vehicles would not significantly impact travel on that roadway. As a result, potential impacts will be less than significant.

c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

No Impact. The Ukiah Municipal Airport is located approximately three miles southwest of the project site. Due to the distance of the proposed project to the Ukiah Municipal Airport, final closure activities, including long-term maintenance of the closed facility, will not affect aviation activities at the airport or expose workers at the site to potential hazards associated with the airport operations. The project site is not located within the area of influence of the Ukiah Municipal Airport and is neither affected by nor affects operations occurring at that aviation facility. Therefore, no significant impacts will occur and no mitigation measures are required.

d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less than Significant Impact. The proposed project is located in an area of Mendocino County that open space and rural residential properties. Access to the project site is from Vichy Springs Road. Project implementation will necessitate the importation of approximately 3,500 cubic yards of earth material in order to construct the final cover, resulting in the generation of about 200 two-way truck trips at the site. Vichy Springs Road is a rural roadway that dead ends at the entrance to the project site. As a result little traffic

circulation is present. The posted speed limit is 35 miles per hour on Vichy Springs Road and all traffic requirements will be implemented for site worker transportation and delivery vehicles. The proposed project does not modify the design if public roadways and all of the proposed work is confined within the boundaries of the project site and increase in hazards or incompatible uses are anticipated to occur during the implementation of the project. Therefore a less than significant impact is seen from the implementation of the project.

e. Result in inadequate emergency access?

Less than Significant Impact. Vehicular and emergency access to the project site is from Vichy Springs Road. Construction workers, haul trucks, and maintenance personnel entering the site will utilize Vichy Springs Road during the implementation phase of the project. Although the number and type of vehicles will vary on a daily basis, depending on the activities undertaken, project implementation would not adversely affect access to the project site from Vichy Springs Road. No significant impacts to emergency access will occur as a result of project implementation.

f. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

No Impact. The project site is a remote site which is located beyond the urban limits of Ukiah. As such, the area of the project site is not served by public transportation and is not in an area where bicycle or pedestrian trails exist. The proposed project does not include any uses that would necessitate the transport of people using public transit and/or by other means of transportation, including bicycle trails, pedestrian trails, etc. Therefore, project implementation will not conflict with or adversely affect any existing alternative modes of transportation. No significant impacts will occur and no mitigation measures are required.

Cumulative Impacts
As indicated in the preceding analysis, potential traffic impacts associated with the project would be short-term in nature, lasting only during the construction phase. Long-term traffic generated by the proposed project would be similar to existing traffic and would be associated with monitoring and maintenance of the environmental control systems construction at the project site. The additional traffic generated by the proposed project would cease following completion of the construction activities. Therefore, no significant cumulative traffic impacts would occur.

4.17 Utilities and Service Systems

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?			X	
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			X	
c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant			X	
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?			X	

e. Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand				X
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				X
g. Comply with federal, state, and local statutes and regulations related to solid waste?				X

Significance Criteria:

The proposed project would result in significant adverse environmental impacts if any of the following occur:

- The project-related demand caused an increase in wastewater treatment that reached or exceeded the current capacity of existing or planned treatment facilities or caused a reduction in the level of service, thereby requiring substantial expansion of existing facilities or the construction of new facilities.
- The proposed project's use of water resources will substantially and adversely deplete existing sources of domestic water.
- The proposed project will require the construction of new water facilities beyond those already planned and the cost of which would not be borne by the applicant.
- The project will generate solid waste that exceeds the capacity of the landfill to accept and disposal of the waste.

Analysis:

a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

Less than Significant Impact. The Ukiah Landfill does not have a formal leachate collection and recovery system but collects landfill leachate and stormwater from a system of collection drains that is conveyed to a holding tank located on the western side of the landfill. The leachate is pumped via buried pipeline to an existing sewer trunk of the community service district operated by the City of Ukiah. Available information indicates that 519,230 gallons of leachate was collected and disposed of to the sanitary sewer in 2014. A review of this information indicates that the volume of leachate greatly increases during the winter months and in fact the leachate that is collected appears to be composed primarily of stormwater. There are no structures at the project site and no bathrooms or other facilities that generate wastewater. It is expected that the proposed project will greatly reduce the generation of leachate by stopping infiltration of stormwater into the cover of the landfill as well as improving drainage and stormwater conveyance system components. Project implementation will not require new sewer collection and/or treatment facilities and would not exceed any wastewater treatment requirements of the Regional Water Quality Control Board. Therefore, no significant impacts are anticipated and no mitigation measures are required.

b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Less than Significant Impact. The proposed project will maintain the existing sewer connection for the disposal of leachate. The project will also include the removal of one existing leachate holding pond. No water mains exist in the project area. With the exception of some temporary demands for water, which would be trucked onto the site and utilized on the site during construction to suppress dust and particulate emissions

as a result of grading, implementation of the proposed project will not create a demand for potable water. Furthermore, project implementation would not require the construction of any water treatment, storage and/or distribution facilities in order to implement the proposed project. Therefore, no significant impacts are anticipated and no mitigation measures are required.

c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Less than Significant Impact with Mitigation Incorporated. Project implementation includes the construction of and modification to the on-site storm drainage facilities. The existing landfill has several benches and drains that direct stormwater to an unnamed tributary located adjacent to the site. Several of the existing drains are substandard and need to be replaced. Several others will be removed and upgraded. Several additional outfalls will be abandoned. Work associated with the drainage outfalls includes work in the bed and bank of the unnamed tributary. Fill calculations and design specifications indicates that approximately three cubic yards of materials net fill will be placed at each drain that is replaced or improved. It is anticipated that fill quantities will total approximately 30 cubic yards in the bed and bank of the unnamed tributary from the storm drain improvements.

The proposed work in the bed and bank of the unnamed tributary will require permitting from applicable agencies. Permits will include a 401 Water Quality Certification from the North Coast Regional Water Quality Control Board, a 404 Clean Water Act Permit from the US Army Corps of Engineers and a 1602 Streambed Alteration Agreement from the California Department of Fish and Wildlife. The suite of permits will be supported by engineering plan and specifications for the proposed work as well as several components of mitigation and avoidance measures for the protection of fish and wildlife. As discussed herein there were no listed Federal species of plants or animals present within the project area. The Wetland Delineation did identify the presence of Waters of the US and Other Waters being present in the unnamed tributary.

While there is not an expansion of the storm water conveyance system components it is clear that work in the bed and bank of the creek will require mitigation and avoidance measures. These measures will be implemented as part of the project to minimize and mitigate conditions related to this activity. As a result, no significant impacts to storm drain facilities are anticipated and no mitigation measures are required.

d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

Less than Significant Impact. As indicated above, project implementation would require only temporary use of water for dust suppression during construction of the final cover and related activities that would occur. The use of water would cease upon completion of the construction activities. Once the proposed project is completed no water supplies would be necessary in the long-term to support the end use. Therefore, project implementation would not result in impacts to the existing and future water supply available to the County of Mendocino.

e. Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

No Impact. As indicated above, the existing landfill discharges leachate and stormwater from the collection system to the sanitary sewer system operated by the City of Ukiah. The completion of the proposed project will reduce leachate and stormwater volumes captured and disposed of from the site. In addition no structures such as bathrooms or dwellings that generate human waste will be present at the project site that would adversely affect the existing treatment capacity of the regional wastewater treatment plan. No impacts will occur as a result of project implementation.

f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

No Impact. The proposed project includes the closure of the Ukiah and the related environmental control systems. No development is proposed that would generate solid waste. Therefore, no impacts to landfill capacity will occur.

g. Comply with federal, state, and local statutes and regulations related to solid waste?

No Impact. As discussed closure of the Ukiah Landfill will be performed in accordance with the applicable regulatory standards prescribed in the California Code of Regulations Title 27, Chapters 3 and 4 and 40 Code of Federal Regulation, Subpart F. The components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, landfill gas collection, control and monitoring systems, groundwater and surface water monitoring systems, and site security. No significant impacts will occur because the proposed project will comply with all applicable regulatory requirements.

Cumulative Impacts

Project implementation will include work in the bed and bank of the unnamed tributary that could impact water quality. It should be recognized however that the new and replaced storm drain system components will improve water quality by providing bank stability, dissipation of energy from discharge of storm water and a reduction in sediment that is currently generated by substandard storm drain system components. Mitigation and avoidance measures will be employed for this work that will mitigate the potential impacts to less than significant levels. These measures will be required by applicable regulatory agencies that will permit and oversee the work related to the storm water conveyance system improvements.

The proposed project creates only a short-term demand for water that will be used during the construction process to control fugitive dust and moisture condition materials for compaction; however, the demand for water would cease upon completion of the final closure plan and no long-term demands would occur.

The proposed project will reduce the amount of leachate and stormwater is captured and disposed of to the Ukiah wastewater treatment plant by reducing infiltration of stormwater and improving site stability.

The proposed project would also not result in the generation of any solid waste and would not, therefore, contribute to cumulative solid waste generation in Mendocino County. Because the project is consistent with the long-range plans and policies adopted for the subject site and would not create demands for water or generation sewage and/or refuse that exceed those anticipated by the County's General Plan, the potential cumulative impacts would be less than significant.

CHAPTER 5.0 – CONCLUSIONS

5.0 CONCLUSIONS

5.1 Mandatory Findings of Significance

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?		X		
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			X	
c. Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?			X	

Impact Analysis

a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Less Than Significant with Mitigation Incorporated. The project site has been highly disturbed by past landfill operations and activities that have modified the existing site features. The project site was closed in 2001 and does not accept refuse for disposal. Implementation of the proposed project will result in the construction of the final landfill cover and related environmental control systems necessary to achieve final closure. Implementation of the proposed project would not significantly degrade the quality of the environment because the subject site has been extensively altered by prior development associated with the historic use of the site as a landfill. Although some short-term potential indirect impacts may occur in the project area resulting from construction noise, generation of dust, and erosion/siltation, project implementation will not result in the loss of any sensitive habitat or species, including both terrestrial and aquatic species or to other sensitive receptors in the area surrounding the project site. The project has been designed to avoid the creation of such impacts. In addition, where potential impacts have been identified, appropriate mitigation measures have been incorporated to ensure that potential impacts to biological resources are reduced to a less than significant level. Although no cultural or scientific resources are known to be located on the site and important historic resources would not be adversely affected

by the project, monitoring during the grading phase will ensure that any potential artifacts that may be encountered can be evaluated and appropriate measures implemented. Project implementation will not substantially reduce the habitat of fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of major periods of California history or prehistory. As previously indicated, potentially significant impacts to biological resources are anticipated as a result of project implementation will be mitigated, resulting in less than significant impacts to those resources.

b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

Less than Significant Impact. As indicated in the analysis presented in the initial study, implementation of the proposed project will not result in significant cumulative impacts. In particular, project-related impacts are short-term in nature and occurring only during the construction phase (e.g., traffic, noise, air quality, etc.). Furthermore, the project site is located in a rural area of Mendocino County with significant distance between the project site and residential or commercial development. The closest developed properties to the project site include the Vichy Springs Resort and a developed residential subdivision located to the southwest of the project site. Neither of these sites have a direct line of site to the project site and both are located a significant distance from the project. Thus, with the mitigation measures that are described herein, the short-term impacts resulting from project implementation would not contribute to cumulative long-term operational impacts such as traffic, noise, air quality, etc. Further, the proposed project does not have the potential to generate other project-related impacts that may be cumulatively considerable. Lastly, the proposed project will not have a foreseen effects of known or prospective current or future projects Therefore, no significant impacts are anticipated as a result of the implementation of the proposed project.

c. Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?

Less than Significant Impact. This study reviewed the proposed project's potential impacts involving each of the issues included in the environmental checklist. As concluded in these assessments, the proposed project would not result in any significant impacts related to these issues. Although project implementation will result in physical changes to the project site, the alterations are not anticipated to result in significant changes or impacts to the environment. Implementation of the proposed project does not include development that would result in any direct or indirect impacts on humans. The project proposes only to place a final cover and related environmental control systems on the existing closed landfill in compliance with Title 27 of the California Code of Regulations. The proposed project is consistent with the Mendocino County General Plan and Title 27 of the California Code of Regulations which regulates landfill closures. Potential impacts of the proposed project have been evaluated in the preceding analysis. Where potentially significant impacts have been identified, adequate mitigation measures have been proposed that would reduce such impacts to a less than significant level. Therefore, potential significant impacts are anticipated to be less than significant after the incorporation and implementation of mitigation measures prescribed in this document.

5.2 Mitigation Monitoring and Reporting Program

In accordance with the California Environmental Quality Act (CEQA), the City of Ukiah Department of Public Works prepared a Mitigated Negative Declaration (MND) and Initial Study for the proposed project located at 3100 Vichy Springs Road in Ukiah, California. The MND indicated that the potential adverse environmental impacts of the project, in terms of Biological Resources, Hydrology and Water Quality, Noise, and Transportation/Traffic could be reduced to below levels of significance or minimized with the implementation of mitigation measures. The mitigation measures have been incorporated into the project and the MND is scheduled for adoption by the City of Ukiah, in conjunction with the approval of the project.

Section 21081.6 of the Public Resources Code (PRC) and CEQA Guidelines section 15097 require the Lead Agency for each project which is subject to CEQA to monitor performance of the mitigation measures included in any environmental document to ensure that implementation does, in fact, take place. The PRC requires the Lead Agency to adopt a monitoring and reporting program that is designed to ensure compliance during project implementation. In accordance with PRC Section 21081.6 and CEQA Guidelines section 15097, the following Mitigation Monitoring Reporting Program has been prepared and will be implemented for the Ukiah Landfill Final Closure Plan. Table 5-1 lists the mitigation measures or standard conditions, responsible parties, time frame for implementation, and monitoring parties.

Table 5.1

Summary of Mitigation Measures & Implementation

Ukiah Landfill Final Closure

3100 Vichy Springs Road, Ukiah, California

Mitigation Reference	Mitigation Measure	Method of Verification	Timing of Implementation	Responsible Party
MM 4.3-1	Water shall be applied by means of truck(s), hoses, and/or sprinklers as needed prior to any land clearing or earth movement to minimize dust emissions.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.3-2	All material excavated, stockpiled, or graded shall be sufficiently watered to prevent fugitive dust from leaving the property boundaries or causing a public nuisance. Watering should occur at least twice daily, however frequency of watering shall be based on the type of operation, soil, and wind exposure	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.3-3	All on-site vehicles traffic shall be limited to 15 miles per hour (mph) on unpaved roads.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.3-4	All trucks hauling soil, sand, or other loose material on public roads will be covered or required to maintain at least two feet of freeboard.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.3-5	All land clearing, grading, or earth moving activities shall be suspended as necessary, based on site conditions, to prevent excessive windblown dust when winds are expected to exceed 20 mph.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.3-6	All inactive portions of the construction site shall be covered, seeded, or watered until a suitable cover is established. Alternatively nontoxic soil stabilizers can be applied to all inactive construction areas.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.3-7	Paved areas adjacent to construction sites shall be swept or washed as required to remove excess accumulations of silt and/or mud, which may have results from grading and construction activities.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.3-8	A publically visible sign shall be posted with the telephone number and person to contact regarding dust complaints.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.4-1	Work is proposed to be conducted outside the rainy season (defined as October 15-April 15), primarily between June 15 and October 15, after the summer season when the creek flows are low, therefore no erosion or sediment control is expected to be necessary. To avoid debris contamination in the creek, a silt fence will be placed parallel to the project area in the creek to contain spoils from drilling and any concrete that may inadvertently drop into the creek during construction. All debris will be cleared out of the creek before the silt fence is removed.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.4-2	Prior to the start of construction, a US Fish and Wildlife Service-approved biologist will train all construction personnel regarding habitat sensitivity, identification of special status species, and required practices before the start of construction. The training will include the general measures that are being implemented to conserve the species as they relate to the project, the penalties for non-compliance, and the boundaries of the project area. If new construction personnel are added to the project, the contractor will ensure that the personnel receive the mandatory training before starting work. A fact sheet or other supporting materials containing this information will be prepared and distributed to all construction personnel. Upon completion of training, construction personnel will sign a form stating that they attended the training and understand all the conservation and protection measures.	Biological training will be performed initially with all contractors and subcontractors as appropriate. Biological monitoring will be conducted as necessary throughout the project implementation by qualified and trained personnel.	Initial training will be conducted at the start of the project. Additional training will be conducted as necessary throughout project as new phases of work start	Qualified biologist and trainined personnel.
MM 4.4-3	No project related activities will occur outside the exclusion fence.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.4-3	Appropriate dust abatement measures (e.g., spraying exposed areas) shall be implemented during construction if airborne dust appears to be significant.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors

Table 5.1

Summary of Mitigation Measures & Implementation

Ukiah Landfill Final Closure

3100 Vichy Springs Road, Ukiah, California

Mitigation Reference	Mitigation Measure	Method of Verification	Timing of Implementation	Responsible Party
MM 4.4-4	During grading, avoid side-casting excess material downslope towards the stream channel.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.4-5	All on-site storage of fuels, oils, and lubricants shall be located in an area where an accidental spill prevents this material from flowing downslope towards the stream.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.4-6	All equipment that uses fuels, oils, and/or lubricants, when not in use, shall be stored in areas where leakage and spills do not flow downslope toward the creek.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.4-7	Regular inspections of all equipment fuel lines, connections, filters, etc., shall be performed to ensure that leaks are detected and treated in a timely fashion.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.4-8	All refueling of machinery shall occur in an area where accidental spills will not flow toward the stream channel. Fuel absorbent matting and other spill containment materials shall be stored on-site and all operators shall be familiar with their proper use.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.4-9	The project site shall be restored to pre-construction condition or better. Streambank, ground and/or soil exposed as a result of construction, and soil within and above toe-rock shall be revegetated by live planting, seed casting, or hydroseeding prior to November 30 of the project year. All debris, sediment, rubbish, vegetation or other material removed from waterway shall be removed to a location where it will not re-enter the waters of the state.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.4-10	Roosting and Nesting surveys for special-status species (i.e., bats and birds) by a qualified biologist shall be conducted at the appropriate times before construction starts to determine occupancy at the site. If no special-status species are found, no further action other than the Best Management Practices identified in the Biological Assessment are required. If individuals are found, including nesting birds, a buffer zone around the species or nest will be required at a sufficient distance to prevent take of individual plants, or until after the nesting season.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.4-11	Due to the potential for special-status species to occur, move through, or into the ephemeral tributary portion of the project area, an on-site monitor, shall at a minimum, check the ground beneath all equipment and stored materials each morning before construction starts to prevent take of individuals. All pipes or tubing 4 inches or greater shall be sealed by the relevant contractor with tape at both ends to prevent animals from entering the pipes at night. All trenches and other excavations shall be backfilled the same day they are opened, or shall have an exit ramp built into the excavation to allow animals to escape.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.4-12	For all areas where rock is to be placed and pools are present, the applicant will capture and relocate any native amphibians found at pools nearest to the rock base placement (within 35 feet or based on a biologist recommendation). Captured native animals will be relocated to the closest pool.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors

Table 5.1

Summary of Mitigation Measures & Implementation

Ukiah Landfill Final Closure

3100 Vichy Springs Road, Ukiah, California

Mitigation Reference	Mitigation Measure	Method of Verification	Timing of Implementation	Responsible Party
MM 4.4-13	The proposed project could result in “take” of individual foothill yellow-legged frog known to occur within this portion of the ephemeral tributary. There is potential for both adults and tadpoles to be affected by the proposed project. Construction will occur above any existing water. If this is not possible, measures will be taken to isolate the workspace from flowing water to prevent stream sedimentation and turbidity. To prevent take of individuals a pre-construction survey of the ephemeral tributary shall be conducted 3 months in advance of work proposed for the ephemeral tributary. The surveys will determine if individuals are present. If no individuals (e.g., adults, juveniles or tadpoles) are present, no further action is required. If adults are present work in the creek shall occur after the metamorph stage of development, typically after August. This timing will ensure that individuals can leave an area of the own volition.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.4-14	The proposed project could result in “take” of individual western pond turtle that may move along this portion of the ephemeral tributary and may use the ponds on the site. To prevent take of individuals a pre-construction survey of the ephemeral tributary and the ponds shall be conducted 3 months in advance of work proposed for either water body. The surveys will determine if individuals are present. If no individuals (e.g., adults, or juveniles) are present, no further action is required. If individuals are present measures to prevent take of individual foothill yellow-legged frog will address concerns for western pond turtle.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.4-15	The proposed project could result in the removal of occupied passerine nests in the trees and shrubs on the project site. Disturbance during the nesting season may result in nest abandonment and mortality of young. Bird species not protected under CESA or FESA, such as some passerines (including mourning dove and scrub jays) are protected under the Fish and Game Code 3503 and the MBTA, and some raptors (including American kestrel) are protected under Fish and Game Code 3503.5 and the MBTA. These aforementioned species may potentially be impacted by the removal of potential nesting habitat in the trees within the project area. Disturbance during the nesting season (February 15- August 15) may result in the potential nest abandonment and mortality of young, which is considered a “take” of an individual. This is a potentially significant impact. To avoid “take” and/or further evaluate presence or absence of passerines, the following measures are recommended:	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	1. Grading or removal of nesting trees should be conducted outside the nesting season, which occurs between approximately March 1 and August 15.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors

Table 5.1

Summary of Mitigation Measures & Implementation

Ukiah Landfill Final Closure

3100 Vichy Springs Road, Ukiah, California

Mitigation Reference	Mitigation Measure	Method of Verification	Timing of Implementation	Responsible Party
	2. If grading between August 15 and March 1 is infeasible and groundbreaking must occur within the breeding season, a pre-construction nesting bird (both passerine and raptor) survey of the grasslands and adjacent trees shall be performed by a qualified biologist within 7 days of ground breaking. If no nesting birds are observed no further action is required and grading shall occur within one week of the survey to prevent "take" of individual birds that could begin nesting after the survey.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	3. If bird nests (either passerine and/or raptor) are observed during the pre-construction survey, a disturbance-free buffer zone shall be established around the nest tree(s) until the young have fledged, as determined by a qualified biologist.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	4. The radius of the required buffer zone can vary depending on the species, (i.e., 75-100 feet for passerines and 200-300 feet for raptors), with the dimensions of any required buffer zones to be determined by a qualified biologist in consultation with CDFG.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	5. To delineate the buffer zone around a nesting tree, orange construction fencing shall be placed at the specified radius from the base of the tree within which no machinery or workers shall intrude.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	6. After the fencing is in place there will be no restrictions on grading or construction activities outside the prescribed buffer zones.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.4-16	The project shall either avoid take or obtain formal incidental take coverage with the required compensatory measures where avoidance cannot be achieved for state and federally listed or proposed species, state candidates for listing, and California Native Plant Society (CNPS) Rank 1B species if they are encountered.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.4-17	For species that do not have formal take protection (e.g., CNPS Rank 1B plants and federally-listed plants where there is no federal nexus), the City shall avoid, minimize, and/or compensate (in that order of preference) at the same level of mitigation as those species that are afforded formal take protection if such plant species are encountered at the project site.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.4-18	If listed plant species are found on the project site, then the project applicant shall prepare a mitigation plan that describes the avoidance or compensatory mitigation measures that would be implemented for these populations. As a performance standard, the plan shall provide for no net loss in the quantity or quality of plant populations. The mitigation plan shall be submitted to the USFWS and/or CDFW for approval for federal and state-listed plants, respectively, if encountered at the project site. The mitigation plan would include the mitigation measures, which are adopted from the CNPS Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened and Endangered Plants (CNPS 1998), described below, or equally effective alternative measures:	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	1. Mitigation for impacts to listed plants would include avoidance measures, when feasible, and compensatory mitigation when avoidance is not possible. Avoidance measures shall include buffer zones to avoid impacting listed plants; installing exclusion fencing around the existing plant populations prior to and during construction. Compensatory mitigation shall include replanting on site or propagation of plants at a nearby conservation site through seeding or translocation. Mitigation ratios shall be sufficient to achieve performance criteria of no net loss of plants. Post-project monitoring shall verify that avoidance and mitigation measures are successful.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	2. If mitigation for impacts to listed or List 1B plants occurs at a non-bank site, preference would be given to locating the mitigation site in an area as close to the project site as possible. If mitigation sites are not available in the vicinity of the project site, mitigation for listed plants may be accomplished at any site in Mendocino County that is suitable and supports the impacted plant population.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors

Table 5.1

Summary of Mitigation Measures & Implementation

Ukiah Landfill Final Closure

3100 Vichy Springs Road, Ukiah, California

Mitigation Reference	Mitigation Measure	Method of Verification	Timing of Implementation	Responsible Party
	3. A long-term mitigation, monitoring, and management plan shall be developed for plant mitigation and submitted to the USFWS and/or CDFW for approval prior to initiation of construction activities. Mitigation sites shall be monitored for five years after installation. Depending on the actual case-by-case circumstances listed plants within the Project footprint may be salvaged and/or transplanted to a mitigation site approved by the CDFG and/or USFWS. When feasible, seed from plants unavoidably impacted shall be collected and preserved for planting on an approved mitigation site.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	4. Impacted plants shall be mitigated at the ratio of 2:1, or as required by resources agencies, for both individuals and area.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	5. All storage and staging areas shall be located outside of stands of listed plants.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.4-19	The project shall avoid significant loss of individuals of a CNPS Rank 2, 3, or 4 (sensitive) plant species, to the extent feasible if encounted atthe project site. Avoidance measures shall include, but not be limited to, buffer zones, to avoid impacting special status plants and installation of exclusion fencing around the existing plant populations prior to and during construction. If the impacts from the project exceed 15% of the known occurrences or populations in Mendocino County, then plants shall be relocated or compensatory mitigation shall occur. The project applicant shall prepare a mitigation plan that describes the avoidance or compensatory mitigation measures that would be implemented for these populations. The mitigation plan would be submitted to the CDFW for approval and include the following, or equally effective alternative measures:	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	1. Prior to the initiation of construction, Rank 2, 3 or 4 plants that would be unavoidably impacted during construction shall be salvaged and transplanted or their seeds shall be collected and preserved for subsequent re-planting. The transplanted plants or seeds shall be reestablished on site if possible; otherwise, they shall be established on a mitigation parcel. Mitigation sites shall be monitored for five years after installation.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	2. Impacted Rank 2, 3 or 4 plants shall be mitigated at a ratio of 1:1, or as required by resources agencies, for both individuals and area.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.4-20	Removal of trees containing suitable bat roosting habitat comprised of cavities, crevices, and/or exfoliating bark, may cause direct mortality of roosting bats if removed during maternity season prior to self-sufficient volancy of pups, or in winter during torpor or hibernation. Removal of larger mature trees has the potential of causing direct mortality of solitary tree-roosting species such as western red bat or hoary bat. Presence/absence surveys for bats in trees are extremely problematic for several reasons. First, only a small percentage of trees can be effectively surveyed by inspecting crevices or cavities due to limited physical access to the roost features, or complete visual access of the feature. As a result, in most cases, trees must be surveyed at night using night vision and bioacoustic equipment to observe any bats emerging from roost features. Typically, only one, or two adjacent trees can be surveyed by each observer each night. In addition, bats are less site-faithful to trees than other roost types like caves, mines, bridges or buildings, and switch tree roosts frequently when active. Therefore, trees must be removed no more than 24-48 hours after each night emergence survey, to ensure the tree is removed prior to bats moving in subsequent to surveys. Because of these logistical limitations, it is rarely safe to rely on emergence surveys of trees if more than a few are present on a project site. Instead, it is generally more cost-effective to presume presence of roosting bats, then conduct two-step tree removal during seasonal periods of bat activity, so that bats can safely abandon the tree prior to removal. These dates are:	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors

Table 5.1

Summary of Mitigation Measures & Implementation

Ukiah Landfill Final Closure

3100 Vichy Springs Road, Ukiah, California

Mitigation Reference	Mitigation Measure	Method of Verification	Timing of Implementation	Responsible Party
	A) Between March 1 (or after evening temperatures rise above 45F and 72 hours after rains fall to less than 0.5" in 24 hours) and April 15 (maternity season), after which time non-volant pups are present in maternity roosts, and;	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
	B) Between September 1, after young are self-sufficiently volant, and October 15, or before evening temperatures fall below 45F, and 72 hours prior to onset of rains greater than 0.5" in 24 hours.	Monitoring During Construction Activities	During all phases of project	Qualified biologist and trainined personnel. Contractors & Subcontractors
MM 4.5-1	Prior to the approval of the project Plans and Specifications, the plans and specifications stipulate that if evidence of subsurface archaeological resources are found during construction, excavation and other construction activity in that area shall cease and the contractor shall contact the Construction Engineer, who will then contact a county certified archaeologist to determine the extent of the find and take proper actions.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.5-2	If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC. The City of Ukiah Public Works Department shall consult with the MLD regarding treatment and disposition of the human remains and items associated with Native American burials.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.8-1	Maintain a water truck on site to control a wild land fire if it were to occur.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.8-2	Smoking shall be restricted to the controlled areas of the project site working area.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.8.3	Maintain a designated area for fuel and liquid storage that include fire extinguishers and spill control materials that are suitable for the materials used and stored at the project site.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM4.9-1	An erosion control plan shall be included with the project planning and design documentation that sets forth management and project site requirements for the control and minimization of sediment and erosion.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.9-2	Grading shall be prohibited after October 15 of any year without regulatory agency approval.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.9.3	Erosion control structures such as sedimentation ponds, energy dissipaters, and silt fences shall be installed prior to the start of the proposed project and maintained until project completion.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.9-4	A General Construction Storm Water Pollution Prevention Plan shall be prepared and implemented as part of the project permitting and documentation. The SWPPP will be fully implemented and remain in effect until the completion of the project.	Monitoring During Construction Activities by Qualified Stormwater Practitioner	During all phases of project	Legally Responsible Party
MM 4.9-5	Post closure monitoring and inspection will be implemented to ensure the project site remains stable and free of slope failures or sediment sources.	Monitoring After Activities	Monitoring will be conducted after compoletion of project to verify site conditions.	City of Ukiah and it's Contractors & Subcontractors
MM 4.12-1	Construction activities shall comply with standard Mendocino County conditions with respect to hours of lesser noise sensitivity, use of proper mufflers and selection of quieter equipment.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.12-2	Noise generating activities at the construction site or in areas adjacent to the construction site associated with the project in any way should be restricted to the hours of 7:00 a.m. to 6:00 p.m., Monday through Friday. No construction activities should occur on weekends or holidays.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.12-3	All internal combustion engine drive equipment should have intake and exhaust mufflers that are in good condition and appropriate for the equipment.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.12-4	Unnecessary idling of internal combustion engines should be strictly prohibited.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.12-5	Low noise air compressors and other stationary noise sources should be utilized where technology exists.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.14-1	No vehicles, including construction worker vehicles, heavy trucks and/or equipment, shall be parked in areas covered with grass. Parking areas shall be established for all vehicles in an area that is cleared of all grass.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors
MM 4.14-2	A water truck shall be present on-site for fire control should flammable material ignite during the final closure construction.	Monitoring During Construction Activities	During all phases of project	Contractors & Subcontractors

CHAPTER 6.0 – REFERENCES

6.0 REFERENCES

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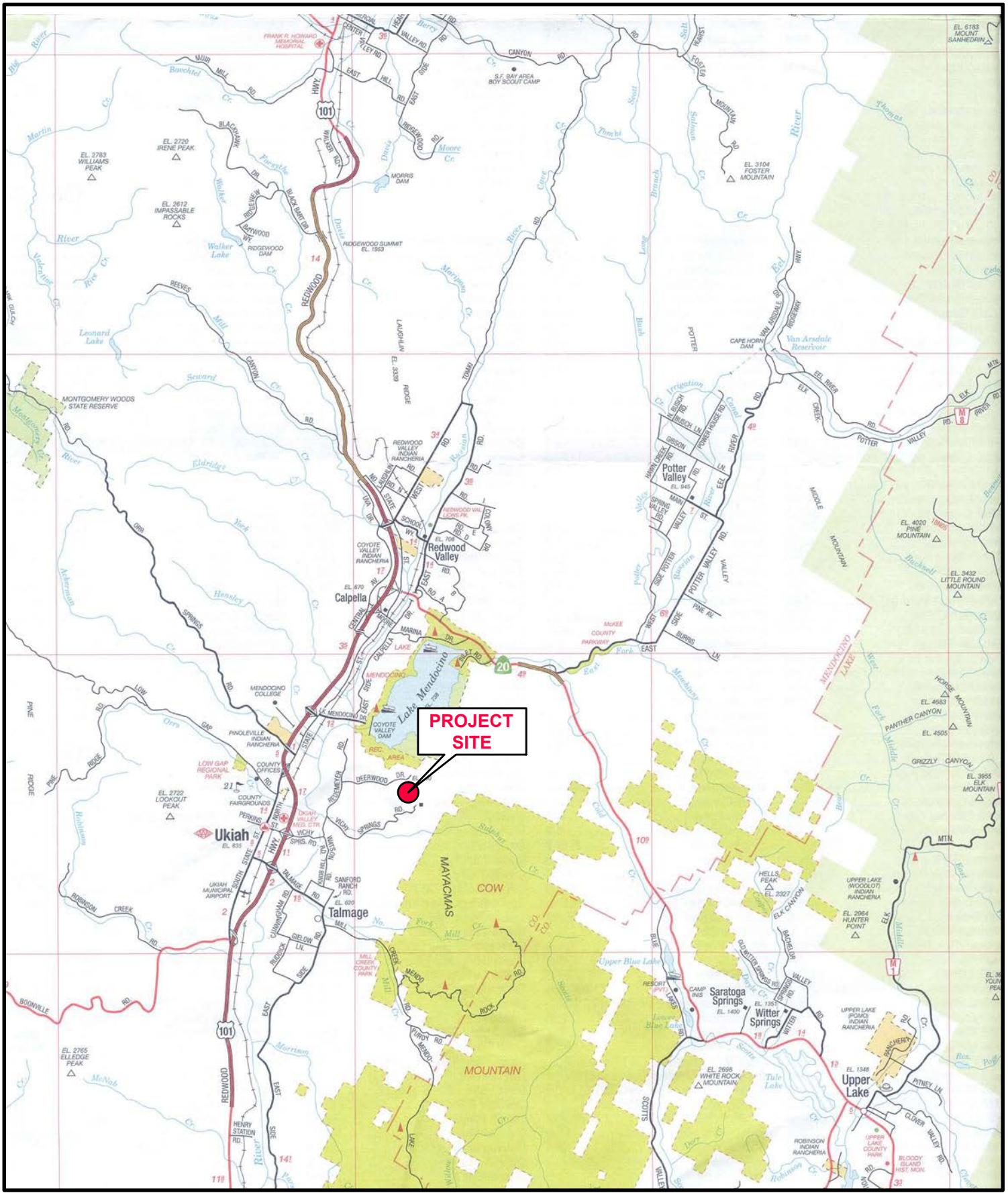
APPENDIX A

FIGURES

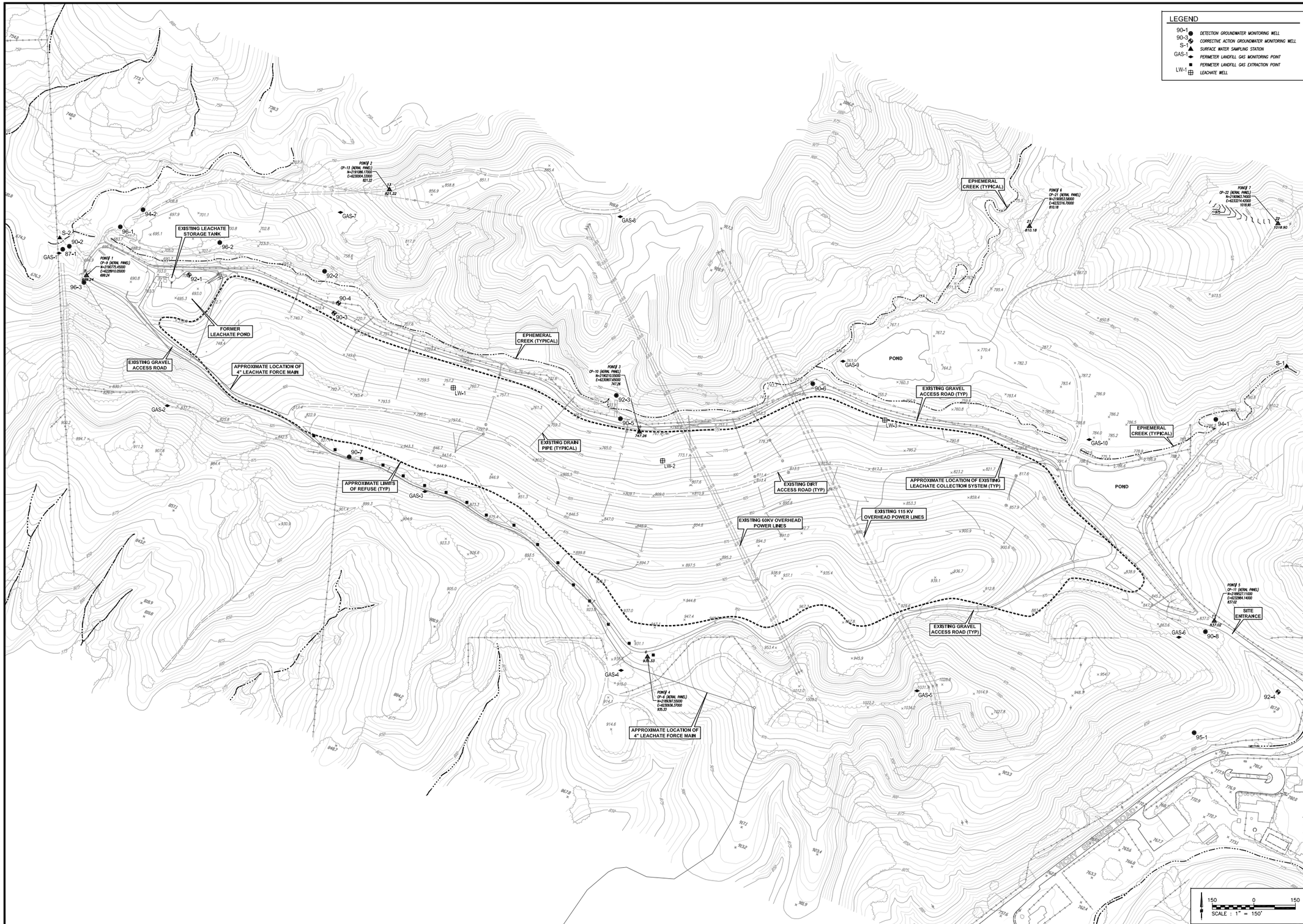


EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

LOCATION MAP

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

FIGURE
1
02–907



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SITE MAP (EXISTING CONDITIONS)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No:	02-907
Drawn By:	SGH/ DTM
Checked By:	DS
Date:	2015-08-14

FIGURE
2

LEGEND

- 90-1 ● DETECTION GROUNDWATER MONITORING WELL
- 90-3 ⊕ CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 ▲ SURFACE WATER SAMPLING STATION
- GAS-1 ◆ PERIMETER LANDFILL GAS MONITORING POINT
- ■ PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 ⊞ LEACHATE WELL

EXISTING SEDIMENTATION BASIN TO REMAIN

EXISTING LEACHATE POND TO BE FILLED

PROPOSED GRAVEL ACCESS ROAD AND BENCH SYSTEM

PROPOSED FLARE SYSTEM

PROPOSED DRAINAGE SYSTEM (TYP)

EPHEMERAL CREEK (TYPICAL)

EXISTING 60KV OVERHEAD POWER LINES

EXISTING 115 KV OVERHEAD POWER LINES

PROPOSED LIMITS OF CLOSURE TURF (TYPICAL)

PROPOSED LIMITS OF GRADING (TYPICAL)

APPROXIMATE LOCATION OF EXISTING 4" LEACHATE FORCE MAIN

EXISTING SEDIMENTATION BASIN TO BE REGRADED

PROPOSED BENCH (TYPICAL)

PROPOSED BORROW AREA

PROPOSED ACCESS ROAD GRADING

EXISTING NATIVE GRASS PRESERVATION AREA (TYP)

EXISTING WETLAND PRESERVATION AREA (TYP)

EXISTING SEDIMENTATION BASIN TO REMAIN

PROPOSED ROCK LINED SWALE (TYPICAL)

APPROXIMATE LIMITS OF REFUSE (TYP)

SITE ENTRANCE

150 0 150
SCALE : 1" = 150'

EBA ENGINEERING
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GRADING PLAN (FINISHED GRADE)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No:	02-907
Drawn By:	SGH/ DTM
Checked By:	DS
Date:	2015-08-14

FIGURE
3

Xrefs: X-Ref - EG - 2014.dwg X-Ref - Submittal.dwg X-Ref - Finished Grade - Design.dwg X-Ref - Finished Grade - Design.dwg X-Ref - Excavation Layer - Design.dwg X-Ref - Turf - Holding.dwg
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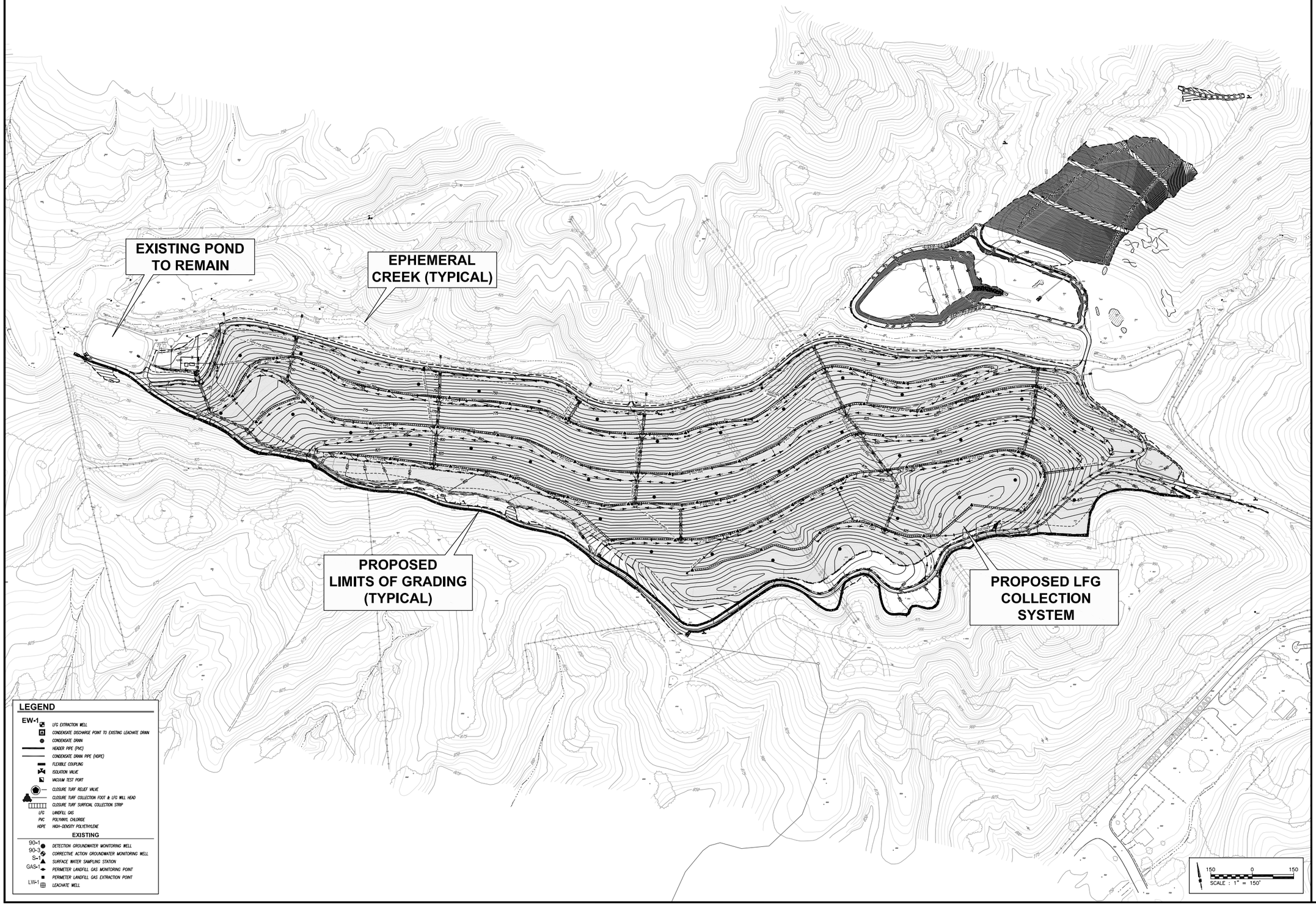

LEGEND

EW-1 LFG EXTRACTION WELL
CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
CONDENSATE DRAIN
HEADER PIPE (PVC)
CONDENSATE DRAIN PIPE (HDPE)
FLEXIBLE COUPLING
ISOLATION VALVE
VACUUM TEST PORT
CLOSURE TURF RELIEF VALVE
CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD
CLOSURE TURF SURFICIAL COLLECTION STRIP
LFG LANDFILL GAS
PVC POLYVINYL CHLORIDE
HDPE HIGH-DENSITY POLYETHYLENE

EXISTING

90-1 DETECTION GROUNDWATER MONITORING WELL
90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1 SURFACE WATER SAMPLING STATION
GAS-1 PERMETER LANDFILL GAS MONITORING POINT
PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1 LEACHATE WELL

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LFG COLLECTION SYSTEM LAYOUT

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:	
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FIGURE
4

Xrefs: G-Ref - EG - 2015.dwg G-Ref - Subutility.dwg G-Ref - Finished Grade - Design.dwg G-Ref - Finished Grade - Hatching.dwg G-Ref - Excavation Layer - Design.dwg G-Ref - Turf - Hatching.dwg
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APPENDIX B

FINAL CLOSURE PLANS

CONSTRUCTION DRAWINGS

FOR

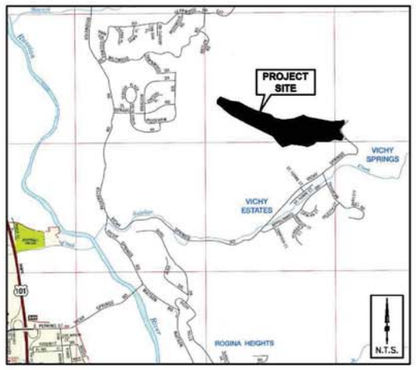
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

APN 178-130-01

3100 VICHY SPRINGS ROAD

UKIAH, CALIFORNIA

LOCATION MAP



SITE MAP



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201	LANDFILL COVER PLAN
202	LANDFILL COVER PLAN
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301	FINISHED GRADE (LANDFILL)
302	FINISHED GRADE (LAND FILL)
303	FINISHED GRADE (BORROW AREA)
304	FLARE STATION AREA BLOW UP
305	SECTIONS
306	SECTIONS
307	SECTIONS
308	SECTIONS
309	PLAN ENLARGEMENTS
400	FLARE STATION AREA BLOW UP
500	GRADING DETAILS
501	GRADING DETAILS
502	GRADING DETAILS
600	LFG COLLECTION SYSTEM LAYOUT - WEST PORTION
601	LFG COLLECTION SYSTEM LAYOUT - CENTRAL PORTION
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TITLE SHEET

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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GENERAL NOTES

1. ALL CONSTRUCTION MATERIALS AND METHODS SHALL CONFORM TO THE REQUIREMENTS OF THE COUNTY OF MENDOCINO. ALL REFERENCES TO STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS SHALL REFER TO THE MAY, 2006 EDITION OF THE STANDARD SPECIFICATIONS. ATTENTION IS ALSO DIRECTED TO THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD PLANS (MAY 6, 2006) WHICH, WHEN APPLICABLE, ARE INCLUDED IN THESE DRAWINGS AND REFERENCED BY STANDARD PLAN NUMBER.
2. PUBLIC SAFETY AND TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH COUNTY REQUIREMENTS AND AS DIRECTED BY THE ENGINEER. SAFE VEHICULAR AND PEDESTRIAN ACCESS SHALL BE PROVIDED AT ALL TIMES DURING CONSTRUCTION.
3. A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR SHALL DO ALL FIELD STAKING AT THE EXPENSE OF THE CONTRACTOR.
4. ANY DISCREPANCY DISCOVERED BY THE CONTRACTOR IN THESE PLANS OR ANY FIELD CONDITIONS DISCOVERED BY THE CONTRACTOR THAT MAY DELAY OR OBSTRUCT THE PROPER COMPLETION OF THE WORK PER THESE PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY UPON DISCOVERY. SAID NOTIFICATION SHALL BE IN WRITING.
5. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, GENERAL CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
6. CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING MONUMENTS AND OTHER SURVEY MARKERS. MONUMENTS, SURVEY MARKERS, GAS, WATER AND MONITORING DEVICES DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
7. CONTRACTOR SHALL MAINTAIN ADEQUATE DUST CONTROL PER SECTION 10, CALTRANS STANDARD SPECIFICATIONS.
8. DURING CONSTRUCTION , THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING NOISE, ODORS, DUST, AND DEBRIS TO MINIMIZE IMPACTS ON SURROUNDING PROPERTIES AND ROADWAYS. CONTRACTOR SHALL BE RESPONSIBLE THAT ALL CONSTRUCTION EQUIPMENT IS EQUIPPED WITH MANUFACTURER'S APPROVED MUFFLER BAFFLES. FAILURE TO DO SO MAY RESULT IN THE ISSUANCE OF AN ORDER TO STOP WORK.
9. CONTRACTOR SHALL INDEPENDENTLY REVIEW GROUND, TOPOGRAPHY, AND EXISTING CONDITIONS THROUGHOUT THE LIMITS OF WORK, AND ASSUME WHOLLY AND UNCONDITIONALLY THE RISK OF COMPLETING THE WORK SET OUT ON THESE PLANS, REGARDLESS OF ROCK, WATER TABLE, OR OTHER CONDITIONS WHICH THE CONTRACTOR MAY ENCOUNTER IN THE COURSE OF THE WORK.
10. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS BEFORE LAYING OUT THE WORK AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE STARTING WORK. HE SHALL BE RESPONSIBLE FOR ANY ERRORS RESULTING FROM HIS FAILURE TO DO SO.
11. DIMENSION TAKE PRECEDENCE OVER SCALE.
12. ALL WORK TO BE COMPLETED IS ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

EROSION CONTROL NOTES

GENERAL

1. PERFORM EROSION PREVENTION AND SEDIMENT CONTROL IN ACCORDANCE WITH THE COUNTY OF MENDOCINO STANDARDS, CALIFORNIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND THE PROJECT CONSTRUCTION DOCUMENTS.
2. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING STORM WATER POLLUTION GENERATED FROM THE CONSTRUCTION SITE YEAR ROUND. WORK SITES WITH INADEQUATE EROSION AND SEDIMENT CONTROL MAY BE SUBJECT TO A STOP WORK ORDER.
3. IF DISCREPANCIES OCCUR BETWEEN THESE NOTES, MATERIAL REFERENCED HEREIN OR MANUFACTURER'S RECOMMENDATIONS, THEN THE MOST PROTECTIVE SHALL APPLY.
4. AT ALL TIMES THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND COMPLYING WITH THE STATE OF CALIFORNIA NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION ACTIVITY. CONSTRUCTION ACTIVITIES INCLUDE BUT ARE NOT LIMITED TO CLEARING, GRADING, EXCAVATION, STOCKPILING, AND RECONSTRUCTION OF EXISTING FACILITIES INVOLVING REMOVAL AND REPLACEMENT.

RAINY SEASON OPERATIONS

1. THE CONTRACTOR MUST IMPLEMENT AN EFFECTIVE COMBINATION OF EROSION PREVENTION AND SEDIMENT CONTROL ON ALL DISTURBED AREAS DURING THE RAINY SEASON (OCTOBER 15 - APRIL 15). CONSTRUCTION GRADING AND DRAINAGE IMPROVEMENT SHALL BE PERMITTED DURING THE RAINY SEASON ONLY WHEN ON-SITE SOIL CONDITIONS PERMIT THE WORK TO BE PERFORMED. STORM WATER BMPS REFERENCED OR DETAILED IN THE PERMIT AUTHORITY'S BEST MANAGEMENT PRACTICES GUIDE SHALL BE IMPLEMENTED AND FUNCTIONAL ON THE SITE AT ALL TIMES.

YEAR ROUND REQUIREMENTS

1. DURING THE NON-RAINY SEASON, ON ANY DAY WHEN THE NATIONAL WEATHER SERVICE FORECAST IS A CHANCE OF RAIN OF 30% OR GREATER WITHIN THE NEXT 24 HOURS, STORM WATER BMPS REFERENCED OR DETAILED IN PRMD'S BEST MANAGEMENT PRACTICES GUIDE SHALL BE IMPLEMENTED, INSTALLED, AND FUNCTIONAL ON THE SITE TO PREVENT SOIL AND OTHER POLLUTANT DISCHARGES. AT ALL OTHER TIMES, BMPS SHOULD BE STORED ON SITE IN PREPARATION FOR INSTALLATION PRIOR TO RAIN EVENTS.
2. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED BY THE CONTRACTOR BEFORE FORECASTED STORM EVENTS AND AFTER STORM EVENTS TO ENSURE MEASURES ARE FUNCTIONING PROPERLY. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES THAT HAVE FAILED OR ARE NO LONGER EFFECTIVE SHALL BE PROMPTLY REPLACED. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED.
3. THE LIMITS OF GRADING SHALL BE DEFINED AND MARKED ON SITE TO PREVENT DAMAGE TO SURROUNDING VEGETATION. PRESERVATION OF EXISTING VEGETATION SHALL OCCUR TO THE MAXIMUM EXTENT PRACTICABLE. ANY EXISTING VEGETATION WITHIN THE LIMITS OF GRADING THAT IS TO REMAIN UNDISTURBED BY THE WORK SHALL BE IDENTIFIED AND PROTECTED FROM DAMAGE BY MARKING, FENCING, OR OTHER MEASURES.
4. CHANGES TO THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN MAY BE MADE TO RESPOND TO FIELD CONDITIONS AND SHALL BE NOTED ON THE PLAN.
5. DISCHARGES OF POTENTIAL POLLUTANTS FROM CONSTRUCTION SITES SHALL BE PREVENTED USING SOURCE CONTROLS TO THE MAXIMUM EXTENT PRACTICABLE. POTENTIAL POLLUTANTS INCLUDE BUT ARE NOT LIMITED TO: SEDIMENT, TRASH, NUTRIENTS, PATHOGENS, PETROLEUM HYDROCARBONS, METALS, CONCRETE, CEMENT, ASPHALT, LIME, PAINT, STAINS, GLUES, WOOD PRODUCTS, PESTICIDES, HERBICIDES, CHEMICALS, HAZARDOUS WASTE, SANITARY WASTE, VEHICLE OR EQUIPMENT WASH WATER, AND CHLORINATED WATER.
6. ENTRANCE(S) TO THE CONSTRUCTION SITE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF POTENTIAL POLLUTANTS OFFSITE. POTENTIAL POLLUTANTS DEPOSITED ON PAVED AREAS WITHIN THE COUNTY RIGHT-OF-WAY, SUCH AS ROADWAYS AND SIDEWALKS, SHALL BE PROPERLY DISPOSED OF AT THE END OF EACH WORKING DAY OR MORE FREQUENTLY AS NECESSARY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING CONSTRUCTION VEHICLES LEAVING THE SITE ON A DAILY BASIS TO PREVENT DUST, SILT, AND DIRT FROM BEING RELEASED OR TRACKED OFFSITE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AT THE END OF EACH WORKING DAY OR MORE OFTEN AS NECESSARY.
7. ALL DISTURBED AREAS SHALL BE PROTECTED BY USING EROSION PREVENTION MEASURES TO THE MAXIMUM EXTENT PRACTICABLE, SUCH AS ESTABLISHING VEGETATION COVERAGE, HYDROSEEDING, STRAW MULCH, BLANKETS OR MATS. TEMPORARY OR PERMANENT REVEGETATION SHALL BE INSTALLED AS SOON AS PRACTICAL AFTER VEGETATION REMOVAL BUT IN ALL CASES PRIOR TO OCTOBER 15. PRIOR TO FINAL INSPECTION, ALL DISTURBED AREAS SHALL BE REVEGETATED OR LANDSCAPING SHALL BE INSTALLED.
8. WHENEVER IT IS NOT POSSIBLE TO USE EROSION PREVENTION MEASURES ON EXPOSED SLOPES, SEDIMENT CONTROL DEVICES SUCH AS FIBER ROLLS AND SILT FENCES SHALL BE INSTALLED TO PREVENT SEDIMENT MIGRATION. FIBER ROLLS AND SILT FENCES SHALL BE TRENCHED AND KEYED INTO THE SOIL AND INSTALLED ON CONTOUR. SILT FENCES SHALL BE INSTALLED APPROXIMATELY 2 TO 5 FEET FROM TOE OF SLOPE.
9. HYDROSEEDING SHALL BE CONDUCTED IN A THREE STEP PROCESS. FIRST, EVENLY APPLY SEED MIX AND FERTILIZER TO THE EXPOSED SLOPE. SECOND, EVENLY APPLY MULCH OVER THE SEED AND FERTILIZER. THIRD, STABILIZE THE MULCH IN PLACE. AN EQUIVALENT SINGLE STEP PROCESS, WITH SEED, FERTILIZER, WATER, AND BONDED FIBERS IS ACCEPTABLE.

   APPLICATIONS SHALL BE BROADCASTED MECHANICALLY OR MANUALLY AT THE RATES SPECIFIED IN THE PROJECT CONSTRUCTION DOCUMENTS.
10. DUST CONTROL SHALL BE PROVIDED BY CONTRACTOR DURING ALL PHASES OF CONSTRUCTION.
11. STORM DRAIN INLETS SHALL BE PROTECTED FROM POTENTIAL POLLUTANTS UNTIL DRAINAGE CONVEYANCE SYSTEMS ARE FUNCTIONAL AND CONSTRUCTION HAS BEEN COMPLETED.
12. ENERGY DISSIPATERS SHALL BE INSTALLED AT STORM DRAIN OUTLETS WHICH MAY CONVEY EROSIVE STORM WATER FLOW.
13. SOIL AND MATERIAL STOCKPILES SHALL BE PROPERLY PROTECTED TO MINIMIZE SEDIMENT AND POLLUTANT TRANSPORT FROM THE CONSTRUCTION SITE.
14. SOLID WASTE, SUCH AS TRASH, DISCARDED BUILDING MATERIALS AND DEBRIS, SHALL BE PLACED IN DESIGNATED COLLECTION AREAS OR CONTAINERS. THE CONSTRUCTION SITE SHALL BE CLEARED OF SOLID WASTE DAILY OR AS NECESSARY. REGULAR REMOVAL AND PROPER DISPOSAL SHALL BE COORDINATED BY THE CONTRACTOR.
15. A CONCRETE WASHOUT AREA, SUCH AS A TEMPORARY PIT, SHALL BE DESIGNATED TO CLEAN CONCRETE TRUCKS AND TOOLS. AT NO TIME SHALL CONCRETE PRODUCTS AND WASTE BE ALLOWED TO ENTER COUNTY WATERWAYS SUCH AS CREEKS OR STORM DRAINS. NO WASHOUT OF CONCRETE, MORTAR MIXERS, OR TRUCKS SHALL BE ALLOWED ON SOIL.
16. PROPER APPLICATION, CLEANING, AND STORAGE OF POTENTIALLY HAZARDOUS MATERIALS, SUCH AS PAINTS AND CHEMICALS, SHALL BE CONDUCTED TO PREVENT THE DISCHARGE OF POLLUTANTS.
17. TEMPORARY RESTROOMS AND SANITARY FACILITIES SHALL BE LOCATED AND MAINTAINED DURING CONSTRUCTION ACTIVITIES TO PREVENT THE DISCHARGE OF POLLUTANTS.
18. APPROPRIATE VEHICLE STORAGE, FUELING, MAINTENANCE, AND CLEANING AREAS SHALL BE DESIGNATED AND MAINTAINED TO PREVENT DISCHARGE OF POLLUTANTS.

ABBREVIATIONS

AGG	AGGREGATE	LF	LINEAL FEET
BC	BEGIN OF CURVE	MIN	MINIMUM
CDF	CONTROL DENSITY FILL	MAX	MAXIMUM
CO	CLEAN-OUT	MFR	MANUFACTURER
CONC	CONCRETE	(N)	NEW
CL	CENTER LINE	NO.	NUMBER
CMP	CORRUGATED METAL PIPE	O.C.	OFF CENTER
CMU	CONCRETE MASONRY UNIT	POC	POINT OF CONCENTRATION
CT	CLOSURE TURF	PVC	POLY VINYL CHLORIDE
DIA	DIAMETER	PVI	POINT OF VERTICAL INDEX
(E)	EXISTING	PT	POINT
EA	EACH	R.C.	RELATIVE COMPACTION
EG	EXISTING GROUND	REIN	REINFORCED
EC	END OF CURVE	S	SLOPE
EOR	EDGE OF ROAD	SCH	SCHEDULE
ET	EVAPOTRANSPIRATIVE FINAL COVER	SO	SIDE OPENING
FL	FLOW LINE	SS	STAINLESS STEEL
FG	FINISH GRADE	TOB	TOP OF BANK
GB	GRADE BREAK	TW	TOP OF WALL
HDPE	HIGH DENSITY POLYETHYLENE	TYP	TYPICAL
INV	INVERT ELEVATION	W/	WITH
LCS	LEACHATE COLLECTION SYSTEM	WMU	WASTE MANAGEMENT UNIT
LCRS	LEACHATE COLLECTION & REMOVAL SYSTEM	WWF	WELDED WIRE FABRIC
LDS	LEAK DETECTION SYSTEM		

LEGEND

DESIGN CONTOUR (MAJOR)

DESIGN CONTOUR (MINOR)

EXISTING CONTOUR (MAJOR)

EXISTING CONTOUR (MINOR)

OVERHEAD ELECTRIC

PROPOSED STORM DRAIN

PROPOSED GRADE BREAK, TOE OF SLOPE OR GRADING LIMITS

EXISTING LIMITS OF REFUSE

PROPOSED DITCH AND FLOW LINE

PROPERTY LINE (APPROXIMATE)

FILL

GAS RELIEF LAYER

REFUSE

ACCESS ROAD OR PAD CLASS II AGGREGATE BASE

CLOSURE TURF/ HYDROBINDER TURF INFILL (SEE SHEETS 200-202)

SAND INFILL WITH CHIPPED SHALE (SEE SHEETS 200-202)

CLASS II AGGREGATE BASE ROCK

ROCK RIPRAP (GROUTED OR LOOSE)

TURF REINFORCEMENT MATTING

90-1 ● DETECTION GROUNDWATER MONITORING WELL

90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL

S-1 ▲ SURFACE WATER SAMPLING STATION

GAS-1 PERIMETER LANDFILL GAS MONITORING POINT

■ PERIMETER LANDFILL GAS EXTRACTION POINT

LW-1 LEACHATE WELL

CONTROL POINT

× 325.84 G SPOT ELEVATION (EXISTING GROUND)

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NOTES, LEGEND AND ABBREVIATIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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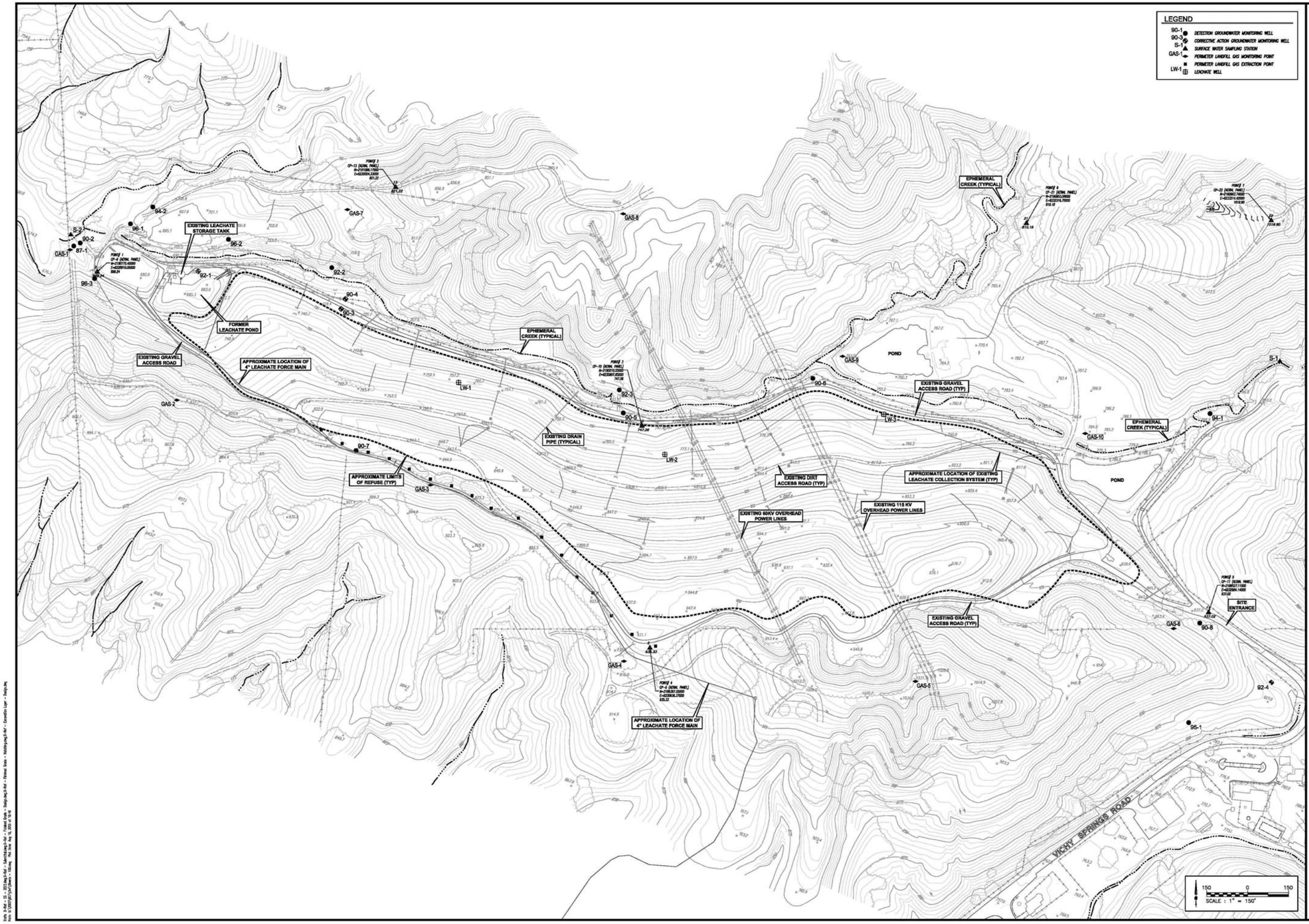

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SITE MAP (EXISTING CONDITIONS)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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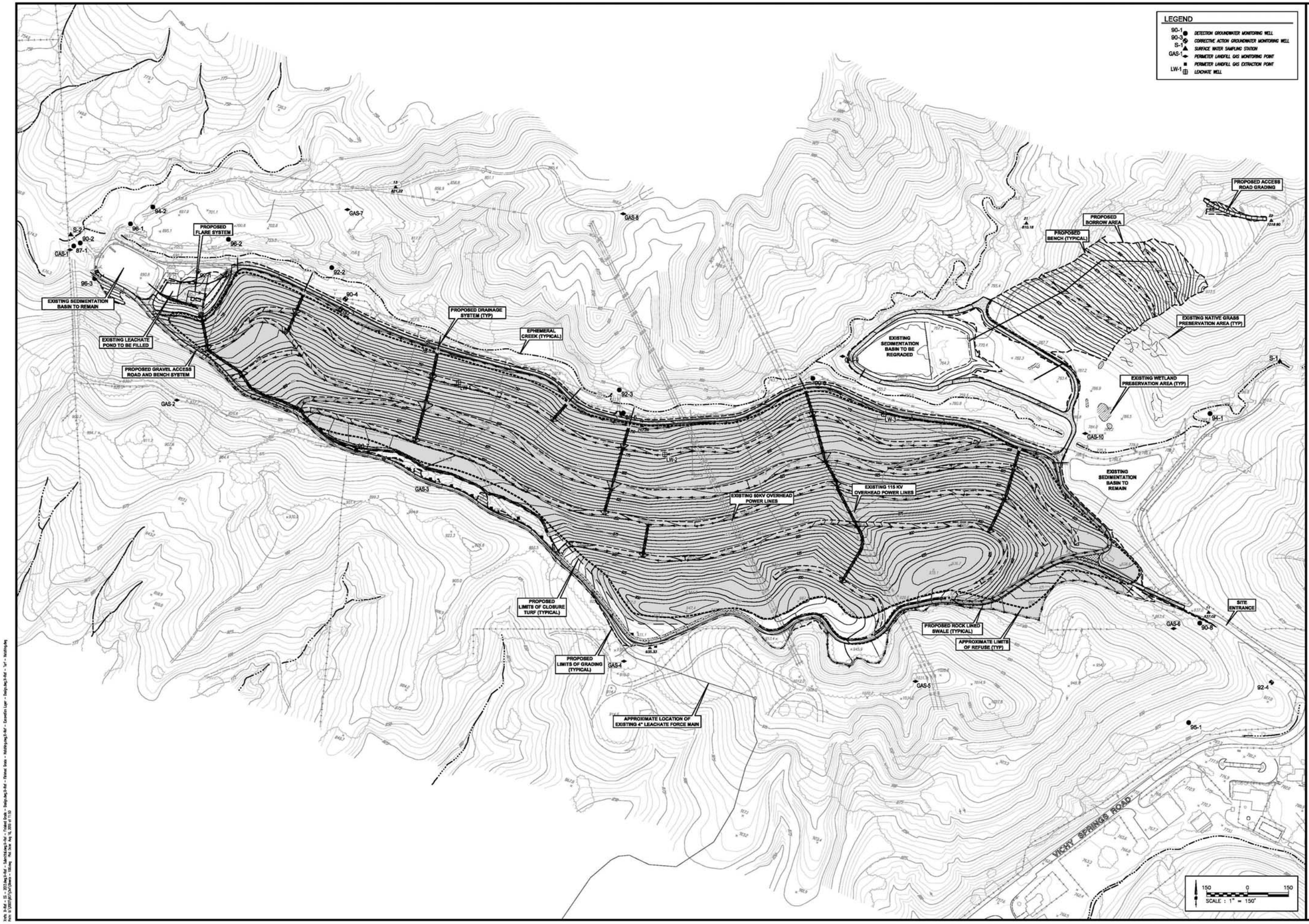

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SITE MAP (FINISHED GRADE)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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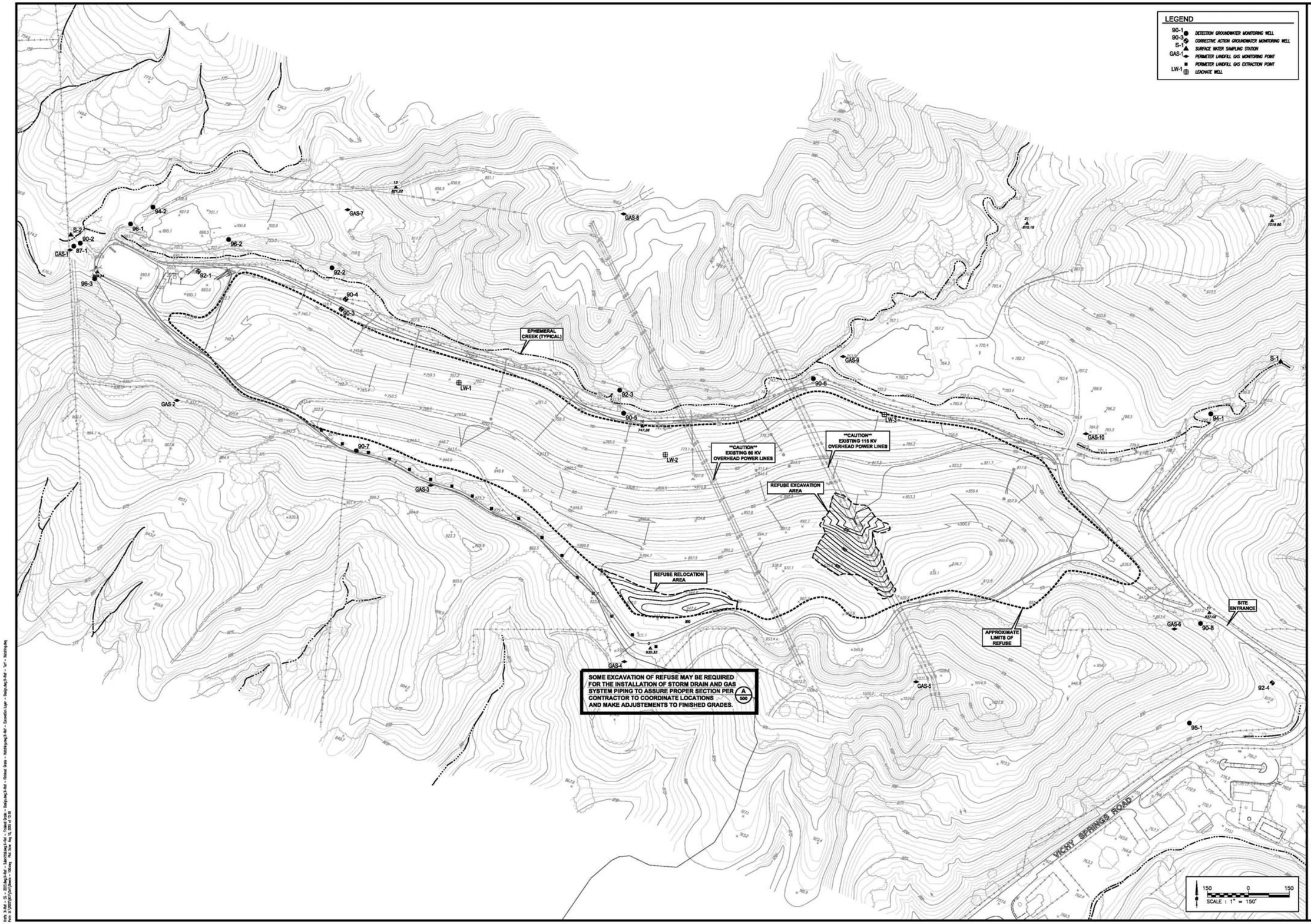

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EXCAVATION AREA

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Xrefs: X-Ref = 01 - 2013.dwg | X-Ref = Sdevt16.dwg | X-Ref = Project Data - Design.dwg | X-Ref = Planting Data - Mulching.dwg | X-Ref = Excavation Layer - Design.dwg | X-Ref = "pl" - Mulching.dwg
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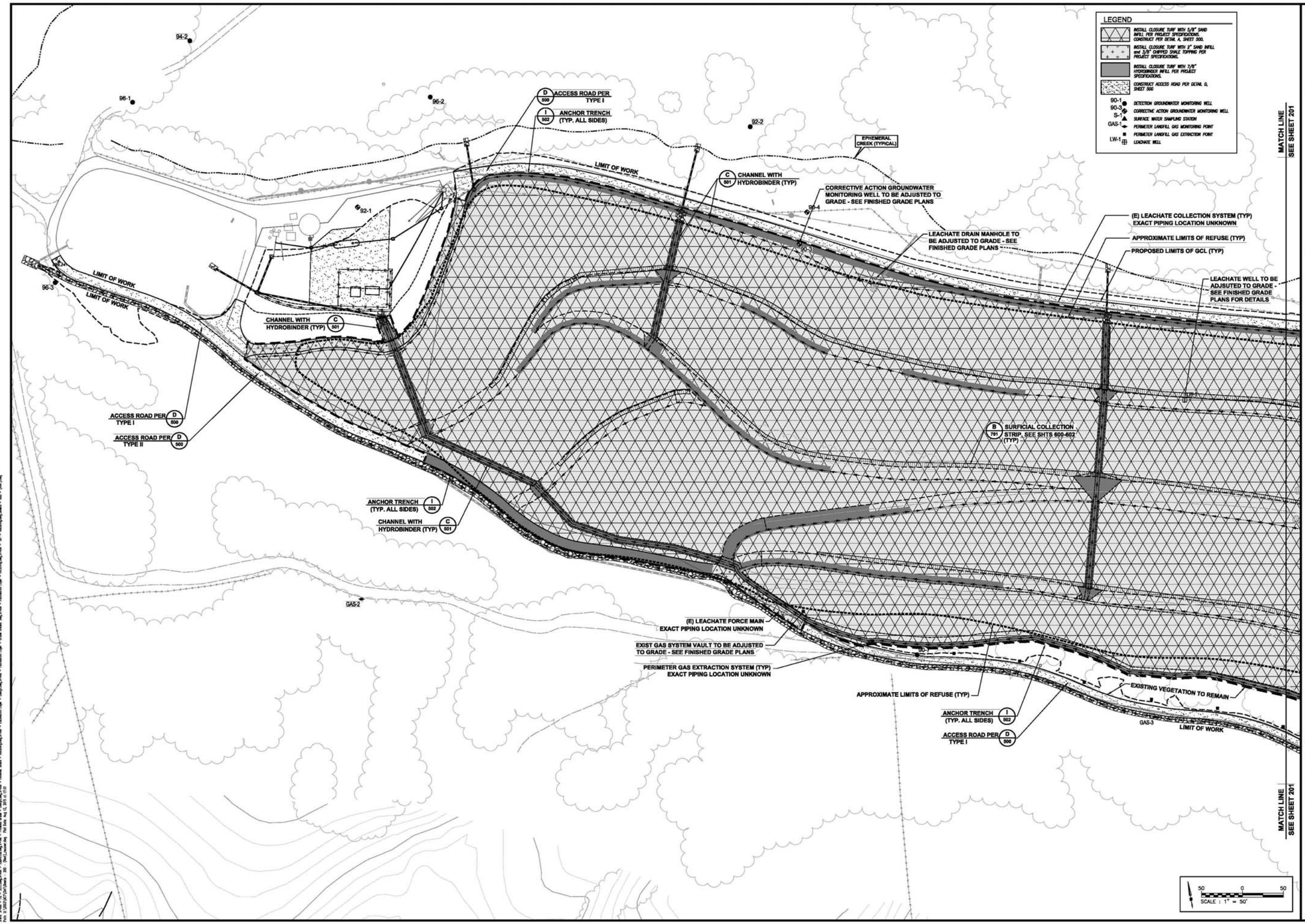

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LAND FILL COVER MATERIALS PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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MATCH LINE SEE SHEET 200

(E) LEACHATE COLLECTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

PROPOSED LIMITS OF GCL (TYP)

EPHEMERAL CREEK (TYPICAL)

92-3

LEACHATE DRAIN MANHOLE TO BE ADJUSTED TO GRADE - SEE FINISHED GRADE PLANS

C 501 CHANNEL WITH HYDROBINDER (TYP)

LIMIT OF WORK

90-5

ANCHOR TRENCH (TYP. ALL SIDES) I 501

ACCESS ROAD PER TYPE I D 500

(E) LEACHATE COLLECTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

APPROXIMATE LIMITS OF REFUSE (TYP)

PRESERVE POWER POLE

LEACHATE WELL TO BE ADJSUTED TO GRADE - SEE FINISHED GRADE PLANS FOR DETAILS

90-6

LEACHATE DRAIN MANHOLE TO BE ADJUSTED TO GRADE - SEE FINISHED GRADE PLANS

LEACHATE WELL TO BE ADJSUTED TO GRADE - SEE FINISHED GRADE PLANS FOR DETAILS

LIMIT OF WORK

LW-3

MATCH LINE SEE SHEET 202

"CAUTION" EXISTING 115 KV OVERHEAD POWER LINES

LW-2

B 701 SURFICIAL COLLECTION STRIP, SEE SHTS 600-602 (TYP)

B 701 SURFICIAL COLLECTION STRIP, SEE SHTS 600-602 (TYP)

"CAUTION" EXISTING 60 KV OVERHEAD POWER LINES

EXISTING VEGETATION TO REMAIN

(E) LEACHATE FORCE MAIN EXACT PIPING LOCATION UNKNOWN

ACCESS ROAD PER TYPE I D 500

ANCHOR TRENCH (TYP. ALL SIDES) I 502

MATCH LINE SEE SHEET 200

EXIST GAS SYSTEM VAULT TO BE ADJUSTED TO GRADE - SEE FINISHED GRADE PLANS

LIMIT OF TURF

PERIMETER GAS EXTRACTION SYSTEM (TYP) EXACT PIPING LOCATION UNKNOWN

APPROXIMATE LIMITS OF REFUSE (TYP)

EXIST GAS SYSTEM VAULT TO BE ADJUSTED TO GRADE - SEE FINSISHED GRADE PLANS

LIMIT OF WORK

LW-13

CHANNEL WITH HYDROBINDER (TYP) C 501

ANCHOR TRENCH (TYP. ALL SIDES) I 502

ACCESS ROAD PER TYPE II D 500

LIMIT OF TURF

PROPOSED LIMITS OF GCL (TYP)

MATCH LINE SEE SHEET 202

LEGEND

- INSTALL CLOSURE TURF WITH 5/8" SAND INFILL PER PROJECT SPECIFICATIONS. CONSTRUCT PER DETAIL A, SHEET 500.
- INSTALL CLOSURE TURF WITH 2" SAND INFILL and 3/8" CHIPPED SHALE TOPPING PER PROJECT SPECIFICATIONS.
- INSTALL CLOSURE TURF WITH 7/8" HYDROBINDER INFILL PER PROJECT SPECIFICATIONS.
- CONSTRUCT ACCESS ROAD PER DETAIL D, SHEET 500
- 90-1, 90-3 DETECTION GROUNDWATER MONITORING WELL
- CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 SURFACE WATER SAMPLING STATION
- GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 LEACHATE WELL

50 0 50
SCALE : 1" = 50'

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DALE S. SOLBERG
No. 30588
EXP. 3-31-14
CIVIL
STATE OF CALIFORNIA

LAND FILL COVER MATERIALS PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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MATCH LINE
SEE SHEET 303

MATCH LINE
SEE SHEET 201

I 502 ANCHOR TRENCH (TYP. ALL SIDES)

H 502 SWALE WITH HYDROBINDER (TYP)

B 500 BENCH WITH HYDROBINDER (TYP)

(E) LEACHATE COLLECTION SYSTEM EXACT PIPING LOCATION UNKNOWN

LIMIT OF WORK

C 501 CHANNEL WITH HYDROBINDER (TYP)

LW-3

GAS-10

EPHEMERAL CREEK (TYPICAL)

LEACHATE DRAIN MANHOLE TO BE ADJUSTED TO GRADE - SEE FINISHED GRADE PLANS

EXISTING SEDIMENTATION POND TO REMAIN

D 500 ACCESS ROAD PER TYPE II

I 502 ANCHOR TRENCH (TYP. ALL SIDES)

B 500 BENCH WITH HYDROBINDER (TYP)

APPROXIMATE LIMITS OF REFUSE (TYP)

PRESERVE PP

B 701 SURFICIAL COLLECTION STRIP, SEE SHTS 600-602 (TYP)

"CAUTION" EXISTING 115 KV OVERHEAD POWER LINES

LIMIT OF WORK

ACCESS ROAD PER TYPE II D 500

ACCESS ROAD PER TYPE I D 500

90-8

GAS-6

APPROXIMATE LIMITS OF REFUSE (TYP)

ANCHOR TRENCH (TYP. ALL SIDES) I 502

D 500 ACCESS ROAD PER TYPE I

GAS-5

95-1

850

825

50 0 50
SCALE : 1" = 50'

LEGEND

- INSTALL CLOSURE TURF WITH 5/8" SAND INFILL PER PROJECT SPECIFICATIONS. CONSTRUCT PER DETAIL A, SHEET 500.
- INSTALL CLOSURE TURF WITH 2" SAND INFILL and 3/8" CHIPPED SHALE TOPPING PER PROJECT SPECIFICATIONS.
- INSTALL CLOSURE TURF WITH 7/8" HYDROBINDER INFILL PER PROJECT SPECIFICATIONS.
- CONSTRUCT ACCESS ROAD PER DETAIL G, SHEET 500
- 90-1 DETECTION GROUNDWATER MONITORING WELL
- 90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 SURFACE WATER SAMPLING STATION
- GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 LEACHATE WELL

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FOUNDATION LAYER GRADING PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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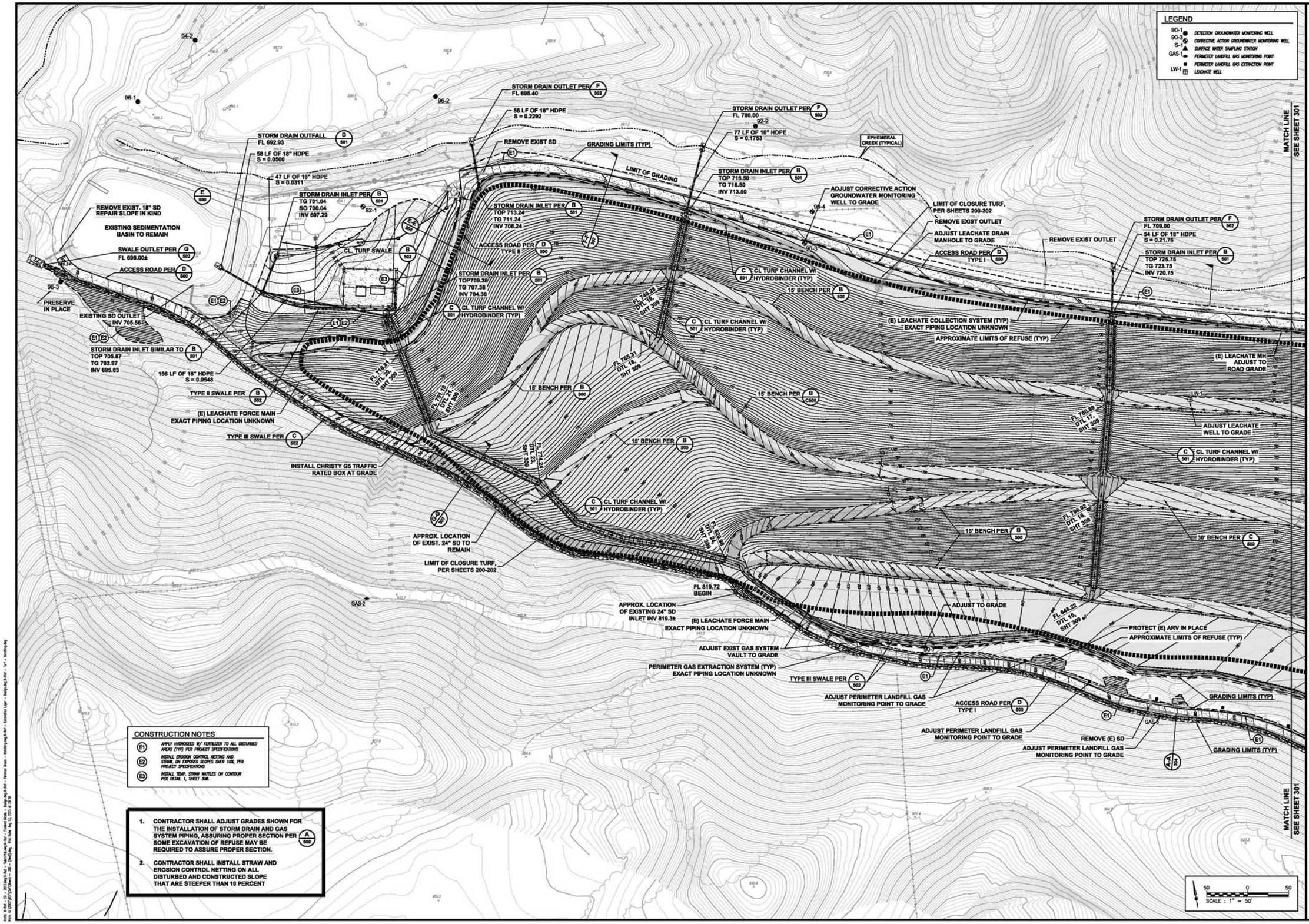

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REGISTERED PROFESSIONAL ENGINEER DALE S. SQUIRES No. 30588 EXP. 3-31-14 CIVIL STATE OF CALIFORNIA

FINISHED GRADE (LANDFILL)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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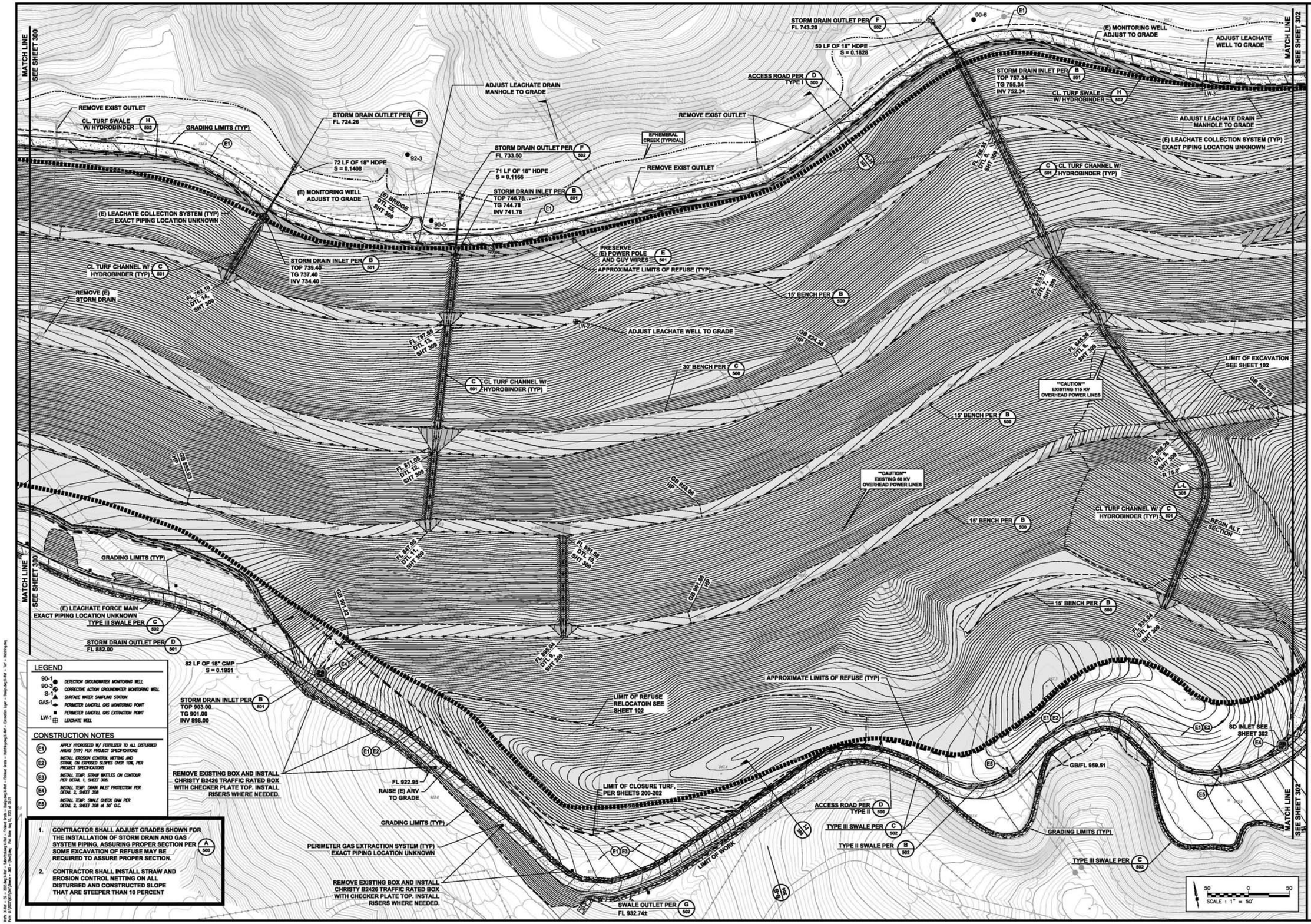

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STATE OF CALIFORNIA

FINISHED GRADE (LANDFILL)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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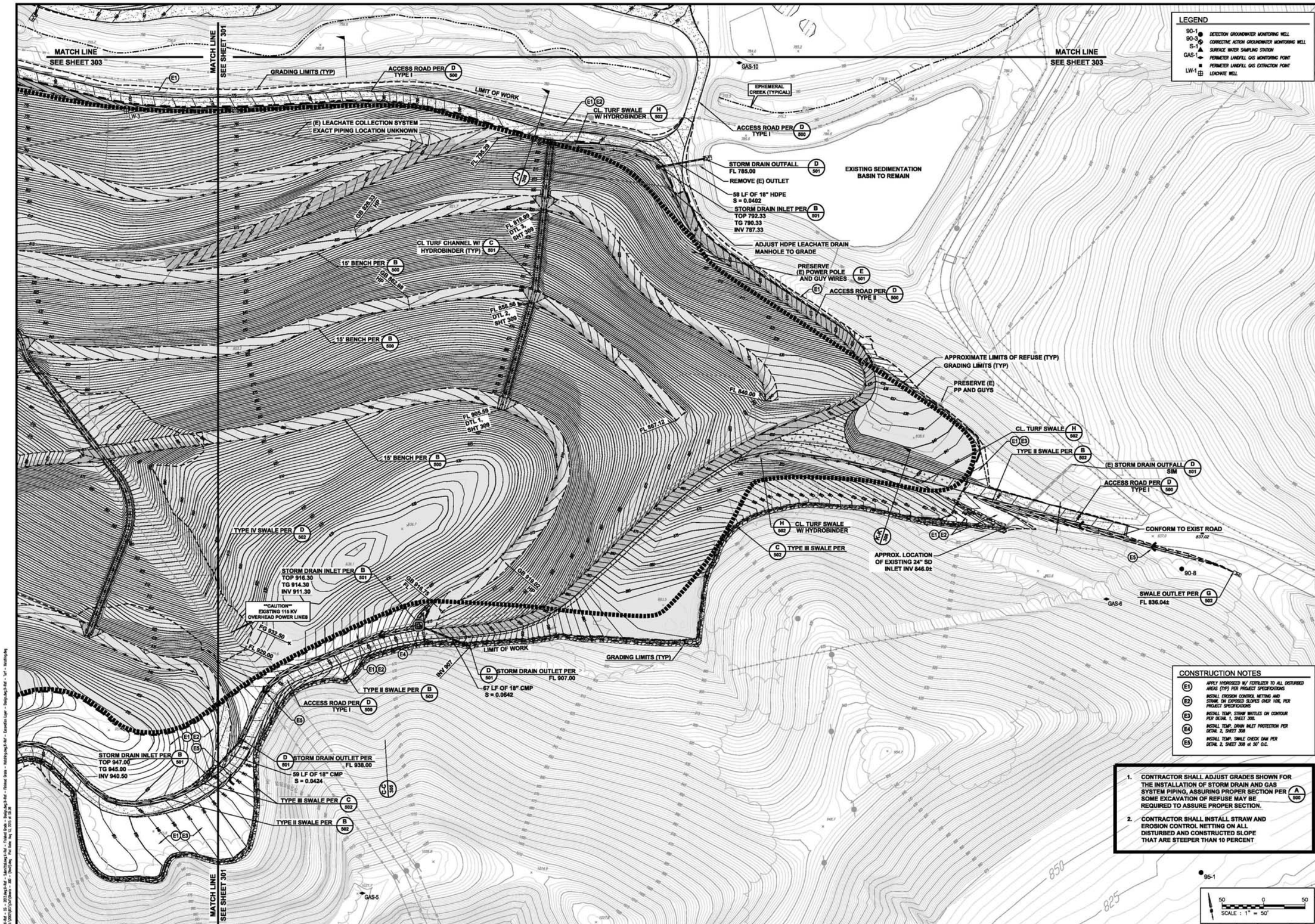

LEGEND

90-1	DETECTION GROUNDWATER MONITORING WELL
90-3	CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1	SURFACE WATER SAMPLING STATION
GAS-1	PERIMETER LANDFILL GAS MONITORING POINT
	PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1	LEACHATE WELL

CONSTRUCTION NOTES

E1	APPLY HYDROSEED W/ FERTILIZER TO ALL DISTURBED AREAS (TYP) PER PROJECT SPECIFICATIONS
E2	INSTALL EROSION CONTROL NETTING AND STRAW, ON EXPOSED SLOPES OVER 10%, PER PROJECT SPECIFICATIONS
E3	INSTALL TEMP. STRAW WATTLES ON CONTOUR PER DETAIL 1, SHEET 308.
E4	INSTALL TEMP. DRAIN INLET PROTECTION PER DETAIL 2, SHEET 308
E5	INSTALL TEMP. SWALE CHECK DAM PER DETAIL 2, SHEET 308 at 50' O.C.

1. CONTRACTOR SHALL ADJUST GRADES SHOWN FOR THE INSTALLATION OF STORM DRAIN AND GAS SYSTEM PIPING, ASSURING PROPER SECTION PER SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE PROPER SECTION. (A 500)
2. CONTRACTOR SHALL INSTALL STRAW AND EROSION CONTROL NETTING ON ALL DISTURBED AND CONSTRUCTED SLOPE THAT ARE STEEPER THAN 10 PERCENT

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STATE OF CALIFORNIA

FINISHED GRADE (LANDFILL)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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LEGEND

90-1 ● DETECTION GROUNDWATER MONITORING WELL
90-5 ◈ CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1 ▲ SURFACE WATER SAMPLING STATION
GAS-1 ► PERIMETER LANDFILL GAS MONITORING POINT
■ PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1 ⊞ LEACHATE WELL

CONSTRUCTION NOTES

E1 APPLY HYDROSEED W/ FERTILIZER TO ALL DISTURBED AREAS (TYP.) PER PROJECT SPECIFICATIONS
E2 INSTALL EROSION CONTROL NETTING AND STRAW, ON EXPOSED SLOPES OVER 10%, PER PROJECT SPECIFICATIONS
E3 INSTALL TEMP. STRAW WATTLES ON CONTOUR PER DETAIL 1, SHEET 308.
E4 INSTALL TEMP. DRAIN INLET PROTECTION PER DETAIL 2, SHEET 308
E5 INSTALL TEMP. SWALE CHECK DAM PER DETAIL 2, SHEET 308 at 50' O.C.

1. CONTRACTOR SHALL INSTALL STRAW AND EROSION CONTROL NETTING ON ALL DISTURBED AND CONSTRUCTED SLOPE THAT ARE STEEPER THAN 10 PERCENT

CONFORM TO EXIST
GRADING LIMITS (TYP)
ACCESS ROAD PER D 500
CONFORM TO EXIST
TYPE I SWALE A 502
24x24 DRAIN INLET A 501 TOP 883.23 TG 881.23 INV 878.23
FL 882.79
147 LF OF 18" CMP S = 0.3046
FL 835.93
24x24 DRAIN INLET A 501 TOP 917.68 TG 915.68 INV 912.68
FL 916.33
196 LF OF 18" CMP S = 0.1758
26.5 LF OF 18" CMP S = 0.0987
11.25° EL INV 875.62
BENCH SWALE D 502
15' BENCH B 500
FL 932.49
24x24 DRAIN INLET A 501 TOP 835.84 TG 833.84 INV 830.84
22 LF OF 18" CMP S = 0.0523
11.25° EL INV 829.89
BENCH SWALE D 502
15' BENCH B 500
FL 893.03
15' BENCH B 500
FL 853.82
LIMIT OF WORK
CONFORM TO EXIST
GRADING LIMITS (TYP)
FL 788.47
78 LF OF 18" HDPE S = 0.1090
FL 787.55
172.5 LF OF 18" HDPE S = 0.2536
24x24 DRAIN INLET A 501 TOP 792.00 TG 790.00 INV 785.95
16.2' LF OF 18" HDPE S = 0.34.30
24x24 DRAIN INLET A 501 TOP 789.40 TG 787.40 INV 784.30
TYPE I SWALE A 502
ACCESS ROAD D 500
11.25° EL INV 778.74
110 LF OF 18" CMP S = 0.1340
LIMIT OF WORK
EXISTING PURPLE NEEDLE GRASS TO BE PRESERVED (TYP.)
ACCESS ROAD D 500
GRADING LIMITS (TYP)
EXISTING SEDIMENTATION BASIN (RE-GRADE AS SHOWN DEPENDING UPON WATER LEVEL)
STORM DRAIN OUTFALL FL 764.00 D 501
STORM DRAIN INLET B 501 TOP 785.94 TG 783.94 INV 781.94
GRADING LIMITS (TYP)
122 LF OF 18" CMP S = 0.0446
STORM DRAIN OUTFALL FL 776.50 D 501
TYPE I SWALE A 502
FL 787.53
GRADING LIMITS (TYP)
FL 761.70
REMOVE EXIST OVERFLOW PIPE AND INSTALL NEW CMP OVERFLOW PIPE PER E 500
STORM DRAIN OUTLET FL 759.90 F 502
37 LF OF 18" HDPE S = 0.0500
GAS-9
EXIST. WETLAND TO REMAIN, PROTECT IN PLACE (TYP.)
CONFORM TO EXIST.
ACCESS ROAD PER D 500
GRADING LIMITS (TYP)
MATCH LINE SEE SHEET 302
MATCH LINE SEE SHEET 302
GAS-10
EPHEMERAL CREEK (TYPICAL)
LW-3
94-1
SCALE : 1" = 50'

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FINISHED GRADE (BORROW AREA)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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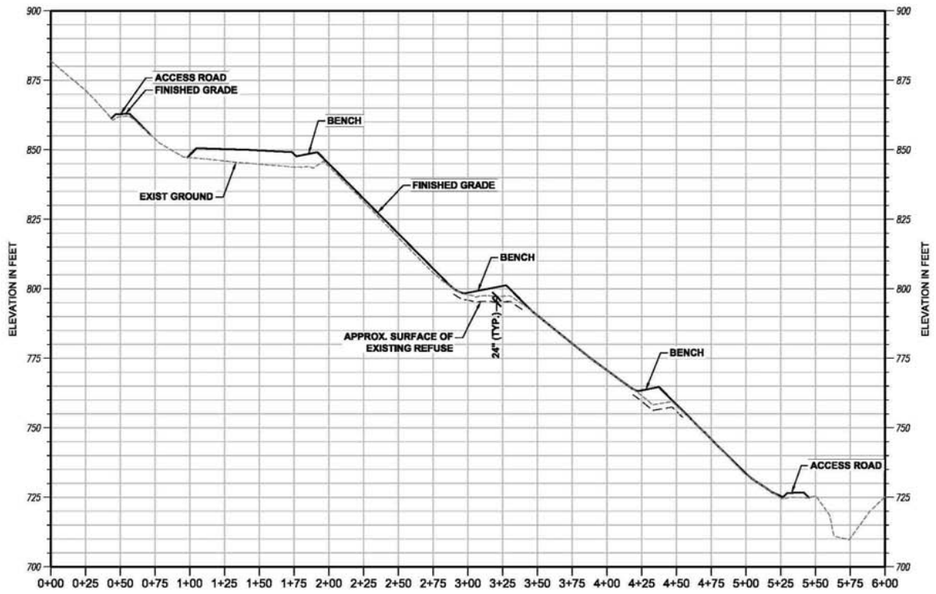
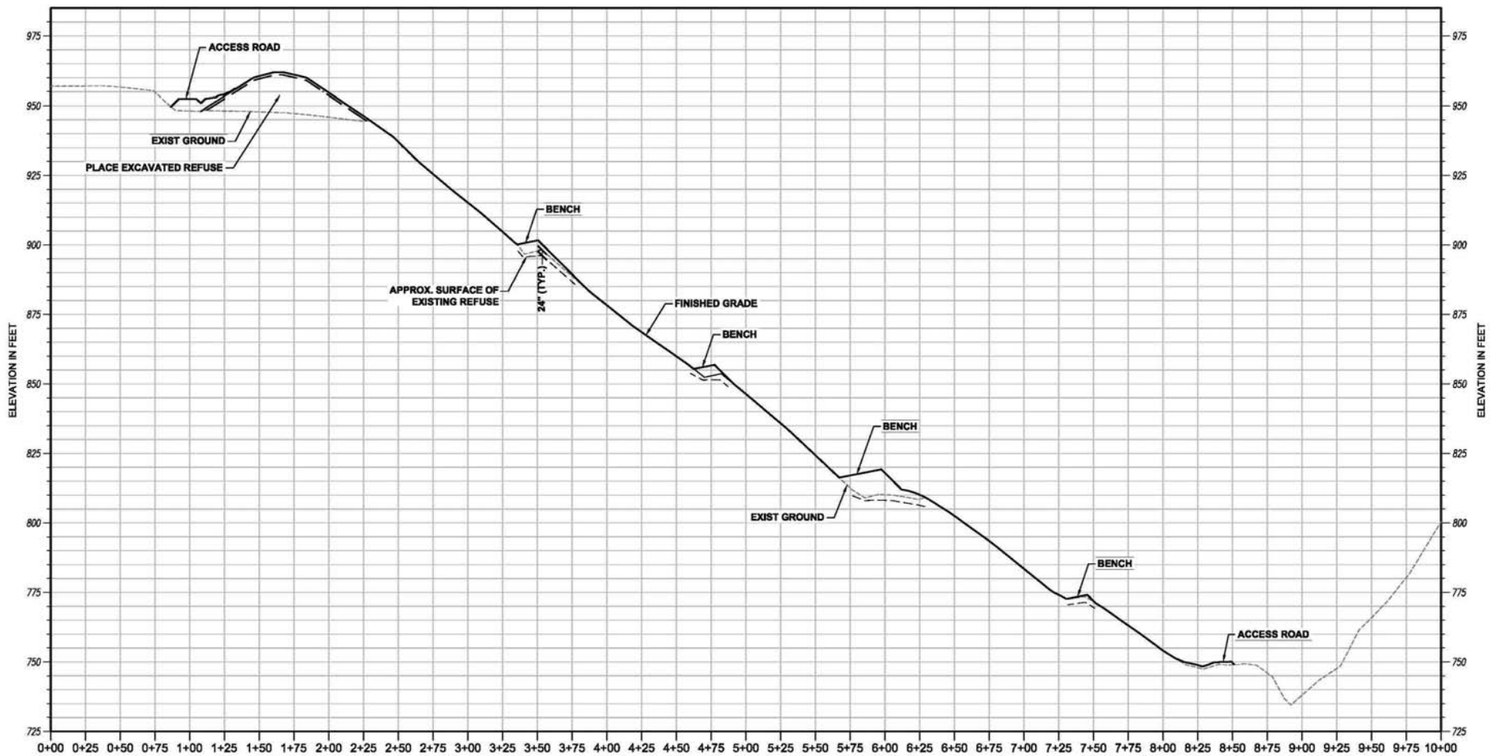


SECTION A-A

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'



SECTION B-B

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'

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EXP. 3-31-14
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SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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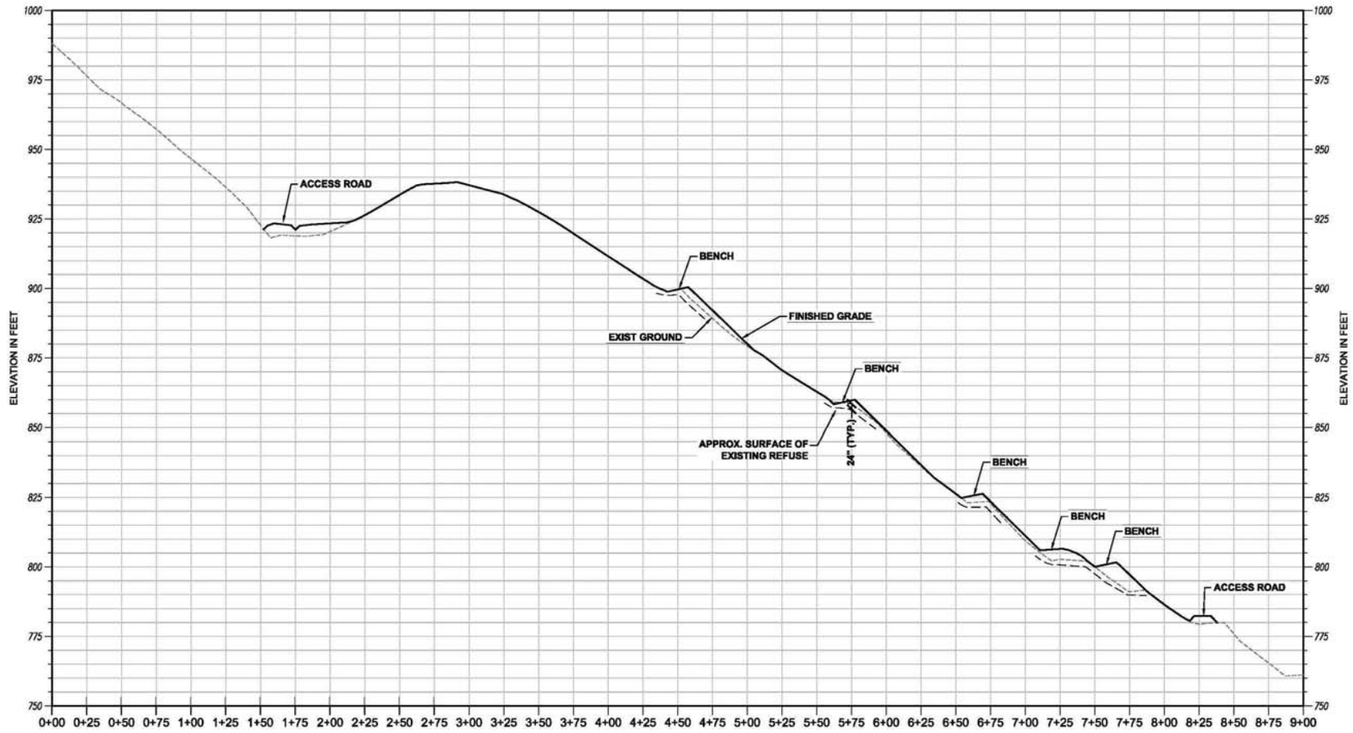

SECTION C-C

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'

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CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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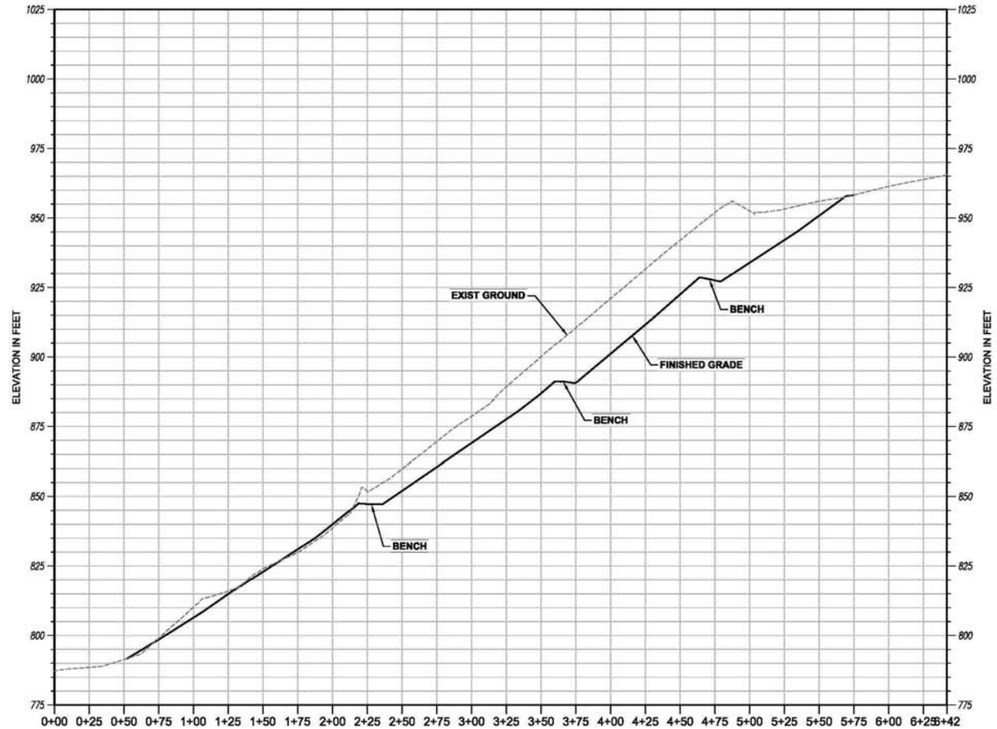

SECTION D-D

HORIZONTAL: 1" = 50'
VERTICAL: 1" = 25'

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STATE OF CALIFORNIA

SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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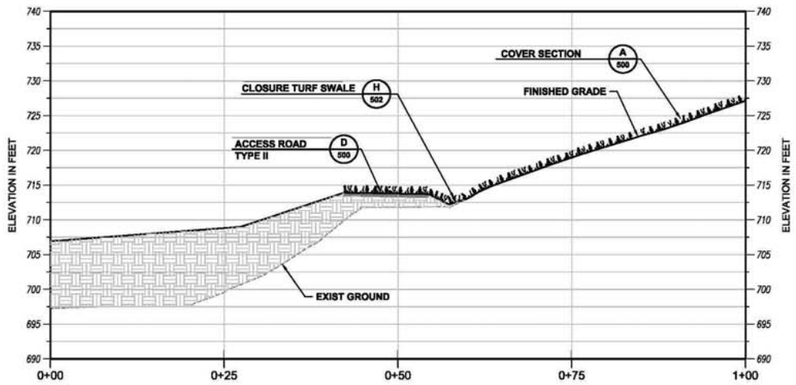
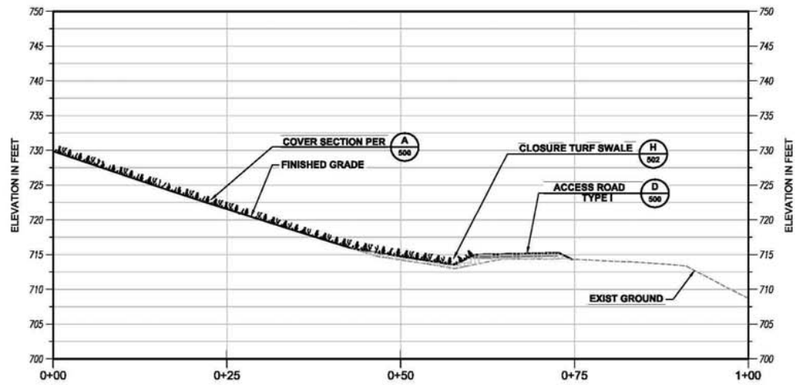


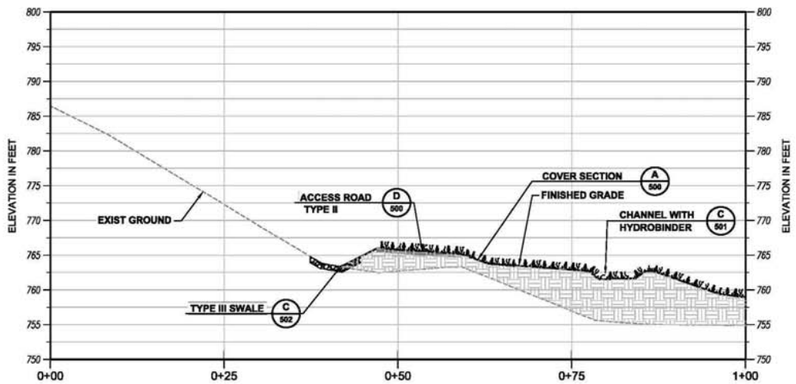
SECTION E-E

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



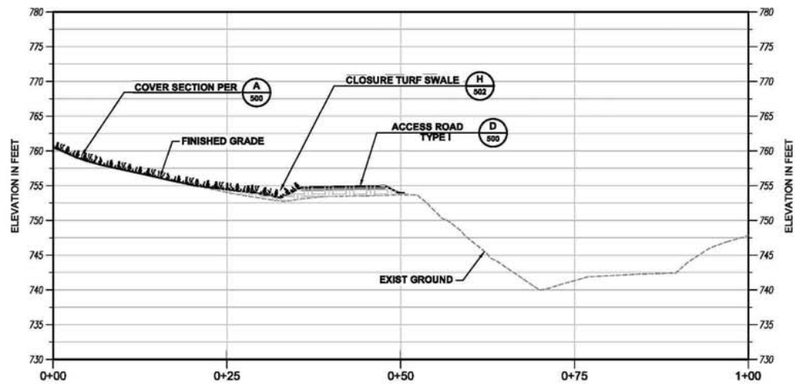
SECTION F-F

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



SECTION G-G

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



SECTION H-H

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'

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SECTIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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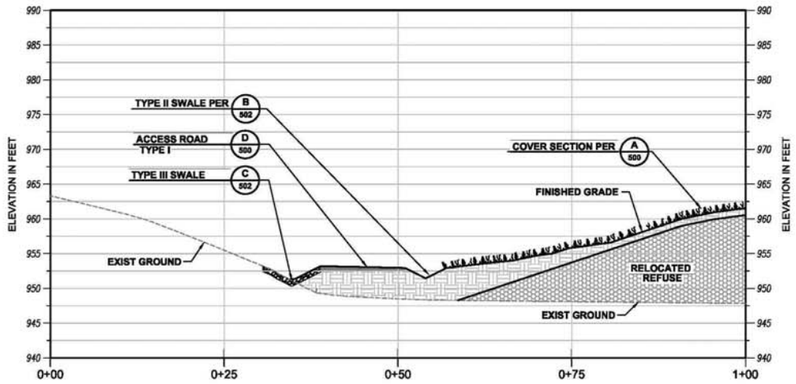
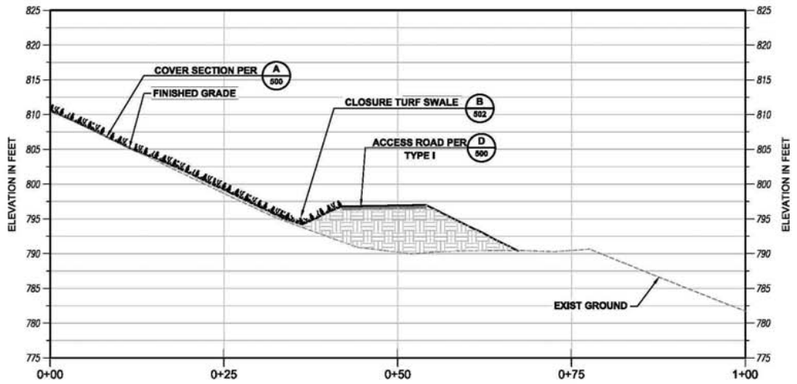


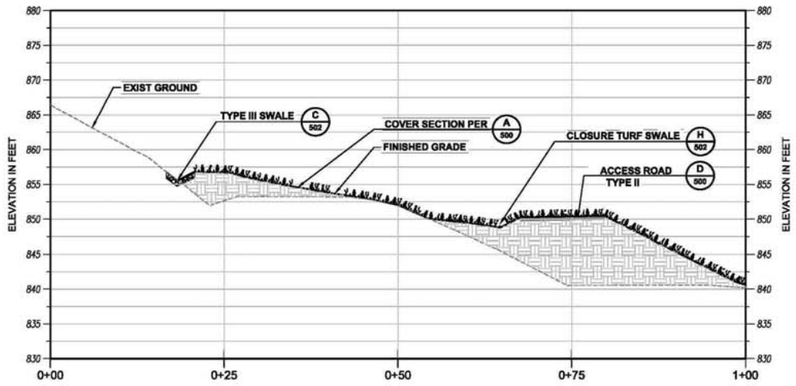
SECTION I-I

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



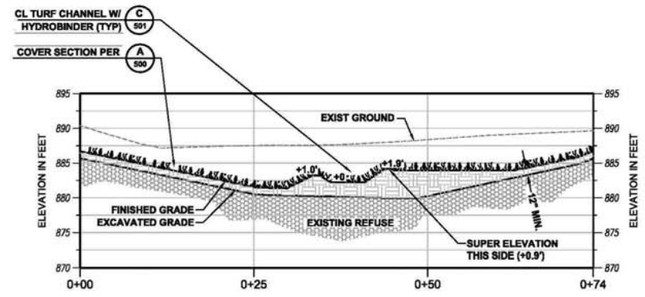
SECTION J-J

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



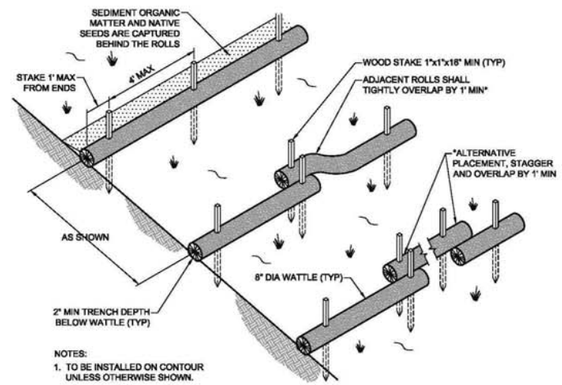
SECTION K-K

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



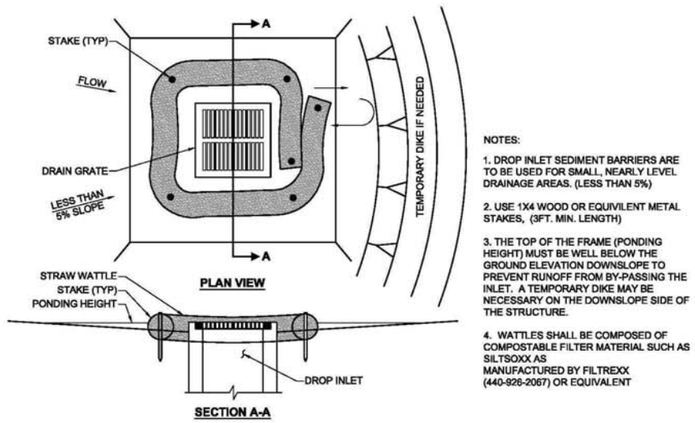
SECTION L-L

HORIZONTAL: 1" = 10'
VERTICAL: 1" = 10'



1 STRAW WATTLE DETAIL

NOT TO SCALE



NOTES:

1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)

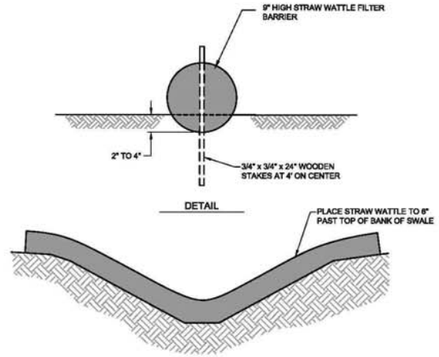
2. USE 1X4 WOOD OR EQUIVILENT METAL STAKES, (3FT. MIN. LENGTH)

3. THE TOP OF THE FRAME (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BY-PASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

4. WATTLES SHALL BE COMPOSED OF COMPOSTABLE FILTER MATERIAL SUCH AS SILTSOXX AS MANUFACTURED BY FILTREXX (440-926-2067) OR EQUIVALENT

2 DRAIN INLET PROTECTION

NOT TO SCALE



3 CHECK DAM AT SWALE

NOT TO SCALE

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825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

REGISTERED PROFESSIONAL ENGINEER
DALE S. SOUZA
No. 30588
EXP. 3-31-14
CIVIL
STATE OF CALIFORNIA

SECTIONS & EROSION CONTROL DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

1	
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6	
7	

Job No:	02-907
Drawn By:	SGH/ DTM
Checked By:	DS
Date:	2015-08-14

Sheet Number

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Xrefs: 2-Ref = 02 - 2012.dwg, 2-Ref = Sabo2nd.dwg, 2-Ref = Finished Grade = Design.dwg, 2-Ref = Finished Grade = Modifying.dwg, 2-Ref = Excavation Layer = Design.dwg, 2-Ref = "Ini" = Modifying.dwg
Plots: by USER(JEFF) on \\Client\c = 300 = (Revs).dwg, Plot Date: May 13, 2015 at 08:35
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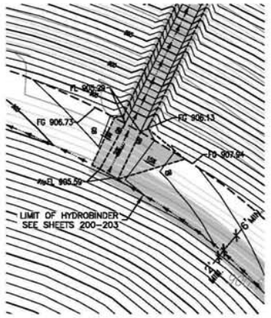

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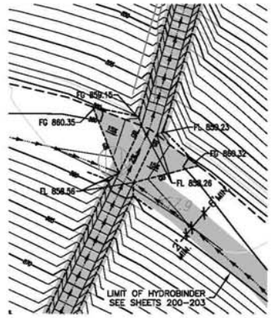

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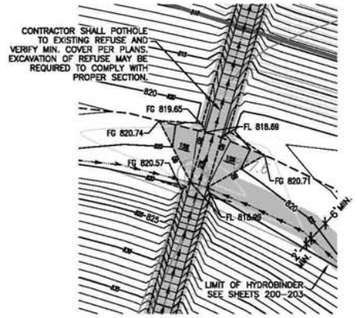

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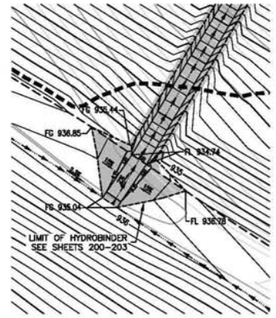

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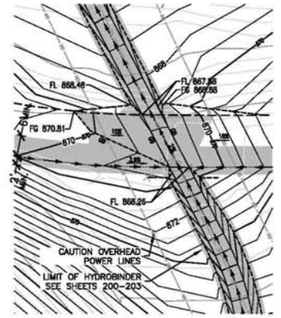

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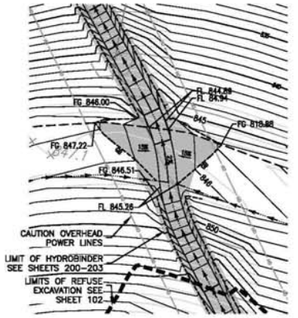

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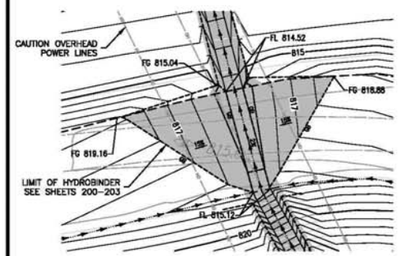

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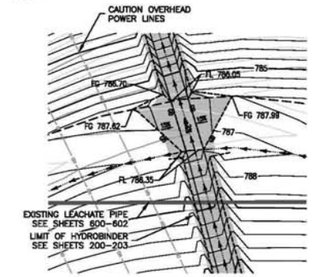

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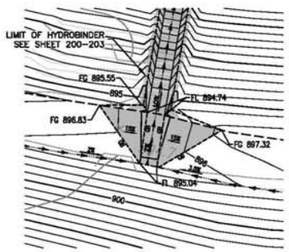

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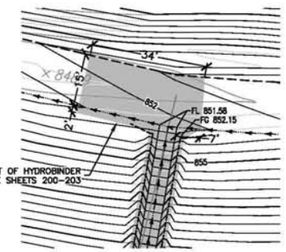

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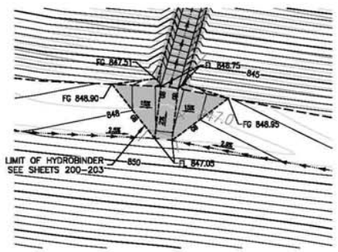

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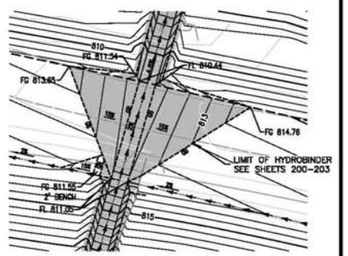

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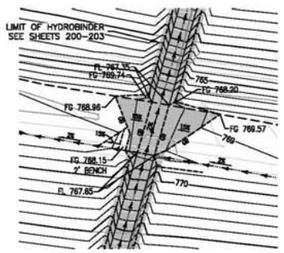

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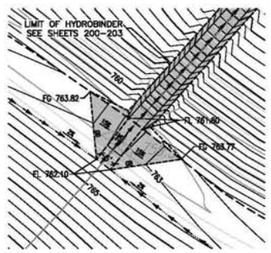

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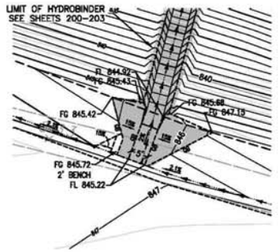

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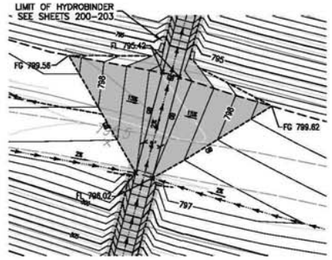

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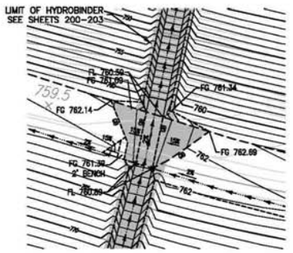

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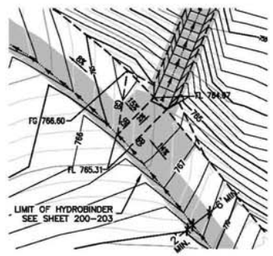

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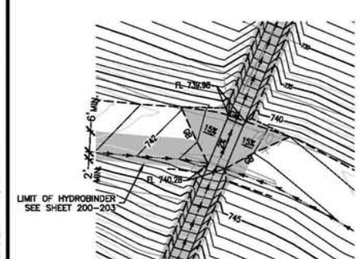

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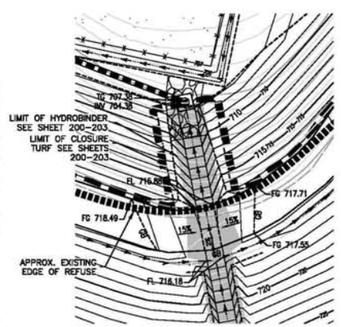

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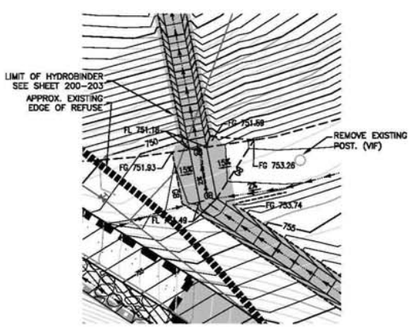

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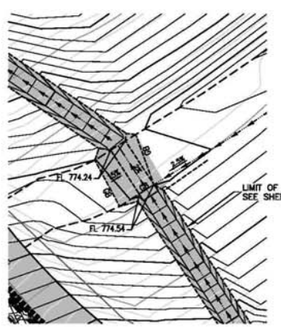

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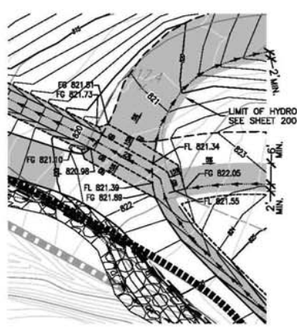

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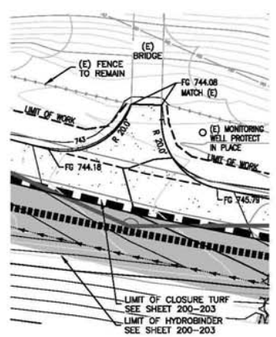

24 (E) BRIDGE ACCESS 1"=20'

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REGISTERED PROFESSIONAL ENGINEER
DALE S. SOLICH
No. 30588
EXP. 3-31-14
CIVIL
STATE OF CALIFORNIA

ENLARGEMENTS

CITY OF UKIAH LANDFILL FINAL CLOSURE
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Date:	2015-08-14

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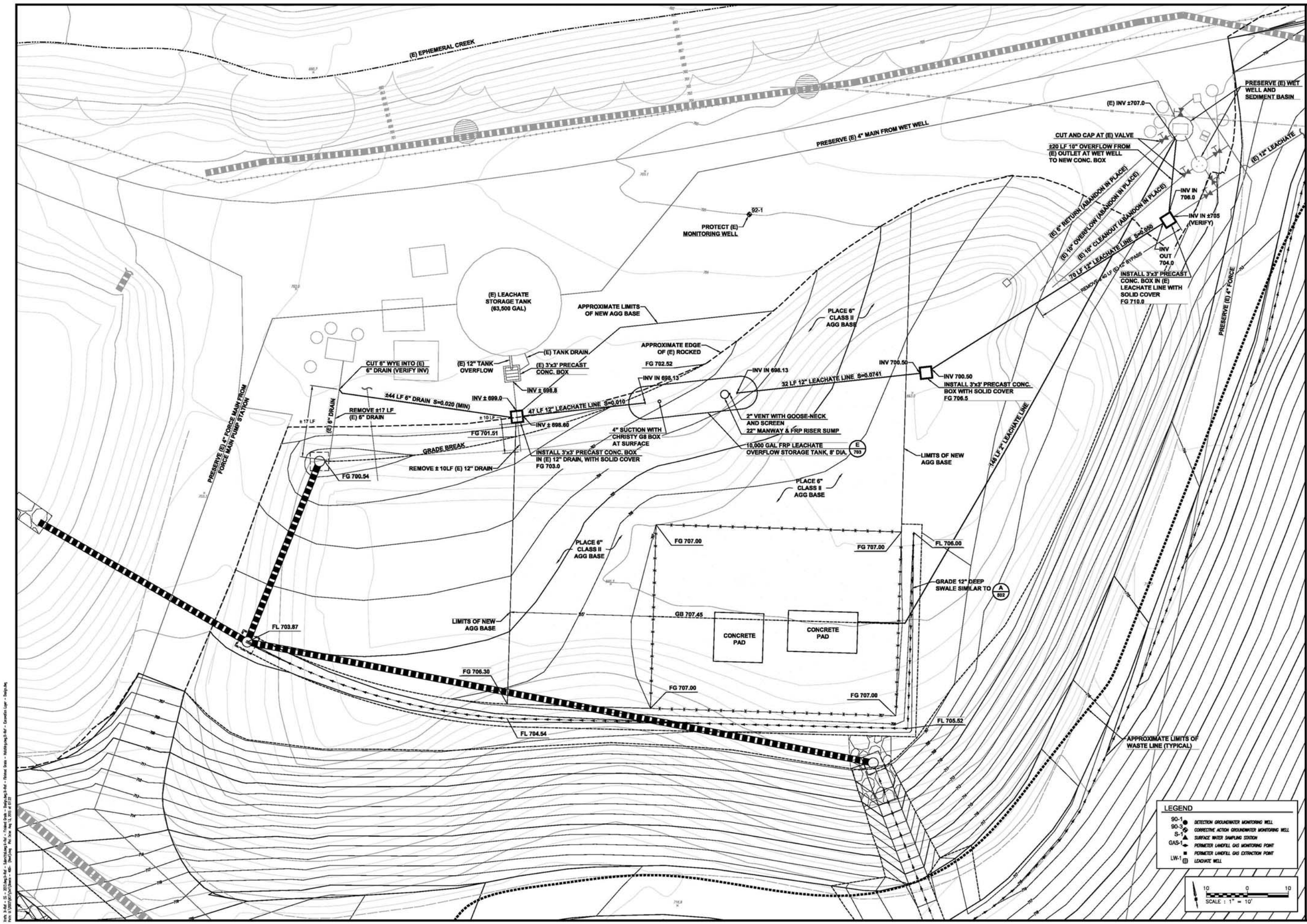

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REGISTERED PROFESSIONAL ENGINEER
DALE S. SOLEM
No. 30588
EXP. 3-31-14
CIVIL
STATE OF CALIFORNIA

FLARE STATION AREA BLOW UP

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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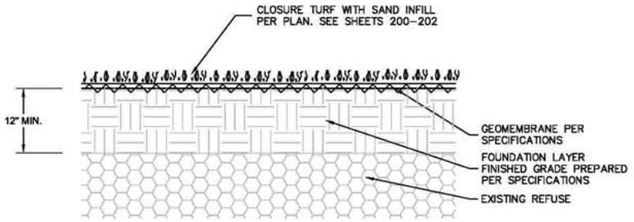
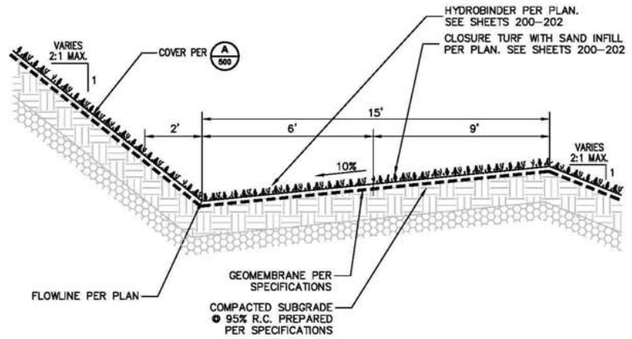


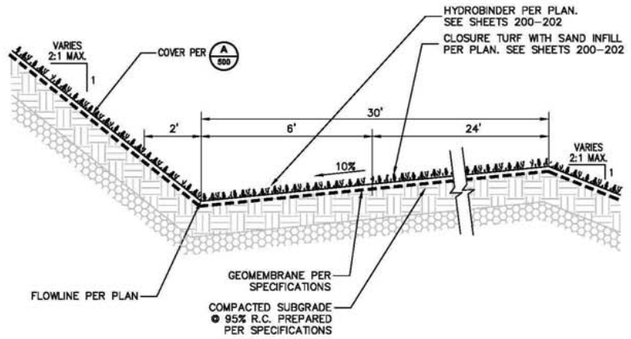
A TYPICAL COVER SECTION

NOT TO SCALE



B TYPICAL 15' BENCH SECTION

NOT TO SCALE



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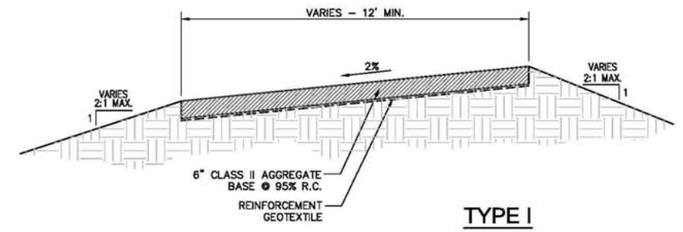
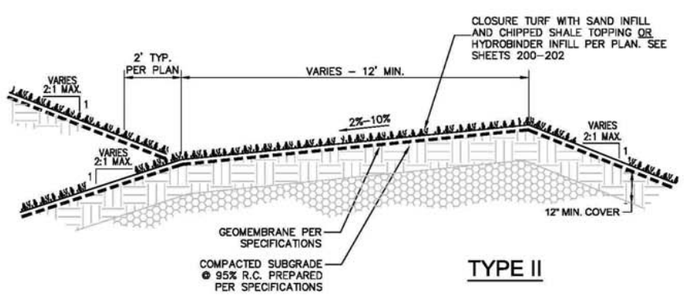


TYPE I



TYPE II

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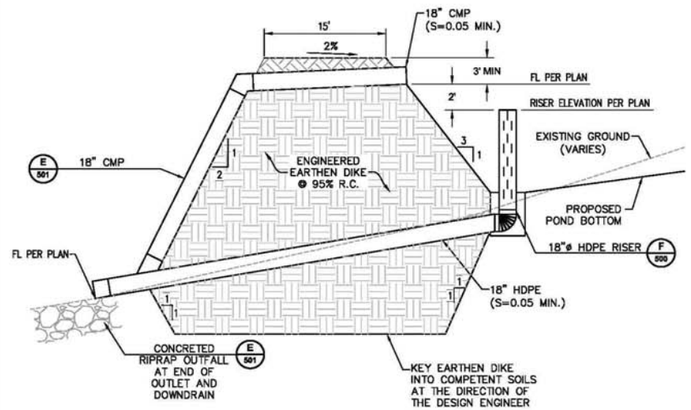

E SEDIMENTATION BASIN OUTLET TYPICAL SECTION

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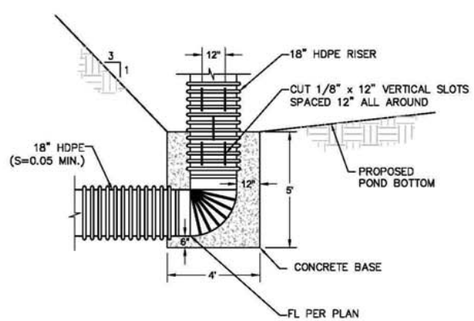

F DRAINAGE RISER DETAIL

NOT TO SCALE

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TEL: (707) 544-0784

REGISTERED PROFESSIONAL ENGINEER
DALE S. SQUIRE
No. 30588
EXP. 3-31-14
CIVIL
STATE OF CALIFORNIA

GRADING DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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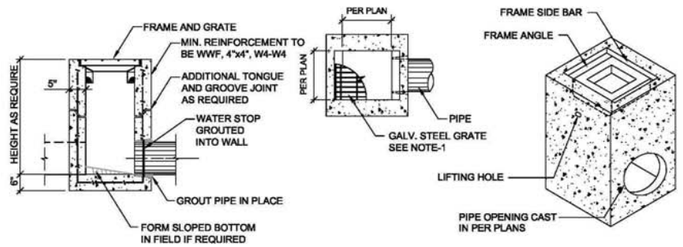
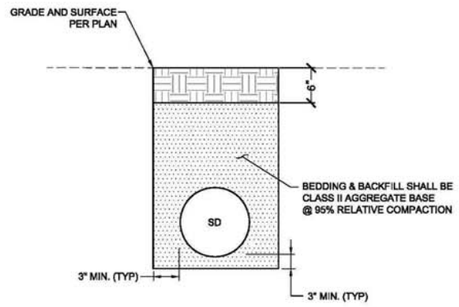
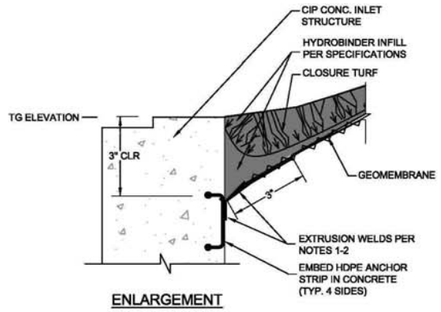




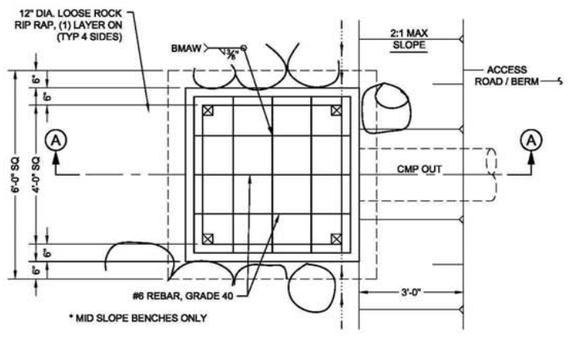
NOTE:
1. FRAMES SHALL BE HEAVY DUTY FOR H20 TRAFFIC LOADING.

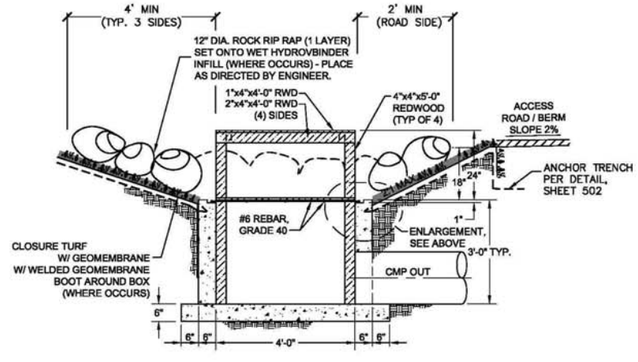
(A) 2'x2' CONCRETE DRAINAGE INLET
(NON-CLOSURE TURF AREAS)

NOT TO SCALE



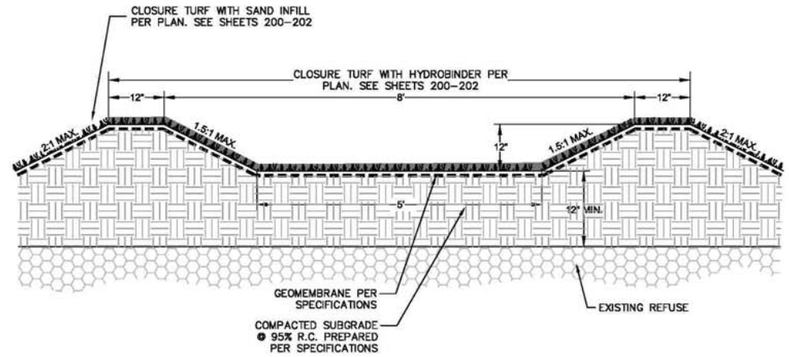
NOTES:
1. HDPE EMBEDMENT STRIP TO FORM BOOT AROUND INLET STRUCTURE. ALL CORNER SEEMS TO BE WELDED TO FORM IMPERVIOUS SEAL.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO HDPE EMBEDMENT STRIP USING EXTRUSION WELD METHOD, 3"MIN. OVERLAP.
3. CONTRACTOR TO CONSTRUCT REDWOOD (RWD) TOP USING #8 EPOXY COATED WOOD SCREWS





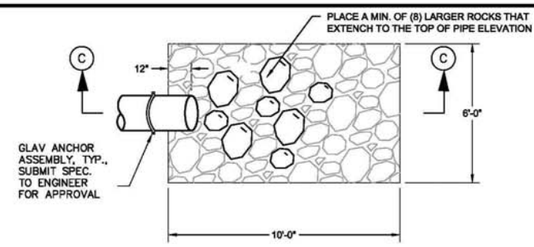
(B) 4'x4' CONCRETE DRAINAGE INLET IN CLOSURE TURF

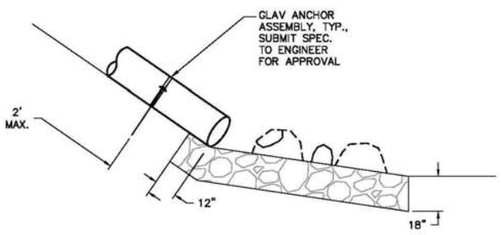
SCALE: 1/2" = 1'-0"



(C) TYP. DRAINAGE CHANNEL

NOT TO SCALE

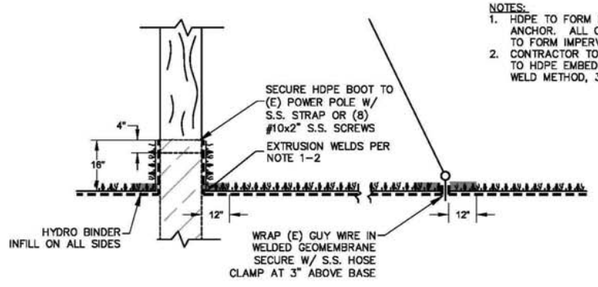




SECTION 'C-C'

(D) GROUTED RIPRAP OUTFALL

NOT TO SCALE



NOTES:
1. HDPE TO FORM BOOT AROUND POLE OR ANCHOR. ALL CORNER SEEMS TO BE WELDED TO FORM IMPERVIOUS SEAL.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO HDPE EMBEDMENT STRIP USING EXTRUSION WELD METHOD, 3"MIN. OVERLAP.

(E) POWER POLE PENETRATION

NOT TO SCALE

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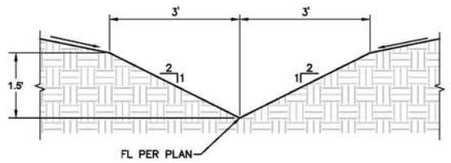
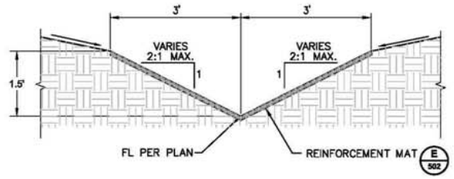


A TYPE I SWALE - EARTHEN

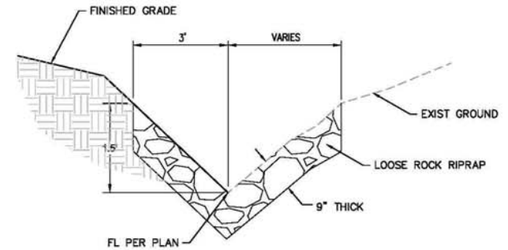
NOT TO SCALE



B TYPE II SWALE -
EARTHEN W/ REINFORCEMENT MAT

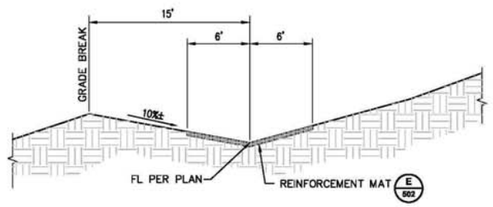
(NON-CLOSURE TURF AREAS)

NOT TO SCALE



C TYPE III SWALE - EARTHEN W/ ROCK RIPRAP

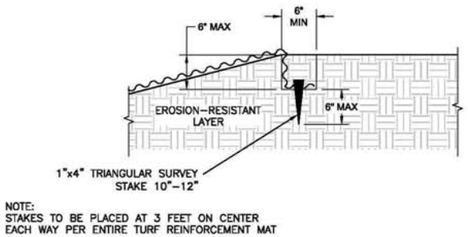
NOT TO SCALE



D BENCH SWALE-
EARTHEN W/ REINFORCEMENT MAT

(NON-CLOSURE TURF AREAS)

NOT TO SCALE

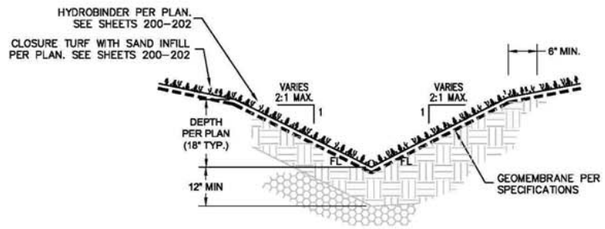


NOTE:
STAKES TO BE PLACED AT 3 FEET ON CENTER
EACH WAY PER ENTIRE TURF REINFORCEMENT MAT

E REINFORCEMENT MAT: ANCHOR SLOT

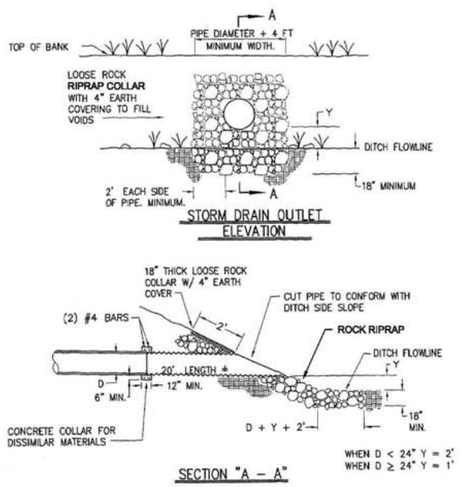
(NON-CLOSURE TURF AREAS)

NOT TO SCALE



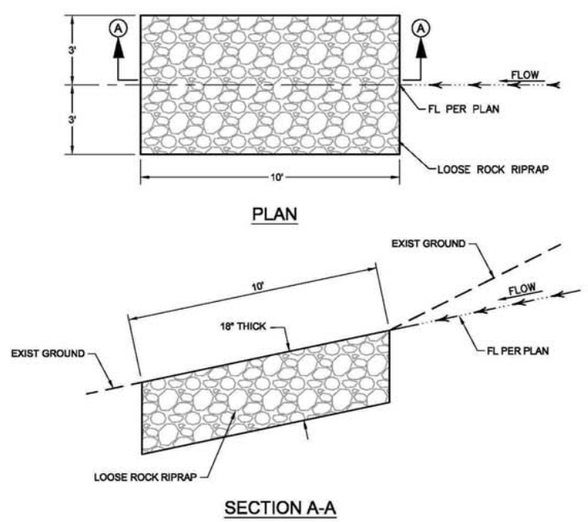
H CLOSURE TURF SWALE

NOT TO SCALE



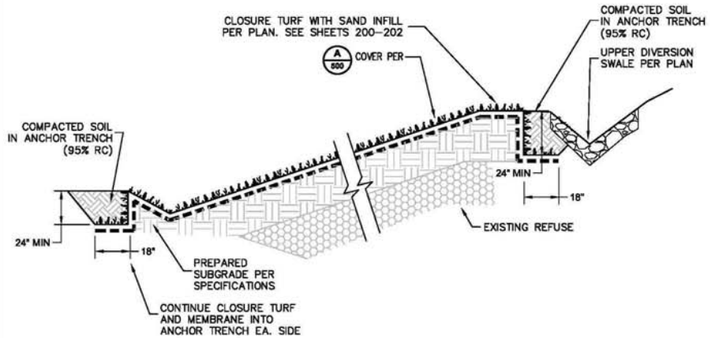
F LOOSE ROCK RIPRAP STORM DRAIN OUTLET

NOT TO SCALE



G SWALE OUTLET DETAIL

NOT TO SCALE



I TYP. CLOSURE TURF ANCHOR TRENCH

NOT TO SCALE

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STATE OF CALIFORNIA

GRADING DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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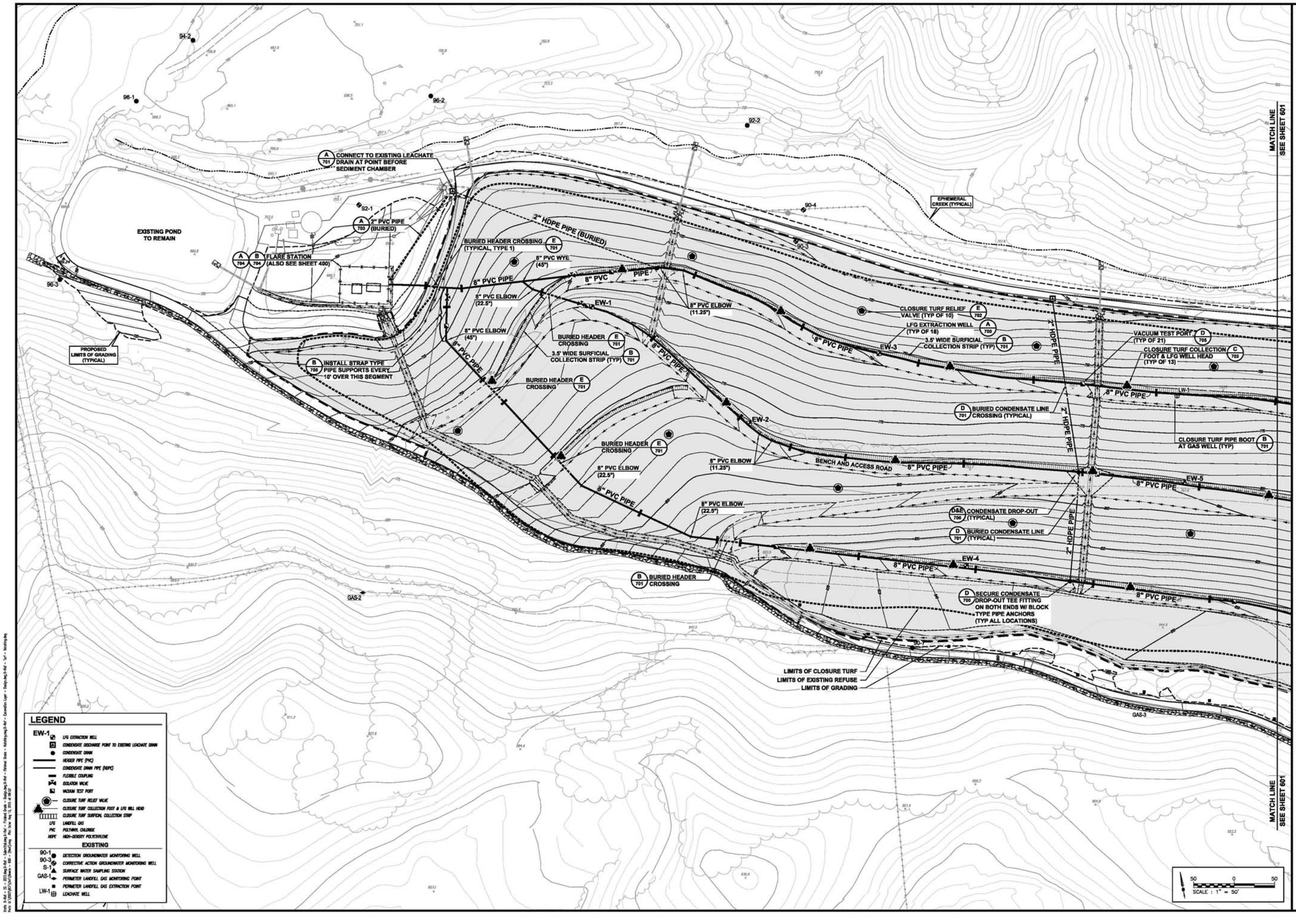

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LFG COLLECTION SYSTEM LAYOUT - WEST PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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MATCH LINE SEE SHEET 600

MATCH LINE SEE SHEET 602

EPHEMERAL CREEK (TYPICAL)

90-6

92-3

90-5

EW-7

EW-11

EW-14

EW-15

EW-10

EW-8

EW-6

EW-12

EW-13

EW-9

LW-2

LW-3

2" HDPE PIPE

2" HDPE PIPE (BURIED)

8" PVC PIPE

4" PVC PIPE

8" PVC ELBOW (11.25°)

8" PVC ELBOW (22.5°)

8" PVC ELBOW (30°)

8" PVC ELBOW (45°)

8"x8"x8" PVC TEE WITH PVC 8"x6" REDUCER BUSHING

8"x8"x8" PVC TEE

8"x8"x4" PVC TEE

4" PVC ELBOWS (TEE, 45°, 45°)

A 701 CONDENSATE DISCHARGE POINT (TYPICAL OF 6)

D 703 FOR FLEXIBLE COUPLING INSTRUCTIONS

B 704 CLOSURE TURF PIPE BOOT AT GAS WELL (TYP)

E 702 CLOSURE TURF RELIEF VALVE (TYP OF 23)

C 703 ISOLATION VALVE (TYPICAL OF 19)

D&E 706 CONNECT CONDENSATE U-TRAP TO CONDENSATE LINE FROM UPPER BENCH (TYPICAL)

A 708 INSTALL BLOCK TYPE PIPE ANCHORS EVERY 50 FEET (MAX) FOR ALL HEADER PIPE SEGMENTS

C 701 8" PVC WYE (15°) ROAD CROSSING (TYPICAL, TYPE 2)

B 703 BURIED CONDENSATE LINE TRENCH DETAIL (TYPICAL)

A 702 ROAD CROSSING (TYPICAL)

C 701 ROAD CROSSING (TYPICAL)

FOR FLEXIBLE COUPLINGS INSTALLED ON SLOPES, INSTALL STRAP TYPE ANCHOR ON UPSLOPE SIDE OF FLEXIBLE CONNECTOR (ALL LOCATIONS)

B 701 3.5' WIDE SURFICIAL COLLECTION STRIP (TYP)

B 705 INSTALL STRAP SUPPORTS EVERY 10' OVER ENTIRE LENGTH OF 4" LATERAL SEGMENT (TYPICAL)

C 702 CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD (TYP OF 31)

PROPOSED LIMITS OF GRADING (TYPICAL)

LIMITS OF EXISTING REFUSE

LIMITS OF CLOSURE TURF

MATCH LINE SEE SHEET 600

MATCH LINE SEE SHEET 602

LEGEND

EW-1 LFG EXTRACTION WELL
CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
CONDENSATE DRAIN
HEADER PIPE (PVC)
CONDENSATE DRAIN PIPE (HDPE)
FLEXIBLE COUPLING
ISOLATION VALVE
VACUUM TEST PORT
CLOSURE TURF RELIEF VALVE
CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD
CLOSURE TURF SURFICIAL COLLECTION STRIP
LFG LANDFILL GAS
PVC POLYVINYL CHLORIDE
HDPE HIGH-DENSITY POLYETHYLENE

EXISTING

90-1 DETECTION GROUNDWATER MONITORING WELL
90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1 SURFACE WATER SAMPLING STATION
GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1 LEACHATE WELL

50 0 50
SCALE : 1" = 50'

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LFG COLLECTION SYSTEM LAYOUT - CENTRAL PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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MATCH LINE SEE SHEET 601

EW-15

6" PVC PIPE

6" PVC END CAP

8" PVC PIPE

EW-17

2" HDPE PIPE (BURIED)

6" PVC ELBOW (11.25°)

LIMITS OF CLOSURE TURF

LIMITS OF EXISTING REFUSE

GAS-10

EPHEMERAL CREEK (TYPICAL)

8" PVC ELBOW (11.25°)

D&E 700 CONDENSATE DROP-OUT (TYPICAL)

CLOSURE TURF PIPE BOOT AT GAS WELL (TYP) B 701

3.5' WIDE SURFICIAL COLLECTION STRIP (TYP) B 701

EW-16

SECURE BOTH ENDS OF ALL TEE, ELBOW AND WYE FITTINGS WITH STRAP TYPE PIPE ANCHORS

8" PVC ELBOW (22.5°)

EW-18

8" PVC ELBOW (30°)

8"x8"x8" PVC TEE

8" PVC ELBOW (30°)

8" PVC ELBOW (45°)

8" PVC WYE (45°)

8" PVC ELBOW (30°)

8" PVC ELBOW (45°)

PROPOSED LIMITS OF GRADING (TYPICAL)

CLOSURE TURF RELIEF VALVE (TYP OF 8) E 702

CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD (TYP OF 8) C 702

3.5' WIDE SURFICIAL COLLECTION STRIP (TYP) B 701

8" PVC ELBOW (15°)

4" PVC PIPE

8" PVC ELBOW (11.25°)

ROAD CROSSING (TYPICAL) E 701

INSTALL STRAP SUPPORTS EVERY 10' OVER ENTIRE LENGTH OF 4" LATERAL SEGMENT (TYPICAL) B 705

90-8

GAS-6

95-1

GAS-5

50 0 50
SCALE : 1" = 50'

LEGEND

EW-1 LFG EXTRACTION WELL
CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN
CONDENSATE DRAIN
HEADER PIPE (PVC)
CONDENSATE DRAIN PIPE (HDPE)
FLEXIBLE COUPLING
ISOLATION VALVE
VACUUM TEST PORT
CLOSURE TURF RELIEF VALVE
CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD
CLOSURE TURF SURFICIAL COLLECTION STRIP
LFG LANDFILL GAS
PVC POLYVINYL CHLORIDE
HDPE HIGH-DENSITY POLYETHYLENE

EXISTING

90-1 DETECTION GROUNDWATER MONITORING WELL
90-3 CORRECTIVE ACTION GROUNDWATER MONITORING WELL
S-1 SURFACE WATER SAMPLING STATION
GAS-1 PERIMETER LANDFILL GAS MONITORING POINT
PERIMETER LANDFILL GAS EXTRACTION POINT
LW-1 LEACHATE WELL

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LFG COLLECTION SYSTEM LAYOUT - EASTERN PORTION

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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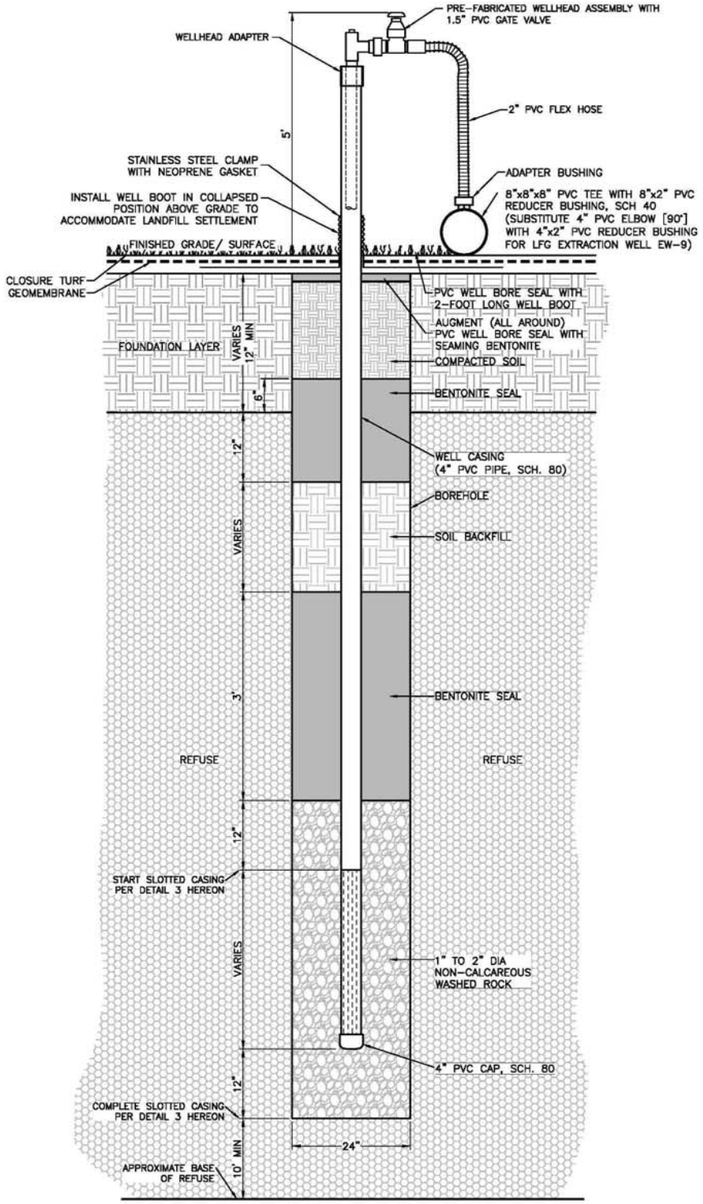
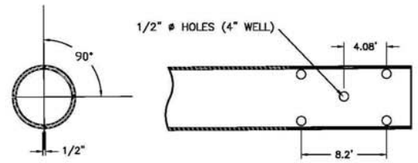


A TYPICAL LFG EXTRACTION WELL

NOT TO SCALE



B TYPICAL CASING PERFORATIONS FOR LFG EXTRACTION WELLS

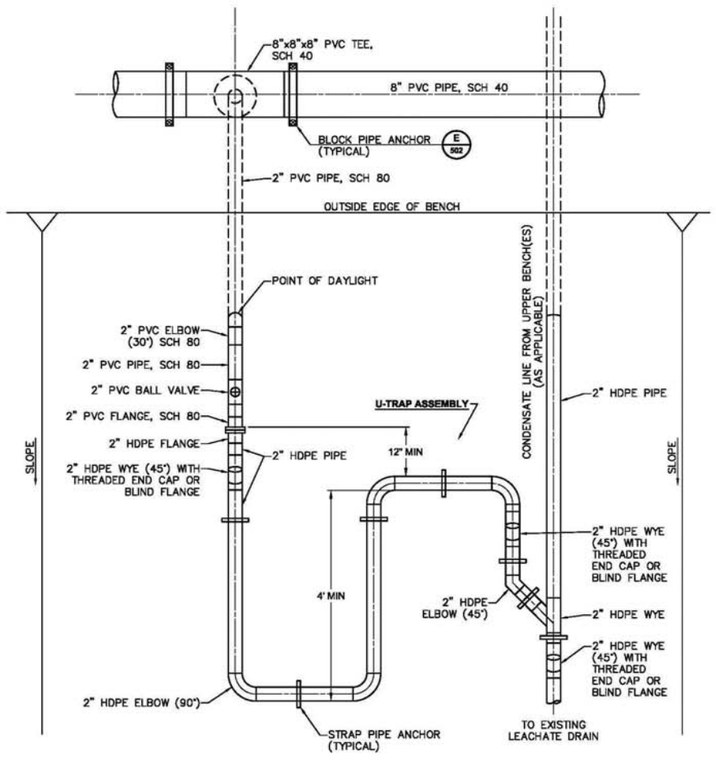
NOT TO SCALE

Extraction Well	Bottom Completion Depth (Feet BGS)	Perforated Interval (Feet BGS)	Gravel Pack Interval (Feet BGS)	Surface Seal Interval (Feet BGS)
EW-1	35	21 - 34	20 - 35	0 - 20
EW-2	45	21 - 44	20 - 45	0 - 20
EW-3	35	21 - 34	20 - 35	0 - 20
EW-4	60	21 - 59	20 - 60	0 - 20
EW-5	70	21 - 69	20 - 70	0 - 20
EW-6	70	21 - 69	20 - 70	0 - 20
EW-7	35	21 - 34	20 - 35	0 - 20
EW-8	70	21 - 69	20 - 70	0 - 20
EW-9	60	21 - 59	20 - 60	0 - 20
EW-10	50	21 - 49	20 - 50	0 - 20
EW-11	25	16 - 25	15 - 25	0 - 15
EW-12	70	21 - 69	20 - 70	0 - 20
EW-13	80	21 - 79	20 - 80	0 - 20
EW-14	45	21 - 44	20 - 45	0 - 20
EW-15	35	21 - 34	20 - 35	0 - 20
EW-16	60	21 - 59	20 - 60	0 - 20
EW-17	35	21 - 34	20 - 35	0 - 20
EW-18	60	21 - 59	20 - 60	0 - 20

BGS: Below Ground Surface (as referenced from top of final grade following placement of final cover system)

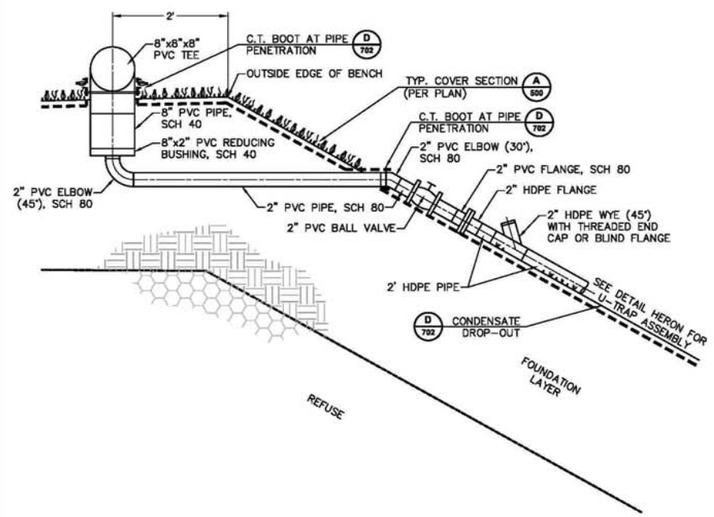
C LFG EXTRACTION WELL COMPLETION CHARACTERISTICS

NOT TO SCALE



D CONDENSATE DROP-OUT - PLAN VIEW (TYPICAL)

NOT TO SCALE



E CONDENSATE DROP-OUT - DETAIL (TYPICAL)

NOT TO SCALE

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LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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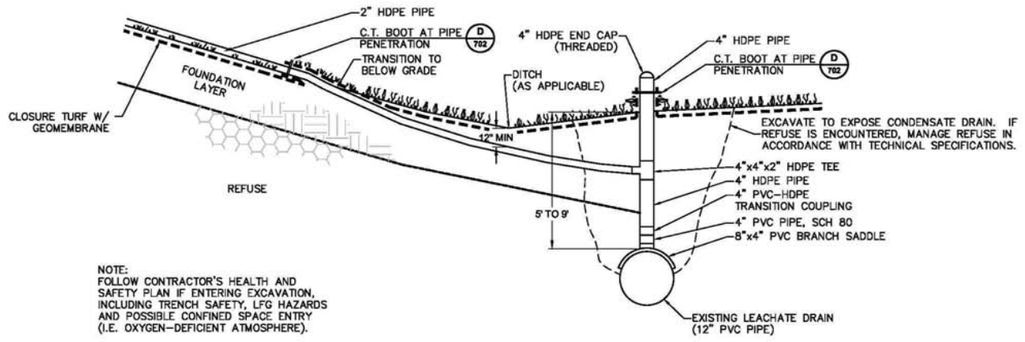
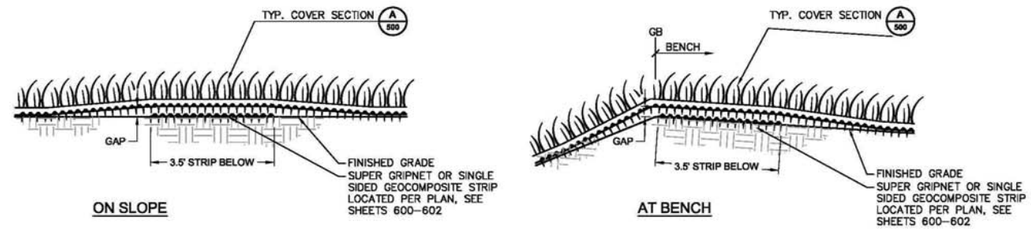


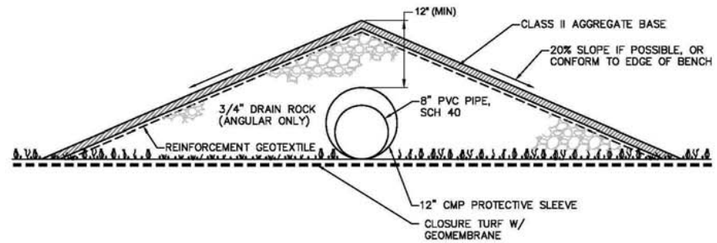
A CONDENSATE DISCHARGE POINT TO EXISTING LEACHATE DRAIN (TYPICAL)

NOT TO SCALE



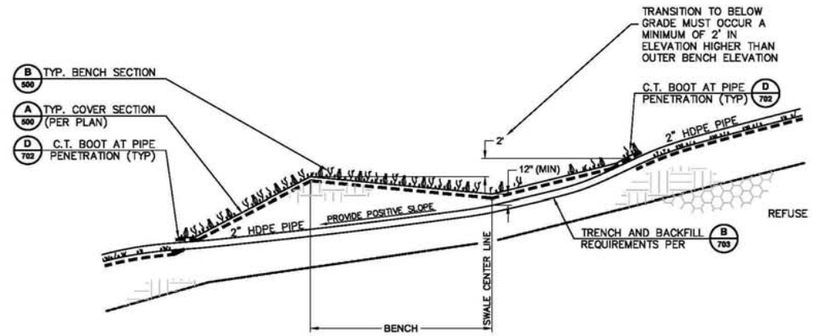
B CLOSURE TURF SURFICIAL COLLECTION STRIP

NOT TO SCALE



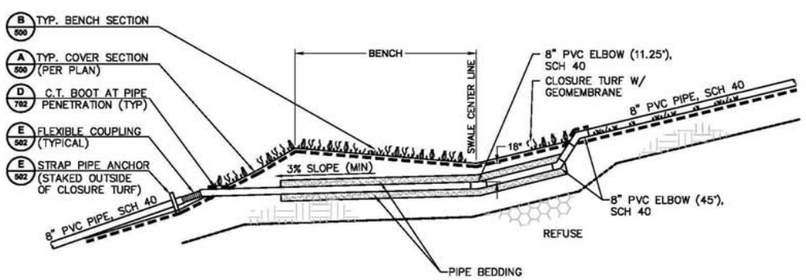
C ROAD CROSSING - DETAIL - (TYPICAL, TYPE 2)

NOT TO SCALE



D BURIED CONDENSATE LINE CROSSING (TYPICAL)

NOT TO SCALE



* CONTRACTOR SHALL ADJUST FOUNDATION GRADE PLAN FOR INSTALLATION OF LFG COLLECTION PIPING, ASSURING PROPER SECTION PER A 500 SOME EXCAVATION OF REFUSE MAY BE REQUIRED TO ASSURE SECTION.

E BURIED HEADER CROSSING (TYPICAL, TYPE 1)

NOT TO SCALE

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LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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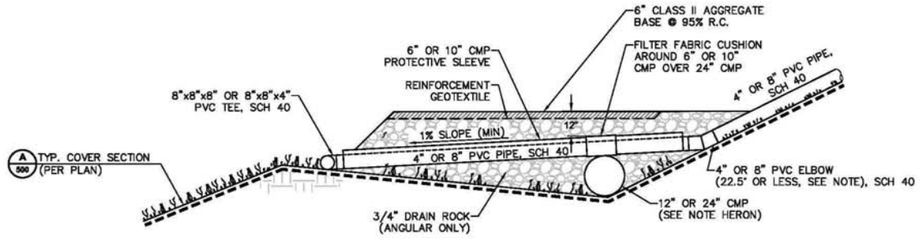
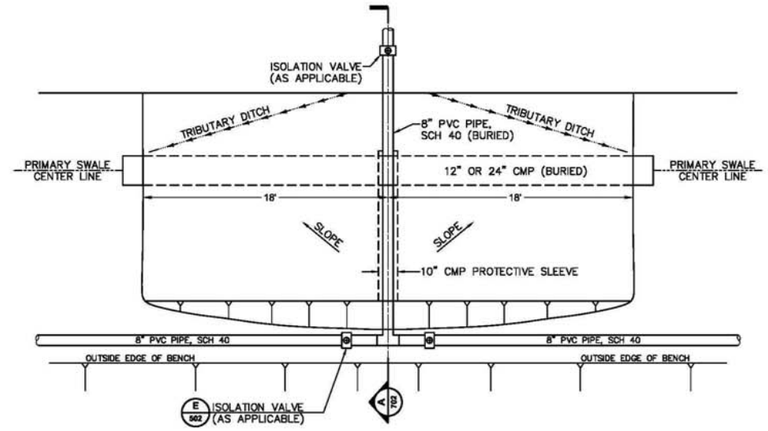


NOTE:
ADJUST AS NECESSARY TO ATTAIN MINIMUM 1 PERCENT PIPE SLOPE WHILE MINIMIZING HEIGHT OF ROAD CROSSING.

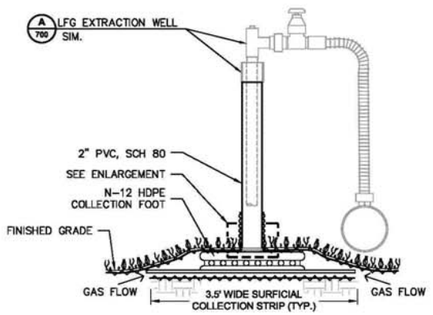
A ROAD CROSSING - DETAIL

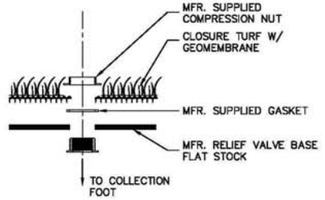
NOT TO SCALE



B ROAD CROSSING - PLAN VIEW

NOT TO SCALE



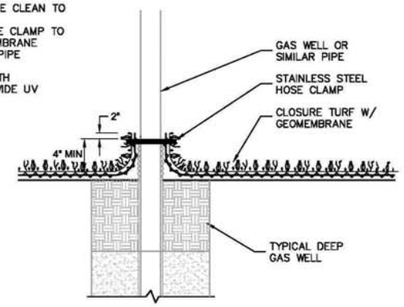


ENLARGEMENT

C CLOSURE TURF COLLECTION FOOT & LFG WELL HEAD

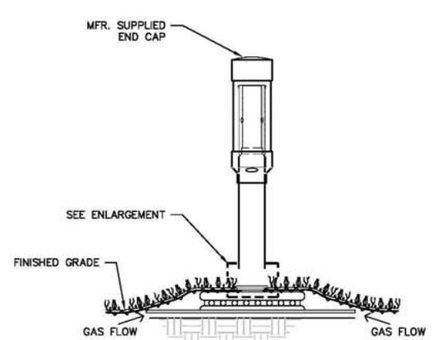
NOT TO SCALE

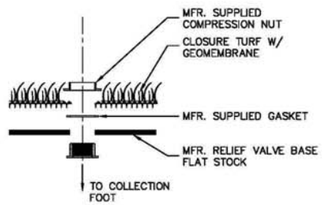
NOTES:
1. PIPE AND GEOMEMBRANE SHALL BE CLEAN TO PROVIDED AIRTIGHT CONNECTION.
2. CONTRACTOR SHALL TIGHTEN HOSE CLAMP TO ENSURE PROPER SEAL OF GEOMEMBRANE AROUND PIPE WHILE PREVENTING PIPE DAMAGE.
3. TURF SHALL BE RUN CLAMPED WITH GEOMEMBRANE IN ORDER TO PROVIDE UV PROTECTION.



D CLOSURE TURF BOOT AT TYP. PIPE PENETRATION

NOT TO SCALE

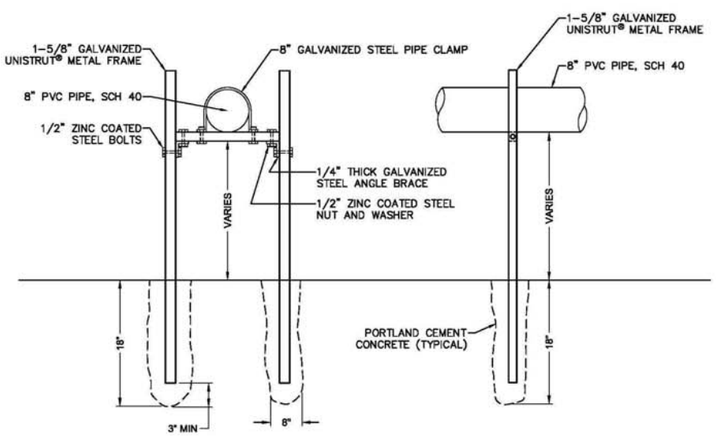




ENLARGEMENT

E CLOSURE TURF RELIEF VALVE

NOT TO SCALE



F METAL FRAME PIPE SUPPORT (TYPICAL OUTSIDE WASTE)

(NON-CLOSURE TURF AREAS)

NOT TO SCALE

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LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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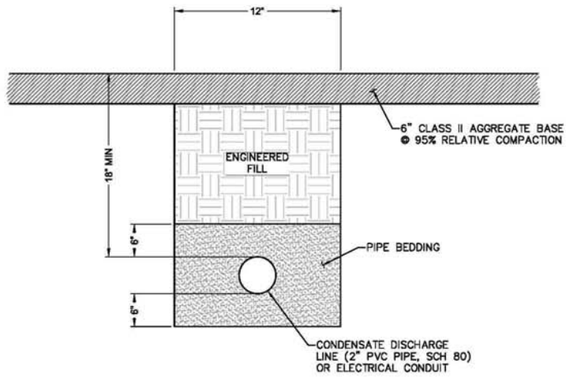
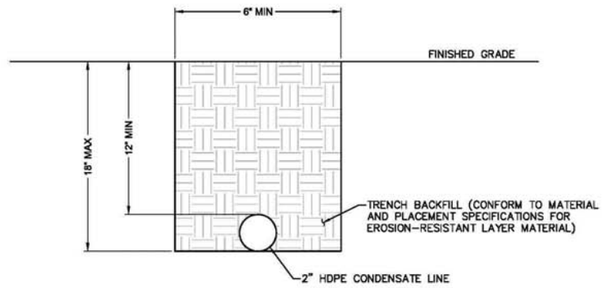


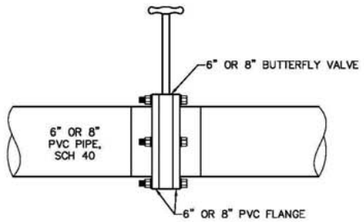
A FLARE STATION TRENCH DETAIL

NOT TO SCALE



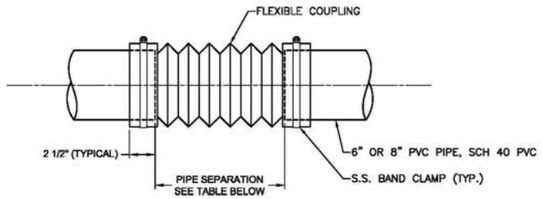
B BURIED CONDENSATE LINE TYPICAL

NOT TO SCALE



C ISOLATION VALVE ASSEMBLY (TYPICAL)

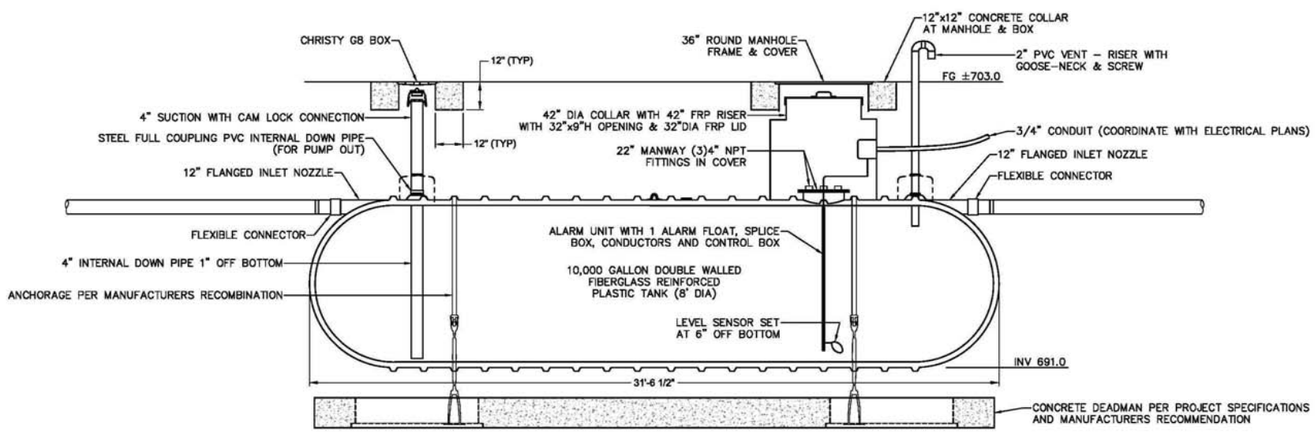
NOT TO SCALE



PIPE SEPARATION TABLE								
INSTALLATION TEMPERATURE (F°)	30	40	50	60	70	80	90	100
PIPE SEPARATION (in)	13	12	12	11	11	10	10	9

D FLEXIBLE COUPLING (TYPICAL)

NOT TO SCALE



E LEACHATE OVERFLOW STORAGE TANK-ELEVATION

NOT TO SCALE

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No. 30888
EXP. 3-31-14
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STATE OF CALIFORNIA

LFG COLLECTION SYSTEM DETAILS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Job No:	02-907
Drawn By:	SGH/ DTM
Checked By:	DS
Date:	2015-08-14

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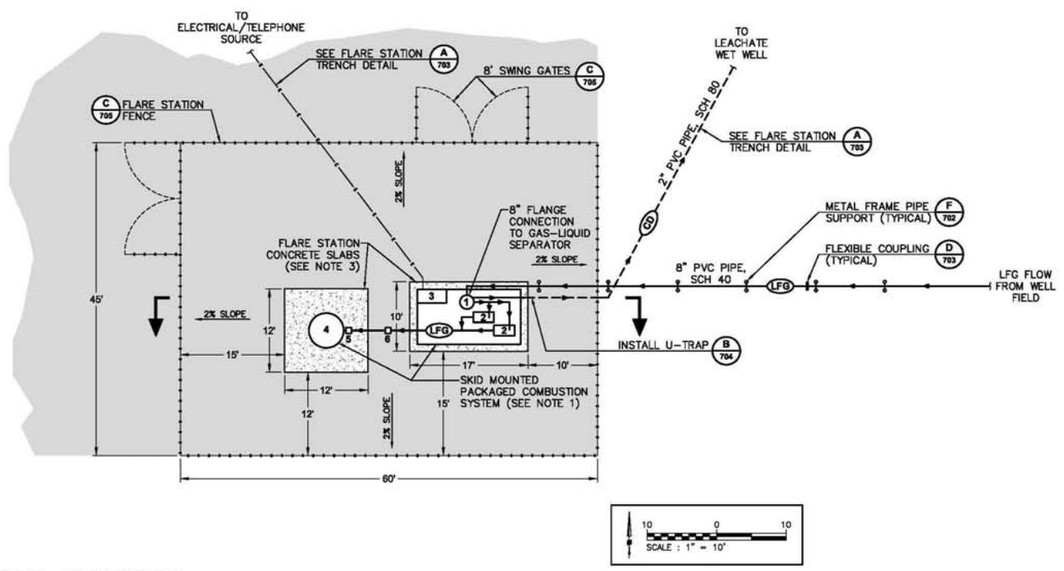


A FLARE STATION - PLAN VIEW

SCALE: 1"=10'

LEGEND

1. GAS–LIQUID SEPARATOR (SUPPLIED BY OWNER)
2. BLOWER (SUPPLIED BY OWNER)
3. CONTROL PANEL (SUPPLIED BY OWNER)
4. FLARE (SUPPLIED BY OWNER)
5. FLAME ARRESTOR AND AUTOMATIC SAFETY SHUTOFF VALVE (SUPPLIED BY OWNER)
6. FLOW METER (SUPPLIED BY OWNER)

CD CONDENSATE DISCHARGE LINE, 2" PVC PIPE, SCH 80

LFG LANDFILL GAS PRIMARY HEADER PIPE

ABOVE GROUND LINE/PIPE

UNDERGROUND LINE/PIPE

ELECTRICAL/TELEPHONE LINE

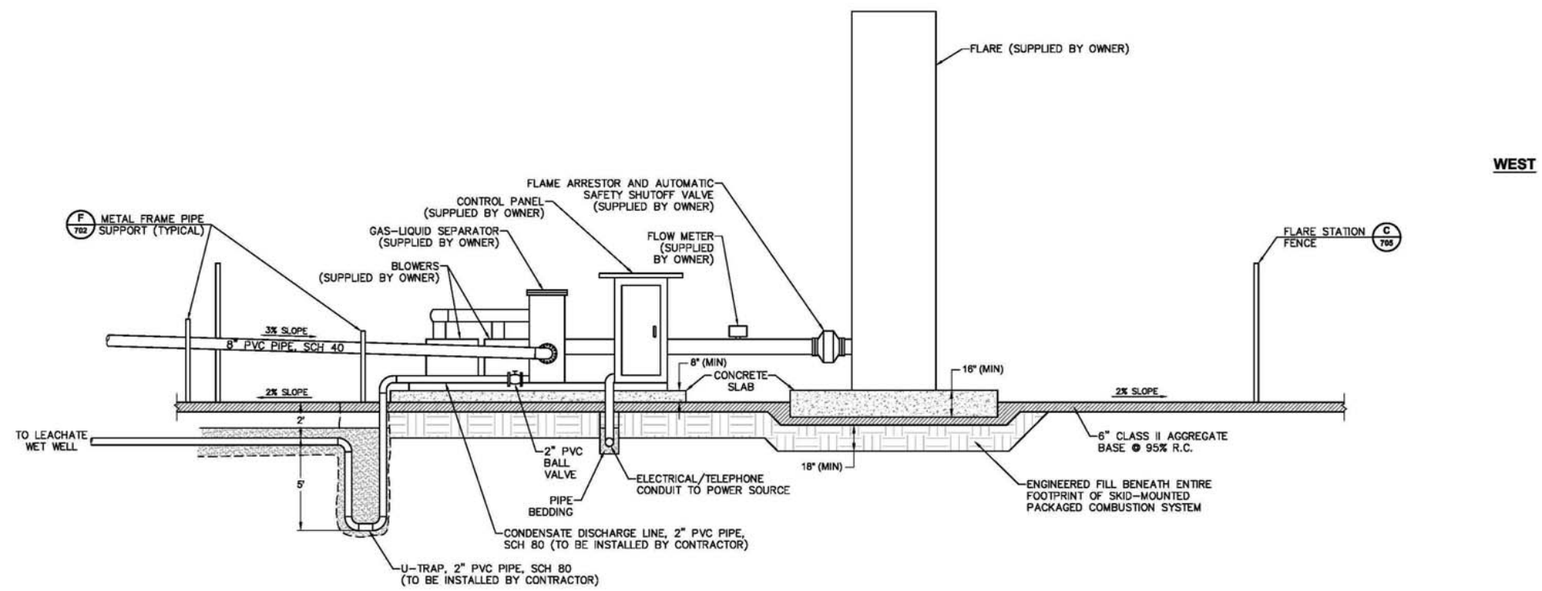
8' HIGH CHAIN LINK FENCE

FLEXIBLE COUPLING

PIPE SUPPORT

NOTES

1. THE ORIENTATION OF THE SKID–MOUNTED PACKAGED COMBUSTION SYSTEM COMPONENTS SHOWN HEREON ARE FOR ILLUSTRATION PURPOSES ONLY. THE ACTUAL ORIENTATION OF THESE COMPONENTS ON THE CONCRETE SLAB ARE SUBJECT TO CHANGE BASED ON MANUFACTURER'S FINAL DESIGN.
2. ALL CONDUIT AND PIPING OUTSIDE LIMITS OF FLARE STATION CONCRETE SLAB SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR.
3. THE CONCRETE SLAB FOR THE FLARE (12'x12') SHALL BE 16" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY AT TOP AND BOTTOM OF SLAB. THE OTHER SLAB (10'x17') SHALL BE 8" THICK WITH #4 BARS AT 12" ON CENTER EACH WAY.
4. COMPLETION HEIGHTS OF PIPE SUPPORTS SHALL BE ADJUSTED ACCORDINGLY TO MAINTAIN POSITIVE SLOPE (3% MINIMUM) OF LFG COLLECTION SYSTEM PIPING TOWARDS THE GAS–LIQUID SEPARATOR.



B FLARE STATION - SECTION VIEW

SCALE: 1"=4'

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Job No:	02–907
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Checked By:	DS
Date:	2015–08–14

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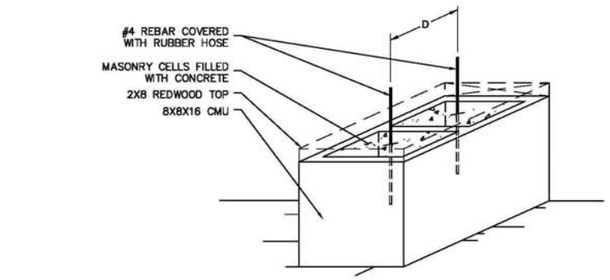
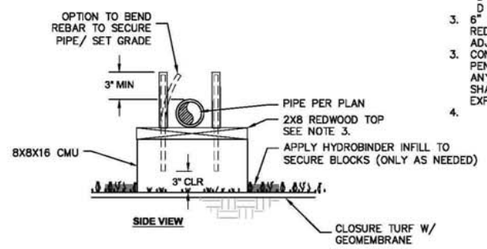
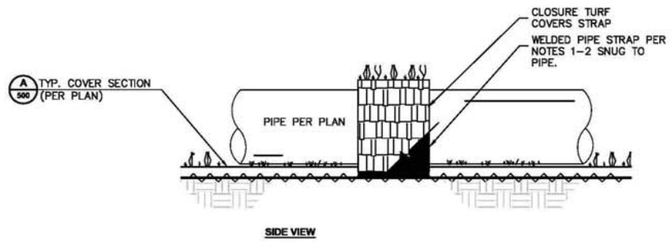


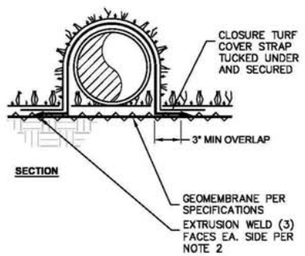


NOTES:
1. CONTRACTOR SHALL PLACE SUPPORTS ON THE CLOSURE TURF SURFACE (DO NOT CAST IN PLACE).
2. D = 11" FOR 8" PVC
   D = 9" FOR 6" PVC
   D = 7" FOR 4" PVC
3. 6" HEIGHT CMU OR ADDITIONAL 1X REDWOOD TOP MAY BE USED TO ADJUST SUPPORT HEIGHT.
3. CONTRACTOR TO ENSURE NO PENETRATION OF THE GEOMEMBRANE. ANY DAMAGE TO THE GEOMEMBRANE SHALL BE REPARED AT CONTRACTOR'S EXPENSE.
4.

(A) BLOCK TYPE PIPE SUPPORT (TYPICAL)

NOT TO SCALE

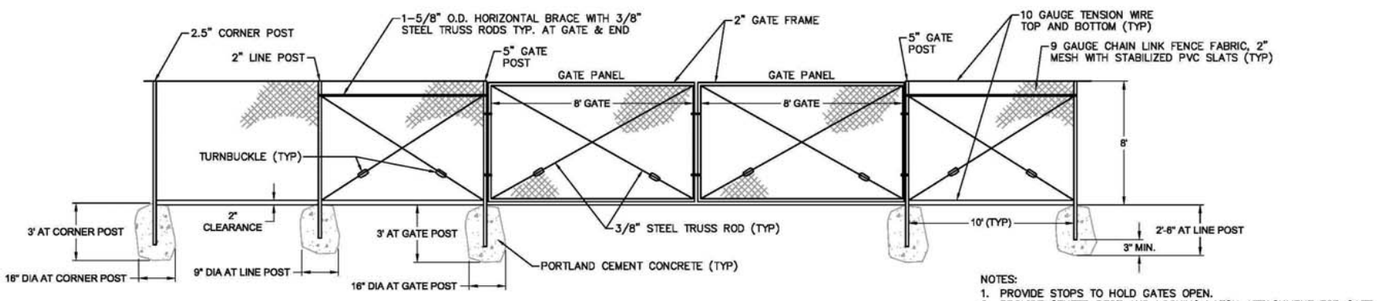




NOTES:
1. HDPE OR LLDPE (GEOMEMBRANE) MATERIAL STRIP TO CROSS PIPE PERPENDICULAR AND FORM SNUG FIT PREVENTING MOVEMENT.
2. CONTRACTOR TO WELD LLDPE GEOMEMBRANE TO STRAP USING EXTRUSION WELD METHOD, 3" MIN. OVERLAP.
3. CONTRACTOR TO ENSURE NO PENETRATION OF THE GEOMEMBRANE. ANY DAMAGE TO THE GEOMEMBRANE SHALL BE REPARED AT CONTRACTOR'S EXPENSE.

(B) STRAP TYPE PIPE ANCHOR (TYPICAL)

NOT TO SCALE



NOTES:
1. PROVIDE STOPS TO HOLD GATES OPEN.
2. PROVIDE CENTER REST AND LOCKING LATCH ATTACHMENT FOR GATE.
3. LINE POST SPACING SHALL NOT EXCEED 10 FEET.

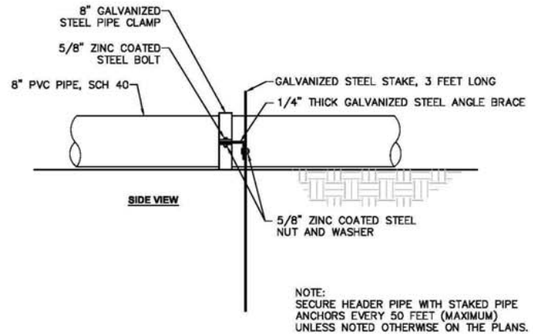
(C) FLARE STATION FENCE AND GATES

NOT TO SCALE

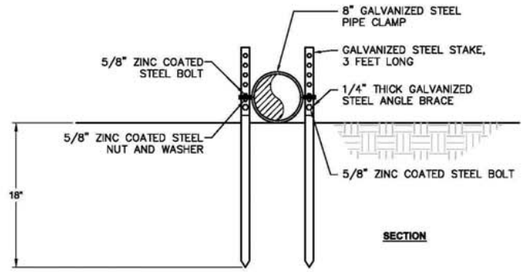


(D) VACUUM TEST PORT (TYPICAL)

NOT TO SCALE

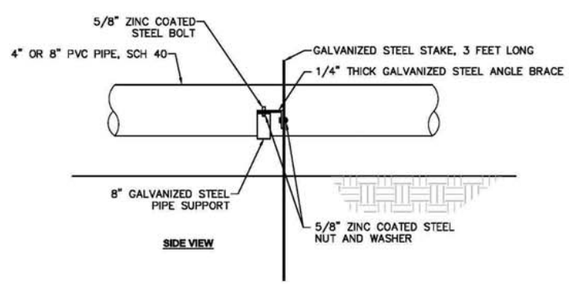


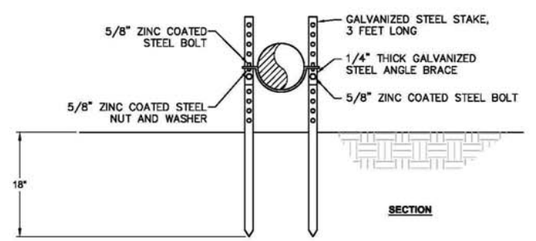
NOTE:
SECURE HEADER PIPE WITH STAKED PIPE ANCHORS EVERY 50 FEET (MAXIMUM) UNLESS NOTED OTHERWISE ON THE PLANS.



(E) STAKED PIPE ANCHOR (TYPICAL)

(NON-CLOSURE TURF AREAS) NOT TO SCALE





(F) STAKED PIPE SUPPORT (TYPICAL)

(NON-CLOSURE TURF AREAS) NOT TO SCALE

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Checked By:	DS
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APPENDIX C

GREENHOUSE GAS EMISSIONS STUDY

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
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Petaluma, California 94954
Tel: 707-794-0400 *Fax: 707-794-0405*
www.illingworthrodkin.com *illro@illingworthrodkin.com*

May 22, 2015

David Noren
EBA Engineering
825 Sonoma Avenue
Santa Rosa, CA 95404

VIA E-MAIL: dnoren@ebagroup.com

SUBJECT: **Ukiah Landfill Closure, Ukiah, CA –**
Construction Greenhouse Gas Emissions Assessment

Dear David:

This letter presents the evaluation of construction greenhouse gas (GHG) emissions associated with the proposed closure of the Ukiah Landfill located in Ukiah. The proposed project will involve closure of the existing landfill, including demolition of piping and drain inlets, site preparation, grading and excavation, well drilling, final cover, utilities, construction of the landfill gas (LFG) flare station, and paving of roads.

The primary sources of GHG emissions associated with the project would be from off-road construction equipment on-site and mobile emissions from worker and hauling truck traffic. The California Emissions Estimator Model (CalEEMod) Version 2013.2.2 was used to predict emissions from construction of the project. CalEEMod is recommended by the Mendocino County Air Quality Management District (MCAQMD) for quantification of construction and development project GHG emissions.

Setting and Regulatory Background

Global temperatures are affected by naturally occurring and anthropogenic-generated (generated by humankind) atmospheric gases, such as water vapor, carbon dioxide, methane, and nitrous oxide. Gases that trap heat in the atmosphere are called greenhouse gases. Solar radiation enters the earth's atmosphere from space, and a portion of the radiation is absorbed at the surface. The earth emits this radiation back toward space as infrared radiation. Greenhouse gases, which are mostly transparent to incoming solar radiation, are effective in absorbing infrared radiation and redirecting some of this back to the earth's surface. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This is known as the greenhouse effect. The greenhouse effect helps maintain a habitable climate. Emissions of GHGs from human activities, such as electricity production, motor vehicle use and agriculture, are elevating the concentration of GHGs in the atmosphere, and are reported to have led to a trend of unnatural warming of the earth's natural climate, known as global warming or global climate change. The term "global climate change" is often used interchangeably with the term "global warming," but "global climate change" is preferred because it

implies that there are other consequences to the global climate in addition to rising temperatures. Other than water vapor, the primary GHGs contributing to global climate change include the following gases:

- Carbon dioxide (CO_2), primarily a byproduct of fuel combustion;
- Nitrous oxide (N_2O), a byproduct of fuel combustion; also associated with agricultural operations such as the fertilization of crops;
- Methane (CH_4), commonly created by off-gassing from agricultural practices (e.g. livestock), wastewater treatment and landfill operations;
- Chlorofluorocarbons (CFCs) were used as refrigerants, propellants and cleaning solvents, but their production has been mostly prohibited by international treaty;
- Hydrofluorocarbons (HFCs) are now widely used as a substitute for chlorofluorocarbons in refrigeration and cooling; and
- Perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6) emissions are commonly created by industries such as aluminum production and semiconductor manufacturing.

These gases vary considerably in terms of Global Warming Potential (GWP), a term developed to compare the propensity of each GHG to trap heat in the atmosphere relative to another GHG. GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and the length of time of gas remains in the atmosphere. The GWP of each GHG is measured relative to CO_2. Accordingly, GHG emissions are typically measured and reported in terms of equivalent CO_2 (CO_2e). For instance, SF_6 is 22,800 times more intense in terms of global climate change contribution than CO_2.

The State of California is addressing the issue of GHG through legislation, policy guidance, and outreach programs. CO_2 is the primary GHG emitted from land use and industrial projects. In 2006 California enacted AB 32 – the Global Warming Solutions Act, which requires that statewide GHG emissions be reduced to 1990 levels by 2020. In 2008, the California Air Resources Board (CARB) adopted the Climate Change Scoping Plan in response to AB 32. This plan describes the strategies that the State will implement to reduce future emissions by 28% to meet the 1990 target goal in 2020.

Per Appendix G of the CEQA Guidelines, greenhouse gas emissions are considered significant if implementation of the proposed projects would:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
2. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

MCAQMD has published CEQA thresholds of significance.[1] However, there are no established thresholds of significance for GHG emissions during temporary construction.

Construction Emissions

CalEEMod was used to predict construction emissions in the form of CO_2e. CalEEMod is a computer model developed by the South Coast Air Quality Management District (SCAQMD) with cooperation of other California Air Districts to estimate air pollutant and GHG emissions. The model is recommended by MCAQMD for use in quantifying construction and development project GHG emissions. The project

[1] MCAQMD, 2010. *Adopted Air Quality CEQA Thresholds of Significance*. June.

applicant provided the anticipated construction schedule and proposed construction equipment, which were input to the model. An approximate 5-month construction schedule was entered in the model based on project-specific information. See *Attachment 1* for the project construction schedule. Construction phases included the following:

- Demolition and removal of piping and drain inlets;
- Site preparation;
- Grading/excavation;
- Well drilling;
- Final cover;
- Utilities (storm drain, LFG pipe);
- Construction of the LFG flare station; and
- Paving of roads.

In addition, the project size (50 acres including borrow area surfaces) was input to the model. The anticipated soil hauling volumes (61,500 cubic yards (cy) foundation layer, 8,850 cy engineered fill, and 13,500 cy excavation) were also input. Preparation of the LFG flare station foundation would require approximately 8 cy of concrete.

Results of modeling indicate that construction of the project would emit 460 metric tons of CO_2e. As mentioned above, neither the County nor the MCAQMD have quantified thresholds for construction activities. For comparison, the emissions would be below the lowest threshold (1,100 metric tons of $C0_2e$ per year for land use development projects) adopted by MCAQMD and would be considered *less-than-significant*. It should be noted that the project applicant is encouraged to incorporate best management practices to reduce GHG emissions during construction, where feasible and applicable. Best management practices may include, but are not limited to, using alternative-fueled (e.g., biodiesel, electric) construction vehicles/equipment for at least 15 percent of the fleet, using at least 10 percent local building materials, and recycling or reusing at least 50 percent of construction waste or demolition materials.

* * *

This concludes our assessment of the construction GHG impacts from this project. If you have any questions or comments, please feel free to contact me at (707) 794-0400, x.35. We appreciate the opportunity to assist you.

Sincerely,

Joshua D. Carman
Illingworth & Rodkin

Attachment 1: CalEEMod Output Worksheets and Construction Schedule
15-060

Project Name:		Ukiah Landfill Final Closure						
	Project Size	NA	square feet bldgs.	NA	acres			
	Construction Hours	NA	am to	NA	pm			
Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Annual Hours	Comments
Qty	**Demolition**	**Start Date:**	8/3/2015	**Total days:**	5			Demolition includes removal of above ground piping
		End Date:	8/7/2015					and drain inlets
							0	
1	Tractors/Loaders/Backhoes	97	0.3685	4	5	4	20	
1	Rubber-Tired Dozers	255	0.3953	4	5	4	20	
	Site Preparation	**Start Date:**	8/10/2015	**Total days:**	10			Site preparation includes clearing, stripping, scarifying approx
		End Date:	8/21/2015					50 acres of landfill and borrow area surfaces
1	Rubber Tired Dozers	255	0.3953	8	10	8	80	
1	Tractors/Loaders/Backhoes	97	0.3685	8	10	8	80	
	Grading / Excavation	**Start Date:**	8/24/2015	**Total days:**	20			Grading/Excavation includes excavating and relocation of refuse,
		End Date:	9/18/2015					grading and placement of foundation layer material from
1	Excavators	162	0.3819	8	2	0.8	16	onsite borrow area, placement miscellaneous engineered fill
1	Graders	174	0.4087	8	10	4	80	Excavation quantity = 13,500 CY
1	Rubber Tired Dozers	255	0.3953	8	20	8	160	Foundation layer quantity = 61,500 CY
2	Tractors/Loaders/Backhoes	97	0.3685	8	20	8	320	Engineered fill quantity = 8,850 CY
2	Scrapers	361	0.48	8	10	4	160	
	Well Drilling	**Start Date:**	9/7/23015	**Total days:**	10			Well drilling includes drilling for the LFG extraction wells
		End Date:	9/18/2015					Vertical lineal feet = 940
1	Tractor/Loader/Backhoe	97	0.3685	4	10	4	40	
1	Bore/Drill Rigs	205	0.5	8	10	8	80	
	Final Cover	**Start Date:**	9/21/2015	**Total days:**	40			Final cover includes placement of the synthetic turf material
		End Date:	11/13/2015					that includes a geomenbrane, drainage layer, turf, and sand
2	Tractor/Loader/Backhoe	97	0.3685	4	40	4	320	ballast
2	Welders	46	0.45	6	40	6	480	
2	Generator Sets	84	0.74	6	40	6	480	
	Utilities (Storm Drain, LFG Pipe)	**Start Date:**	11/2/2015	**Total days:**	20			Utilities includes storm drain culverts and inlets, and installation
		End Date:	11/27/2015					of above ground LFG piping that is butt welded
1	Tractor/Loader/Backhoe	97	0.3685	4	20	4	80	
1	Excavators	162	0.3819	6	10	3	60	
1	Welder	46	0.45	4	15	3	60	
1	Generator Sets	84	0.74	4	15	3	60	
	LFG Flare Station	**Start Date:**	11/9/2015	**Total days:**	15			LFG flare station includes setting flare and blower skids,
		End Date:	11/27/2015					preparation of foundation and placement of concrete (8 CY)
1	Cranes	226	0.2881	4	3	0.8	12	installation of underground storage tank, and
2	Tractors/Loaders/Backhoes	97	0.3685	4	8	2.1	64	placement of aggregate base
1	Excavator	162	0.3819	8	2	1.1	16	Electric available
	Roads	**Start Date:**	11/9/2015	**Total days:**	15			Roads include placement of aggregate base on perimeter
		Start Date:	11/27/2015					access road and benches
1	Rollers	80	0.3752	8	15	8	120	
2	Tractors/Loaders/Backhoes	97	0.3685	8	15	8	240	

Ukiah Landfill Closure - Construction GHG

Mendocino-Rural Inland South County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	50.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	86
Climate Zone	1			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Land Use - Project acreage from construction spreadsheet.

Construction Phase - Anticipated phasing schedule provided by project applicant.

Off-road Equipment - Proposed equipment list provided by project applicant.

Off-road Equipment - Proposed equipment list provided by project applicant.

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Off-road Equipment - Proposed equipment list provided by project applicant.

Grading - 61,500 CY foundation layer and 8,850 engineered fill.

Trips and VMT - 1.25 workers per piece of equipment assumed.

Table Name	Column Name	Default Value	New Value
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tblConstructionPhase	NumDays	75.00	20.00
tblConstructionPhase	NumDays	55.00	15.00
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tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37

tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.80
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	7.00	0.80
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	7.00	2.10
tblOffRoadEquipment	UsageHours	8.00	6.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	0.00	6.00
tblTripsAndVMT	WorkerTripNumber	0.00	16.00
tblTripsAndVMT	WorkerTripNumber	0.00	10.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.3390	2.9636	3.1892	5.0300e-003	80.0951	0.0968	80.1920	8.0441	0.0905	8.1346	0.0000	459.9091	459.9091	0.0261	0.0000	460.4567
Total	**0.3390**	**2.9636**	**3.1892**	**5.0300e-003**	**80.0951**	**0.0968**	**80.1920**	**8.0441**	**0.0905**	**8.1346**	**0.0000**	**459.9091**	**459.9091**	**0.0261**	**0.0000**	**460.4567**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/3/2015	8/7/2015	5	5	
2	Site Preparation	Site Preparation	8/10/2015	8/21/2015	5	10	
3	Grading	Grading	8/24/2015	9/18/2015	5	20	
4	Well Drilling	Building Construction	9/7/2015	9/18/2015	5	10	
5	Final Cover	Building Construction	9/21/2015	11/13/2015	5	40	
6	Utilities	Trenching	11/2/2015	11/27/2015	5	20	
7	LFG Flare Station	Building Construction	11/9/2015	11/27/2015	5	15	
8	Paving	Paving	11/9/2015	11/27/2015	5	15	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Final Cover	Cranes	0	7.00	226	0.29
Demolition	Excavators	0	8.00	162	0.38
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Grading	Excavators	1	0.80	162	0.38
Well Drilling	Cranes	0	7.00	226	0.29
Well Drilling	Forklifts	0	8.00	89	0.20
Well Drilling	Generator Sets	0	8.00	84	0.74
Paving	Pavers	0	8.00	125	0.42
Paving	Rollers	1	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	4.00	255	0.40

Grading	Rubber Tired Dozers	1	8.00	255	0.40
Well Drilling	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Grading	Graders	1	4.00	174	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Paving Equipment	0	8.00	130	0.36
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	4.00	361	0.48
Well Drilling	Welders	0	8.00	46	0.45
LFG Flare Station	Cranes	1	0.80	226	0.29
Final Cover	Forklifts	0	8.00	89	0.20
LFG Flare Station	Forklifts	0	8.00	89	0.20
Final Cover	Generator Sets	2	6.00	84	0.74
LFG Flare Station	Generator Sets	0	8.00	84	0.74
Final Cover	Tractors/Loaders/Backhoes	2	4.00	97	0.37
LFG Flare Station	Tractors/Loaders/Backhoes	2	2.10	97	0.37
Final Cover	Welders	2	6.00	46	0.45
LFG Flare Station	Welders	0	8.00	46	0.45
Demolition	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Well Drilling	Bore/Drill Rigs	1	8.00	205	0.50
Utilities	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Utilities	Excavators	1	3.00	162	0.38
Utilities	Welders	1	3.00	46	0.45
Utilities	Generator Sets	1	3.00	84	0.74
LFG Flare Station	Excavators	1	1.10	162	0.38
Paving	Tractors/Loaders/Backhoes	2	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class

Demolition	2	5.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	7	18.00	0.00	10,481.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	2	6.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	3	8.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Final Cover	6	16.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
LFG Flare Station	4	10.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	4	10.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.0400e-003	0.0223	0.0167	1.0000e-005		1.1700e-003	1.1700e-003		1.0800e-003	1.0800e-003	0.0000	1.4289	1.4289	4.3000e-004	0.0000	1.4379
Total	**2.0400e-003**	**0.0223**	**0.0167**	**1.0000e-005**		**1.1700e-003**	**1.1700e-003**		**1.0800e-003**	**1.0800e-003**	**0.0000**	**1.4289**	**1.4289**	**4.3000e-004**	**0.0000**	**1.4379**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-004	1.7000e-004	1.4700e-003	0.0000	0.1418	0.0000	0.1418	0.0142	0.0000	0.0142	0.0000	0.1370	0.1370	1.0000e-005	0.0000	0.1373
Total	**1.0000e-004**	**1.7000e-004**	**1.4700e-003**	**0.0000**	**0.1418**	**0.0000**	**0.1418**	**0.0142**	**0.0000**	**0.0142**	**0.0000**	**0.1370**	**0.1370**	**1.0000e-005**	**0.0000**	**0.1373**

3.3 Site Preparation - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0301	0.0000	0.0301	0.0166	0.0000	0.0166	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.1700e-003	0.0891	0.0670	6.0000e-005		4.7000e-003	4.7000e-003		4.3200e-003	4.3200e-003	0.0000	5.7217	5.7217	1.7100e-003	0.0000	5.7576
Total	**8.1700e-003**	**0.0891**	**0.0670**	**6.0000e-005**	**0.0301**	**4.7000e-003**	**0.0348**	**0.0166**	**4.3200e-003**	**0.0209**	**0.0000**	**5.7217**	**5.7217**	**1.7100e-003**	**0.0000**	**5.7576**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-004	3.5000e-004	2.9300e-003	0.0000	0.2837	0.0000	0.2837	0.0283	0.0000	0.0283	0.0000	0.2740	0.2740	2.0000e-005	0.0000	0.2745

Total	**2.0000e-004**	**3.5000e-004**	**2.9300e-003**	**0.0000**	**0.2837**	**0.0000**	**0.2837**	**0.0283**	**0.0000**	**0.0283**	**0.0000**	**0.2740**	**0.2740**	**2.0000e-005**	**0.0000**	**0.2745**

3.4 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1644	0.0000	0.1644	0.0446	0.0000	0.0446	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0401	0.4577	0.3024	3.4000e-004		0.0229	0.0229		0.0211	0.0211	0.0000	32.0923	32.0923	9.5800e-003	0.0000	32.2935
Total	**0.0401**	**0.4577**	**0.3024**	**3.4000e-004**	**0.1644**	**0.0229**	**0.1873**	**0.0446**	**0.0211**	**0.0656**	**0.0000**	**32.0923**	**32.0923**	**9.5800e-003**	**0.0000**	**32.2935**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.2130	1.8995	2.3536	3.9600e-003	70.7955	0.0331	70.8286	7.0736	0.0305	7.1040	0.0000	363.7970	363.7970	3.2300e-003	0.0000	363.8648
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4500e-003	2.5000e-003	0.0211	3.0000e-005	2.0423	2.0000e-005	2.0423	0.2040	2.0000e-005	0.2040	0.0000	1.9731	1.9731	1.6000e-004	0.0000	1.9764
Total	**0.2145**	**1.9020**	**2.3747**	**3.9900e-003**	**72.8378**	**0.0331**	**72.8709**	**7.2775**	**0.0305**	**7.3080**	**0.0000**	**365.7701**	**365.7701**	**3.3900e-003**	**0.0000**	**365.8412**

3.5 Well Drilling - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.8400e-003	0.0388	0.0168	5.0000e-005		1.5800e-003	1.5800e-003		1.4500e-003	1.4500e-003	0.0000	4.9168	4.9168	1.4700e-003	0.0000	4.9477
Total	**2.8400e-003**	**0.0388**	**0.0168**	**5.0000e-005**		**1.5800e-003**	**1.5800e-003**		**1.4500e-003**	**1.4500e-003**	**0.0000**	**4.9168**	**4.9168**	**1.4700e-003**	**0.0000**	**4.9477**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.4000e-004	4.2000e-004	3.5200e-003	0.0000	0.3404	0.0000	0.3404	0.0340	0.0000	0.0340	0.0000	0.3289	0.3289	3.0000e-005	0.0000	0.3294
Total	**2.4000e-004**	**4.2000e-004**	**3.5200e-003**	**0.0000**	**0.3404**	**0.0000**	**0.3404**	**0.0340**	**0.0000**	**0.0340**	**0.0000**	**0.3289**	**0.3289**	**3.0000e-005**	**0.0000**	**0.3294**

3.6 Final Cover - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e

Category	tons/yr										MT/yr					
Off-Road	0.0474	0.2815	0.2245	3.4000e-004		0.0215	0.0215		0.0211	0.0211	0.0000	28.5447	28.5447	5.0300e-003	0.0000	28.6504
Total	**0.0474**	**0.2815**	**0.2245**	**3.4000e-004**		**0.0215**	**0.0215**		**0.0211**	**0.0211**	**0.0000**	**28.5447**	**28.5447**	**5.0300e-003**	**0.0000**	**28.6504**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.5900e-003	4.4400e-003	0.0375	5.0000e-005	3.6307	4.0000e-005	3.6308	0.3626	4.0000e-005	0.3627	0.0000	3.5077	3.5077	2.8000e-004	0.0000	3.5136
Total	**2.5900e-003**	**4.4400e-003**	**0.0375**	**5.0000e-005**	**3.6307**	**4.0000e-005**	**3.6308**	**0.3626**	**4.0000e-005**	**0.3627**	**0.0000**	**3.5077**	**3.5077**	**2.8000e-004**	**0.0000**	**3.5136**

3.7 Utilities - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.3900e-003	0.0620	0.0470	7.0000e-005		4.2600e-003	4.2600e-003		4.0800e-003	4.0800e-003	0.0000	6.2042	6.2042	1.4200e-003	0.0000	6.2340
Total	**8.3900e-003**	**0.0620**	**0.0470**	**7.0000e-005**		**4.2600e-003**	**4.2600e-003**		**4.0800e-003**	**4.0800e-003**	**0.0000**	**6.2042**	**6.2042**	**1.4200e-003**	**0.0000**	**6.2340**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.1000e-004	1.3900e-003	0.0117	1.0000e-005	1.1346	1.0000e-005	1.1346	0.1133	1.0000e-005	0.1133	0.0000	1.0962	1.0962	9.0000e-005	0.0000	1.0980
Total	**8.1000e-004**	**1.3900e-003**	**0.0117**	**1.0000e-005**	**1.1346**	**1.0000e-005**	**1.1346**	**0.1133**	**1.0000e-005**	**0.1133**	**0.0000**	**1.0962**	**1.0962**	**9.0000e-005**	**0.0000**	**1.0980**

3.8 LFG Flare Station - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.4100e-003	0.0252	0.0154	2.0000e-005		1.6100e-003	1.6100e-003		1.4800e-003	1.4800e-003	0.0000	2.0952	2.0952	6.3000e-004	0.0000	2.1083
Total	**2.4100e-003**	**0.0252**	**0.0154**	**2.0000e-005**		**1.6100e-003**	**1.6100e-003**		**1.4800e-003**	**1.4800e-003**	**0.0000**	**2.0952**	**2.0952**	**6.3000e-004**	**0.0000**	**2.1083**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.1000e-004	1.0400e-003	8.7900e-003	1.0000e-005	0.8510	1.0000e-005	0.8510	0.0850	1.0000e-005	0.0850	0.0000	0.8221	0.8221	7.0000e-005	0.0000	0.8235
Total	**6.1000e-004**	**1.0400e-003**	**8.7900e-003**	**1.0000e-005**	**0.8510**	**1.0000e-005**	**0.8510**	**0.0850**	**1.0000e-005**	**0.0850**	**0.0000**	**0.8221**	**0.8221**	**7.0000e-005**	**0.0000**	**0.8235**

3.9 Paving - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.1300e-003	0.0765	0.0516	7.0000e-005		5.8900e-003	5.8900e-003		5.4200e-003	5.4200e-003	0.0000	6.3116	6.3116	1.8800e-003	0.0000	6.3512
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.1300e-003**	**0.0765**	**0.0516**	**7.0000e-005**		**5.8900e-003**	**5.8900e-003**		**5.4200e-003**	**5.4200e-003**	**0.0000**	**6.3116**	**6.3116**	**1.8800e-003**	**0.0000**	**6.3512**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e

Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.8000e-004	8.3000e-004	7.0300e-003	1.0000e-005	0.6808	1.0000e-005	0.6808	0.0680	1.0000e-005	0.0680	0.0000	0.6577	0.6577	5.0000e-005	0.0000	0.6588
Total	**4.8000e-004**	**8.3000e-004**	**7.0300e-003**	**1.0000e-005**	**0.6808**	**1.0000e-005**	**0.6808**	**0.0680**	**1.0000e-005**	**0.0680**	**0.0000**	**0.6577**	**0.6577**	**5.0000e-005**	**0.0000**	**0.6588**

APPENDIX D

LFG FLARE DOCUMENTATION

AIR QUALITY MANAGEMENT DISTRICT

306 EAST GOBBI STREET
UKIAH, CA 95482
(707) 463-4354

AIR QUALITY APPLICATION FORM # 207.48

Section I — TYPE OF APPLICATION

- [x] Authority to Construct
- [ ] Permit for Existing Equipment
- [ ] Permit Update
- [ ] Transfer of Location
- [ ] Transfer of Ownership
- [ ] Registration of Equipment
- [ ] Modification of Permit- Previous Application #

Section II — APPLICATION INSTRUCTIONS (Also review List & Criteria)

A. This application must be filled out completely with all statements answered. Please type or print in black or blue ink. For permitting assistance please call the District office at 707-463-4354.
B. Applications must be accompanied by one copy of each plan, specification, and drawing required. The District may request additional information.
C. This application must be signed by the owner/operator or a responsible member of the organization that is to operate the equipment for which the application is made.
D. Incomplete applications will delay the review process. Faxed applications or copies will not be accepted.
E. Mail original signed application to: **Mendocino County AQMD, 306 E Gobbi Street Ukiah, CA, 95482**
F. Construction and/or operation prior to obtaining a permit from the District is a violation of District Regulations and subject to penalties as specified in Regulation 1, Rule 1-300(i).

Section III — APPLICANT INFORMATION

Name of Business or Organization (DBA) Permit Will be Issued to: City of Ukiah

Legal Owner (if different from DBA)

Type of Ownership: [ ] Corporation [ ] Partnership [ ] Sole Proprietor [x] Government Agency [ ] Other

Nature of Business: City/Municipality

Mailing Address, City, State, Zip: 300 Seminary Avenue, Ukiah CA 95482

Address Where Equipment is Located: 3100 Vichy Springs Road, Ukiah CA 95482

Equipment or Process Name: **Landfill Gas Control Systems**

Section IV — PROCESS DESCRIPTION

Process - Landfill Gas Control System (List equipment on Page 2)

Estimated Volume of Landfilled Waste: 1,732,000 CY (1,039,116 tons @ ~~(Cu.Yds.)~~ density of 1,200 PCY) — Estimate

Describe Type of Waste (municipal, nonbiodegradable, hazardous, etc.): Municipal

Type of Cover (i.e., clay, membrane, etc.): Membrane (upon closure) — Closure Turf™

Cover Depths: N/A Max. N/A Ft., N/A Min. N/A Ft., Average N/A Ft.

Operating Status: [ ] Accepting Waste [ ] Inactive [x] Closed

Date Waste First Accepted: 1955 Date Waste Last Accepted: 2001 Closure Date: 2016

Section V — AUTHORIZED FACILITY REPRESENTATIVE INFORMATION

Signature of Owner/Operator — Date

Name (Please Print): Tim Eriksen — Title: Director of Public Works/City Eng.

Telephone Number: (707) 463-6280 — Fax Number: (707) 463-6204

Email: teriksen@cityofukiah.com

(District Use Only) *District Receipt Stamp:*

Application #:

Facility ID #:

AIR QUALITY MANAGEMENT DISTRICT
306 EAST GOBBI STREET
UKIAH, CA 95482
(707) 463-4354

AIR QUALITY APPLICATION FORM # 207.48, Page 2

Duplicate this page as necessary for additional process equipment. List all equipment (saws, sanders, routers, loaders, etc. that produce air emissions.

Section VI LANDFILL GAS COLLECTION SYSTEM INFORMATION

What will be the end use of collected landfill gas? (Enclosed Flare, Boiler, Gas Turbine, etc.)

Enclosed Flare

Number of Gas Collection Wells: 18 (EW-1 through EW-18)

Gas Collection Well Materials of Construction:

4" Schedule 80 PVC Casing (perforated & blank), 1"-2" ϕ non-calcareous washed rock (gravel pack), Bentonite hole plug, Soil Backfill.

Well Depths: Max. 80 Ft., Min. 25 Ft., Average 52 Ft.

Will each well be equipped with a shut-off valve? Pre-fabricated Wellhead Assembly ☒ Yes ☐ No

Describe the materials to be used as packing at the well head/ landfill cover interface:

- Each well will be equipped w/ PVC wellbore seal. Seaming bentonite will be placed at membrane/casing penetration beneath the PVC wellbore seal.

Estimated volume of landfill gas to be collected each day: 302,400 Cu. Ft. (max @ 210 SCFM)

Estimated landfill gas heat content: 269 to 492 BTU/SCF

Describe the method of condensate and leachate collection and disposal: Condensate will be collected at low points within conveyance system (drop-outs) and discharged to existing leachate drain. Leachate drain discharges to vault, where it is pumped to storage tank & eventually pumped to POTW.

Describe any safety or monitoring devices for ensuring the collection system integrity: System is equipped with continuous temperature sensors. Drop in temperature would be indicative of potential leak or integrity issue. Well field & piping also inspected on regular basis to ID potential integrity issues.

Describe the equipment that will condition or process collected landfill gas: (i.e.: Enclosed Flare, Boiler, Gas Turbine, etc.)

Enclosed Flare

Number of Condition / Processing Devices: 1

What is the Methane Destruction Efficiency: >98% %

Does the control equipment have Automatic Dampers?	☒ Yes	☐ No
Does the control equipment have Automatic Shutdown?	☒ Yes	☐ No
Does the control equipment have Flame Arrestors?	☒ Yes	☐ No
Are there Continuous Recording Temperature Sensors?	☒ Yes	☐ No

What fuel will supplement unburned methane during startup and restart? ☐ Natural Gas ☒ Propane ☐ Other

Describe any backup landfill gas processing equipment or other information on Page 3:

AIR QUALITY MANAGEMENT DISTRICT
306 EAST GOBBI STREET
UKIAH, CA 95482
(707) 463-4354

AIR QUALITY APPLICATION FORM # 207.30, Page 3

Duplicate this page as necessary for additional process equipment. List all equipment that produces air emissions.

Section V EQUIPMENT INFORMATION

Equipment Description: Gas Blower (2) – See "Supplemental Information" package.
Make: Continental | Model: 08.07
Serial Number: To be determined | Horsepower: 7.5 | ☐ Portable ☒ Stationary
Power Source: ☒ Electric ☐ Diesel ☐ Natural Gas ☐ Propane ☐ Other

Equipment Description: Purge Air Blower – See "Supplemental Information" package.
Make: American Fan Company | Model: SC-800
Serial Number: To be determined | Horsepower: 3/4 | ☐ Portable ☒ Stationary
Power Source: ☒ Electric ☐ Diesel ☐ Natural Gas ☐ Propane ☐ Other

Equipment Description:
Make: | Model:
Serial Number: | Horsepower: | ☐ Portable ☐ Stationary
Power Source: ☐ Electric ☐ Diesel ☐ Natural Gas ☐ Propane ☐ Other

Equipment Description:
Make: | Model:
Serial Number: | Horsepower: | ☐ Portable ☐ Stationary
Power Source: ☐ Electric ☐ Diesel ☐ Natural Gas ☐ Propane ☐ Other

Section VI AIR POLLUTION CONTROL (ABATEMENT) DEVICE INFORMATION

Type of Afterburner Control Device: ☒ Direct Flame (Enclosed Flare) ☐ Catalyst
Make: John Zink Company LLC | Model: Enclosed ZTOF Flare
Btu/Hr: 6.2 MMBtu/hr (maximum) | Operating Temperature: 1,400 to 1,800°F
Exhaust Velocity (Ft./Min.): 271 ft/min (based on 3,400 SCFM through 4' ϕ flare)
Retention Time (Seconds): 0.7 seconds

Section VII CHEMICAL APPLICATION AND STORAGE INFORMATION

Product Identification: Not Applicable. (Include MSDS)
Method of Application: | Application Rate:
Applicator: Make: | Model:
Serial Number: | Storage Tank Size:
Power Source: ☐ Electric ☐ Diesel ☐ Natural Gas ☐ Propane ☐ Other

Describe periodic maintenance procedures to be used to ensure that emissions will be minimized:
See "Supplemental Information" package.

AIR QUALITY MANAGEMENT DISTRICT
306 EAST GOBBI STREET
UKIAH, CA 95482
(707) 463-4354

AIR QUALITY APPLICATION FORM # 207.48, Page 3

Attach a drawing showing well locations, depths, transfer piping and process equipment. Also provide a schematic of gas collection well construction and completions and a narrative about maintenance of the collection and processing equipment. Duplicate this page as necessary for each diagram.

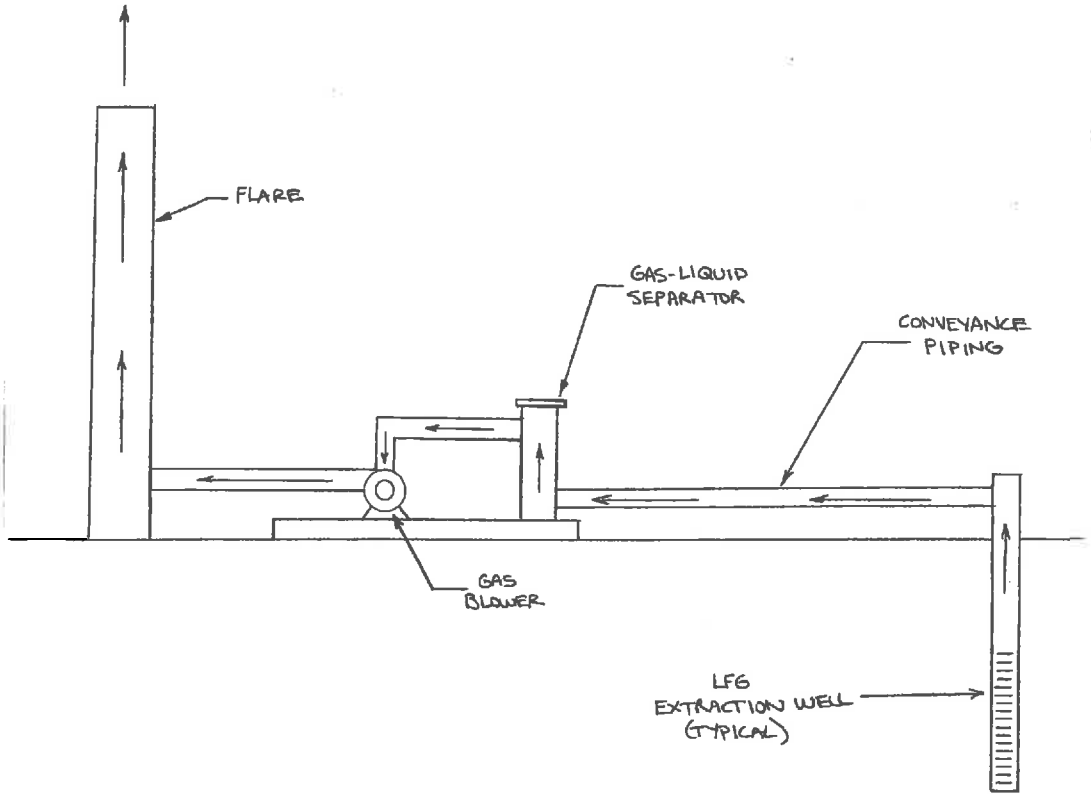
Section VII FACILITY AND PROCESS FLOW DIAGRAM

Include adjacent buildings and streets on facility drawings.
Indicate all associated processes on process flow diagrams.

N↑

- See Appendix E (Construction Drawings) of Updated Design Plan (EBA, 2015) for various drawings/schematics requested above. Also see "Supplemental Information" package for maintenance narrative

PROCESS FLOW DIAGRAM



AUTHORITY TO CONTRUCT PERMIT APPLICATION
CITY OF UKIAH LANDFILL

SUPPLEMENTAL INFORMATION

The following provides supplemental information in support of the Authority to Construct (ATC) permit application.

SECTION IV – PROCESS DESCRIPTION

Describe Process

The process entails operation of a landfill gas (LFG) collection and control system at the City of Ukiah Landfill (Landfill). The design, which was developed to meet the requirements of Title 17 of the California Code of Regulations (17CCR), §95464(b), was summarized in a report entitled *"Design Plan for LFG Collection and Control System, City of Ukiah Landfill (Design Plan)"* dated October 2013 and submitted to the Mendocino County Air Quality Management District (MCAQMD) for regulatory approval. The MCAQMD subsequently approved the *Design Plan* in a letter dated January 2, 2014. Overall, the LFG collection and control system will consist of a series of perimeter and interior LFG extraction wells (well field), associated above ground collection system piping, condensate collection provisions, and a flare station. Operations will consist of applying a vacuum to the well field for the purpose of extracting LFG from the buried refuse mass associated with the Landfill. The LFG extracted from the well field will be conveyed via piping to a totally-enclosed vertical ground flare (flare) for subsequent combustion and destruction of the methane and non-methane organic compound (NMOC) components associated with the LFG.

SECTION VI – EQUIPMENT INFORMATION

Gas Blowers

Two gas blowers will be mounted on a packaged skid assembly. The design includes two gas blowers for the purpose of redundancy. As such, only one gas blower will be operated at any given time. Please see the shop drawings enclosed herein (Attachment 1) for illustrations of the gas blower configuration on the packaged skid assembly.

Per the ATC permit application requirements, the following additional information is provided for the gas blowers:

2.a *Inlet and Outlet Temperatures:* The inlet and outlet temperatures for the gas blowers will be approximately 100°F and 153°F, respectively.

2.b *Emission Points:* The emission point corresponds to the flare, which is described under Section VII of the ATC permit application.

2.c *Material Entering/Leaving Equipment:* The material entering and leaving the gas blowers will be LFG, which is generally comprised of approximately 30 to 55 percent methane, 30 to 40 percent carbon dioxide, 5 to 10 percent nitrogen, 0 to 5 percent oxygen, and 50 to 1,200 parts per million by volume (ppmv) NMOCs.

2.d *Energy Consumption:* 5.6 KW/hr.

2.e *Operation Frequency:* Continuous

Purge Air Blower

The flare will be equipped with a purge air blower for the purpose of purging the flare cylinder prior to startup. Please see the shop drawings enclosed herein (Attachment 1) for illustrations of the purge air blower for the flare.

Per the ATC permit application requirements, the following additional information is provided for the purge air blower:

2.a *Inlet and Outlet Temperatures:* The inlet and outlet temperatures for the purge air blower will be equal to ambient temperatures at the time the blower is in operation.

2.b *Emission Points:* The emission point corresponds to the top of the flare, which is described under Section VII of the ATC permit application.

2.c *Material Entering/Leaving Equipment:* The material entering and leaving the purge air blower will be ambient air.

2.d *Energy Consumption:* 0.6 KW/hr.

2.e *Operation Frequency:* Intermittent

Remaining Components

The remaining components associated with the LFG collection and control system do not include equipment that qualify under this section. These components include: LFG extraction wells; LFG conveyance piping; gas-liquid separator for removal of moisture from the LFG stream prior to entering the gas blowers (packaged skid assembly); and system control panel (packaged skid assembly).

SECTION VII – AIR POLLUTION CONTROL (ABATEMENT) DEVICE INFORMATION

1.a *Type of Control Device:* Totally enclosed vertical ground flare

1.b *Equipment Make and Model:* Enclosed ZTOF Flare manufactured by John Zink Company LLC

1.c Not Applicable

1.d *Type of Material to be Controlled:* LFG

1.e *Type of Collection Device for Controlled Material:* LFG extraction wells and conveyance piping.

1.f *Calculations / Drawings:* See *Design Plan* (previously submitted) and enclosed shop drawings (Attachment 1) for details of the control device.

2.a *Schematic of Air Pollution Control Equipment:* See enclosed shop drawings (Attachment 1).

2.b *Inlet and Outlet Concentrations:* The inlet concentrations of the LFG are estimated to be as follows (approximate): 30 to 55 percent methane; 30 to 40 percent carbon dioxide; 5 to 10 percent nitrogen; 0 to 5 percent oxygen; and 50 to 1,200 ppmv NMOCs.

The outlet concentrations and/or destruction efficiency of the flare are expected to be as follows:

- Overall Destruction Efficiency: 98 percent by weight
- NOx, lb / MMBTU: 0.05
- CO, lb / MMBTU: 0.20

2.c *Control Efficiency:* Control efficiency will be determined through source testing. Per 17CCR, §95464(b)(4)(A), source testing will be initially performed on an annual basis. However, if the flare remains in compliance after three consecutive source tests, the annual source test frequency will be extended to every three years.

2.d Not Applicable

2.e *Energy Consumption:* The energy consumption for the flare is negligible as compared to the gas blowers. Components requiring energy include pilot ignitor (startup only), purge air blower (startup only), actuated control damper, flame detection system, and thermocouples.

2.f *Height of Outlet Above Ground Level:* 30 feet

2.g *Size and Shape of Outlet:* 4-foot round

2.h *Flow Rate of Exhaust Gases:* 3,400 standard cubic feet per minute (assumes an operating temperature of 1,600°F)

2.i *Outlet Temperature:* 1,400°F to 1,800°F

2.j *Estimated Quantities of Pollutants Emitted:* The following provides a summary of the estimated quantities of pollutants to be emitted by the flare:

- Methane Emissions: 0.81 to 5.9 pounds per hour (lbs/hr)
- NMOCs Emissions: 0.01 to 0.04 lbs/hr
- SO2 Emissions: 0.02 to 0.06 lbs/hr
- NOX Emissions: 0.05 to 0.37 lbs/hr
- CO Emissions: 0.17 to 1.2 lbs/hr

2.k *Copies of Calculations:* See Attachment 2 for emissions calculations.

SECTION IX – PERIODIC MAINTENANCE PROCEDURES

The LFG collection and control system will be monitored and maintained as outlined in the *Design Plan* (previously submitted). Upon initial startup, the system will be monitored on a weekly basis, then transition to at least monthly once the well field concentrations have stabilized. During these weekly/monthly monitoring events, the various system components (i.e., well heads, conveyance piping, packaged skid assembly, and flare) will be inspected to identify any maintenance and repairs that might be necessary to ensure optimal operating conditions. In addition, all equipment associated with the packaged skid assembly and flare (i.e., gas blowers, gas-liquid separator, flame arrestor, etc.) will be maintained and serviced in accordance with the manufacturer's recommendations. Finally, the flare will be source tested in accordance with the frequency stipulated in 17CCR, §95464(b)(4)(A) to verify ongoing compliance with applicable emission standards.

ATTACHMENT 1

SHOP DRAWINGS

JOHN ZINK
JOHN ZINK COMPANY LLC

P.O. Box 21220
Tulsa, OK 74121-1220

11920 East Apache
Tulsa, OK 74116

Phone: (918) 234-1800
Fax: (918) 234-2700

Telex: 497414
ITT: 4630098

City of Ukiah
411 West Clay Street
Ukiah, CA
95482 USA
Attention: Mary Horger

Date: 9/4/2015

P.O. Number: 43704-00

S.O. Number: 9161045

JZ Project Mgr: Ingrid McKoy

Issued By: Ingrid McKoy

To Whom It May Concern:

We are enclosing the following:

E-Mail:	1	Each
Copies:	N/A	Each

PLEASE NOTE: To prevent possible scheduling conflicts, return approval drawings to the address listed below by:
September 17, 2015

DRAWING NUMBER	CODE	REV	DESCRIPTION
9161045-301s1	CAR	1	Enclosed ZTOF Flare

CODES:

CA - Customer Approval	INF - Information Only
CAB - Certified as Built	OF - Outside Final
CAR - Customer Approval Revised	OFR - Outside Final Revised
CF - Customer Final	PRE - Preliminary
CFR - Customer Final Revised	VEN - Vendor Drawings

RETURN APPROVED PRINTS TO:
JOHN ZINK COMPANY
P.O. BOX 21220
TULSA, OK 74121-1220

Please acknowledge receipt of the above listed items by signing and returning the duplicate of all sheets of this transmittal to the sender at the address shown above.

Received By (Signature):	Company Name:	Date:

JOHN ZINK
JOHN ZINK COMPANY LLC

P.O. Box 21220
Tulsa, OK 74121-1220

11920 East Apache
Tulsa, OK 74116

Phone: (918) 234-1800
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City of Ukiah
411 West Clay Street
Ukiah, CA
95482 USA
Attention: Mary Horger

Date: 7/27/2015

P.O. Number: 43704-00

S.O. Number: 9161045

JZ Project Mgr: Ingrid McKoy

Issued By: Ingrid McKoy

To Whom It May Concern:

We are enclosing the following:

E-Mail:	1	Each
Copies:	N/A	Each

PLEASE NOTE: To prevent possible scheduling conflicts, return approval drawings to the address listed below by:
August 7, 2015

DRAWING NUMBER	CODE	REV	DESCRIPTION
9161045-150s1	CA	0	Process & Instrument Diagram
9161045-301s1	CA	0	Enclosed ZTOF Flare
9161045-303s1	CA	0	Moisture Seperator
9161045-304s1	CA	0	Blower Skid Assembly
9161045-400s1	CA	0	PR-101 Panel Rack Assembly
9161045-400s2	CA	0	Panel Detail (PNL-101)
9161045-401s1	CA	0	PNL-101 Wiring Diagram
9161045-401s2	CA	0	PNL-101 Wiring Diagram
9161045-402s1	CA	0	PNL-101 Wiring Diagram
9161045-403s1	CA	0	PNL-101 Wiring Diagram
9161045-404s1	CA	0	PNL-101 Wiring Diagram
9161045-405s1	CA	0	PNL-101 Wiring Diagram
9161045-406s1	CA	0	PNL-101 Wiring Diagram
9161045-407s1	CA	0	PNL-101 Wiring Diagram
9161045-901s1	CA	0	Anchor Bolt Template
9161045-SS00 pg. 01	CA	0	Spec Sheet
9161045-SS01 pg. 01	CA	0	Spec Sheet
9161045-SS01 pg. 02	CA	0	Spec Sheet
9161045-SS01 pg. 03	CA	0	Spec Sheet
9161045-SS01 pg. 04	CA	0	Spec Sheet
9161045-SS01 pg. 05	CA	0	Spec Sheet
9161045-SS01 pg. 06	CA	0	Spec Sheet
9161045-SS01 pg. 07	CA	0	Spec Sheet

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TULSA, OK 74121-1220

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Received By (Signature):	Company Name:	Date:

JOHN ZINK
JOHN ZINK COMPANY LLC

P.O. Box 21220
Tulsa, OK 74121-1220

11920 East Apache
Tulsa, OK 74116

Phone: (918) 234-1800
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95482 USA
Attention: Mary Horger

Date: 7/27/2015

P.O. Number: 43704-00

S.O. Number: 9161045

JZ Project Mgr: Ingrid McKoy

Issued By: Ingrid McKoy

To Whom It May Concern:

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E-Mail:	1	Each
Copies:	N/A	Each

DRAWING NUMBER	CODE	REV	DESCRIPTION
9161045-SS01 pg. 08	CA	0	Spec Sheet
9161045-SS02 pg. 01	CA	0	Spec Sheet
9161045-SS03 pg. 01	CA	0	Spec Sheet
9161045-SS04 pg. 01	CA	0	Spec Sheet
9161045-SS04 pg. 02	CA	0	Spec Sheet
9161045-SS05 pg. 01	CA	0	Spec Sheet
9161045-SS05 pg. 02	CA	0	Spec Sheet
9161045-SS05 pg. 03	CA	0	Spec Sheet
9161045-SS05 pg. 04	CA	0	Spec Sheet
9161045-SS06 pg. 01	CA	0	Spec Sheet
9161045-SS07 pg. 01	CA	0	Spec Sheet
9161045-SS07 pg. 02	CA	0	Spec Sheet
9161045-SS08 pg. 01	CA	0	Spec Sheet
9161045-SS09 pg. 01	CA	0	Spec Sheet
9161045-SS09 pg. 02	CA	0	Spec Sheet
9161045-SS10 pg. 01	CA	0	Spec Sheet
9161045-SS11 pg. 01	CA	0	Spec Sheet
9161045-SS12 pg. 01	CA	0	Spec Sheet
9161045-SS12 pg. 02	CA	0	Spec Sheet
9161045-SS13 pg. 01	CA	0	Spec Sheet
9161045-SS14 pg. 01	CA	0	Spec Sheet
9161045-SS15 pg. 01	CA	0	Spec Sheet
9161045-SS16 pg. 01	CA	0	Spec Sheet

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JOHN ZINK COMPANY LLC

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JZ Project Mgr: Ingrid McKoy

Issued By: Ingrid McKoy

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We are enclosing the following:

E-Mail:	1	Each
Copies:	N/A	Each

DRAWING NUMBER	CODE	REV	DESCRIPTION
9161045-SS17 pg. 01	CA	0	Spec Sheet
9161045-SS18 pg. 01	CA	0	Spec Sheet
9161045-SS19 pg. 01	CA	0	Spec Sheet
9161045-SS19 pg. 02	CA	0	Spec Sheet
9161045-SS19 pg. 03	CA	0	Spec Sheet
9161045-SS20 pg. 01	CA	0	Spec Sheet
9161045-SS21 pg. 01	CA	0	Spec Sheet
9161045-SS22 pg. 01	CA	0	Spec Sheet

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JOHN ZINK COMPANY
P.O. BOX 21220
TULSA, OK 74121-1220

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Received By (Signature):	Company Name:	Date:

JOHN ZINK
JOHN ZINK COMPANY LLC

Project Spec Sheet List

Project # 9161045 **Project Site** CITY OF UKIAH LANDFILL
Description 4' X 30' ENCLOSED ZTOF FLARE SYSTEM_
Customer CITY OF UKIAH
Location UKIAH, CALIFORNIA
Cust. PO # 43704-00

Spec	Page	Of	Revision	Description	Spec Name
1	1	8	0	PNL-101	FLARE CONTROL PANEL
1	2	8	0	PNL-101	FLARE CONTROL PANEL
1	3	8	0	PNL-101	FLARE CONTROL PANEL
1	4	8	0	PNL-101	FLARE CONTROL PANEL
1	5	8	0	PNL-101, BE-203	FLAME DETECTION SYSTEM
1	6	8	0	PNL-101	RECEIVER INSTRUMENTS
1	7	8	0	PNL-101	RECEIVER INSTRUMENTS
1	8	8	0	PNL-101	AUTOMATIC TELEPHONE DIALER
2	1	1	0	PNL-102	DISCONNECT PANEL
3	1	1	0	PNL-103	IGNITION TRANSFORMER
4	1	2	0	PR-101	PANEL RACK
4	2	2	0	VFD-103, VFD-104	PANEL RACK
5	1	4	0	PCV-302	PRESSURE CONTROL VALVES & REGULATORS
5	2	4	0	SV-303	SOLENOID VALVES
5	3	4	0	HV-304	MANUAL BALL VALVE
5	4	4	0	PI-305	PRESSURE GAGES
6	1	1	0	TCV-202A	ACTUATED CONTROL DAMPER
7	1	2	0	TE-201, TE-202A, TE-202B, TE-202C	THERMOCOUPLES & THERMOWELLS
7	2	2	0	TE-103A, TE-103B, TE-104A, TE-104B	THERMOCOUPLES & THERMOWELLS
8	1	1	0	PDSL-204	PRESSURE SWITCHES
9	1	2	0	BL-103, BL-104	GAS BLOWER
9	2	2	0	BL-204	PURGE AIR BLOWER
10	1	1	0	DV-103A, DV-104A, HV-107B	MANUAL BALL VALVE
11	1	1	0	HV-103B, HV-104B	MANUALLY OPERATED BUTTERFLY VALVE
12	1	2	0	EJ-103A, EJ-103B, EJ-104A, EJ-104B	EXPANSION JOINT
12	2	2	0	EJ-107	EXPANSION JOINT
13	1	1	0	CV-103, CV-104	CHECK VALVES
14	1	1	0	VT-103A, VT-104A	VIBRATION TRANSMITTER
15	1	1	0	MOV-102, ZSC-102, ZSO-102	ACTUATED BUTTERFLY VALVE
16	1	1	0	FA-107	FLASH - BACK ARRESTOR
17	1	1	0	FE-107, FT-107	MASS FLOW METER
18	1	1	0	LG-101	GAGE GLASSES AND COCKS
19	1	3	0	PDI-101	PRESSURE GAGES
19	2	3	0	PDI-107	PRESSURE GAGES
19	3	3	0	PI-107	PRESSURE GAGES
20	1	1	0	TI-102, TI-106	BIMETAL THERMOMETERS
21	1	1	0	LSHH-101	LEVEL SWITCHES
22	1	1	0	PIT-100	DIFFERENTIAL PRESSURE INSTRUMENTS

JOHN ZINK JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	JZ SPECIFICATION SHEET FLARE CONTROL PANEL PNL-101	Spec Rev: 1 0 Page No: 1 of 8 Project: 9161045

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Customer Name: **CITY OF UKIAH**
Project Site: **CITY OF UKIAH LANDFILL**
Customer P.O.: **43704-00**

	Item No.	Qty	Tag Number(s)	Description	JZ Part No.
1		1	CE-101	HOFFMAN #C-SD483616 ENCLOSURE, NEMA 4	1120179
2				(48" H X 36" W X 16" D)	
3		1	-----	HOFFMAN #CMFK MOUNTING KIT	0303601
4		1	-----	HOFFMAN #C-P4836 SUBPANEL	1099131
5		1	-----	HOFFMAN #AWDH2416N4 WINDOW KIT, HINGED, NEMA 4	1182177
6				(16" H x 24" W)	
7		1	HTR-1	HOFFMAN #DAH2001A HEATER, 200 W	0300056
8		1	GFI-1	LEVITON #7599-I RECEPTACLE, GFCI, 15 A WITH	0401112
9				#80401-I COVER AND APPLETON #4CS1/2 BOX	
10					
11		1	UPS-1	POWERWARE #5P1000R UNINTERRUPTIBLE POWER SUPPLY,	1154547
12				120 V	
13		1	-----	HOFFMAN #A36P24 SUBPANEL (SWING PANEL)	0301564
14		1	-----	HOFFMAN #A-NADFK MOUNTING KIT, SWING PANEL	1143947
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

25 **Notes:**

ALL ITEMS REQUIRE UL LABEL

PANEL MOUNT

	Revision Date	Initials	Revision Description		Date	Name
Δ				Prepared	08/29/2014	ROLFJ
Δ				Checked	07/24/2015	MCKOYI
Δ				Approved	07/24/2015	MCKOYI
Δ				Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

JZ96.09 adopted from ISA-20-1975

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JOHN ZINK JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	JZ SPECIFICATION SHEET FLARE CONTROL PANEL PNL-101	Spec Rev: 1 0 Page No.: 2 of 8 Project: 9161045

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Customer Name: **CITY OF UKIAH**
Project Site: **CITY OF UKIAH LANDFILL**
Customer P.O.: **43704-00**

	Item No.	Qty	Tag Number(s)	Description	JZ Part No.
1		1	L-1	CUTLER HAMMER #10250T181NC12N PILOT LIGHT,	0029577
2				TRANSFORMER TYPE, NEMA 4X, 120 V, WHITE LENS	
3		1	L-2	CUTLER HAMMER #10250T181NC8N PILOT LIGHT,	0029575
4				TRANSFORMER TYPE, NEMA 4X, 120 V, GREEN LENS	
5		1	L-3	CUTLER HAMMER #10250T181NC7N PILOT LIGHT,	0029574
6				TRANSFORMER TYPE, NEMA 4X, 120 V, RED LENS	
7					
8					
9					
10					
11					
12		1	S-1	CUTLER HAMMER #10250T20KB SELECTOR SWITCH, TWO	0029572
13				POSITION , NEMA 4X, 1-N/O AND 1-N/C CONTACTS	
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

25 **Notes:**

ALL ITEMS REQUIRE UL LABEL

PANEL MOUNT

	Revision Date	Initials	Revision Description		Date	Name
Δ				Prepared	06/03/2015	MCKOYI
Δ				Checked	07/24/2015	MCKOYI
Δ				Approved	07/24/2015	MCKOYI
Δ				Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
FLARE CONTROL PANEL
PNL-101

Spec	Rev	1	0
Page No.		3 of 8	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

	Item No.	Qty	Tag Number(s)	Description	JZ Part No.
1		1	PLC-1	ALLEN BRADLEY #1762-L40AWAR PROCESSOR, MICROLOGIX	1157192
2				WITH DUAL RS-232 PORTS	
3		2	PLC-1	ALLEN BRADLEY #1762-IT4 INPUT MODULE, THERMOCOUPLE	1127113
4		2	PLC-1	ALLEN BRADLEY #1762-IF2OF2 INPUT AND OUTPUT MODULE	1127117
5				ANALOG	
6					
7					
8					
9		1	OIP-1	AUTOMATION DIRECT #EA7-S6M TOUCHSCREEN, NEMA 4,	1182022
10				CAPABLE OF MEMORY MODULE EXPANSION	
11		1	-----	AUTOMATION DIRECT #EA-MLOGIX-CBL CABLE	1128532
12		1	PS-1	IDEC #PS5R-E24 POWER SUPPLY, 24 V DC, 100 W,	1078418
13				120 V, 60 HZ	
14		1	COM-1	ALLEN BRADLEY # 1761-NET-ENI COMMUNICATION MODULE,	1212476
15				ETHERNET	
16					
17					
18					
19					
20					
21					
22					
23					
24					

25 **Notes:**

ALL ITEMS REQUIRE UL LABEL

PANEL MOUNT

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
Δ			

	Date	Name
Prepared	06/03/2015	MCKOYI
Checked	07/24/2015	MCKOYI
Approved	07/24/2015	MCKOYI
Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	JZ SPECIFICATION SHEET FLARE CONTROL PANEL PNL-101	Spec | Rev: 1 | 0 Page No.: 4 of 8 Project: 9161045

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Customer Name: **CITY OF UKIAH**
Project Site: **CITY OF UKIAH LANDFILL**
Customer P.O.: **43704-00**

	Item No.	Qty	Tag Number(s)	Description	JZ Part No.
1		100	-----	ENTRELEC #M4/6 TERMINAL (P/N 115 116.07)	0020514
2		10	-----	ENTRELEC #FEM6 END SECTION (P/N 118 368.16)	0020515
3		10	-----	ENTRELEC #BAM END STOP (P/N 103 002.26)	0036813
4		1	-----	ENTRELEC #PR4 RAIL, DIN-3 MOUNT (P/N 101 598.26)	1012629
5		1	-----	ENTRELEC BLANK MARKING TAG (P/N 233 000.01)	1006764
6		4	-----	ENTRELEC #BJM6 JUMPER, 10 POINT (P/N 168 973.07)	1019660
7		3	-----	ENTRELEC #M10/10 TERMINAL (P/N 115 120.17)	1041301
8		10	-----	ENTRELEC #MTC6 TERMINAL (P/N 115 206.22)	1070213
9					
10		1	CB-4	SQUARE D #60131 CIRCUIT BREAKER, 25 A, ONE POLE	1181308
11		2	CB-2,11	SQUARE D #60110 CIRCUIT BREAKER, 10 A, ONE POLE	1140427
12		1	CB-8	SQUARE D #60106 CIRCUIT BREAKER, 5 A, ONE POLE	1140428
13		2	CB-22, 99	SQUARE D #MG24428 CIRCUIT BREAKER, 4 A, 24 V DC	1187122
14					
15		1	MS-204	SQUARE D #LC1D12G7 MOTOR STARTER FOR 3/4 HP	1191576
16				120 V, 60 HZ MOTOR, 120 V COIL	
17		1	-----	SQUARE D #LRD21 OVERLOAD RELAY, 12 TO 18 A	1003613
18				ADJUSTABLE RANGE	
19					
20		4	CR- 83 87 88 89	IDEC #RR3B-ULCAC120V RELAY, 3 PDT WITH INDICATING	0401314
21				LIGHT AND PUSH-TO-TEST BUTTON	
22		4	-----	IDEC #SR3B-05 SOCKET	0030703
23		1	-----	PHOENIX #PT-2PE/S-120 AC-ST SURGE PROTECTION	1183117
24		1	-----	PHOENIX #PT/FM BASE	1183119

25 **Notes:**

ALL ITEMS REQUIRE UL LABEL

PANEL MOUNT

Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	06/03/2015	MCKOYI
Δ			Checked	07/24/2015	MCKOYI
Δ			Approved	07/24/2015	MCKOYI
Δ			Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK / JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	**JZ SPECIFICATION SHEET** **FLAME DETECTION SYSTEM** **PNL-101, BE-203**	Spec | Rev: **1** | **0** Page No.: **5** of **8** Project: **9161045**

Project Name: ***4' X 30' ENCLOSED ZTOF FLARE SYSTEM***
Project Site: ***CITY OF UKIAH LANDFILL***
Customer Name: ***CITY OF UKIAH***
Customer P.O.: ***43704-00***

	1	Manufacturer	IRIS SYSTEMS	**JZ Part No.**
	2	Model No.	S706-PF	1090686
	3	Quantity	1	
FLAME SCANNER	4	Type	Ultra-Violet	
	5		SELF-CHECKING	
	6	Power Requirement	24 V DC	
	7	Cable	20" LEAD	
	8	Mounting Connection	1/2" NPT PROCESS AND CONDUIT	
	9	Tag Number(s)	BE-203	
	10			
	11			
	12			
	13	Mount	SHIP LOOSE FOR FIELD INSTALLATION	
	14	Manufacturer	IRIS SYSTEMS	
	15	Model No.	700DC	1187355
	16	Quantity	1	
	17	Description	SINGLE CHANNEL, FAIL-SAFE, PROGRAMMABLE,	
FLAME RELAY	18		DIGITAL DISPLAY, LED INDICATION	
	19			
	20	Power Requirement	24 V DC	
	21	Amplifier	INTEGRAL	
	22	Wiring Base		
	23	F.F.R.T.	3 SEC	
	24			
	25			
	26	Tag No.(s)	BS-203	
	27	Mount	PANEL	

28 ***Notes:***

	Revision Date	Initials	Revision Description		Date	Name
Δ				Prepared	06/03/2015	MCKOYI
Δ				Checked	07/24/2015	MCKOYI
Δ				Approved	07/24/2015	MCKOYI
Δ				Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
RECEIVER INSTRUMENTS
PNL-101

Spec	Rev	1	0
Page No.		6 of 8	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

GENERAL	1	Service	TEMPERATURE
	2		
	3	Function	SWITCH
	4	Case / Color	
	5	Mounting	INTERNAL
	6		
	7	Enclosure Class	General Purpose
	8	Power Supply	117 V 60 Hz
	9	Chart	
	10		
	11	Chart Drive	
	12	Scales	
	13		
CONTROLLER	14	P=Prop(Gain), I=Integral(Auto Reset), D=Derivative(Rate), Sub: s=Slow, f=Fast	
	15	Control Modes	
	16	Action	
	17	Auto-Man Switch	
	18	Set Point Adj.	
	19	Manual Reg.	
	20	Output	
	21		
	22		
	23		
	24		
INPUTS	25	Input Signals	TYPE K THERMOCOUPLE
	26	No. of Inputs	1
	27	Power for XMTRS	External
	28	Transmitter Spec. No.	
	29	Burnout	UPSCALE
	30		
	31		
	32		
OPTIONS	33	Alarm Switches: Qty / Form	1
	34	Rating	3 A
	35	Function	Meas. Var.
	36	Contact / on Measurement	Open / Increase
	37		
	38		
	39		
	40		
	41		
	42		
ORDER	43	Manufacturer	OMRON
	44	Model No.	E5C2-R20K
	45	Tag No.	TSHH-201
	46	Quantity	1
	47	Mount	PANEL
	48	JZ Part No.	0016484

49 **Notes:**

ALSO SUPPLY OMRON #P2CF-08 BASE
JOHN ZINK PART NUMBER: 0034301
QUANTITY: ONE (1) REQUIRED

ALL ITEMS REQUIRE UL LABEL

Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	06/03/2015	MCKOYI
Δ			Checked	07/24/2015	MCKOYI
Δ			Approved	07/24/2015	MCKOYI
Δ			Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK / JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	**JZ SPECIFICATION SHEET** **RECEIVER INSTRUMENTS** **PNL-101**	Spec | Rev: **1** | **0** Page No.: **7** of **8** Project: **9161045**

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

GENERAL	1	Service	FLOW AND TEMPERATURE
	2		
	3	Function	Record
	4	Case / Color	
	5	Mounting	Flush
	6		
	7	Enclosure Class	Weather Proof
	8	Power Supply	117 V 60 Hz
	9	Chart	ELECTRONIC
	10		
	11	Chart Drive	
	12	Scales	
	13		
CONTROLLER	14	P=Prop(Gain), I=Integral(Auto Reset), D=Derivative(Rate), Sub: s=Slow, f=Fast	
	15	Control Modes	
	16	Action	
	17	Auto-Man Switch	
	18	Set Point Adj.	
	19	Manual Reg.	
	20	Output	
	21		
	22		
	23		
	24		

INPUTS	25	Input Signals	4-20 mA
	26	No. of Inputs	6
	27	Power for XMTRS	External
	28	Transmitter Spec. No.	
	29		
	30		
	31		
	32		
OPTIONS	33	Alarm Switches: Qty / Form	
	34	Rating	
	35	Function	
	36	Contact / on Measurement	
	37		
	38		
	39		
	40		
	41		
	42		
ORDER	43	Manufacturer	YOKOGAWA
	44	Model No.	FX1006-4-2-L/C7/M1/S3
	45	Tag No.	FR-107, TR-202
	46	Quantity	1
	47	Mount	PANEL
	48	JZ Part No.	1364501

49 ***Notes:***

ALSO SUPPLY NEWARK #RN60C2500BB14 RESISTOR, 250 OHM
JOHN ZINK PART NUMBER: 1256267
QUANTITY: TWO (2) REQUIRED

ALL ITEMS REQUIRE UL LABEL

Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	06/03/2015	MCKOYI
Δ			Checked	07/24/2015	MCKOYI
Δ			Approved	07/24/2015	MCKOYI
Δ			Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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1

AUTOMATIC TELEPHONE DIALER

MANUFACTURER: PHONETICS
MODEL: SENSAPHONE FGD-1800-CD
QUANTITY: ONE (1) REQUIRED

FEATURES: 8 UNIVERSALLY CONFIGURABLE INPUT CHANNELS, APPROXIMATE 12 HOUR RECHARGABLE BATTERY, STATUS AND CHANNEL INDICATING LIGHTS

CONFIGURATION:
CHANNEL 1: FLAME FAILURE
CHANNEL 2: FLARE HIGH TEMPERATURE
CHANNEL 3: FLARE LOW TEMPERATURE
CHANNEL 4: AUTOMATIC BLOCK VALVE FAILURE
CHANNEL 5: BL-103 GAS BLOWER FAILURE
CHANNEL 6: BL-104 GAS BLOWER FAILURE
CHANNEL 7: SEPARATOR HIGH LEVEL ALARM
CHANNEL 8: GENERAL ALARM

POWER: 120 V, SINGLE PHASE, 60 HZ WITH POWER CORD

JOHN ZINK PART NUMBER: 1356425
TAG: ATD-1

PANEL MOUNT

JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
DISCONNECT PANEL
PNL-102

Spec	Rev	2	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

	Item No.	Qty	Tag Number(s)	Description	JZ Part No.
1	1	1	PNL-102	DISCONNECT PANEL, CONSISTING OF:	9161045
2					A02
3		1	CE-102	SCHAEFER #ES24208W ENCLOSURE, NEMA 4	-----
4				(24 H X 20" W X 8" D)	
5					
6		1	CB-102	EATON #EGB3060F CIRCUIT BREAKER, 60 A, 480 V WITH	-----
7				EXTERNAL DISCONNECT HANDLE	
8		1	CB-1	EATON #EGB3015FFG CIRCUIT BREAKER, 15 A,	-----
9				480 V, 2 POLE	
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

25 **Notes:**

ALL ITEMS AND ENTIRE ASSMEBLY REQUIRE UL LABEL

PANEL MOUNT, THEN RACK MOUNT

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
Δ			

	Date	Name
Prepared	06/03/2015	MCKOYI
Checked	07/24/2015	MCKOYI
Approved	07/24/2015	MCKOYI
Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	**JZ SPECIFICATION SHEET** **IGNITION TRANSFORMER** **PNL-103**	Spec | Rev: **3** | **0** Page No.: **1 of 1** Project: **9161045**

Project Name: ***4' X 30' ENCLOSED ZTOF FLARE SYSTEM***
Project Site: ***CITY OF UKIAH LANDFILL***
Customer Name: ***CITY OF UKIAH***
Customer P.O.: ***43704-00***

	TRANSFORMER	
1	Manufacturer	DONGAN
2	Model	A06-SA6
3	Tag No.	IT-1
4	Primary	120 V, 60 HZ
5	Secondary	6000 V
6	JZ Part No.	-----
7		
8		
9		
10		
11		
12		

	ENCLOSURE	
13	Manufacturer	HOFFMAN
14	Model	A1412NF
15	Enclosure	NEMA 4
16	Dimensions	14" H X 12" W X 6" D
17	JZ Part No.	-----
18		
19	Sub-Panel Manufacturer	HOFFMAN
20	Sub-Panel Model No	A14P12
21	JZ Part No.	-----
22		
23		
24	Mount	BELOW

25 ***Notes:***

JOHN ZINK PART NUMBER: 1200432
QUANTITY: ONE (1) ASSEMBLY REQUIRED

ALL ITEMS REQUIRE UL LABEL

PANEL MOUNT, THEN SHIP LOOSE FOR FIELD INSTALLATION

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
Δ			

	Date	Name
Prepared	06/03/2015	MCKOYI
Checked	07/24/2015	MCKOYI
Approved	07/24/2015	MCKOYI
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JOHN ZINK COMPANY LLC

FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET

PANEL RACK

PR-101

Spec	Rev	4	0
Page No.		1 of 2	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**

Project Site: **CITY OF UKIAH LANDFILL**

Customer Name: **CITY OF UKIAH**

Customer P.O.: **43704-00**

	Item No.	Qty	Tag Number(s)	Description	JZ Part No.
1	1	1	T-1	SQUARE D #5S1F TRANSFORMER, 3 KVA	1155584
2				480 V PRIMARY, 120 V SECONDARY, SINGLE PHASE	
3					
4					
5					
6					
7					
8					
9					
10					
11	2 *	25'	-----	DELCO #440 IGNITION WIRE, HIGH VOLTAGE	0002167
12	3 *	400'	-----	THERMO SENSORS #PPZS16KX THERMOCOUPLE WIRE,	0403529
13				16 GAGE SHIELDED, MOISTURE RESISTANT	
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

25 **Notes:**

ALL ITEMS REQUIRE UL LABEL

RACK MOUNT

* SHIP LOOSE FOR FIELD INSTALLATION

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
Δ			

	Date	Name
Prepared	06/03/2015	MCKOYI
Checked	07/24/2015	MCKOYI
Approved	07/24/2015	MCKOYI

Quote Attached: ☐ Yes

Copies of Vendor Literature Req'd: 1

JZ96.09 adopted from ISA-20-1975

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JOHN ZINK JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	JZ SPECIFICATION SHEET PANEL RACK VFD-103, VFD-104	Spec | Rev: 4 | 0 Page No.: 2 of 2 Project: 9161045

Project Name: 4' X 30' ENCLOSED ZTOF FLARE SYSTEM
Project Site: CITY OF UKIAH LANDFILL
Customer Name: CITY OF UKIAH
Customer P.O.: 43704-00

	Item No.	Qty	Tag Number(s)	Description	JZ Part No.
1	1	2	VFD-103,104	VARIABLE FREQUENCY DRIVE PANEL, EACH CONSISTS OF:	9161045
2					A04
3		1	-----	SCHAFFER #ES242412W ENCLOSURE, NEMA 4	-----
4				RATING WITH FANS, FILTERS, LOUVERS, AND MOTOR	
5				HEATER PROVISIONS (24" H X 24" W X 12" D)	
6					
7		1	CB-103, 104	EATON #EGB3020FFG CIRCUIT BREAKER, 20 A, 480 V	-----
8				WITH EXTERNAL DISCONNECT HANDLE	
9		1	-----	FUJI #FRN007G1S4U MEGA VARIABLE FREQUENCY DRIVE,	-----
10				7.5HP, 480 V WITH EXTERNAL DIGITAL DISPLAY	
11					
12		1	T-103,104	MICRON #B500BTZ13RBF TRANSFORMER, 500 VA, 480V	-----
13				PRIMARY, 120 V SECONDARY, SINGLE PHASE	
14		2	F-103A,104A	MERSEN #ATQR-3 FUSE, 3A	-----
15		2	F-103B,104B	MERSEN #ATQR-8 FUSE, 8A	-----
16					
17		1	-----	CITEL #DS43S-480V SURGE ARRESTER	-----
18		1	-----	DBK #FGC3116 200W HEATER	-----
19					
20					
21					
22					
23					
24					

25 **Notes:**

ALL ITEMS AND ENTIRE ASSMEBLY REQUIRE UL LABEL

PANEL MOUNT, THEN RACK MOUNT

Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	06/03/2015	MCKOYI
Δ			Checked	07/24/2015	MCKOYI
Δ			Approved	07/24/2015	MCKOYI
Δ			Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
PRESSURE CONTROL VALVES & REGULATORS
PCV-302

Spec	Rev	5	0
Page No.		1 of 4	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

LINE	1	Service		PILOT GAS	
	2	Line No./Vessel No.			
	3	Line Size/Sched. No.		1/2"	
	4	Function		REGULATE	
BODY	5	Type of Body		BOLTED	
	6	Body Size	Port Size		3/8"
	7	Guiding	No. of Ports		
	8	End Conn. & Rating		1/2" NPT	
	9	Body Material		ALUMINUM	
	10	Packing Material			
	11	Lubricator	Isolating Valve		
	12	Seal Type			
	13	Trim Form			
	14	Trim Material		ALUMINUM	
	15	Seat Material		NITRILE	
	16	Required Seat Tightness			
	17	Max. Allow. Sound Level dBA			
ACTUATOR	18	Type of Actuator		SPRING DIAPHRAGM	
	19	Pilot			
	20	Supply to Pilot			
	21	Self Cont.	Ext. Conn.	X	
	22	Diaphragm Material		NITRILE	
	23	Diaphragm Rating		400 PSIG	
	24	Spring Range		0 TO 35 PSIG	
	25	Set Point		15 PSIG	
	26				
	27				

ACCESSORIES	28	Filt. Reg.	Supply Gage	NO	NO
	29	Line Strainer			
	30	Housing Vent			
	31	Internal Relief		NO	
	32				
	33				
	34				
SERVICE	35	Flow Units		SCFH	
	36	Fluid		PROPANE / NATURAL GAS	
	37	Quant. Max		25 / 50	
	38	Quant. Oper.		22 / 45	
	39	Valve Cv	Valve 1	1.33	35.02
	40	Norm. Inlet Press.	ΔP	20 PSIG	
	41	Max. Inlet Press.		400 PSIG	
	42	Max. Shut Off ΔP		400 PSIG	
	43	Temp. Max.	Operating	180	60
	44	Oper. sp. gr.	Mol. Wt.	1.52 / 0.65	44 / 19
	45	Oper. Visc.	% Flash		
	46	% Superheat	% Solids		
	47	Vapor Press.	Crit. Press.		
	48	Predicted Sound Level dBA			
ORDER	49				
	50	Manufacturer		FISHER	
	51	Model No.		67D-27	
	52	Mount		RACK	
	53	Tag No.		PCV-302	
	54	JZ Part No.		1260113	

55 **Notes:**

QUANTITY: ONE (1) REQUIRED

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
Δ			

	Date	Name
Prepared	06/03/2015	MCKOYI
Checked	07/24/2015	MCKOYI
Approved	07/24/2015	MCKOYI
Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
SOLENOID VALVES
SV-303

Spec	Rev	5	0
Page No.		2 of 4	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

GENERAL	1	Tag No.		SV-303	
	2	Service		PILOT GAS	
	3				
	4	Line No. / Vessel No.			
	5	Quantity		1	
VALVE BODY	6	Type			
	7	Size: Body	Port	1/2"	3/4"
	8	Rating	Type Conn.		NPT
	9	Material -- Body		ALUMINUM	
	10	Material -- Seat		NITRILE	
	11	Material -- Diaphragm		NITRILE	
	12	Operation Direct/ Pilot		DIRECT	
	13	Packless or Type Packed		PACKLESS	
	14	Manual Re-Set		NO	
	15	Manual Operator		NO	
	16				
	17				
WHEN DE-ENERGIZED	18	2-Way Valve Opens/Close			CLOSES
	19	3-Way			
	20	Vent Port Opens/Close			
	21	Press Port Opens/Clos			
	22	4-Way			
	23	Press to Cyl.1 / Cyl.2			
	24	Exh. from Cyl.1 / Cyl.2			
	25				
	26				
	27				

SOLENOID	28	Enclosure		NEMA 4,7	
	29	Voltage / HZ		120 V	60
	30	Style of Coil		F	
	31	Single or Double Coil		SINGLE	
	32				
	33				
SERVICE COND.	34	Fluid		PROPANE	NATURAL GAS
	35	Qty. Maximum		25 SCFH	50 SCFH
	36	Oper. Diff. Min / Max		0	20 PSI
	37	Allow. Diff. Min / Max		0	50 PSI
	38	Temp. Norm / Max. F		60	125
	39	Oper. sp. gr.		1.52	0.65
	40	Oper. Viscosity			
	41	Required Cv			
	42	Valve Cv		4.4	
	43				
	44				
	45				
	46				
	47				
	48				
	49				
	50				
	51	Manufacturer		ASCO	
	52	Model No.		EF8215G20	
	53	Mount		RACK	
	54	JZ Part No.		0012004	

55 **Notes:**

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
Δ			

	Date	Name
Prepared	06/03/2015	MCKOYI
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Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
MANUAL BALL VALVE
HV-304

Spec	Rev	5	0
Page No.		3 of 4	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

1	Manufacturer	APOLLO
2	Model No.	73A-103-01
3	Process Connections	THREADED
4	Body Material	CARBON STEEL
5	Ball Material	CARBON STEEL
6	Stem Material	CARBON STEEL
7	Seal/Seat Material	TFE/TFE
8	Packing Material	TFE
9	Handle Type	LEVER
10		
11		
12		

34 **Notes:**

13	Qty	Tag No.	Size	Oper. Press. PSIG	Oper. Temp. ° F	Service	Mount	JZ Part No.
14	1	HV-304	1/2"	15	60	PILOT GAS	RACK	0501519
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								

	Revision Date	Initials	Revision Description
Δ			
Δ			
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	Date	Name
Prepared	06/03/2015	MCKOYI
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Quote Attached: ☐ Yes
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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
PRESSURE GAGES
PI-305

Spec Re	5 0
Page No.	4 of 4
Project	9161045

Project Name **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Project Site **CITY OF UKIAH LANDFILL**
Customer Name **CITY OF UKIAH**
Customer P.O.: **43704-00**

1	Type		Direct		
2	Mount Type		Local		
3	Dial Diamete	Color	4 1/2"	WHITE	
4	Case Material		Phenol		
5	Ring Type		Screwed		
6	Blow-Out Protection		Back		
7	Lens Material		Plastic		
8	Accuracy Required		+/- 0.5%		
9	Element Type		Bourdon		
10	Element Materia		SS		
11	Socket Material		Steel		
12	Movement Material		SS		

13	Process Connection	1/2" BOTTOM
14	Operating Temperature	60 °F
15	OPTIONS	
16		
17		
18		
19		
20		
21		
22		
23	Manufacturer	WIKA
24	Model No.	222.34 4.5 30PSI 1/2L

	Quantity	Tag No	Range PSIG	Oper. Press. PSIG	Service	JZ Part No
25						
26	1	PI-305	0 TO 30	15	PILOT GAS	1209636
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						

45 **Notes:**

RACK MOUNT

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
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	Date	Name
Prepare	06/03/2015	MCKOYI
Checked	07/24/2015	MCKOYI
Approved	07/24/2015	MCKOYI

Quote Attached: ☐ Yes | Copies of Vendor Literature Req'd: 1

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
ACTUATED CONTROL DAMPER
TCV-202A

Spec	Rev	6	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

DAMPER	1	Tag No.		TCV-202A				
	2	Service		AIR				
	3	Manufacturer		AMERICAN WARMING				
	4	Line Size/Sched. No.						
	5	Type of Body		VC-412 OPPOSE BLADE				
	6	Body Size		24" H x 30" W				
	7	Port Size						
	8	End Conn. and Rating						
	9							
MATERIALS	10	Body		GALVANIZED				
	11	Disc		GALVANIZED				
	12	Shaft		3/4" DIAMETER				
	13	Bushing						
	14	Trim:	Seat					
	15		Packing					
	16							
	17							
	18	Required Seat Tightness		LOW LEAKAGE				
	19							
SERVICE	20	Temp °	Max / Min	AMBIENT				
	21	Press.	Max / Min	AMBIENT				
	22	Maximum Shut Off	Δ /Pressure					
	23	Max Flow	Cv (Cg)					
	24	Norm. Flow	Cv (Cg)					
	25							
ACTUATOR	26	Manufacturer		HONEYWELL				
	27	Model No.		M7284Q-1009				
	28	Type		ELECTRIC				
	29							
	30	JZ Part No.		0001625				
	31							
	32	Quantity		1				
	33	Location		SHIP LOOSE				
	34	JZ Part No.						

35 **Notes:**

ACTUATED DAMPER TO OPEN AT 4 MA INPUT AND CLOSE AT 20 MA INPUT.

ALSO SUPPLY HONEYWELL #4074ERU GASKET
JOHN ZINK PART NUMBER: 9019000445
QUANTITY: ONE (1) REQUIRED

ALSO SUPPLY LOVEJOY #L070 COUPLING
JOHN ZINK PART NUMBER: 1315251
QUANTITY: ONE (1) REQUIRED

	Revision Date	Initials	Revision Description
Δ			
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	Date	Name
Prepared	06/03/2015	MCKOYI
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Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
THERMOCOUPLES & THERMOWELLS
TE-201, TE-202A, TE-202B, TE-202C

Spec	Rev	7	0
Page No		1 of 2	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

ELEMENT	1	Manufacturer		THERMO SENSORS	
	2	Model No.		494-92716-18-K-I600	
	3	ISA Type	Wire Size	K	14 AWG
	4	Sheath O.D.	Sheath Mat'l	3/8"	INC 600
	5	Type		Ungrounded	
HEAD	6	Material		CAST IRON	
	7	Conduit Connection		3/4"	
	8	Terminal Block		Single	
	9				
	10				

WELL	11	Material		INCONEL 600	
	12	Construction		STRAIGHT PIPE	
	13	O.D. Dim.	I.D. Dim.	0.840"	0.622"
	14	Process Conn.	Internal Conn.	1" NPT	
	15				
ASSMBY.	16	Nipple Length "N"			
	17				
	18	Manufacturer			
	19	Model			
	20				

	Tag No.	Well Dimes. "U"	Well Dimes. "T"	Element Length	Single Duplex	Type	Gage	Service	JZ Part No.
21									
22	TE-201			18"	SINGLE	K	14	HIGH TEMPERATURE	1099113
23	TE-202A			18"	SINGLE	K	14	TEMPERATURE CONTROL	1099113
24	TE-202B								
25	TE-202C								
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									

37 **Notes:**

QUANTITY: FOUR (4) ASSEMBLIES REQUIRED

SHIP LOOSE FOR FIELD INSTALLATION

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
Δ			

	Date	Name
Prepared	06/03/2015	MCKOYI
Checked	07/24/2015	MCKOYI
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Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
THERMOCOUPLES & THERMOWELLS
TE-103A, TE-103B, TE-104A, TE-104B

Spec	Rev	7	0
Page No.		2 of 2	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

ELEMENT	1	Manufacturer		THERMO SENSORS	
	2	Model No.		Y3K36-U-0-GSM3	
	3	ISA Type	Wire Size	K	14 AWG
	4	Sheath O.D.	Sheath Mat'l	3/16"	316 SS
	5	Type		Ungrounded	
HEAD	6	Material		CAST ALUMINUM	
	7	Conduit Connection		3/4"	
	8	Terminal Block		Single	
	9	Process Connection		1/2"	
	10				

WELL	11	Material			
	12	Construction			
	13	O.D. Dim.	I.D. Dim.		
	14	Process Conn.	Internal Conn.		
	15				
ASSMBY.	16	Nipple Length "N"			
	17				
	18	Manufacturer			
	19	Model			
	20				

	Tag No.	Well Dimes. "U"	Well Dimes. "T"	Element Length	Single Duplex	Type	Gage	Service	JZ Part No.
21									
22	TE-103A				SINGLE	K	14	GAS BLOWER BEARING	1137558
23	TE-103B								
24	TE-104A								
25	TE-104B								
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									

37 **Notes:**

QUANTITY: FOUR (4) ASSEMBLIES REQUIRED

SKID MOUNT

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
Δ			

	Date	Name
Prepared	06/03/2015	MCKOYI
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Quote Attached: ☐ Yes
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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
PRESSURE SWITCHES
PDSL-204

Spec	Rev	8	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

GENERAL	1	Type	Press	SWITCH 11	Type: Snap
	2	Setting	Field	12	Quantity: Single
	3	Dead Band	Fixed	13	Form: SPDT
	4			14	Rating: 15 A / 120 V / 60 HZ
	5			15	Load: Non-inductive
ELEMENT	6	Type	Diaphragm	ORDER 16	Enclosure: Expl. Proof
	7	Material	RUBBER	17	Conduit Connection: 1/2" NPT
	8	Connection	1/8" NPT BOTTOM	18	
	9	Mounting	Local	19	Manufacturer: DWYER
	10			20	Model: 1950-1-2F

	Tag No.	Process Cond.	Adj. Range	Set Point		Operating Temp.	Operating Press.	Service	Mount	JZ Part No.
21				Process	Signal	o F	PSI			
22	PDSL-204	Increase	0.4 TO 1.6"	0.5"		AMB.	ATM.	PURGE AIR	FIELD	0024372
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										

36 **Notes:**

QUANTITY: ONE (1) REQUIRED

	Revision Date	Initials	Revision Description		Date	Name
Δ				Prepared	06/03/2015	MCKOYI
Δ				Checked	07/24/2015	MCKOYI
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JOHN ZINK JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	JZ SPECIFICATION SHEET GAS BLOWER BL-103, BL-104	Spec Rev 9 0 Page No. 1 of 2 Project 9161045

Project Name: 4' X 30' ENCLOSED ZTOF FLARE SYSTEM	Customer Name: CITY OF UKIAH
Project Site: CITY OF UKIAH LANDFILL	Customer P.O.: 43704-00

1

CENTRIFUGAL GAS BLOWER

MANUFACTURER:	CONTINENTAL
MODEL:	08.07
QUANTITY:	TWO (2) REQUIRED
FEATURES:	INLET DIRECT DRIVE; CAST ALUMINUM INLET AND OUTLET HEADS; CAST ALUMINUM INTERMEDIATE SECTIONS; CAST ALUMINUM ALLOY IMPELLERS MOUNTED ON CARBON STEEL SHAFT SUPPORTED BY TWO GREASE LUBRICATED BALL BEARINGS; COMMON STEEL BASE PLATE; EXTERNAL DRAIN CONNECTION WITH PLUG; VIBRATION ISOLATION MOUNTING PADS; 4" DIAMETER VERTICAL INLET AND OUTLET CONNECTIONS
OPTIONS:	1/2" DIAMETER NPT CONNECTION IN EACH BEARING HOUSING FOR A SEPARATE THERMOCOUPLE 1/2" DIAMETER NPT CONNECTION IN EACH INBOARD BEARING HOUSING FOR A SEPARATE VIBRATION TRANSMITTER
MOTOR:	7.5 HP, 480 V, THREE PHASE, 60 HZ, TOTALLY ENCLOSED FAN COOLED (TEFC) MOTOR WITH 120 V INTEGRAL HEATER AND SUITABLE FOR VARIABLE FREQUENCY DRIVE OPERATION
DESIGN CONDITIONS:	LANDFILL GAS AT 100 °F, 210 SCFM MAXIMUM, -35" H_2O INLET, 10" H_2O DISCHARGE, 55% METHANE (CH_4) MAXIMUM, 45% CARBON DIOXIDE (CO_2), 705' ELEVATION
JOHN ZINK PART NUMBER:	9161045A09
TAG NUMBER:	BL-103, BL-104

SKID MOUNT

Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	06/03/2015	MCKOYI
Δ			Checked	07/24/2015	MCKOYI
Δ			Approved	07/24/2015	MCKOYI
Δ			Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

1

PURGE AIR BLOWER

MANUFACTURER:	AMERICAN FAN COMPANY
MODEL:	SC-800
QUANTITY:	ONE (1) REQUIRED
ARRANGEMENT:	4-FM
MOTOR:	3/4 HP, 1800 RPM, TOTALLY ENCLOSED FAN COOLED (TEFC), 56-C FRAME 120/240 V, SINGLE PHASE, 60 HZ
SPEED:	1750 RPM @ 0.5 BHP
DUTY:	700 CFM @ 1.7" H_2O
TEMPERATURE:	100 °F
ACCESSORIES:	OUTLET FLANGE, INLET SCREEN, 50% CUTOFF DAMPER, DRAIN
JOHN ZINK PART NUMBER:	0403173
TAG:	BL-204

SHIP LOOSE FOR FIELD INSTALLATION

	Revision Date	Initials	Revision Description		Date	Name
Δ				Prepared	06/03/2015	MCKOYI
Δ				Checked	07/24/2015	MCKOYI
Δ				Approved	07/24/2015	MCKOYI
Δ				Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
MANUAL BALL VALVE
DV-103A, DV-104A, HV-107B

Spec	Rev	10	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

1	Manufacturer	KF CONTROMATICS
2	Model No.	1/2" S8000-SS-M3
3	Process Connections	THREADED
4	Body Material	STAINLESS STEEL
5	Ball Material	316 STAINLESS STEEL
6	Stem Material	316 STAINLESS STEEL
7	Seal/Seat Material	PTFE/PTFE
8	Packing Material	PTFE
9	Handle Type	LEVER
10		
11		
12		

34 **Notes:**

13	Qty	Tag No.	Size	Oper. Press. H2O	Oper. Temp. ° F	Service	Mount	JZ Part No.
14	2	DV-103A	1/2"	-35"	70	GAS BLOWER	SKID	1138982
15		DV-104A						
16								
17	1	HV-107B	1/2"	10"	100	FLAME ARRESTER	FIELD	1138982
18								
19								
20								
21								
22								
23								
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Revision Date	Initials	Revision Description
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	Date	Name
Prepared	06/03/2015	MCKOYI
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Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
MANUALLY OPERATED BUTTERFLY VALVE
HV-103B, HV-104B

Spec	Rev	11	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

1	Manufacturer	ABZ
2	Model No.	04-396-812-GO
3	Process Connections	125 LB LUG
4	Body Material	DUCTILE IRON
5	Blade Material	316 STAINLESS STEEL
6	Shaft Material	416 STAINLESS STEEL
7	Seal/Seat Material	VITON
8	Packing Material	NITRILE
9	Shaft Bearing	TEFLON
10	Actuator	HANDWHEEL
11		
12		

34 **Notes:**

13	Qty	Tag No.	Size	Oper. Press. H2O	Oper. Temp. ° F	Service	Mount	JZ Part No.
14	4	HV-103A	4"	10"	100	LANDFILL GAS	SKID	
15		HV-103B						
16		HV-104A						
17		HV-104B						
18								
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	Revision Date	Initials	Revision Description
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	Date	Name
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JZ96.22 adopted from ISA-20-1975

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1

EXPANSION JOINT

MANUFACTURER:	RED VALVE
MODEL:	REDFLEX J-1, SINGLE ARCH
QUANTITY:	FOUR (4) REQUIRED
CONNECTIONS:	4" DIAMETER X 6" LONG ANSI 150 LB FF FLANGE DRILLING
MATERIAL:	HYPALON BODY GALVANIZED STEEL RETAINING RINGS
JOHN ZINK PART NUMBER:	1065123
TAG:	EJ-103A, EJ-103B, EJ-104A, EJ-104B

SKID MOUNT

Revision Date	Initials	Revision Description		Date	Name
			Prepared	06/03/2015	MCKOYI
			Checked	07/24/2015	MCKOYI
			Approved	07/24/2015	MCKOYI
			Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Customer Name: **CITY OF UKIAH**
Project Site: **CITY OF UKIAH LANDFILL**
Customer P.O.: **43704-00**

1

EXPANSION JOINT

MANUFACTURER:	RED VALVE
MODEL:	REDFLEX J-1, SINGLE ARCH
QUANTITY:	ONE (1) REQUIRED
CONNECTIONS:	4" DIAMETER X 6" LONG ANSI 150 LB FF FLANGE DRILLING
MATERIAL:	HYPALON BODY GALVANIZED STEEL RETAINING RINGS
JOHN ZINK PART NUMBER:	1065123
TAG:	EJ-107

SHIP LOOSE FOR FIELD INSTALLALTION

Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	06/03/2015	MCKOYI
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Δ			Approved	07/24/2015	MCKOYI
Δ			Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
CHECK VALVES
CV-103, CV-104

Spec	Rev	13	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

1	Manufacturer	TECHNO
2	Model No.	5004-CAL
3	Type	Swing
4	Port	Full
5	Cover	
6	Process Connection	125 LB FF
7	Body Material	ALUMINUM
8	Cover Material	
9	Ball/Disc Material	ALUMINUM
10	Seat Material	
11	Gasket Material	
12	Seal Material	NITRILE

34 **Notes:**

13	Qty	Tag No.	Size	Oper. Press. H20	Oper. Temp. ° F	Service	Mount	JZ Part No.
14	2	CV-103	4"	10"	100	LANDFILL GAS	SKID	1139232
15		CV-104						
16								
17								
18								
19								
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Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	06/03/2015	MCKOYI
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JOHN ZINK JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	JZ SPECIFICATION SHEET VIBRATION TRANSMITTER VT-103A, VT-104A	Spec Rev: 14 0 Page No: 1 of 1 Project: 9161045

Project Name: 4' X 30' ENCLOSED ZTOF FLARE SYSTEM_	Customer Name: CITY OF UKIAH
Project Site: CITY OF UKIAH LANDFILL	Customer P.O.: 43704-00

1

VIBRATION TRANSMITTER

MANUFACTURER:	PMC/BETA
MODEL:	162VTS-200-045-00
QUANTITY:	TWO (2) REQUIRED
MATERIAL:	STAINLESS STEEL
CONNECTION:	1/2" NPT (WITH #8253-002 ADAPTER)
RANGE:	0 TO 1.6 IN/SEC
OUTPUT:	4 TO 20 MA
DESIGN TEMPERATURE:	200 °F
JOHN ZINK PART NUMBER:	1084300
TAG NUMBER:	VT-103A, VT-104A

SKID MOUNT

	Revision Date	Initials	Revision Description		Date	Name
Δ				Prepared	06/04/2015	MCKOYI
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Δ				Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
ACTUATED BUTTERFLY VALVE
MOV-102, ZSC-102, ZSO-102

Spec	Rev	15	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

GENERAL	1	Tag No.		MOV-102	
	2	Service		LANDFILL GAS	
	3	Line No./Vessel No.			
	4	Line Size/Sched. No.		4"	
TYPE	5	Type of Body	Body Size	WAFER	4"
	6	Port Size	Valve Cv	4"	
	7	Shaft Diameter			
	8	Face to Face Dimension			
	9	End Conn. and Rating		4" 150 LB RF	
MATERIALS	10	Body		CARBON STEEL	
	11	Disc		316 STAINLESS STEEL	
	12	Shaft		17-4 PH STAINLESS STEEL	
	13	Bushing			
	14	Trim Form			
	15	Trim:	Seat	PTFE	
	16		Seal		
	17		Packing		
	18	Seat Leakage Classification			
	19				
ACTUATOR	20	Manufacturer		RCS	
	21	Model		SURE 100-10	
	22	Type (Pneumatic/Electrical)		ELECTRICAL	
	23	Input Signal (Max/Min)			
	24	Action (Spring Return/Double)		SPRING RETURN	
	25	Actuator/Valve Orientation			
	26	Failure Mode		CLOSED	
	27	NEMA		7	

POSITIONER	28	Manufacturer	
	29	Model	
	30	Signal Supply Requirement	
	31	Input Signal	
	32	Output Signal	
	33	Electrical Rating	
	34		
OPTIONS	35	Filter Regulator	
	36	Gage Set	
	37	Mechanical Travel Stop	
	38	Instr. Tubing Requirements	
	39		
	40		
	41		
	42		
	43		
	44		
SERVICE	45	Fluid Type	LANDFILL GAS
	46	Operating Temperature Range	40 TO 100 °F
	47	Operating Flow Rate Range	0 TO 210 SCFM
	48	Operating Pressure Range	10" H2O
	49	Maximum Shut Off Δ /Pressure	
	50		
	51	Manufacturer	WKM
	52	Model Number	B5110-02-S02-11-00
	53	Mount	SKID
	54	JZ Part No.	

55 **Notes:**

QUANTITY: ONE (1) ASSEMBLY REQUIRED

	Revision Date	Initials	Revision Description
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	Date	Name
Prepared	06/04/2015	MCKOYI
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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
FLASH - BACK ARRESTOR
FA-107

Spec	Rev	16	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Project Site: **CITY OF UKIAH LANDFILL**

Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

1	Manufacturer	ENARDO
2	Model No.	E70804/D-AAF-13
3	Process Connections	125 LB FF
4	Body Material	ALUMINUM
5	Element Materia	ALUMINUM
6	Drain Connection	1/2" NPT WITH PLUG
7	Body Configuration	ECCENTRIC
8		
9		
10		
11		
12		

34 **Notes:**

TWO (2) 1/2" FNPT TAPS WITH PLUG REQUIRED, ONE ON EACH SIDE OF ELEMENT.

13	Qty	Tag No.	Size	Oper. Press. H2O	Oper. Temp. ° F	Service	Mount	JZ Part No.
14	1	FA-107	4"	10"	100	LANDFILL GAS	FIELD	1127119
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
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Revision	Date	Initials	Revision Description
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	Date	Name
Prepared	06/04/2015	MCKOYI
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1

MASS FLOW METER

MANUFACTURER:	THERMAL INSTRUMENT COMPANY
MODEL:	62-9/9500-I-G-1/2-316SS-PG-120-4/20-ND
QUANTITY:	ONE (1) ASSEMBLY REQUIRED
CONNECTION:	3/4" MALE NPT COMPRESSION FITTING (316 STAINLESS STEEL BODY AND FERRULE)
MOUNT:	SIDE OR TOP
PROBE LENGTH:	12"
TUBE MATERIAL:	316 STAINLESS STEEL
POWER:	120 V, SINGLE PHASE, 60 HZ
ENCLOSURE RATING:	NEMA 7/4X
ENCLOSURE MATERIAL:	ALUMINUM
TRANSMITTER:	INTEGRAL
OUTPUT:	4 TO 20 MA
SERVICE:	LANDFILL GAS (55% CH_4, 45% CO_2)
PIPE:	4" DIAMETER, SCHEDULE 10S STAINLESS STEEL (4.260" INSIDE DIAMETER)
MINIMUM FLOW RATE:	0 SCFM (2% OF FULL SCALE)
DESIGN FLOW RATE:	210 SCFM
MAXIMUM FLOW RATE:	300 SCFM
MINIMUM PRESSURE:	0 PSIG
DESIGN PRESSURE:	10" H_2O
MAXIMUM PRESSURE:	1 PSIG
MINIMUM TEMPERATURE:	32 °F
DESIGN TEMPERATURE:	100 °F
MAXIMUM TEMPERATURE:	120 °F
JOHN ZINK PART NUMBER:	9161045A17
TAG NUMBER:	FE-107, FT-107

SKID MOUNT

Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	02/12/2015	MCKOYI
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Δ			Approved	07/24/2015	MCKOYI
Δ			Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
GAGE GLASSES AND COCKS
LG-101

Spec	Rev	18	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

GAGE GLASS	1	Type		Tubular	
	2	Connection Type		Top & Bottom	
	3	Connection Size:	Vent / Drain	3/4"	3/4"
	4	Material		316 STAINLESS STEEL	
	5	Minimum Rating		-6 psig at 150 °F	
	6	Options		SHIELDED SIGHT GLASS	
	7	Manufacturer		KENCO	
	8	Model		EPG-3/4-24-V-RL-180-150-NS	
	9			-KTV-22	
	10				
GAGE COCKS	11	Type		Straight	
	12	Connection Vessel		3/4" NPT	
	13	Connection: Gage	Vent / Drain		1/4" / 1/4"
	14	Material		316 STAINLESS STEEL	
	15	Minimum Rating		-6 psig at 150 °F	
	16	Construction			
	17	Bonnet			
	18	Options		Ball Checks	
	19	Manufacturer		KENCO	
	20	Model		KTV-75-SS	

	Qty.	Tag No.	Visible Glass	C.L. Conn.	Model No.	Operating Temp. °F	Operating Press. H2O	Service	JZ Part No.
21									
22	1	LG-101	18"	24"	BELOW	100	-35"	LANDFILL GAS	BELOW
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									

37 **Notes:**

DESCRIPTION:	ISOLATION VALVES	SHIELDED SIGHT GLASS
MODEL:	KTV-75-SS	EPG-3/4-24-V-RL-180-150-NS-KTV-22
QUANTITY:	ONE (1) SET REQUIRED	ONE (1) REQUIRED
JOHN ZINK PART NUMBER:	1004970	1006492

CENTER TO CENTER DISTANCE IS 24" BETWEEN TWO (2) 3/4" DIAMETER FEMALE NPT VESSEL CONNECTIONS.

SKID MOUNT

Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	06/05/2015	MCKOYI
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JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
PRESSURE GAGES
PDI-101

Spec	Re	19	0
Page No.		1 of 3	
Project		9161045	

Project Name **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Project Site **CITY OF UKIAH LANDFILL**
Customer Name **CITY OF UKIAH**
Customer P.O.: **43704-00**

1	Type		DIRECT		
2	Mount Type		LOCAL		
3	Dial Diamete	Color	4-3/4"	WHITE	
4	Case Material		ALUMINUM		
5	Ring Type		SCREWED		
6	Blow-Out Protection		BLOWOUT PLUG		
7	Lens Material		PLASTIC		
8	Accuracy Required		2%		
9	Element Type		DIAPHRAGM		
10	Element Materia		SILICONE RUBBER		
11	Socket Material				
12	Movement Material				

13	Process Connection	1/4" NPT
14		
15	OPTIONS	
16		
17		
18		
19		
20		
21		
22		
23	Manufacturer	DWYER
24	Model No.	4005

	Quantity	Tag No	Range H2O	Oper. Press. H2O	Service	JZ Part No
25						
26	1	PDI-101	0 TO 5"	2"	MOISTURE SEPARATOR	1118640
27						
28						
29						
30						
31						
32						
33						
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36						
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45 **Notes:**

SKID MOUNT

	Revision Date	Initials	Revision Description
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	Date	Name
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Quote Attached: ☐ Yes
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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
PRESSURE GAGES
PDI-107

Spec	Re	19	0
Page No.		2 of 3	
Project		9161045	

Project Name **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Project Site **CITY OF UKIAH LANDFILL**
Customer Name **CITY OF UKIAH**
Customer P.O.: **43704-00**

1	Type		DIRECT	13	Process Connection	1/4" NPT
2	Mount Type		LOCAL	14		
3	Dial Diamete	Color	4-3/4" WHITE	15	OPTIONS	
4	Case Material		ALUMINUM	16		
5	Ring Type		SCREWED	17		
6	Blow-Out Protection		BLOWOUT PLUG	18		
7	Lens Material		PLASTIC	19		
8	Accuracy Required		2%	20		
9	Element Type		DIAPHRAGM	21		
10	Element Materia		SILICONE RUBBER	22		
11	Socket Material			23	Manufacturer	DWYER
12	Movement Material			24	Model No.	4005

	Quantity	Tag No	Range H2O	Oper. Press. H2O	Service	JZ Part No
25						
26	1	PDI-107	0 TO 5"	2"	FLAME ARRESTER	1118640
27						
28						
29						
30						
31						
32						
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34						
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44						

45 **Notes:**

SHIP LOOSE FOR FIELD INSTALLATION

	Revision Date	Initials	Revision Description
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	Date	Name
Prepare	06/05/2015	MCKOYI
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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
PRESSURE GAGES
PI-107

Spec	Re	19	0
Page No.		3 of 3	
Project		9161045	

Project Name **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site **CITY OF UKIAH LANDFILL**
Customer Name **CITY OF UKIAH**
Customer P.O.: **43704-00**

1	Type		Direct		
2	Mount Type		Local		
3	Dial Diamete	Color	4"	WHITE	
4	Case Material		304 STAINLESS STEEL		
5	Ring Type		Screwed		
6	Blow-Out Protection		None		
7	Lens Material		Glass		
8	Accuracy Required		1/2%		
9	Element Type		Bourdon		
10	Element Materia		SS		
11	Socket Material		SS		
12	Movement Material		SS		

13	Process Connection	1/2" NPT
14		CENTER BACK
15	OPTIONS	
16		
17		
18		
19		
20		
21		
22		
23	Manufacturer	MCDANIEL
24	Model No.	C25L

	Quantity	Tag No	Range H2O	Oper. Press. H2O	Service	JZ Part No
25						
26	1	PI-107	0 TO 25"	10"	LANDFILL GAS	1241016
27						
28						
29						
30						
31						
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33						
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42						
43						
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45 **Notes:**

SKID MOUNT

	Revision Date	Initials	Revision Description		Date	Name
Δ				Prepare	06/05/2015	MCKOYI
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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
BIMETAL THERMOMETERS
TI-102, TI-106

Spec	Rev	20	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM_**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

THERMOMETER	1	Manufacturer		ASHCROFT	
	2	Model No.		30EI60R-025-0/200F	
	3	Stem Conn.	Location	1/2" NPT	REAR
	4	Stem Diameter		.250in	
	5	Stem Material		STAINLESS STEEL	
	6	Dial Size	Color	3"	WHITE
	7	Scale Length	Color		
	8	Case Style			
	9				
	10				

WELL	11	Manufacturer	
	12	Model No.	
	13	Material	
	14	Construction	
	15	Process Connection	
	16		
	17		
	18		
	19		
	20		

	Qty.	Tag No.	Range °F	Op. Temp. °F	Op. Press. H2O	Service	Mount	JZ Part No.
21								
22	1	TI-102	0-200	100	-35"	LANDFILL GAS	SKID	1023595
23	1	TI-106	0-200	100	10"	LANDFILL GAS	SKID	1023595
24								
25								
26								
27								
28								
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39 **Notes:**

	Revision Date	Initials	Revision Description
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	Date	Name
Prepared	06/05/2015	MCKOYI
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JOHN ZINK / JOHN ZINK COMPANY LLC FOR JZ PARTS: (918)234-2751	JZ SPECIFICATION SHEET LEVEL SWITCHES LSHH-101	Spec Rev: 21 0 Page No.: 1 of 1 Project: 9161045

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

GENERAL	1	Tag No.		LSHH-101	
	2	Service		LANDFILL GAS	
	3	Line No. / Vessel No			
	4	Quantity		1	
ELECTRICAL	5	Electrical Supply		120 V, 60 HZ	
	6	Electrical Classification		CLASS 1, DIVISION 1,	
	7			GROUP D	
	8	Number of Switches			
	9	Contacts: No.	Form	2	DPDT
	10	Contact Rating			
	11	Action of Contacts			
	12				
PROBE	13	Probe Connection		1" NPT	
	14	Probe Housing Material		ALUMINUM	
	15	Probe Material		316 STAINLESS STEEL	
	16	Probe Coating			
	17	Probe Length			
	18				
	19				
	20				

PROCESS	21	Pressure Range			
	22	Temperature Range (^{o} F)			
	23				
	24	Operating Pressure Range			
	25	Operating Temperature Range			
	26				
	27				
	28				
	29				
OPTIONS	30				
	31	Airset	Supply Gage		
	32	Gage Glass Connections			
	33	Gage Glass Model No.			
	34	Contacts: No.	Form		
	35	Contact Rating			
	36	Action of Contacts			
ORDER	37	Manufacturer		ENDRESS+HAUSER	
	38	Model No.		FTL50-TGN2AA4E5A	
	39	Mount		SKID	
	40	JZ Part No.		1337750	

41 **Notes:**

Revision Date	Initials	Revision Description		Date	Name
Δ			Prepared	06/05/2015	MCKOYI
Δ			Checked	07/24/2015	MCKOYI
Δ			Approved	07/24/2015	MCKOYI
Δ			Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

JZ96.20 adopted from ISA-20-1975

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JOHN ZINK
JOHN ZINK COMPANY LLC
FOR JZ PARTS: (918)234-2751

JZ SPECIFICATION SHEET
DIFFERENTIAL PRESSURE INSTRUMENTS
PIT-100

Spec	Rev	22	0
Page No.		1 of 1	
Project		9161045	

Project Name: **4' X 30' ENCLOSED ZTOF FLARE SYSTEM**
Project Site: **CITY OF UKIAH LANDFILL**
Customer Name: **CITY OF UKIAH**
Customer P.O.: **43704-00**

GENERAL	1	Service	LANDFILL GAS
	2	Function	Trans
	3	Case	
	4	Mounting	Surface
	5	Enclosure Class	CLASS 1, DIVISION 1
	6	Intrinsic Safety	No
	7	Power Supply	24 V DC
	8	Chart	
	9	Chart Drive	
	10	Scales	
XMT	11	Transmitter Output	4 TO 20 MA
	12		
CONTROLLER	13	Control Modes	
	14	Action	
	15	Auto-Man Switch	
	16	Set Point Adj.	
	17	Manual Reg.	
	18	Output	
	19		
	20		
	21		
	22		
	23		
	24		

UNIT	25	Service			Diff. Pressure
	26	Element Type			Diaphragm
	27	Material:	Body	Element	ALUMINUM / 316L SS
	28	Rating:	Overrange	Body Rating	
	29	Range			-250 TO 250" H2O
	30	Process Data			
	31	Process Connections			1/4" NPT
	32	Calibrated Range			-100 TO 100" H2O
OPTIONS	33	Alarm Switches: Qty		Form	
	34	Rating			
	35	Function			
	36	Contact Action			
	37	Digital Display			YES
	38	Mounting Bracket			YES
	39	Calibration Certificate			YES
	40	Hazardous Location			YES
	41				
	42				
ORDER	43	Manufacturer			ROSEMOUNT
	44	Model No.			3051CD2A22A1AM5B4Q4K6
	45	Tag No.			PIT-100
	46	Quantity			1
	47	Mount			SHIP LOOSE
	48	JZ Part No.			9161045A22

49 **Notes:**

	Revision Date	Initials	Revision Description
Δ			
Δ			
Δ			
Δ			

	Date	Name
Prepared	06/05/2015	MCKOYI
Checked	07/24/2015	MCKOYI
Approved	07/24/2015	MCKOYI
Quote Attached: ☐ Yes	Copies of Vendor Literature Req'd:	1

JZ96.13 adopted from ISA-20-1975

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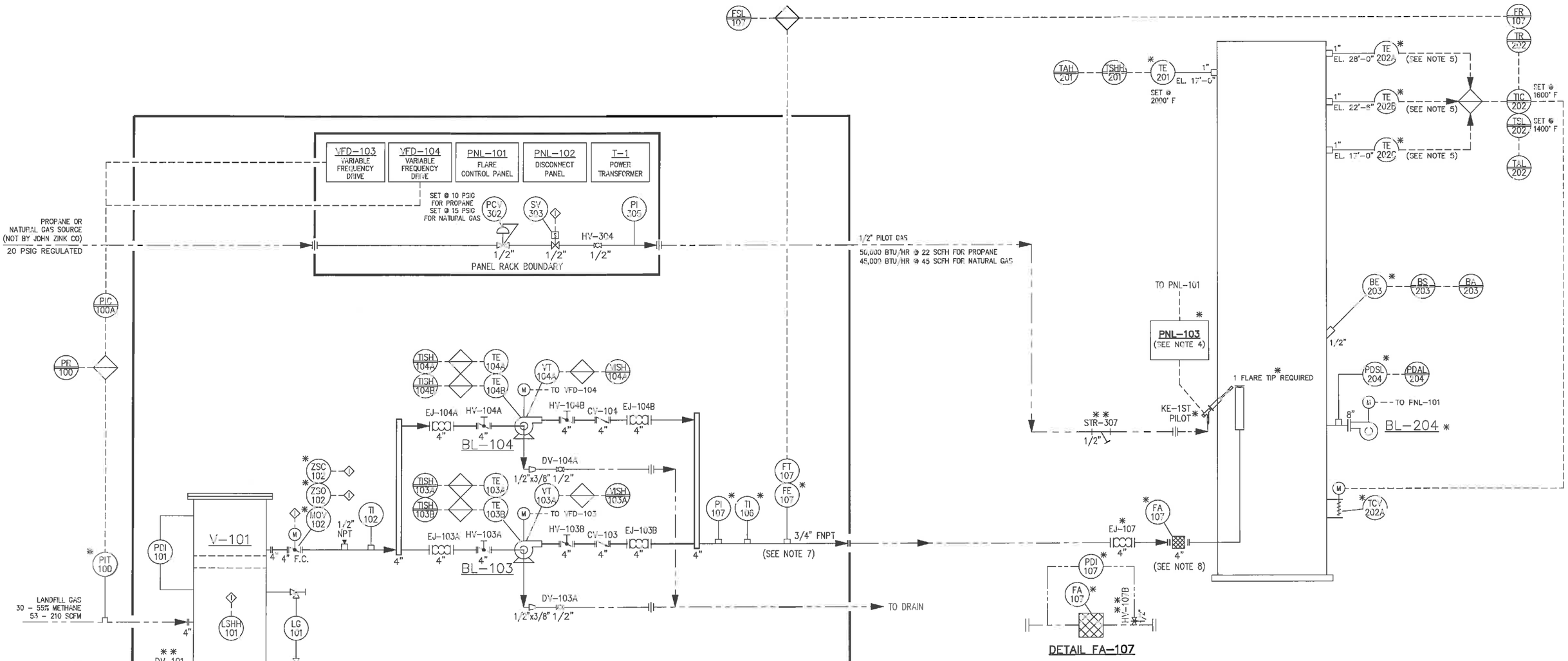
V-101
ZMS MOISTURE SEPARATOR
2' x 8'

BL-103, BL-104
GAS BLOWERS
7.5 HP

ENCLOSED
ZTOF FLARE
4' x 30'

BL-204
PURGE AIR BLOWER
3/4 HP



NOTES
1. * - SUPPLIED BY JOHN ZINK CO. AND SHIPPED LOOSE FOR FIELD INSTALLATION.
2. ** - SUPPLIED BY OTHERS (NOT BY JOHN ZINK CO.)
3. ELECTRICAL AREA CLASSIFICATION: NON-HAZARDOUS
4. IGNITION TRANSFORMER IS INSIDE PNL-103 AND MOUNTED ON FLARE.
5. TEMPERATURE CONTROL THERMOCOUPLE (TE-202) IS SELECTED DEPENDING ON GAS FLOW RATE TO FLARE. EQUIPMENT DAMAGE MAY OCCUR IF THE IMPROPER ELEVATION IS SELECTED.
6. DAMPER TCV-202A IS AUTOMATIC.
7. LOCATE FLOW ELEMENT WITH 10 DIAMETERS OF STRAIGHT UNDISTURBED FLOW UPSTREAM AND 5 DIAMETERS DOWNSTREAM.
8. LOCATE FLAME ARRESTOR AT FLARE INLET WITH 5 DIAMETERS OF STRAIGHT UNDISTURBED FLOW UPSTREAM.
9. THERMOCOUPLE WIRE AND IGNITION WIRE SUPPLIED BY JOHN ZINK CO. AND SHIPPED LOOSE FOR FIELD INSTALLATION.
10. PNL-101, PNL-102, VFD-103 & VFD-104 ARE TO BE U.L. LISTED AS INDUSTRIAL CONTROL PANELS.

HIGH TEMPERATURE SHUTDOWN THERMOCOUPLE LOCATION

GAS FLOW (SCFM)	TE-201 ELEVATION (FT)
ALL FLOW RATES	17'-0"

TEMPERATURE CONTROL THERMOCOUPLE LOCATION AT MAXIMUM METHANE CONCENTRATION

GAS FLOW (SCFM)	TE-202 ELEVATION (FT)
53 - 105	17'-0"
105 - 158	22'-8"
158 - 210	28'-0"

LEGEND

- FIELD MOUNTED INSTRUMENT
- REMOTE PANEL MOUNTED NORMALLY ACCESSIBLE TO OPERATOR
- LOCAL PANEL MOUNTED NORMALLY ACCESSIBLE TO OPERATOR
- REMOTE SUB-PANEL MOUNTED NORMALLY INACCESSIBLE TO OPERATOR
- LOCAL SUB-PANEL MOUNTED NORMALLY INACCESSIBLE TO OPERATOR
- LOCATED IN THE PLC
- INTERLOCK TO/FROM CONTROL PANEL.
- PIPE & FITTINGS BY OTHERS (NOT BY JOHN ZINK CO.)
- ELECTRICAL INTERCONNECTIONS
- INSTRUMENT CONTROL AIR LINE
- PIPE & FITTINGS BY JOHN ZINK CO.

FOR PARTS AND SERVICE: • TEL: 1-800-755-4252 • FAX: (918) 234-1988

NO.	REVISION DESCRIPTION	BY	CHK	APP	DATE

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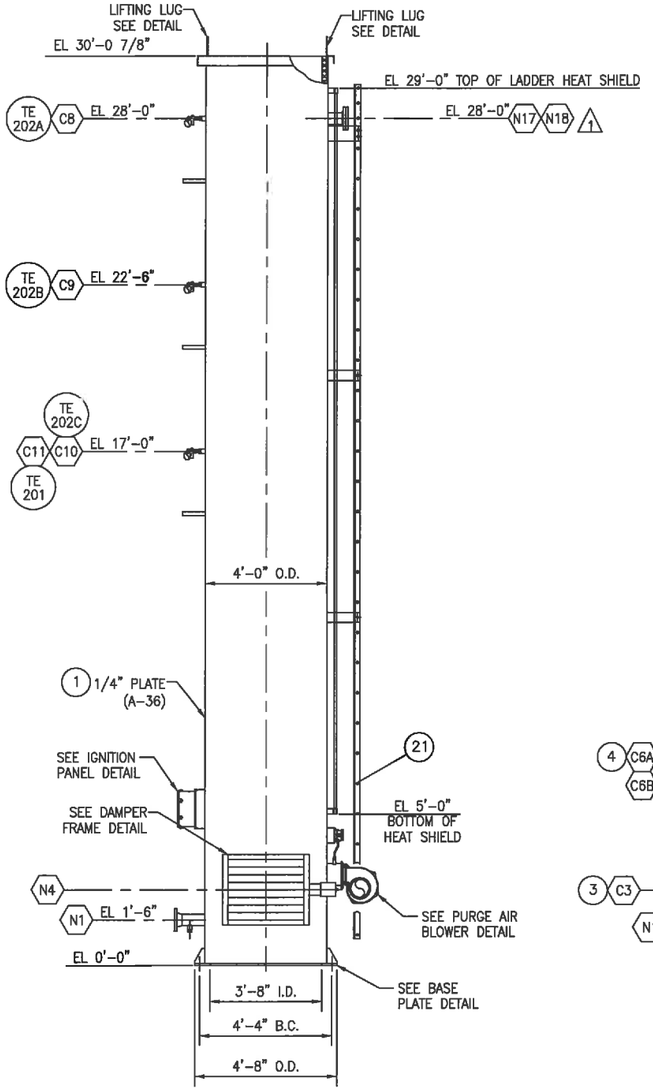
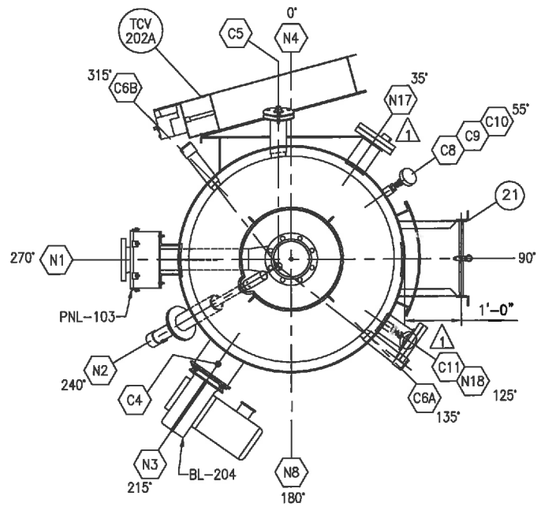
JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

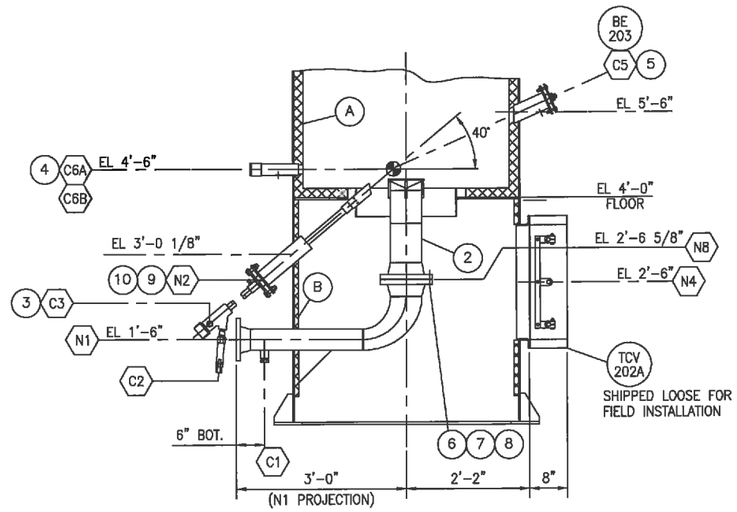
FOR: CITY OF UKIAH	PROCESS & INSTRUMENT DIAGRAM FOR AN ENCLOSED ZTOF FLARE SYSTEM
USER: CITY OF UKIAH	
JOBSITE: UKIAH, CA	
DRAWN: RPJ / CHK: IM / APP: IM / SHEET: 1 OF 1	
S.O. NO: BF-9161045 / DATE: 6-8-15 / DATE: 7-24-15 / DATE: 7-24-15	
P.O. NO: 43704-06 / DRAWING NUMBER: D-F-9161045-150 / REV. 0	
SCALE: NONE	



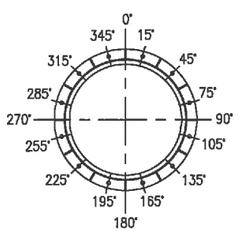
ELEVATION
NOT TRUE ORIENTATION



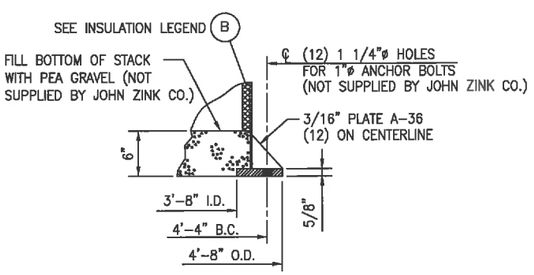
PLAN VIEW
TRUE ORIENTATION



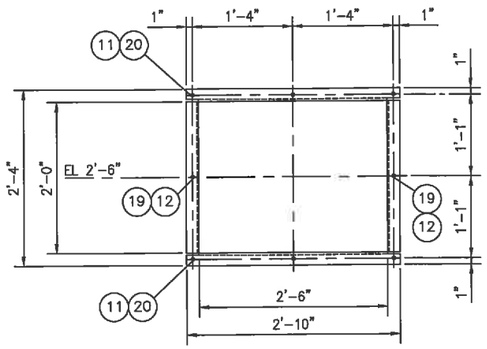
PARTIAL SECTIONAL ELEVATION
NOT TRUE ORIENTATION



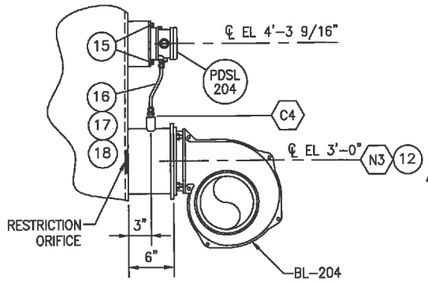
FOUNDATION BOLT PATTERN



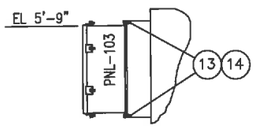
BASE PLATE DETAIL



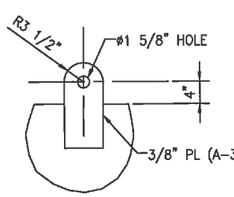
DAMPER FRAME DETAIL
N4



PURGE AIR BLOWER DETAIL
SHIPPED LOOSE FOR
FIELD INSTALLATION



IGNITION PANEL DETAIL
SHIPPED LOOSE FOR
FIELD INSTALLATION



LIFTING LUG DETAIL
(2 REQ'D. LOCATED AT 90° AND 270°)
(NOTE: CUT OFF LUGS AFTER STACK ERECTION)

PARTS LIST

ITEM	QTY	DESCRIPTION	MK: NO	MATERIAL
1	1	ENCLOSED ZTOF FLARE	D-701-1	
2	1	6" FLARE TIP ASSEMBLY	D-ST-1247-1	
3	1	PILOT ASSEMBLY	ST11916-1	
4	2	2" SIGHT PORT	CA-ST-0600-1	
5	1	SWIVEL SCANNER MOUNT ASSEMBLY	CA-ST-1044-1	
6	1	GASKET: 6" 150# RF x 1/16" THK	G6-150-R	NON-ASB
7	8	BOLT, STUD: 3/4" x 4" LG (PLATED)	SB-6-4	A-193-B7
8	16	NUT, HVY HEX: 3/4-10NC (PLATED)	SN-6	A-194-2H
9	4	BOLT, HEX HD: 5/8" x 2 1/2" LG (PLATED)	HB-5-2 1/2	A-307
10	4	NUT, REG HEX: 5/8-11NC (PLATED)	HN-5	A-307
11	2	BOLT, HEX HD: 3/8" x 1 1/4" LG (PLATED)	HB-3-1 1/4	A-307
12	10	NUT, REG HEX: 3/8-16NC (PLATED)	HN-3	A-307
13	4	BOLT, HEX HD: 1/4" x 1" LG (PLATED)	HB-2-1	A-307
14	4	NUT, REG HEX: 1/4-20NC (PLATED)	HN-2	A-307
15	2	SCREW, HEX HD MACH: #10-24NC x 3/4" LG (PLATED)	HCS-#10-3/4	A-307
16	1	3/8" COPPER TUBING x 1'-0" LG		COPPER
17	1	MALE CONNECTOR, 1/8" NPT x 3/8" TUBING		BRASS
18	1	MALE ELBOW CONNECTOR, 1/2" NPT x 3/8" TUBING		BRASS
19	6	SCREW, FLAT HD. SL: 3/8-NC x 1" LG. (PLATED)	FH-3-1	A-307
20	2	WING NUT: 3/8-16NC (PLATED)	WN-3	A-307
21	1	GALVANIZED LADDER WITH PERSONNEL PROTECTION	D-702-1	
		SCREEN, SAF-T HARNESS, SAF-T-LOK SLEEVE,		
		SAF-T-NOTCH CARRIER RAIL		

NOZZLE LEGEND

MK	QTY	DESCRIPTION
N1	1	GAS CONNECTION: 4" 150# F.F.
N2	1	PILOT MTG CONN: 3/8" PLATE FLG W/ 3" 150# DRILLING
N3	1	BLOWER - 8" CONN 10" O.D. x 3/8" PL W/ (4) 3/8" STUDS ON 9 1/8" B.C.
N4	1	DAMPER CONN - SEE DETAIL (HINGED)
N8	1	FLARE TIP CONN - 6" 150# RF
N17-18	2	SAMPLE PORT 4" 150# RF WITH BLIND
C1	1	DRAIN - 1" FNPT WITH PLUG
C2	1	PILOT GAS CONN - 1/2" FNPT
C3	1	PILOT CONDUIT CONN - 1/2" FNPT
C4	1	PURGE AIR PRESSURE CONN - 1/2" FNPT
C5	1	SCANNER CONN - 1/2" MNPT
C6A-B	2	SIGHT PORT - 2" MNPT
C8-11	4	THERMOCOUPLE CONN - 1" FNPT

1

DESIGN DATA

WINDLOAD (PER ASCE 7-05, EXP. C)	110 M.P.H.
SEISMIC (PER UBC-1997)	ZONE 4
SHEAR @ BASE	2.9 K
MOMENT @ BASE	41.9 K-FT
DEADLOAD	5.8 K
SHELL DESIGN TEMPERATURE	500° F
CORROSION ALLOWANCE	0.0

LIFTING NOTES

A: MAIN CRANE AT TOP REQUIRES SPREADER BAR, (NOT SUPPLIED BY JOHN ZINK CO.)
B: CHOKE STACK AT APPROX. 5'-0" EL WITH TAILING CRANE
C: LIFTING LUGS DESIGNED FOR 13 1/2 TON CROSBY ANCHOR SHACKLE AND VERTICAL SLINGS.

INSULATION LEGEND

A: (1) OVERLAPPING LAYER OF 1" THICK 8 LB DENSITY, 2300° F. BACKED WITH (1) LAYER, 1" THICK 6 LB DENSITY, 2300° F. ON INCONEL PINS AND KEEPERS.
B: (1) OVERLAPPING LAYER OF 1" THICK 6 LB DENSITY, 2300° F. ON INCONEL PINS AND KEEPERS.
C. AFTER INSTALLING INSULATION, SPRAY ALL EXPOSED SURFACES ABOVE FLOOR WITH INORGANIC KAWOOL SODIUM SILICATE RIGIDIZER SOLUTION.

GENERAL NOTES

1. TAG NUMBERS TO BE PRECEDED BY JOHN ZINK SALES ORDER NUMBER.
2. FLARE ASSEMBLY IS NOT TO BE USED AS AN ANCHOR POINT FOR CUSTOMER PIPING.
3. PRE-TENSION ANCHOR BOLTS BY THE "TURN OF THE NUT" METHOD/AISC.
4. BOLT HOLES TO STRADDLE NORMAL CENTER LINES UNLESS NOTED.
5. FINISH EXTERIOR CARBON STEEL, INSIDE OF SKIRT, BOTTOM OF FLOOR PLATE, AND MANIFOLD. SANDBLAST PER SSPC-SP-6 AND PRIME WITH SHERWIN WILLIAMS ZINC CLAD DOT #B69VZ20/B69VZ18/B69D11(2-4 MILS D.F.T.) TOP COAT EXTERIOR SHERWIN WILLIAMS #100A518 HIGH TEMP ALUMINUM (1-2 MILS D.F.T.)TOP 5 FOOT BAND OF SHERWIN WILLIAMS HI-TEMP COATINGS 1000V SILSCON RESIN (BLACK) (1.5-2.0 MILS D.F.T.)

FOR PARTS AND SERVICE: • TEL: 1-800-755-4252 • FAX: (918) 234-1968

NO.	REVISION DESCRIPTION	BY	CHK	APP	DATE
1	REVISE PER CUSTOMER COMMENTS	NGM	GFG	IM	9-4-15

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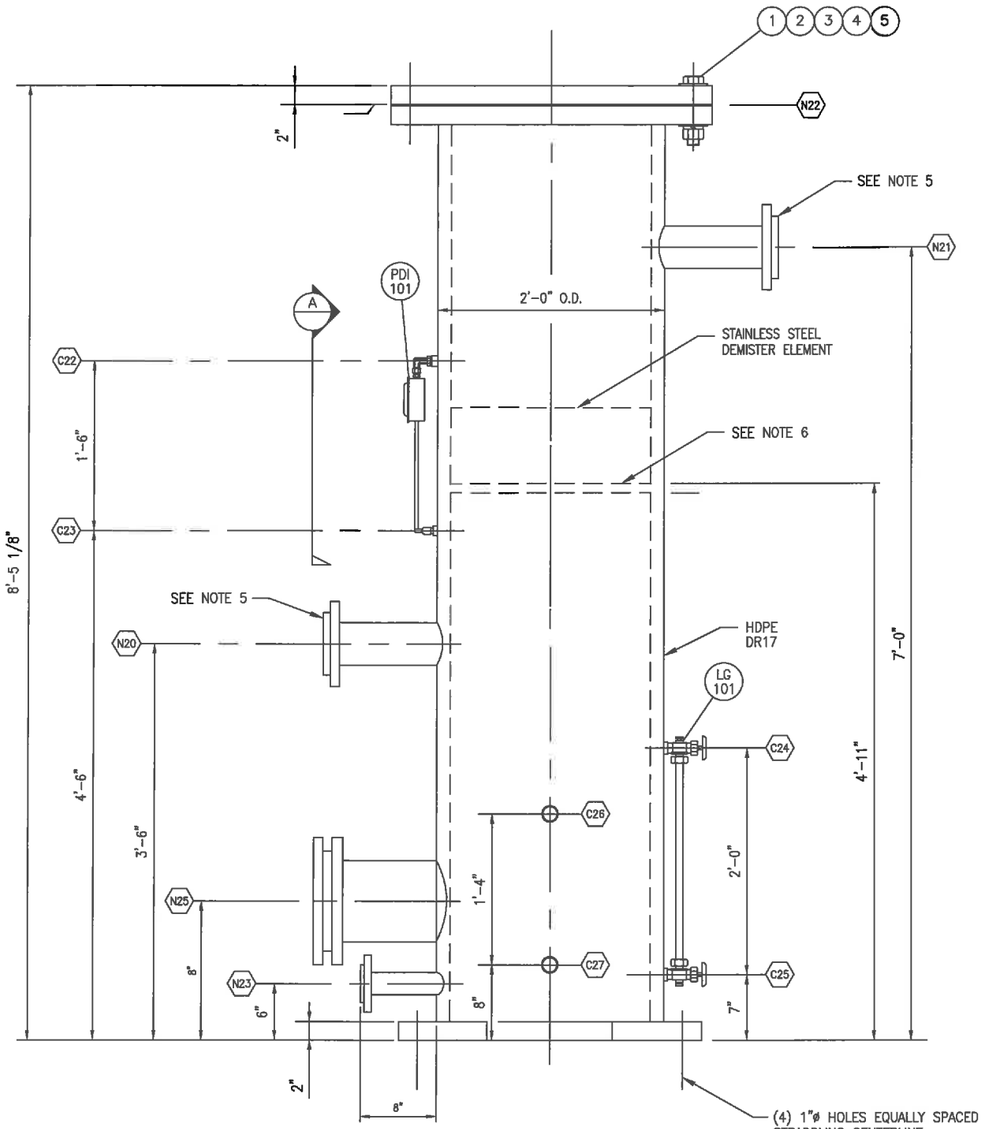
JOHN ZINK HAMWORTHY
COMBUSTION
JOHN ZINK COMPANY, LLC

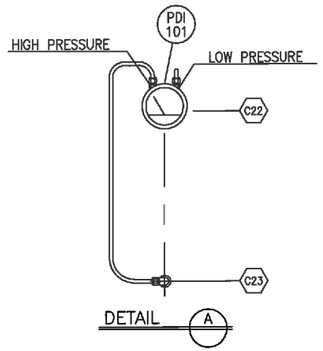
FOR: CITY OF UKIAH	ENCLOSED ZTOF FLARE 4'-0" O.D. x 30' H.			
USER: CITY OF UKIAH				
JOBSITE: UKIAH, CA				
S.O. NO: BF-9161045	DRAWN: GFG DATE: 06-17-15	CHK: IM DATE: 7-24-15	APP: IM DATE: 7-24-15	SHEET: 1 OF 1
P.O. NO: 43704-00	DRAWING NUMBER: D-F-9161045-301			REV. 1
SCALE: NONE				

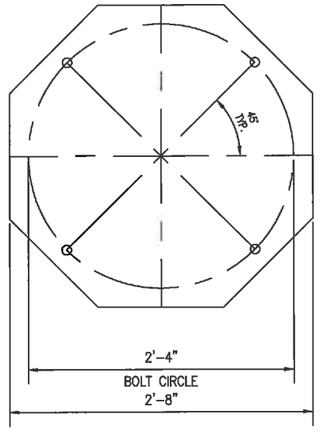
PARTS LIST				
ITEM	QTY	DESCRIPTION	MK: DWG	MATERIAL
1	1	GASKET: 1/8" THICK		NEOPRENE
2	20	HEX BOLT, 1 1/4" x 6 1/2" LG (PLATED)		A-307
3	20	NUT, REG HEX: 1 1/4-8NC (PLATED)		A-307
4	40	WASHER, 1 1/4" FLAT (PLATED)		A-569
5	20	WASHER, 1 1/4" LOCK (PLATED)		A-569

NOZZLE LEGEND		
MK	QTY	DESCRIPTION
N20	1	INLET: 4" FLANGE ADAPTER WITH 150# BACK-UP RING
N21	1	OUTLET: 4" FLANGE ADAPTER WITH 150# BACK-UP RING
N22	1	FLANGED TOP: 32" O.D. WITH (20) 1 3/8"ø HOLES ON 29 1/2" B.C.
N23	1	DRAIN: 2" FLANGE ADAPTER WITH 150# BACK-UP RING
N25	1	ACCESS NOZZLE: 8" FLANGE ADAPTER WITH 150# BACK-UP RING AND BLIND FLANGE
C22	1	PRESSURE CONNECTION: 1/2" FNPT (SS BUSHING)
C23	1	PRESSURE CONNECTION: 1/2" FNPT (SS BUSHING)
C24	1	LIQUID LEVEL GAUGE CONNECTION: 3/4" FNPT (SS BUSHING)
C25	1	LIQUID LEVEL GAUGE CONNECTION: 3/4" FNPT (SS BUSHING)
C26	1	LIQUID LEVEL SWITCH CONNECTION: 1" FNPT (SS BUSHING WITH PLUG)
C27	1	LIQUID LEVEL SWITCH CONNECTION: 1" FNPT (SS BUSHING WITH PLUG)

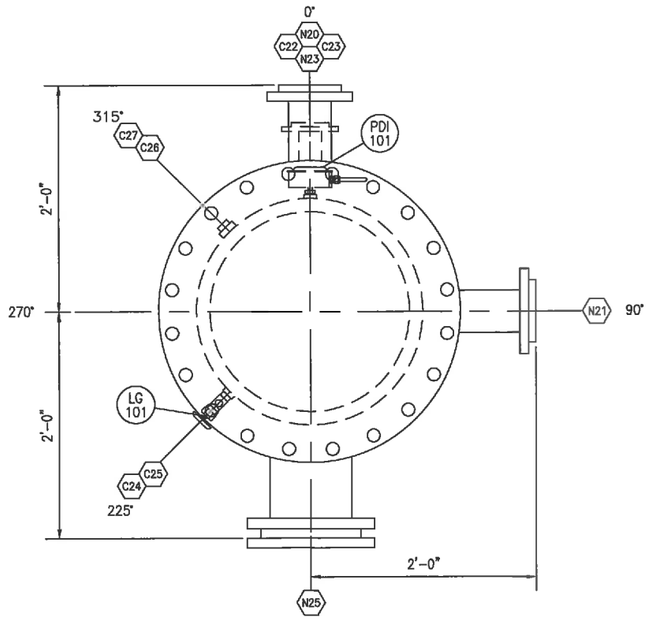


ELEVATION
(NOT TRUE ORIENTATION)
(MK: V-101)





BASE PLATE DETAIL



PLAN VIEW
(TRUE ORIENTATION)

NOTES
1. BOLT HOLES TO STRADDLE NORMAL CENTERLINES UNLESS NOTED.
2. MOISTURE SEPARATOR IS NOT TO BE USED AS AN ANCHOR POINT FOR CUSTOMER PIPING.
3. PRE-TENSION ANCHOR BOLTS BY THE "TURN OF THE NUT" METHOD/AISC.
4. TAG NUMBERS TO BE PRECEDED BY JOHN ZINK SALES ORDER NUMBER.
5. FLANGE ADAPTERS TO BE SDR-17 AND BACK-UP RINGS TO BE PAINTED.
6. DEMISTER MOUNTING RING 1" THICK X 2" WIDE WITH (8) 1/4"ø BOLT HOLES.

DESIGN DATA

VACUUM ____ -5 PSI

EMPTY WEIGHT ____ 700 LB.

FOR PARTS AND SERVICE: • TEL: 1-800-755-4252 • FAX: (918) 234-1968

NO.	REVISION DESCRIPTION	BY	CHK	APP	DATE

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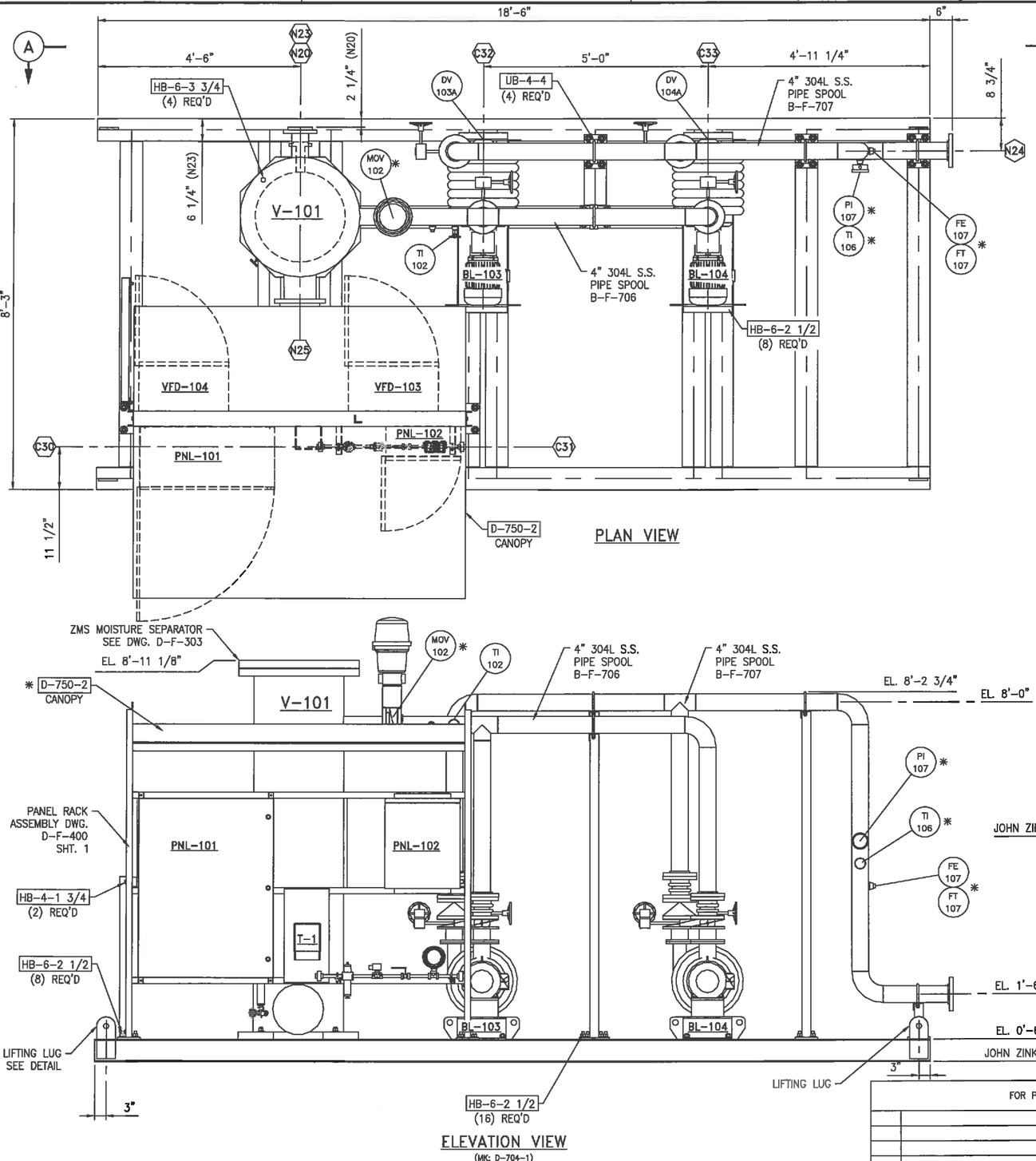
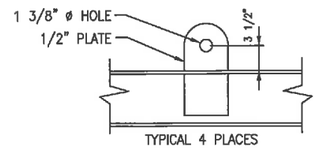
JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

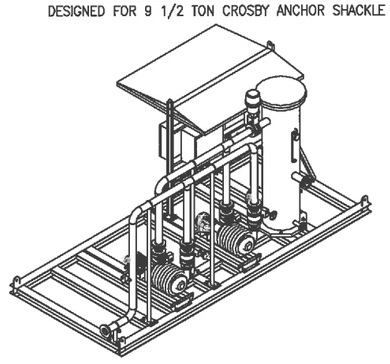
FOR: CITY OF UKIAH	ZMS MOISTURE SEPARATOR 2'-0" O.D. x 8'-0" HIGH			
USER: CITY OF UKIAH				
JOBSITE: UKIAH, CA				
	DRAWN: CFG	CHK: IM	APP: IM	SHEET: 1 OF 1
S.O. NO: BF-9161045	DATE: 06-18-15	DATE: 7-24-15	DATE: 7-24-15	
P.O. NO: 43704-00	DRAWING NUMBER: D-F-9161045-303			REV. 0
SCALE: NONE				



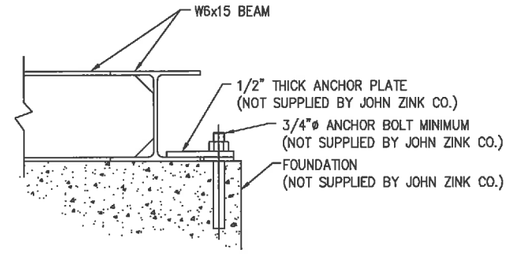


LIFTING LUG DETAIL

DESIGNED FOR 9 1/2 TON CROSBY ANCHOR SHACKLE

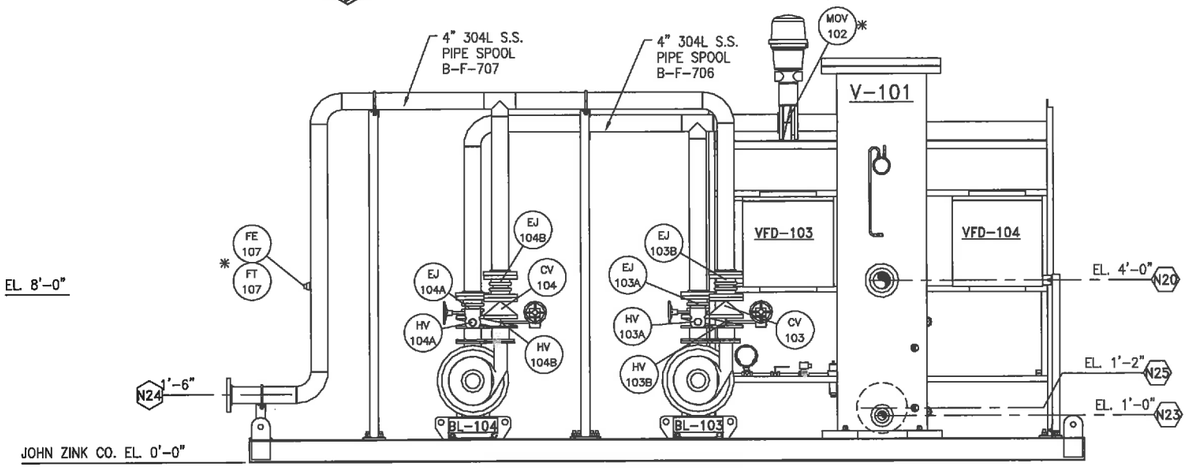


NOZZLE LEGEND		
MK	QTY	DESCRIPTION
N20	1	GAS INLET: 4" FLANGE ADAPTER WITH 150# BACK-UP RING
N23	1	CONDENSATE DRAIN: 2" FLANGE ADAPTER WITH 150# BACK-UP RING
N24	1	GAS OUTLET: 4" 150# RF FLANGE
N25	1	ACCESS NOZZLE: 8" FLANGE ADAPTER WITH 150# BACK-UP RING & BLIND FLANGE
C30	1	PILOT GAS INLET: 1/2" NPT
C31	1	PILOT GAS OUTLET: 1/2" NPT
C32	1	BLOWER DRAIN: 1/2" NPT
C33	1	BLOWER DRAIN: 1/2" NPT



SKID ANCHOR DETAIL

(TYP 4 PLACES MINIMUM)



VIEW A-A

NOTES
1. PREFIX ALL MK: NO'S WITH SALES ORDER NUMBER.
2. DO NOT BOLT THE BLOWER DOWN TIGHT. DOING SO VOIDS THE WARRANTY. BLOWERS ARE MOUNTED ON VIBRATION ISOLATION PADS.
3. WEIGHT APPROX. 12,070 LBS. (DOES NOT INCLUDE ELEVATED ZEF FLARE)
4. JOHN ZINK RECOMMENDS THAT A SPREADER BAR BE USED TO LIFT SKID
5. SKID DESIGN AND CONSTRUCTION IS IN ACCORDANCE WITH STRUCTURAL REQUIREMENTS FOR SEISMIC ZONE 4.
6. NO ELECTRICAL AREA CLASSIFICATION.
7. SKID & PIPE SUPPORTS FINISH PER SSPC-SP6 AND SHERWIN WILLIAMS ZINC CLAD DOT INORGANIC ZINC RICH PRIMER No. B69VZ20/B69VZ18/B69D11 (3-4 MILS D.F.T.)
8. IF A FOUNDATION IS UNAVAILABLE, POSITION THE SKID ON A LEVEL COMPACT GRAVEL BASE AND EITHER ANCHOR WITH STAKES OR FILL INTERIOR OF SKID FRAME ENTIRELY WITH GRAVEL.
9. *SUPPLIED BY JOHN ZINK AND SHIPPED LOOSE FOR FIELD INSTALLATION.

FOR PARTS AND SERVICE: • TEL: 1-800-755-4252 • FAX: (918) 234-1968

NO.	REVISION DESCRIPTION	BY	CHK	APP	DATE

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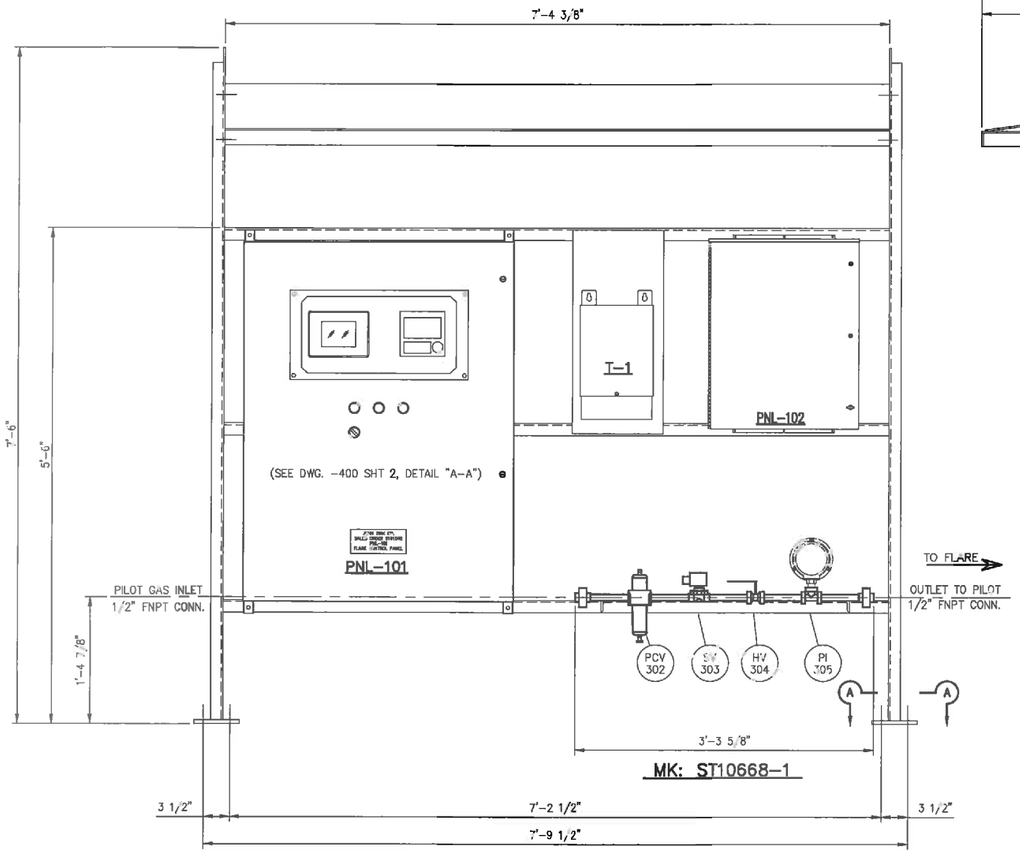
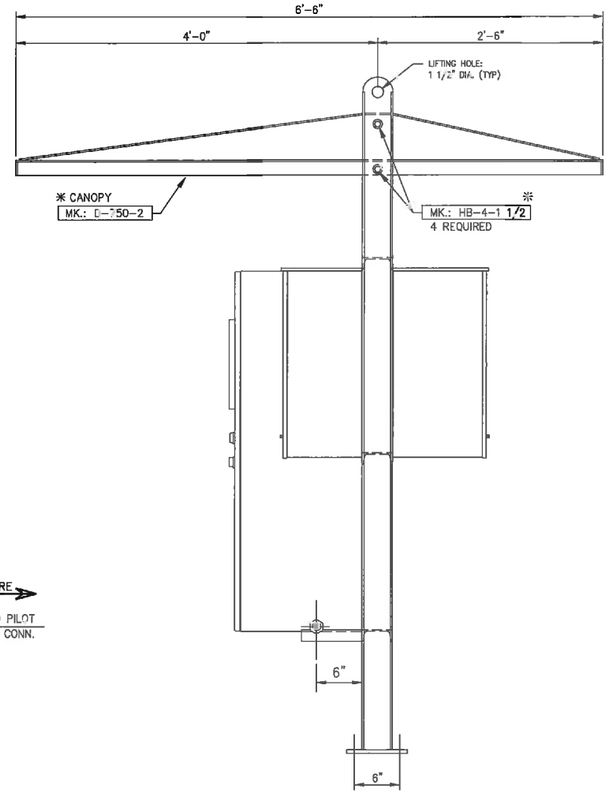
JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

FOR: CITY OF UKIAH	BLOWER SKID ASSEMBLY			
USER: CITY OF UKIAH				
JOBSITE: UKIAH, CA	DRAWN: GFG	CHK: IM	APP: IM	SHEET:
S.O. NO: BF-9161045	DATE: 06-17-15	DATE: 7-24-15	DATE: 7-24-15	1 OF 1
P.O. NO: 43704-00	DRAWING NUMBER: D-F-9161045-304			REV. 0
SCALE: NONE				

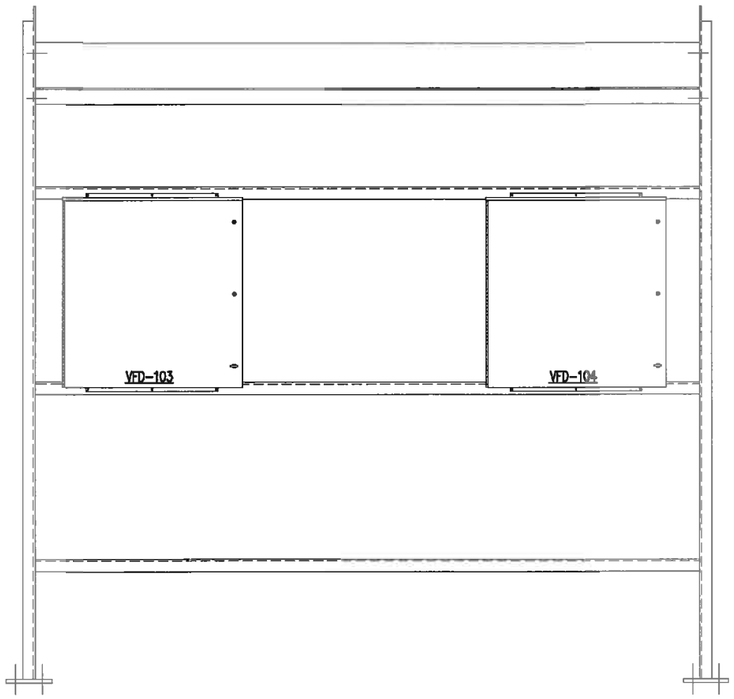


FRONT VIEW

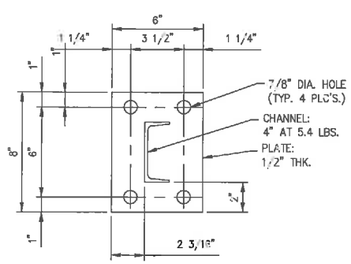
MK: D-750-1



SIDE VIEW



BACK VIEW



SECTION "A-A"

GENERAL NOTES

1. SURFACE PREPARATION: SSPC-SP-2 OR SSPC-SP-3.
   PRIME: SHERWIN WILLIAMS DTM ACRYLIC PRIMER #B66W1 2.5 TO 5.0 MILS D.F.T.
   FINISH: SHERWIN WILLIAMS STEEL SPEC ALKYD #B55-800 (ARCTIC BLUE MC89 GLOSS) 3.0 TO 5.0 MILS D.F.T.
2. ELECTRICAL AREA CLASSIFICATION: NON-HAZARDOUS.
3. * SHIP LOOSE FOR FIELD INSTALLATION.

NO.	REVISION DESCRIPTION	BY	CHK	APP	DATE

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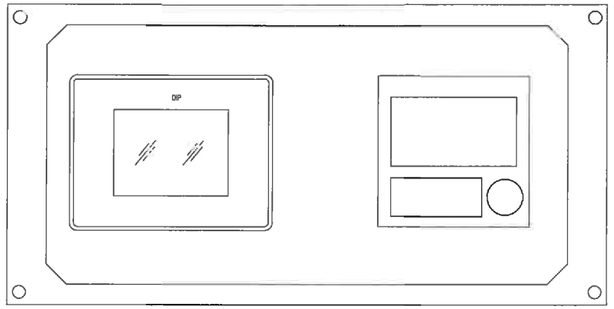
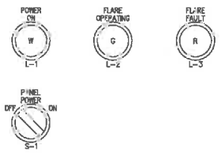
JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

FOR: CITY OF UKIAH	PR-101 PANEL RACK ASSEMBLY FOR AN ENCLOSED ZTOF FLARE SYSTEM
USER: CITY OF UKIAH	
JOBSITE: UKIAH, CA	
S.O. NO: BF-9161045	DRAWN: RPJ · DATE: 6-8-15 · CHK: IM · DATE: 7-24-15 · APP: IM · DATE: 7-24-15 · SHEET: 1 OF 2
P.O. NO: 43704-00	DRAWING NUMBER: D-F-9161045-400 · REV. 0
SCALE: NONE	



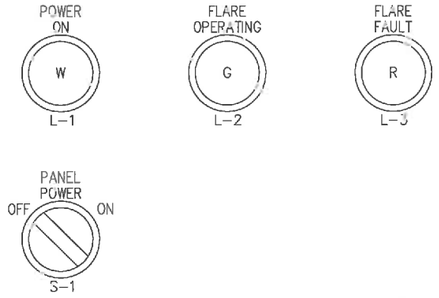


SEE DETAIL "A-A"

4'-0"

JOHN ZINK CO.
SALES ORDER 9161045
PNL-101
FLARE CONTROL PANEL

3'-0"



DETAIL "A-A"

NOTE:

1. LOCATING THE FLARE CONTROL PANEL, PNL-101, FACING NORTH IS RECOMMENDED TO IMPROVE VISIBILITY OF THE OPERATOR INTERFACE SCREEN, OIP-1.

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NO.	REVISION DESCRIPTION	BY	CHK	APP	DATE

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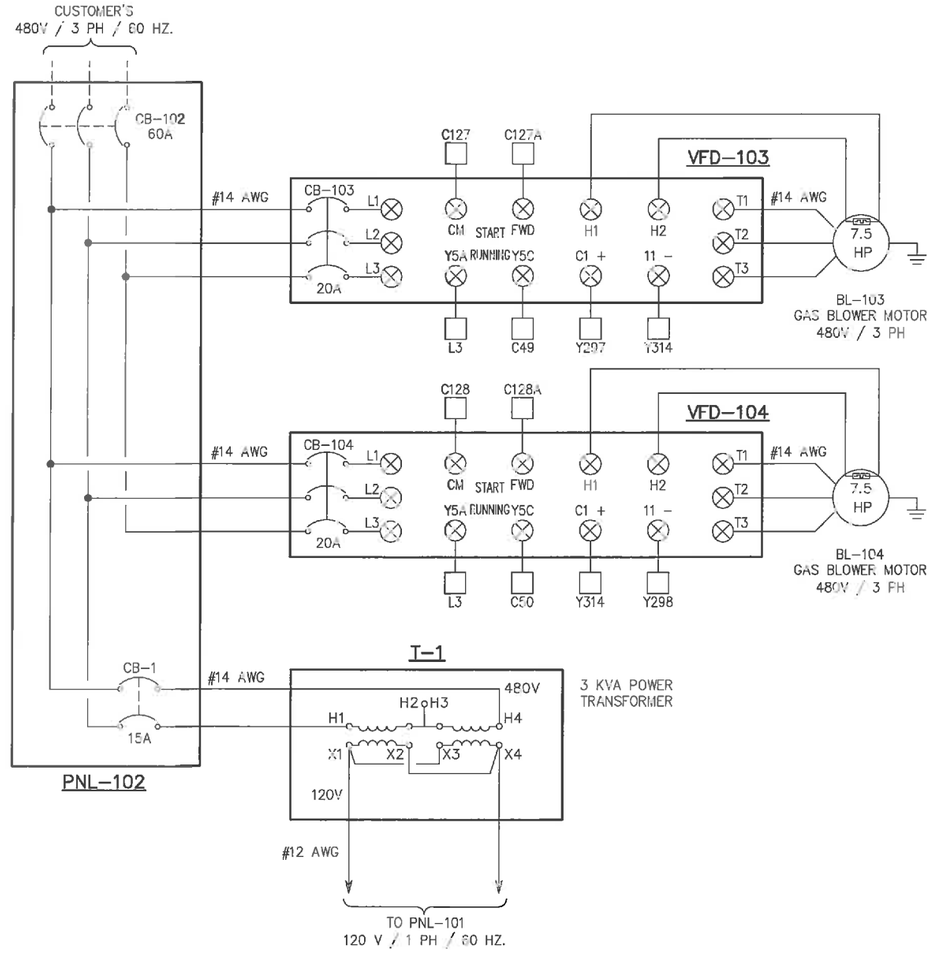
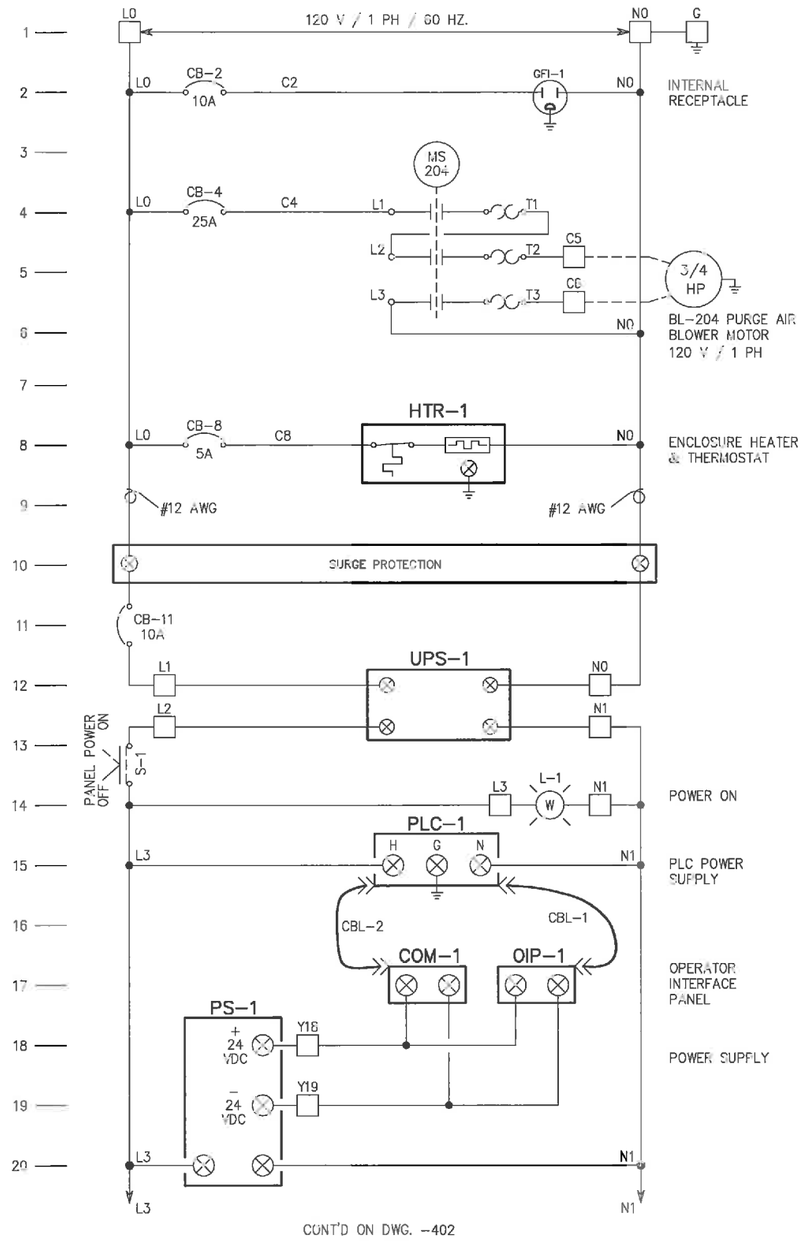
JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

FOR: CITY OF UKIAH	PANEL DETAIL (PNL-101)			
USER: CITY OF UKIAH				
JOBSITE: UKIAH, CA				
	DRAWN: RPJ	CHK: IM	APP: IM	SHEET: 2 OF 2
S.O. NO: DF-9161045	DATE: 6-8-13	DATE: 7-24-15	DATE: 7-24-15	
P.O. NO: 43704-00	DRAWING NUMBER: D-F-9161045-400			REV. 0
SCALE: NONE				





NOTES:

1. ALL WIRING TO BE AS FOLLOWS UNLESS INDICATED OTHERWISE:
   WIRE SIZING PER NEC
   MIN. 18 GA./600V/THHN OR THWN FOR CONTROL
   MIN. 18 GA./TWO CONDUCTOR SHIELDED FOR SIGNAL
2. MINIMUM FIELD CONDUIT REQUIRED:
   (1) THERMOCOUPLES
   (1) POWER – 120V
   (1) POWER – 480V
   (1) CONTROL SIGNAL
   (1) FLAME SCANNER
3. TERMINAL BLOCKS TO BE ARRANGED IN NUMERICAL ORDER.
4. PROCESSOR LOGIC PROGRAM C9161045
5. WIRING LEGEND:
   - ⊗ TERMINAL IN PANEL MOUNTED INSTRUMENTS.
   - □ TERMINAL IN FLARE CONTROL PANEL PNL-101
   - △ TERMINAL IN MOTOR CONTROL PANEL PNL-102
   - ◪ TERMINAL IN IGNITION PANEL PNL-103
   - ———— WIRING BY JOHN ZINK CO.
   - – – – – – – WIRING BY OTHERS
6. ALL WIRING COLORS TO BE AS FOLLOWS UNLESS INDICATED OTHERWISE:

120 V POWER	BLACK
120 V NEUTRAL	WHITE
GROUND	GREEN
24 V DC POWER	BLUE
24 V DC COMMON	YELLOW
SHIELDED ANALOG SIGNAL	BLACK
SHIELDED ANALOG COMMON	WHITE

7. PNL-101, PNL-102, VFD-103 & VFD-104 ARE TO BE U.L. LISTED AS INDUSTRIAL CONTROL PANELS.

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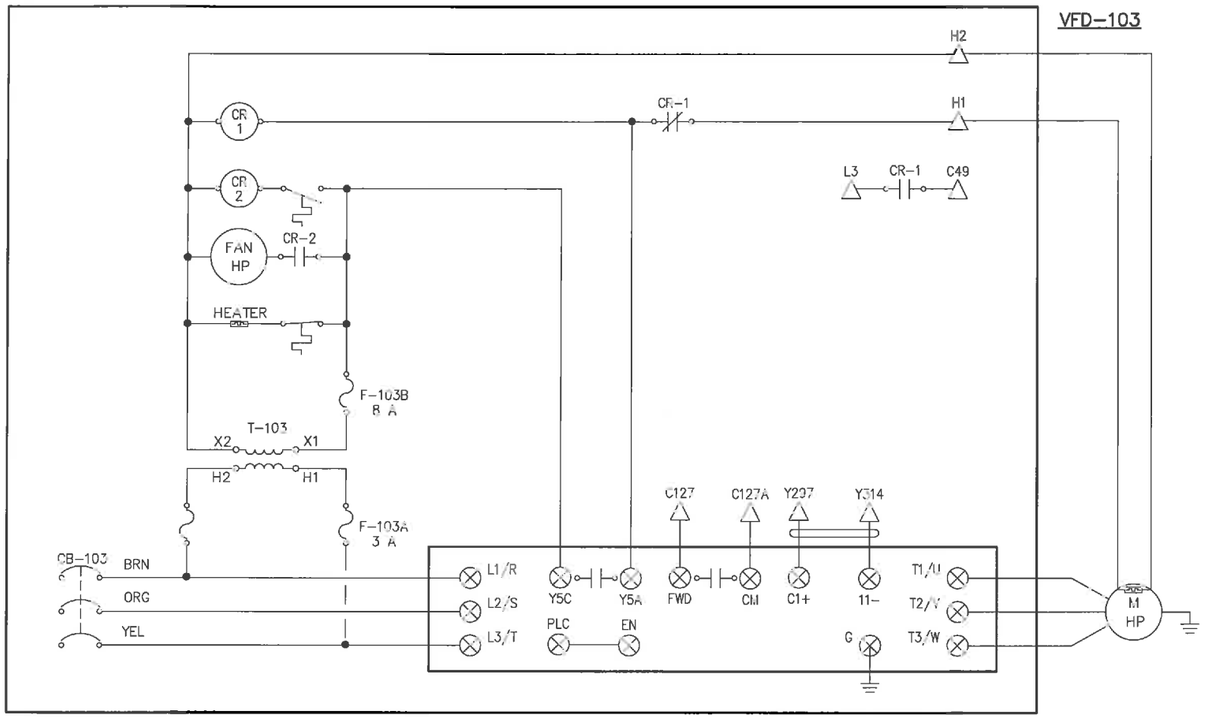
JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

FOR: CITY OF UKIAH	PNL-101 WIRING DIAGRAM FOR AN ENCLOSED ZTOF FLARE SYSTEM
USER: CITY OF UKIAH	
JOBSITE: UKIAH, CA	
S.O. NO: BF-9161045	DRAWN: RPJ / CHK: IM / APP: IM / SHEET: 1 OF 2
P.O. NO: 43704-00	DATE: 6-8-15 / DATE: 7-24-15 / DATE: 7-24-15
SCALE: NONE	DRAWING NUMBER: D-F-9161045-401 REV. 0



					FWD	CM	C1+	11–		CR–1	
VFD–103	CB–103	T–103	F–103A	F–103B	C127	C127A	Y297	Y314	L3		C49
VFD–104	CB–104	T–104	F–104A	F–104B	C128	C128A	Y314	Y298	L3		C50

NO.	REVISION DESCRIPTION	BY	CHK	APP	DATE

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JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

FOR: CITY OF UKIAH	WIRING DIAGRAM FOR A VARIABLE FREQUENCY DRIVE PANEL
USER: CITY OF UKIAH	
JOBSITE: UKIAH, CA	
S.O. NO: BF–9161045	DRAWN: RPJ · DATE: 6–8–15 · CHK: IM · DATE: 7–24–15 · APP: IM · DATE: 7–24–15 · SHEET: 2 OF 2
P.O. NO: 43704–00	DRAWING NUMBER: D–F–9161045–401 · REV: 0
SCALE: NONE	

CONT'D FROM DWG -401

BS-203

+24V BATT
GND
RFA COM
RFA ON
VH SIG
VH SC
VH +V
VH GND

Y18 CB-22 4A Y19
L3
C23 44
Y24 Y25 Y26 Y27 S28

BE-203

VH SIG RED
VH SC BLK
VH +V WHT
VH GND GRN

BSL-203 FLAME FAILURE

FLAME SCANNER (INSTALL SCANNER WIRING IN SEPARATE CONDUIT)

TSHH-201

L3 7 8 N1
TE-201 TC1 YEL + 1 4
TC2 RED − 2 5 C32 43
S33

FLARE HIGH TEMPERATURE

LSHH-101

L3 1 2 N1
4 5 C40 53

SEPARATOR HIGH LEVEL

PLC-1

L3	C42	IN0	I:0/0	COM0	N1
32 C32		IN1	I:0/1	COM1	
23 C23		IN2	I:0/2	COM2	
L3	C45	IN3	I:0/3		
ZSC-102					
L3	C46	IN4	I:0/4		
ZSO-102					
L3 PDSL-204	C47	IN5	I:0/5		
L3 MS-204 AUX.	C48	IN6	I:0/6		
L3 VFD-103 AUX.	C49	IN7	I:0/7		
L3 VFD-104 AUX.	C50	IN8	I:0/8		
		IN9	I:0/9		
		IN10	I:0/10		
40 C40		IN11	I:0/11		
		IN12	I:0/12		
		IN13	I:0/13		
		IN14	I:0/14		
		IN15	I:0/15		

REMOTE START/STOP
FLARE HIGH TEMPERATURE
FLAME PROVED
AUTOMATIC BLOCK VALVE CLOSED
AUTOMATIC BLOCK VALVE OPEN
PURGE AIR PRESSURE
PURGE AIR BLOWER
BL-103 GAS BLOWER
BL-104 GAS BLOWER
SEPARATOR HIGH LEVEL

CONT'D ON DWG -403

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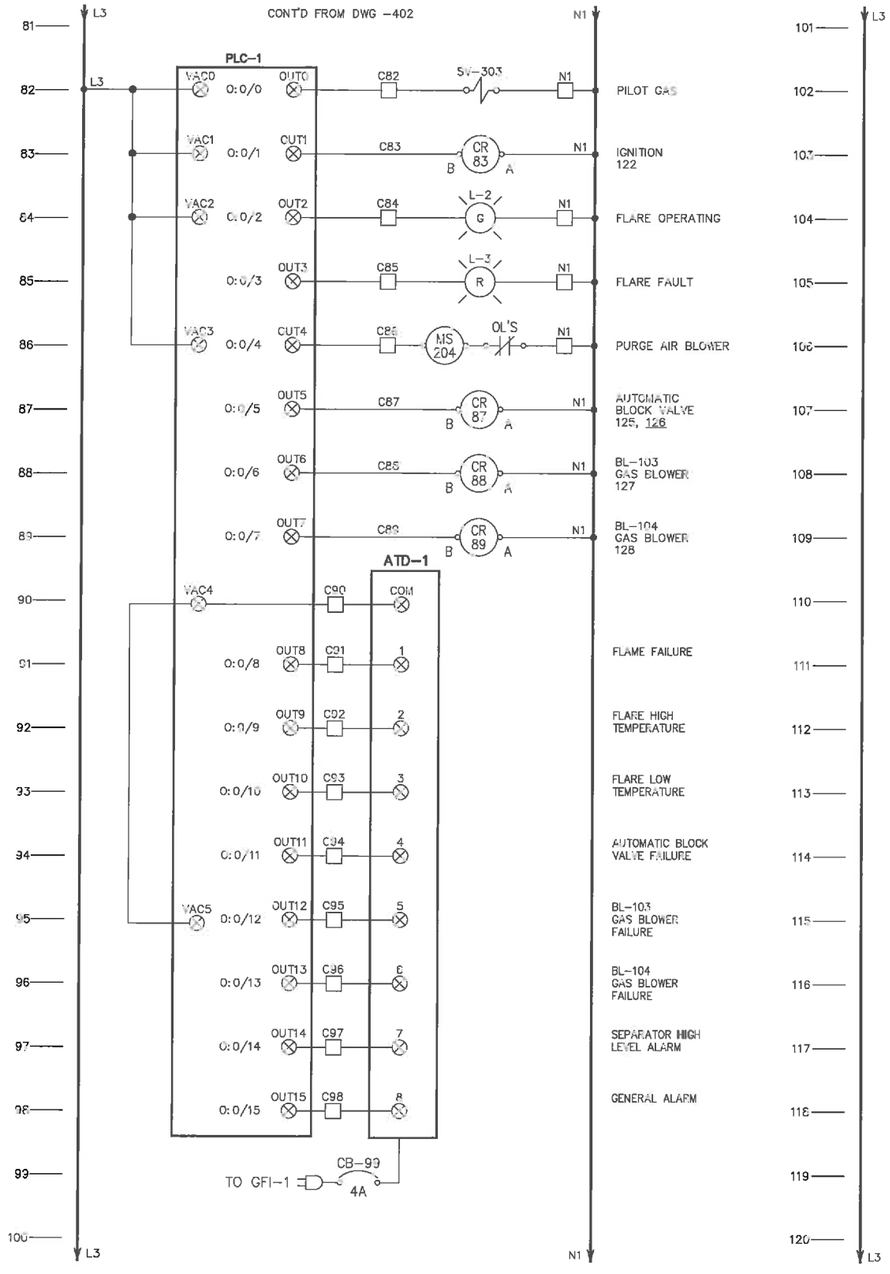
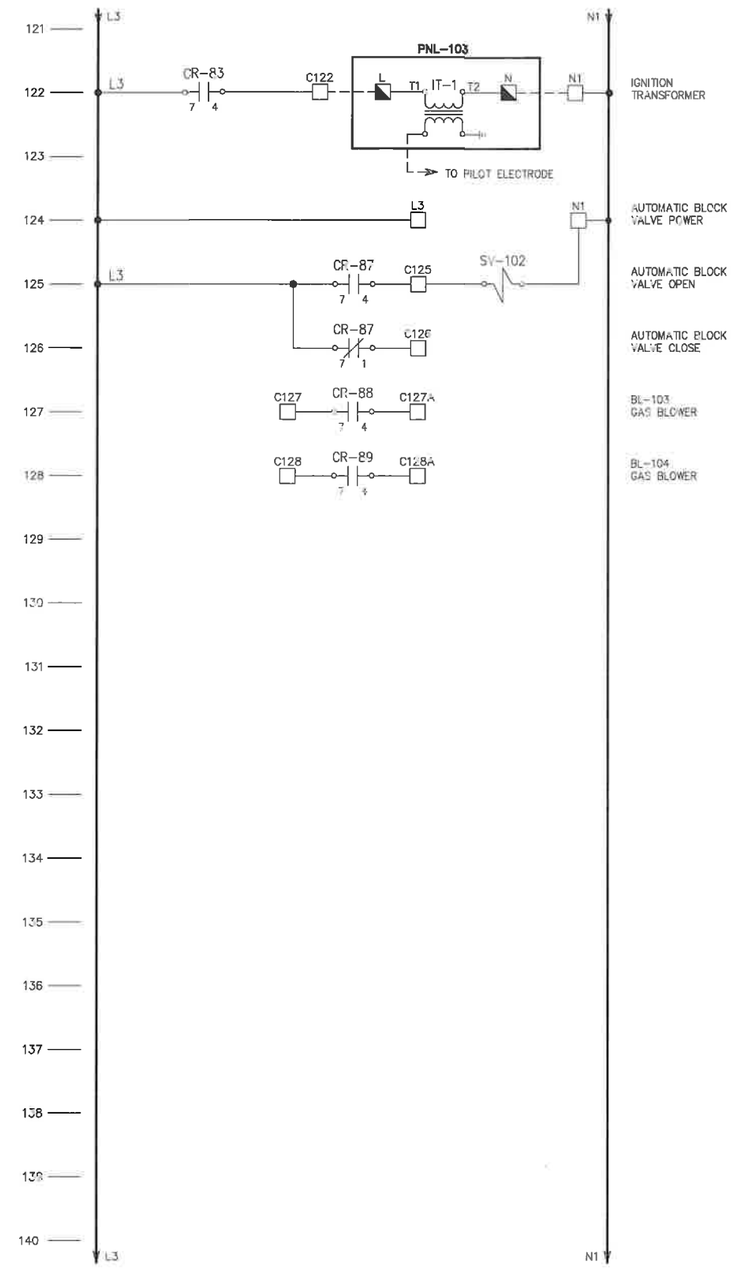
JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

FOR: CITY OF UKIAH	PNL-101 WIRING DIAGRAM FOR AN ENCLOSED ZTOF FLARE SYSTEM
USER: CITY OF UKIAH	
JOBSITE: UKIAH, CA	
S.O. NO: BF-9161045	DRWN: RPJ DATE: 6-8-15 / CHK: IM DATE: 7-24-15 / APP: IM DATE: 7-24-15 / SHEET: 1 OF 1
P.O. NO: 43704-00	DRAWING NUMBER: D-F-9161045-402 REV. 0
SCALE: NONE	





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JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

FOR: CITY OF UKIAH	PNL-101 WIRING DIAGRAM FOR AN ENCLOSED ZTOF FLARE SYSTEM
USER: CITY OF UKIAH	
JOBSITE: UKIAH, CA	
S.O. NO: BF-9161045	DRAWN: PPJ DATE: 8-8-15 · CHK: IM DATE: 7-24-15 · APP: IM DATE: 7-24-15 · SHEET: 1 OF 1
P.O. NO: 43704-00	DRAWING NUMBER: D-F-9161045-403 · REV: 0
SCALE: NONE	

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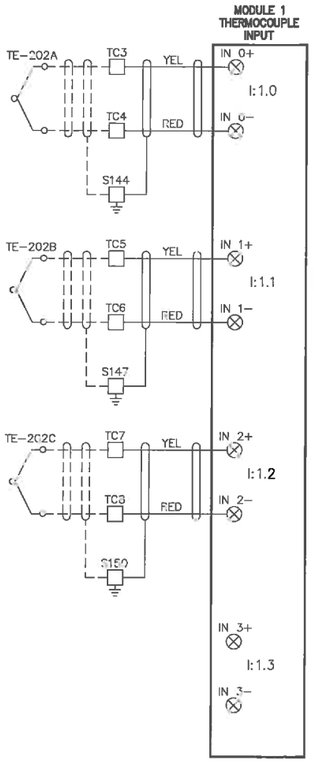
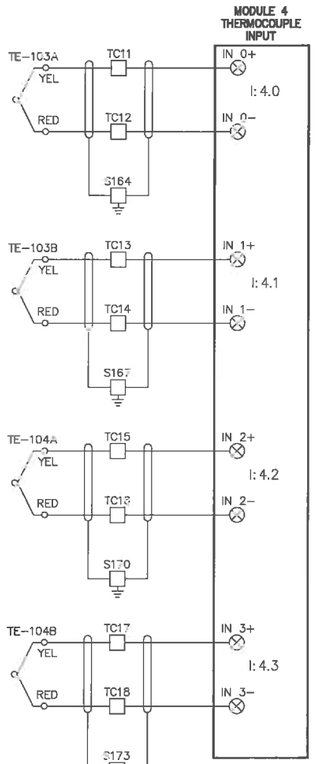


TOP FLARE TEMPERATURE

MIDDLE FLARE TEMPERATURE

BOTTOM FLARE TEMPERATURE



BL-103 BEARING THERMOCOUPLE

BL-103 BEARING THERMOCOUPLE

BL-104 BEARING THERMOCOUPLE

BL-104 BEARING THERMOCOUPLE

CONT'D ON DWG -405

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JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

FOR:	CITY OF UKIAH
USER:	CITY OF UKIAH
JOBSITE:	UKIAH, CA
S.O. NO:	BF-9161045
P.O. NO:	43704-00
SCALE:	NONE

PNL-101 WIRING DIAGRAM FOR AN ENCLOSED ZTOF FLARE SYSTEM

DRAWN:	CHK:	APP:	SHEET:
RPJ	IM	IM	1 OF 1
DATE: 6-8-15	DATE: 7-24-15	DATE: 7-24-15	

DRAWING NUMBER: D-F-9161045-404 REV. 0

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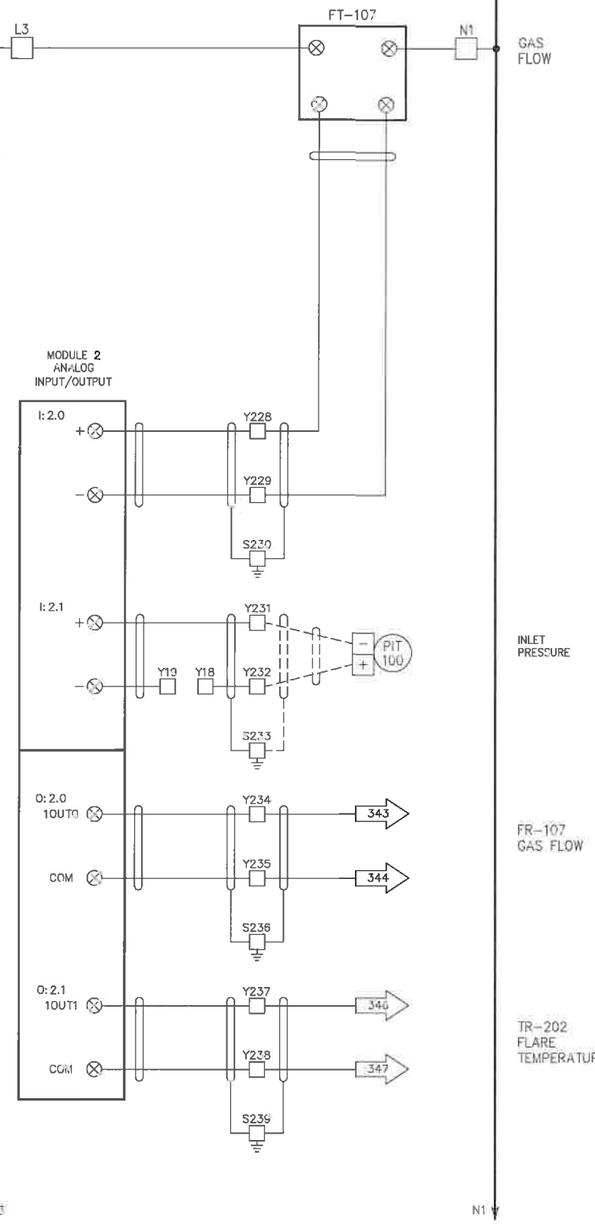

CONT'D ON DWG -406

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JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

FOR: CITY OF UKIAH	PNL-101 WIRING DIAGRAM FOR AN ENCLOSED ZTOF FLARE SYSTEM
USER: CITY OF UKIAH	
JOBSITE: UKIAH, CA	
S.O. NO: EF-9161045	DRAWN: RPJ DATE: 6-8-15 · CHK: IM DATE: 7-24-15 · APP: IM DATE: 7-24-15 · SHEET: 1 OF 1
P.O. NO: 43704-00	DRAWING NUMBER: D-F-9161045-405 · REV. 0
SCALE: NONE	

CONT'D FROM DWG -405

L3

N1

MODULE 3
ANALOG
INPUT/OUTPUT

I:3.0

Y288

VT
103

Y19

Y18

Y289

S290

I:3.1

Y291

VT
104

Y19

Y18

Y292

S293

O:3.0
10UT0

Y294

311

COM

Y295

312

S296

O:3.1
10UT1

Y297

313

COM

Y298

316

S299

BL-103
VIBRATION

BL-104
VIBRATION

AIR DAMPER
LOUVER POSITION

GAS BLOWER
FREQUENCY

L3

N1

ACTUATED
AIR DAMPER

L1

L2

294

295

TCV-202A

VFD-103

297

Y314

VFD-104

298

GAS BLOWER

CONT'D ON DWG -407

FOR PARTS AND SERVICE: • TEL: 1-800-755-4252 • FAX: (918) 234-1968

NO.	REVISION DESCRIPTION	BY	CHK	APP	DATE

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JOHN ZINK HAMWORTHY
COMBUSTION
JOHN ZINK COMPANY, LLC

FOR: CITY OF UKIAH	PNL-101 WIRING DIAGRAM FOR AN ENCLOSED ZTOF FLARE SYSTEM
USER: CITY OF UKIAH	
JOBSITE: UKIAH, CA	
S.O. NO: EF-9161045	DRAWN: RPJ DATE: 6-8-15 / CHK: IM DATE: 7-24-15 / APP: IM DATE: 7-24-15 / SHEET: 1 OF 1
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SCALE: NONE	

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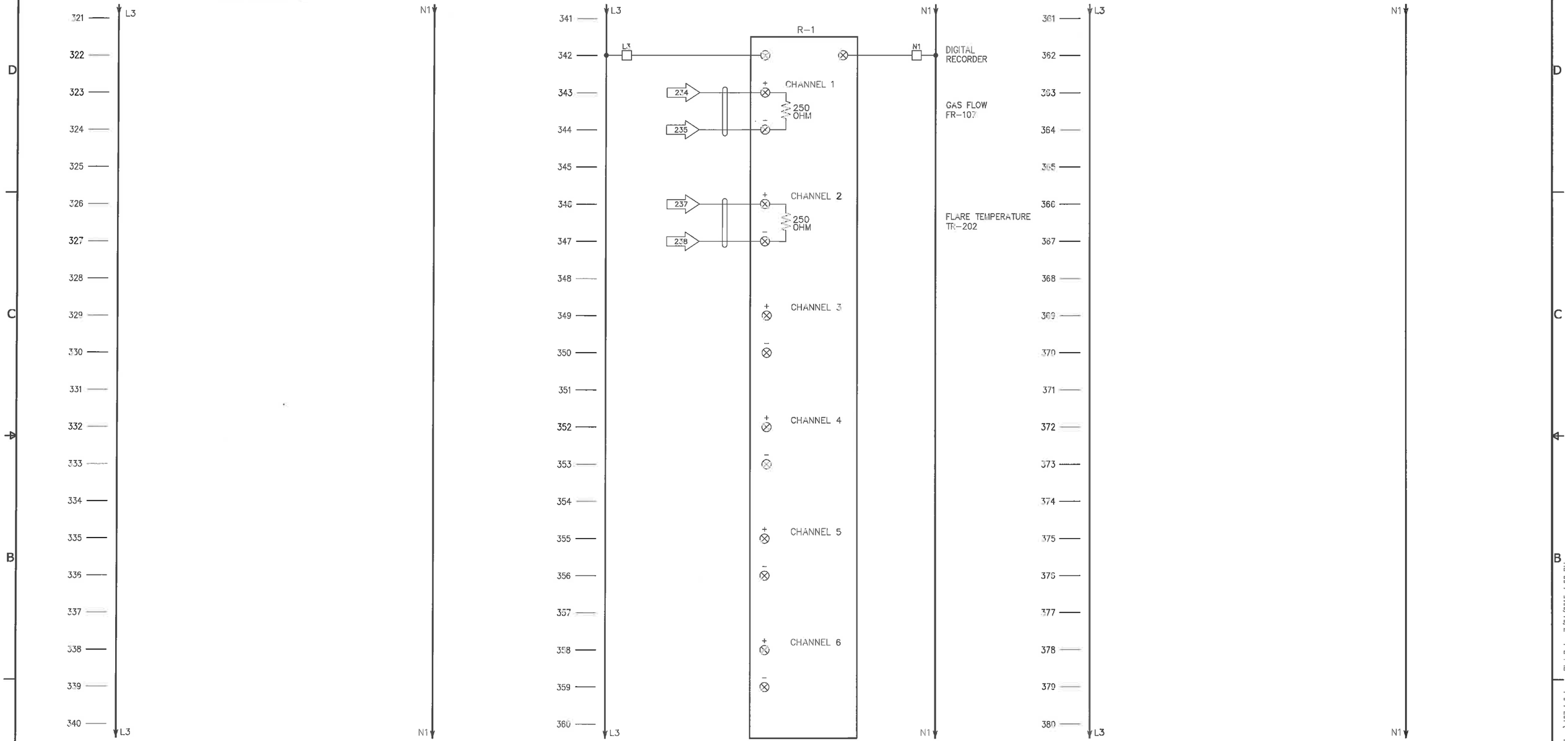

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NO.	REVISION DESCRIPTION	BY	CHK	APP	DATE

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JOHN ZINK HAMWORTHY COMBUSTION
JOHN ZINK COMPANY, LLC

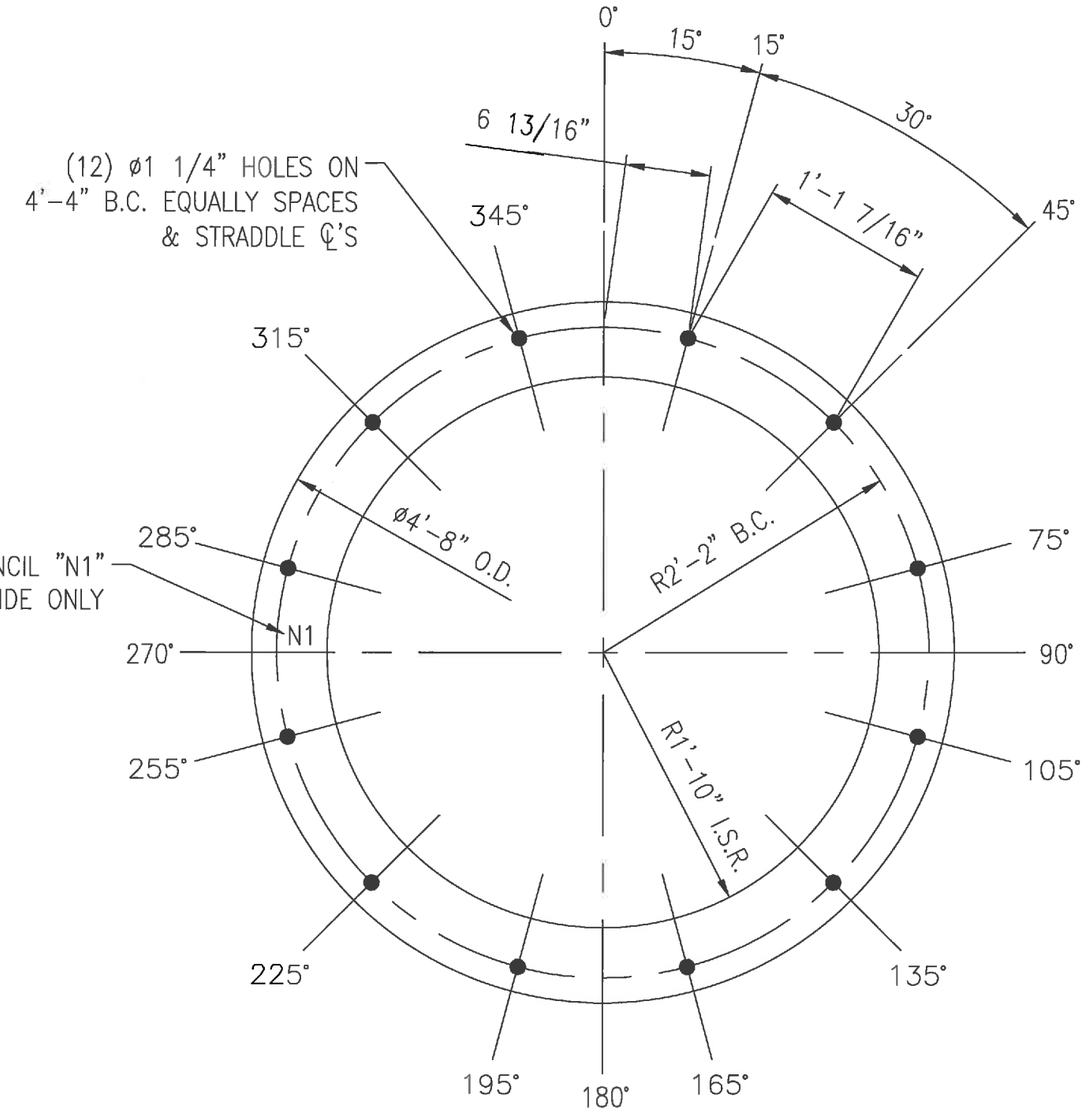
FOR: CITY OF UKIAH	
USER: CITY OF UKIAH	
JOBSITE: UKIAH, CA	
S.O. NO: BF-9161045	
P.O. NO: 43704-00	
SCALE: NONE	

PNL-101 WIRING DIAGRAM FOR AN ENCLOSED ZTOF FLARE SYSTEM

DRAWN: PPJ	CHK: IM	APP: IM	SHEET:
DATE: 6-8-15	DATE: 7-23-15	DATE: 7-24-15	1 OF 1

DRAWING NUMBER: D-F-9161045-407 REV. 0

CHORD DIMENSIONS BASED
ON 2'-2" RADIUS



MK: B-901-1

MATERIAL: 1/4" PLATE
(A-36)

NOTE:
1. TEMPORARILY TACK WELD ANCHOR BOLT TEMPLATE TO FLARE BASE PLATE AND SIMULTANEOUSLY MATCH DRILL THE BOLT HOLES IN BOTH TO ENSURE PROPER ALIGNMENT.
2. APPROXIMATE WEIGHT 67 LB.

REVISION 2	
REVISION 1	
S.O. NO.: BF-9161045	P.O. NO.: 43704-00

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ANCHOR BOLT TEMPLATE

FOR 4'-0" DIA ENCLOSED ZTOF FLARE

FOR: CITY OF UKIAH

DR.:GFG 06-18-15	CERTIFIED	DRAWING NUMBER B-F-9161045-901	REV 0
CK.:IM 7-24-15			
APP.:IM 7-24-15	DATE:	SCALE NONE	

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ATTACHMENT 2

EMISSIONS CALCULATIONS

EMISSION CALCULATIONS
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

LANDFILL GAS (LFG) PARAMETERS

Temperature:	153	F
Methane Concentration (Max):	55	percent
Methane Concentration (Min):	30	percent
Carbon Dioxide Concentration (Max):	40	percent
Carbon Dioxide Concentration (Min):	30	percent
NMOC Concentration (Max):	1200	ppmv
NMOC Molecular Weight (Assumed):	50	lbs/lb-mole
Methane Heating Value:	895	BTU/scf
LFG Molar Equivalent Volume:	379	scf/lb-mole
Methane Molecular Weight:	16	lbs/lb-mole
Total Sulfur Concentration (Assumed):	30	ppmv
SO2 Molecular Weight:	64	lbs/lb-mole

DESIGN PARAMETERS

LFG Flow Rate (at maximum conc.):	210	scfm
LFG Flow Rate (at minimum conc.):	53	scfm
Flare Efficiency:	98	percent
Residual Flare Efficiency:	2	percent
NOX Generation:	0.06	lbs/MMBTU
CO Generation:	0.2	lbs/MMBTU
Op. Temperature (Minimum):	1400	F
Op. Temperature (Expected):	1600	F

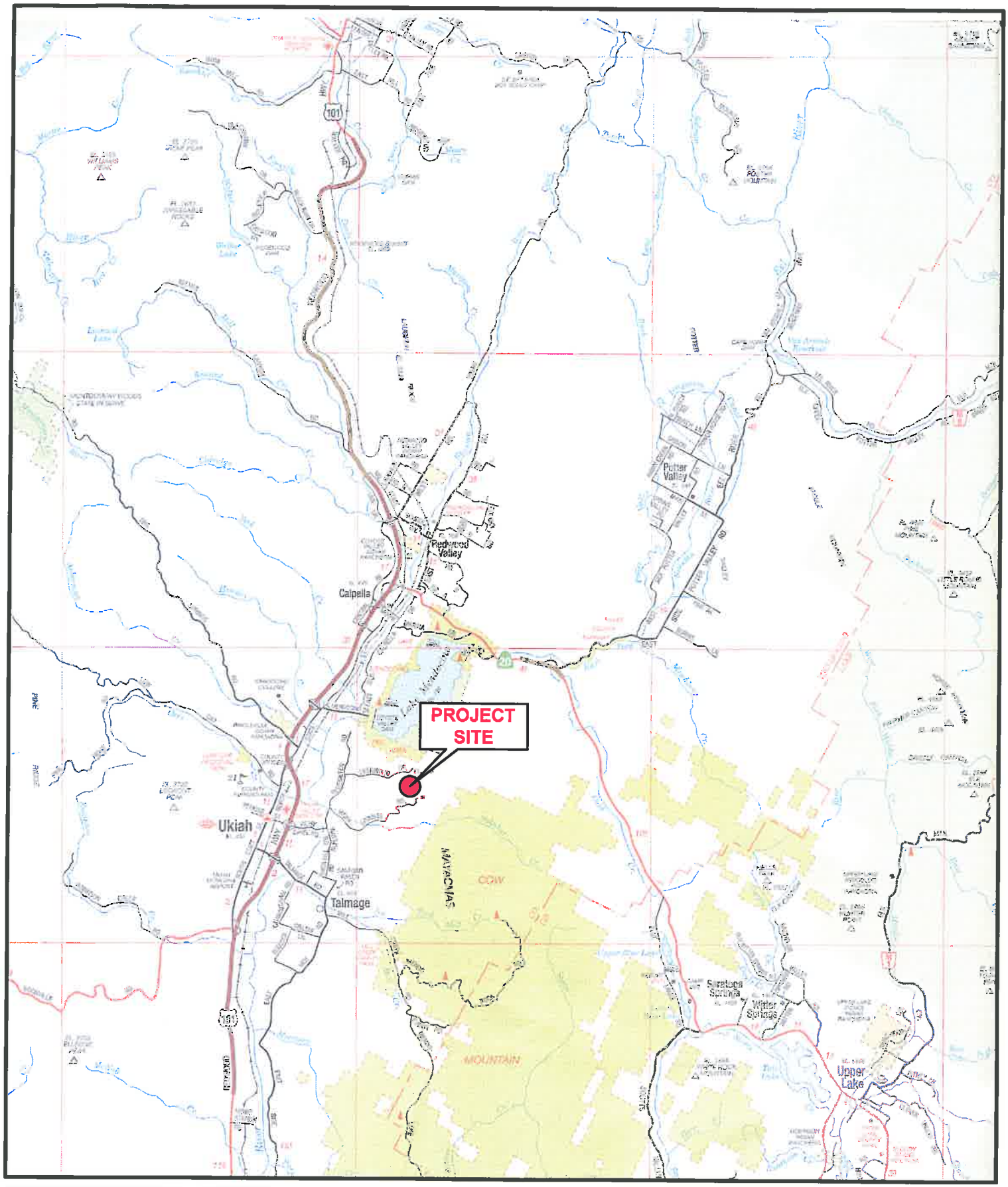
HEATING VALUE CHARACTERISTICS

Max LFG Heating Value = Methane Heating Value x Max Methane Concentration:	492.3	BTU/scf (Higher Heat Value)
Min LFG Heating Value = Methane Heating Value x Min Methane Concentration:	268.5	BTU/scf (Higher Heat Value)
Max LFG Heat Release = Max LFG Flow Rate x Max LFG Heating Value:	6.2	MMBTU/hr
Min LFG Heat Release = Min LFG Flow Rate x Min LFG Heating Value:	0.9	MMBTU/hr

	@ Maximum Influent Methane Concentration	@ Minimum Influent Methane Concentration
METHANE EMISSION CALCULATIONS		
Hourly Methane Generation Rate (scf/hr) = LFG Flow Rate x Methane Concentration:	6930 scf/hr	954 scf/hr
Hourly Methane Emission Rate (scf/hr) = Hourly Methane Generation Rate x Residual Flare Efficiency:	138.6 scf/hr	19.08 scf/hr
Hourly Methane Emission Rate (lb-mole/hr) = Hourly Methane Emission Rate (scf/hr) / LFG Molar Equivalent Volume:	0.366 lb-mole/hr	0.050 lb-mole/hr
Hourly Methane Emission Rate (lbs/hr) = Hourly Methane Emission Rate (lb-mole/hr) x Methane Molecular Weight:	5.9 lbs/hr	0.81 lbs/hr
NMOC EMISSION CALCULATIONS		
Hourly NMOC Generation Rate (scf/hr) = LFG Flow Rate x NMOC Concentration:	15 scf/hr	4 scf/hr
Hourly NMOC Emission Rate (scf/hr) = Hourly NMOC Generation Rate x Residual Flare Efficiency:	0.3024 scf/hr	0.07632 scf/hr
Hourly NMOC Emission Rate (lb-mole/hr) = Hourly NMOC Emission Rate (scf/hr) / LFG Molar Equivalent Volume:	0.00080 lb-mole/hr	0.00020 lb-mole/hr
Hourly NMOC Emission Rate (lbs/hr) = Hourly NMOC Emission Rate (lb-mole/hr) x NMOC Molecular Weight:	0.04 lbs/hr	0.01 lbs/hr
SO2 EMISSION CALCULATIONS		
Hourly Sulfur Generation Rate (scf/hr) = LFG Flow Rate x Total Sulfur Concentration:	0.378 scf/hr	0.095 scf/hr
Total Sulfur to SO2 Conversion = Hourly Total Sulfur Generation Rate (scf/hr) x Flare Efficiency:	0.370 scf/hr	0.093 scf/hr
Hourly SO2 Emission Rate (lb-mole/hr) = Hourly SO2 Emission Rate (scf/hr) / LFG Molar Equivalent Volume:	0.0010 lb-mole/hr	0.0002 lb-mole/hr
Hourly SO2 Emission Rate (lbs/hr) = Hourly SO2 Emission Rate (lb-mole/hr) x SO2 Molecular Weight:	0.06 lbs/hr	0.02 lbs/hr
NOX EMISSION CALCULATIONS		
Hourly NOX Emission Rate (lbs/hr) = NOX Generation x LFG Heat Release:	0.37 lbs/hr	0.05 lbs/hr
CO EMISSION CALCULATIONS		
Hourly CO Emission Rate (lbs/hr) = CO Generation x LFG Heat Release:	1.2 lbs/hr	0.17 lbs/hr

ATTACHMENT 3

FACILITY DRAWINGS



EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

LOCATION MAP

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

FIGURE
1
02-907

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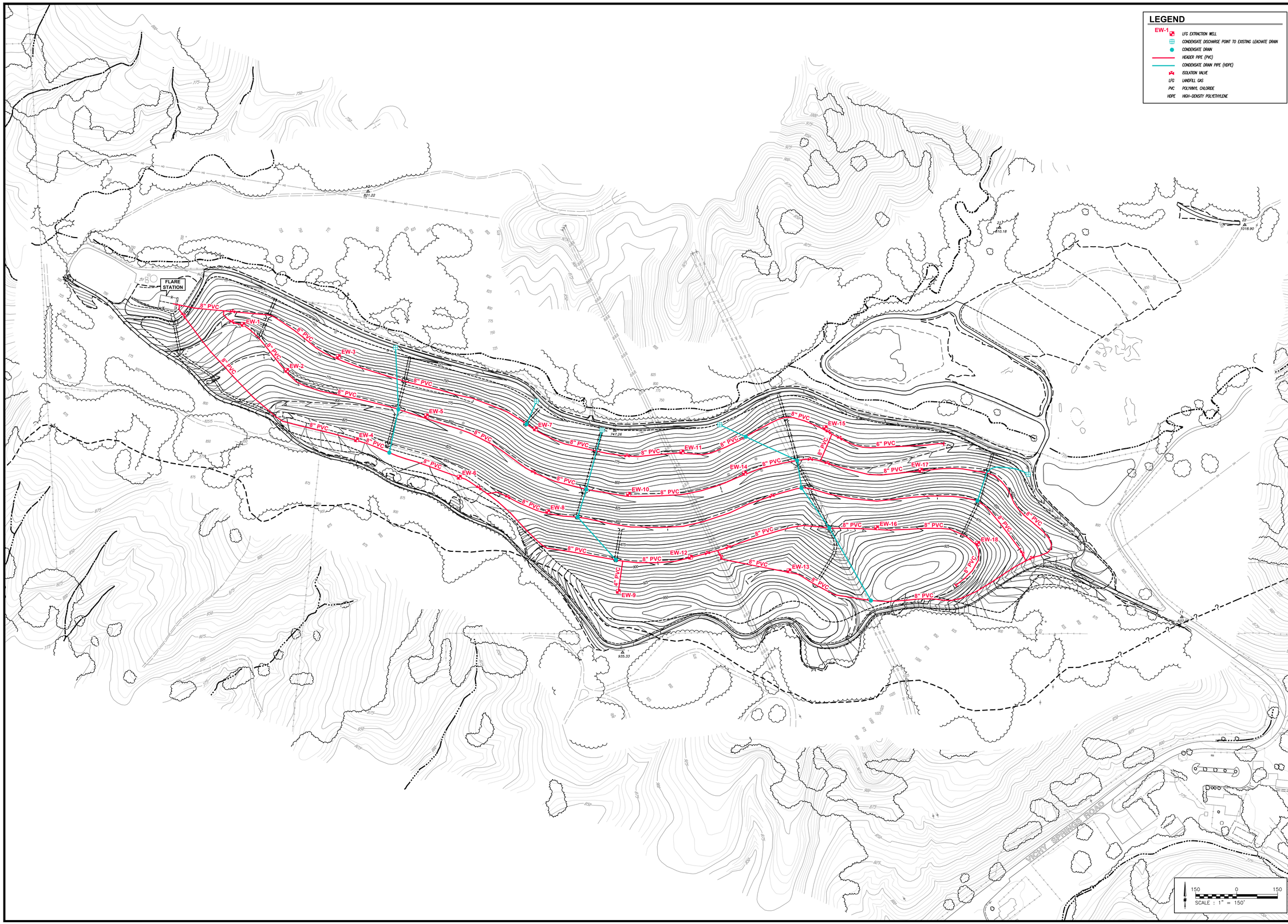

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SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

LFG COLLECTION AND CONTROL SYSTEM LAYOUT

UKIAH LANDFILL
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

1	
2	
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Job No:	02-907
Drawn By:	SGH
Checked By:	MD
Date:	2013-10-03

Figure

2

Xrefs: X-Ref - EG - 2013.dwg X-Ref - Finished Grade - Design.dwg
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APPENDIX E

SPECIAL STATUS PLANT SURVEY REPORT

SPECIAL STATUS PLANT SURVEY REPORT

Ukiah Landfill Closure
City of Ukiah, Mendocino County, California
(APN: 027-0200069)

DRAFT

July 22, 2015

Prepared for:
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Appendix A: Special Status Plant List
Appendix B: List of plants, mosses and lichens observed

INTRODUCTION

This report and attachments presents the results of seasonal protocol level surveys conducted for special status plants for the Ukiah Landfill Closure Project located at 3100 Vichy Springs Road, Ukiah, Mendocino County, CA. This work was conducted on behalf of the City of Ukiah, who is the project proponent or applicant. The assessor parcel number (APN) for the project study area is 027-020-069. This report is an addendum to the Biological Resource Assessment report prepared by Wildlife Research Associates and Jane Valerius Environmental Consulting for the City of Ukiah dated May 27, 2015.

The Ukiah Landfill Closure project is located approximately three miles east of Ukiah in Mendocino County, California and is located on the Ukiah USGS 7.5-minute quadrangle. The Landfill occupies approximately 40 acres of permitted landfill area on a 284-acre parcel. The Landfill has been graded to form a series of flat terraces stepping down from south to north. The project study area included a 50-foot buffer around the landfill and included some natural oak woodland communities, constructed ponds and natural creek channels.

The proposed project includes closure of the Landfill which will be performed in accordance with the applicable regulatory standards prescribed in the California Code of Regulations (CCR) [i.e., 27 CCR, Chapters 3 and 4 and CFR, Subpart F]. The components and systems required for closure of the Landfill include the final cover and grading design to control storm water, potential infiltration and accommodate future settlement, drainage and erosion control systems, landfill slope stability, landfill gas (LFG) control systems, leachate control systems, and construction quality assurance (CQA).

METHODS

As required by the California Department of Fish and Wildlife (CDFW), plant surveys were conducted during the time of year when special status plants are most identifiable, which is typically when they are in flower. Prior to the site visit a search of the U. S. Fish & Wildlife Service (USFWS) quadrangle species lists (USFWS 2015), California Natural Diversity Data Base (CNDDB) (CNDDB 2015) and the California Native Plant Society (CNPS) (CNPS 2015) on-line electronic inventory was conducted for the 9-quadrangle search around the Ukiah 7.5-minute USGS quadrangle. A list of special status plant species known to occur in the area based on these data base searches is provided as Appendix A.

Surveys were conducted throughout the 2015 blooming window, capturing an entire blooming season. Site visits were conducted from spring to early summer, a period broad enough to include know blooming and fruiting times of potentially occurring special status plant species and also encompassing the blooming period of early annuals, wetland plants and late blooming herbaceous perennial species. These surveys took place on April 15, 21 and 29, May 19 and 22 and June 30, 2015. The survey was floristic in nature and took into account all vascular plant species, lichens and mosses encountered. The entire project area was covered on foot as thoroughly as possible so that all representative habitat types, topographic features and aspects were investigated. Material that could not be identified in the field was collected so that a determination could be made at a later time using a dissecting scope and reference materials. Mosses were collected and sent to a moss expert for identification. Sensitive plant communities were identified mapped and described. A complete list of vascular plant species, mosses and lichens were recorded (Appendix B) along with habitat and plant community characteristics.

RESULTS

Plant Communities

Nomenclature for vegetation types follows *The Manual of California Vegetation* Second Edition (Sawyer, et. al. 2009) where applicable. Nine vegetation communities occur within the project study area. These are: 1) *Avena (barbata, fatua)* semi-natural herbaceous stands or wild oats grasslands; 2) ruderal forbs; 3) *Nasella pulchra* herbaceous alliance or purple needle grass grassland; 4) *Quercus douglasii* woodland alliance or blue oak woodland; 5) *Arctostaphylos manzanita* provisional shrubland alliance or manzanita chaparral; 6) *Salix exigua* shrubland alliance or sandbar willow thickets; 7) *Eleocharis macrostachya* herbaceous alliance or pale spike rush marshes; 8) *Typha angustifolia* herbaceous alliance or cattail marshes; and 9) seasonal wetlands.

1) Wild oats grasslands is the dominant vegetation type within the project study area as this type covers most of the landfill area, borrow area and roadsides. The wild oats grassland is mixed in with the ruderal forbs type. The revegetated portions of the landfill have a mixture of non-native grasses and in some areas non-native forbs (ruderal forbs) are dominant. Plant species commonly found in the wild oats grasslands include wild oats (*Avena barbata, A. fatua*), rip-gut brome (*Bromus diandrus*), soft chess (*Bromus hordaceus*), hare barley (*Hordeum murinum* ssp. *leporinum*), Harding grass (*Phalaris aquatica*), orchard grass (*Dactylis glomerata*), ryegrass (*Festuca perennis*), tall fescue (*Festuca arundinacea*) and rattail fescue (*Festuca myuros*). A few native grass species were also noted in this type including purple needle grass (*Nasella pulchra*), California oatgass (*Danthonia californica*) and six weeks fescue (*Festuca microstachys*). A variety of non-native forb species also occur in this type including hairy vetch (*Vicia villosa*), cut-leaf plantain (*Plantago coronopus*), yellow star thistle (*Centaurea solsititalis*), European umbrella milkwort (*Tolpis barbata*), yellow glandweed (*Parentucellia viscosa*), Mediterranean linseed (*Bellardia trixago*), rose clover (*Trifolium hirtum),* filarees (*Erodium cicutarium, E. botrys*), and rough cat's-ear (*Hypochaeris radicata*). Native forb species included blow wives (*Achyrachaena mollis*), erect plantain (*Plantago erecta*), suncups (*Taraxia ovata*), blue-eyed grass (*Sisrynchium bellum*), soaproot (*Chloragalum pomeridianum*), Pacific sanicle (*Sanicula crassicaulis*), and California buttercup (*Ranunculus californicus*).

2) Ruderal forbs dominate the area on northeastern portion of the project study area in the flat area of the former borrow pit. This area is dominated primarily by non-native forb species such as European umbrella milkwort, lesser hawbit (*Leontodon taraxacoides* ssp. *taraxacoides*), cut-leaf plantain, hairy vetch, yellow star thistle, and rough cat's-ear.

3) Purple needle grass grassland was mapped in several locations in the borrow pit area. Small areas of purple needlegrass occur in other locations on the site but are not large enough to map separately as a stand along grassland community. The areas on the borrow site were large enough to map and identify as a separate plant community.

4) Blue oak woodland occurs along the southern portion of the project study area and also occurs along the northern bank of the unnamed creek that forms the northern boundary of the study area. Blue oak (*Quercus douglasii*) are the dominant species. Other trees and shrubs noted include interior live oak (*Quercus wislenzi* var. *wislizeni*), coast live oak (*Quercus agrifolia*), black oak (*Quercus kelloggii*), Shreve oak (*Quercus parvula* var. *shrevei*), buckeye (*Aesculus californica*), madrone (*Arbutus menziesii*), coyote brush (*Baccharis pilularis*), manzanita (*Arctostaphylos manzanita* ssp. *glaucescens*), toyon (*Heteromeles arbutifolia*), buckbrush (*Ceanothus cuneatus*), mountain mahogany (*Cercocarpus betuloides)* and poison oak (*Toxicodendron diversilobum*). A diversity of native grasses are found in this type include onion grass (*Melica geyeri, M. torreyana*), blue wildrye (*Elymus glaucus*), Nevada bluegrass (*Poa secunda*) and native fescues (*Festuca rubra and F. idahoensis*). Native forbs include blue dicks (*Dichelostemma capitatum*), for-toothed ookow (*Dicelstemma congestum*), Ithuriels' spear (*Triteleia laxa*), phacelia (*Phacelia* sp.), Pacific sanicle, soaproot, Diogene's lantern (*Calochortus amabilis*), farewell to spring (*Clarkia gracilis*) and fringed checkerbloom (*Sidalcea diploscypha*).

5) Manzanita chaparral occurs primarily on the northern portion of the study area along the north bank of the unnamed creek. Whiteleaf manzanita (*Arctostaphylos manzanita* ssp. *glaucescens*) is dominant and includes other chaparral shrub species such as toyon, buckbrush, coyote brush, mountain mahogany, chamise (*Adenostoma fasciculatum*), sticky monkeyflower (*Mimulus aurantiacus*), and snowberry (*Symphoricarpos albus* var. *laevigatus)*. A variety of native and non-native grasses and forbs occur as understory species including blue-eyed grass, Douglas iris (*Iris douglasiana*), phacelia, hound's tongue (*Cynoglossum grande*), blue dicks, farewell to spring, and Ithuriel's spear.

6) Sandbar willow thickets occur along unnamed creek that forms the northern boundary of the study area. Sandbar willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*) are dominant. Other tree and shrub species include valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), madrone, manzanita, coyote brush, Himalayan blackberry (*Rubus armeniacus*) and poison oak. Herbaceous wetland plants noted within the creek bed include scouring rush (*Equisetum hymale*), rushes (*Juncus patens, J mexicanus, J. balticus ssp. ater*), foothill sedge (*Carex tumulicola)*, pale spike rush (*Eleocharis macrostachya*) and cattails (*Typha angustifolia*).

7) Pale spike rush marshes occur along the pond margins along with the cattail marsh types and also within vegetated sections of the unnamed creek channel in the eastern portion of the study area. The dominant species is pale spike rush. Other wetland plants noted include pennyroyal (*Mentha pulegium*), curly dock (*Rumex crispus*), umbrella sedge (*Cyperus eragrostis*), rushes and water plantain (*Alisma sp.*).

8) Cattail marshes occur in conjunction with the pale spike rush vegetation type and include the same species. Narrowleaf cattail (*Typha angustifolia*) is dominant and can be a monotypic community type.

9) Seasonal wetlands were mapped in four areas in the eastern portion of the study area. Three seasonal wetlands were mapped in the borrow area and one occurs along the entrance road on the southeastern side of the project study area. Seasonal wetlands occur as relatively small depressions in the flatter areas of the borrow area. The one along the road appears to have developed as a result of water flowing along the inside portion of the roadway. Plant species noted in these areas include pennyroyal, cocklebur (*Xanthium strumarium*), rabbitsfoot grass (*Polypogon monspeliensis*), small quaking grass (*Briza minor*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), hyssop loosestrife (*Lythrum hyssopifolium*) and cut-leaf plantain.

Special Status Plants

Review of the USFWS (USFWS 2015), the CDFW, and the CNDDB (CNDDB 2015) revealed that nine (9) federally listed plant species, one (1) federal candidate, three (3) state-listed species and twenty-two (22) CNPS ranked species have potential to occur in the area. There are no coastal dunes, coastal prairie, coastal scrub, coastal bluff scrub, volcanic ash flow vernal pools, lower montane coniferous forest, upper montane coniferous forest, North Coast coniferous forest, or closed-cone coniferous forest and no serpentinite within the project area that would provide habitat for many of these species. Although potential habitat occurs in the project area for many of the special status plant species known to occur in the area none were found during the protocol level seasonal plant surveys.

A total of 255 vascular plants and 41 mosses and lichens were observed during the April, May and June 2015 plant surveys (Appendix B). These 296 species represent 73 plant families. There was a high diversity of species even within the grassland areas of the landfill. The pond wetland areas actually have a low diversity of species, most of which are native species, but the ponds provide aquatic habitat which has high wildlife value. The creeks on the site have a diversity of both wetland and non-wetland species, most of which are native species, and also provide valuable wildlife habitat including habitat for the state listed foothill yellow-legged frog.

No special status plant species were found during the seasonal and protocol level plant surveys conducted for the project study area. In spite of the drought occurring in the region plants were in flower and 255 vascular plants were recorded along with 41 mosses and lichens. The surveys were conducted during the time of year when special status plants would have been identifiable. Based on the surveys the site does not support any special status plants are none are expected to occur on the site.

The purple needle grass grassland is a special status vegetation community. This type occurs on the slopes of the existing former borrow area in the northeast portion of the study area. The sandbar willow thickets, cattail marsh, pale spike rush marshes and seasonal wetland areas are wetland vegetation types and even though they do not have a special status designation they are regulated by the Corps, RWQCB and CDFW and therefore are considered to be sensitive natural communities and any impacts to these communities type will require mitigation if any impacts occur to these vegetation types.

REFERENCES

California Department of Fish and Wildlife (CDFW). 2015. Records search of the California Natural Diversity Database. March 2015.

California Native Plant Society (CNPS). 2015. On-line electronic inventory of rare and endangered plants of California, 7th Edison. www.cnps.org

U.S. Fish and Wildlife Service (USFWS). 2105. Threatened and endangered species system (TESS) and candidate species as of 5/2015.

APPENDIX A:

Potentially Occurring Special-Status Plant Species in the Ukiah Sanitary Landfill Closure Study Area.

Scientific Name Common Name	Status USFWS/ CDFG/ CNPS Rank	Habitat Affinities and Blooming Period	Occurrence Potential
Arabis macdonaldiana McDonald's rock-cress	FE/CE/1B	Lower montane coniferous forest, upper montane coniferous forest on serpentinite. Blooms May to July. Elevation: 135-1800m.	None. No habitat on site.
Arctostaphylos stanfordiana ssp. *raichei* Raiche's manzanita	-/-/1B	Chaparral, lower montane coniferous forest (openings)/rocky, often serpentinite. Blooms February to April. Elevation: 450-1000m.	None. Potential chaparral habitat on site but not observed during surveys.
Arctostapylos canescens ssp. *sonomensis* Sonoma canescent manzanita	-/-/1B	Chaparral, lower montane coniferous forest/sometimes serpentinite. Blooms January to June. Elevation: 180-1675m.	None. Potential chaparral habitat on site but not observed during surveys.
Arenaria paludicola Marsh sandwort	FE/CE/1B	Marshes and swamps (freshwater or brackish), sandy, openings. Blooms May to August. Elevation 3-170m.	None. Potential freshwater marsh habitat on site but not known from Mendocino County. Not observed during surveys.
Astragalus breweri Brewer's milk-vetch	-/-/4	Chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland (open, often gravelly)/often serpentinite, volcanic. Blooms April to June. Elevation 90-730m.	None. Potential chaparral, cismontane woodland and grassland habitat on site but not observed during surveys.
Brasenia schreberi Watershield	-/-/2B	Marshes and swamps/freshwater. Blooms June to September. Elevation: 30-2200m.	None. Potential freshwater marsh habitat on site. Not observed during surveys.
Carex comosa Bristly sedge	-/-/2B	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland. Blooms May to September. Elevation: 0-625m.	None. Potential marsh and grassland habitat on site. Not observed during surveys
Ceanothus confusus Rincon Ridge ceanothus	-/-/1B	Closed-cone coniferous forest, chaparral, cismontane woodland/volcanic or serpentinite. Blooms February to June. Elevation: 75-1065m.	None. Potential chaparral and cismontane habitat on site but not observed during surveys.
Chorizanthe howellii Howell's spineflower	FE/CE/1B	Coastal dunes, coastal prairie, coastal scrub. Blooms May to July. Elevation: 0-35m.	None. No habitat on site.
Cuscuta jepsonii Jepson's dodder	-/-/1B	North Coast coniferous forest/streambanks. Blooms July to September. Elevation: 1200-2300m.	None. No habitat on site.

Scientific Name Common Name	Status USFWS/ CDFG/ CNPS Rank	Habitat Affinities and Blooming Period	Occurrence Potential
Entosthodon kochii Koch's cord moss	-/-/1B	Cismontane woodland (soil). Elevation: 180-1000m.	None. Potential cismontane woodland habitat on site. Not observed during surveys.
Eriogonum kelloggii Red Mountian (Kellogg's) buckwheat	FC/CE/1B	Lower montane coniferous forest (rocky, serpentinite). Blooms May to August.	None. No habitat on site.
*Erysimum menziesii (*includes ssp*. yadonii)* Menzies's wallflower	FE/CE/1B	Coastal dunes. Blooms March to September. Elevation: 0-35m.	None. No habitat on site.
Fissidens pauperculus Minute pocket moss	-/-/1B	North Coast coniferous forest (damp coastal soil). Elevation: 10-1024m.	None. No habitat on site.
Fritillaria roderickii Roderick's fritillary	-/CE/1B	Coastal bluff scrub, coastal prairie, valley and foothill grassland. Blooms March to May. Elevation: 15-400m.	None. Potential grassland habitat present but not observed during surveys.
Grimmia torenii Toren's grimmia	-/-/1B	Chaparral, cismontane woodland, lower montane coniferous forest/openings, rocky, boulder and rock walls, carbonate, volcanic. Elevation: 320-1160m.	None. Potential chaparral and cismontane woodland habitat on site. Not observed during surveys.
Hemizonia congesta ssp. *congesta* Congested-headed hayfield tarplant	-/-/1B	Valley and foothill grassland/sometimes roadsides. Blooms April to November. Elevation: 20-560m.	None. Potential grassland habitat on site but not observed during surveys.
Hesperolinon adenophyllum glandular western flax	-/-/1B	Chaparral, cismontane woodland, valley and foothill grassland/usually serpentinite. Blooms May-Aug. Elevation: 150-1315 m.	None. No serpentinite in project area.
Horkelia bolanderi Bolander's horkelia	-/-/1B	Chaparral, lower montane coniferous forest, meadows and seeps, valley and foothill grassland/edges, vernally mesic areas. Blooms June-Aug. Elevation: 450-1100 m.	None. Potential chaparral and grassland habitat on site. Not observed during surveys.
Howellia aquatilis Water howellia	FT/-/2B	Freshwater marshes and swamps. Blooms June. Elevation: 1085-1290m.	None. Potential freshwater march habitat on site. Not observed during surveys.
Kopsiopsis hookeri Small groundcone	-/-/2B	North Coast coniferous forest. April-Aug. Elevation: 90-885 m.	None. No habitat on site.
Lasthenia burkei Burke's goldfields	FE/CE/1B	Meadows and seeps (mesic), vernal pools. Blooms April to June. Elevation: 15-600m.	None. Typical habitat not present in study area. Not observed during surveys.
Layia septentrionalis Colusa layia	-/-/1B	Chaparral, cismontane woodland, valley and foothill grassland/sandy, serpentinite. Blooms April to May. Elevation: 100-1098m.	None. No habitat on site – no serpentinite.

Scientific Name Common Name	Status USFWS/ CDFG/ CNPS Rank	Habitat Affinities and Blooming Period	Occurrence Potential
Limnanthes bakeri Baker's meadowfoam	-/CR/1B	Meadows and seeps, freshwater marshes and swamps, valley and foothill grassland (vernally mesic), vernal pools. Blooms April to May. Elevation: 175-910m.	None. Typical habitat not on site. Not observed during surveys.
Malacothamnus hallii Halls' bush-mallow	-/-/1B	Chaparral, coastal scrub. Blooms May to September (October). Elevation: 10-650m.	None. Potential chaparral habitat present but not observed on site.
Malacothamnus mendocinensis Mendocino bush-mallow	-/-/1A	Cismontane woodland. Blooms May to June. Elevation: 425-575m.	None. Potential cismontane woodland habitat present but not observed on site.
Navarretia leucocephala ssp. *bakeri* Baker's navarretia	-/-/1B	Cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools/mesic. Blooms April to June. Elevation: 5-1740m.	None. Potential cismontane woodland and grassland habitat on site but not observed during surveys.
Navarretia leucocephala ssp. *pauciflora* Few-flowered navarretia	FE/CT/1B	Volcanic ash flow vernal pools. Blooms May to June. Elevation: 400-855m.	None. No habitat on site.
Navarretia leucocephala ssp. *plieantha* Many-flowered navarretia	FE/CE/1B	Volcanic ash flow vernal pools. Blooms May to June. Elevation: 30-950m.	None. No habitat on site.
Plagiobothrys lithocaryus Mayacamas popcorn-flower	-/-/1A	Chaparral, cismontane woodland, valley and foothill grassland/mesic. Blooms April to May. Elevation: 300-450m.	None. Potential cismontane woodland and grassland habitat on site but not observed during surveys.
Pleuropogon hooverianus North Coast semaphore grass	-/CT/1B	Chaparral, cismontane woodland, valley and foothill grassland/mesic. Blooms April to June. Elevation 10-671m.	None. Potential chaparral, cismontane woodland and grassland habitat on site but not observed during surveys.
Sanguisorba officinalis Great burnet	-/-/2B	Bogs and fens, broadleafed upland forest, meadows and seeps, marshes and swamps, North Coast coniferous forest, riparian forest/often serpentinite. Blooms July-October. Elevation: 60-1400m.	None. Typical habitat not on site. No serpentintie.
Sedum laxum ssp. *eastwoodiae* Red Mountain stonecrop	FC/-/1B	Lower montane coniferous forest (serpentinite). Blooms May to July. Elevation: 600-1200m.	None. No habitat on site.
Traycina rostrata Beaked tracyina	-/-/1B	Cismontane woodland, valley and foothill grassland. Blooms May to June. Elevation: 90-790m.	None. Potential cismontane woodland and grassland habitat present on site but not observed during surveys.

Scientific Name Common Name	Status USFWS/ CDFG/ CNPS Rank	Habitat Affinities and Blooming Period	Occurrence Potential
Viburnum ellipticum Oval-leaved viburnum	-/-/2B	Chaparral, cismontane woodland, lower montane coniferous forest. Blooms May to June. Elevation: 215-1400m.	None. Potential chaparral and cismontane woodland habitat on site but not observed during surveys.

U.S. Fish and Wildlife Service

FE = federally Ranked Endangered
FT = federally Ranked Threatened
FPE = federally proposed Endangered
SC[1] = federally Species of Concern

California Department of Fish and Wildlife

CE = California Ranked Endangered
CR = California Ranked as Rare
CT = California Ranked as Threatened

California Native Plant Society

Rank 1A: Plants presumed extirpated in California and either rare or extinct elsewhere
Rank 1B: Plants rare and endangered in California and elsewhere
Rank 2B: Plants rare and endangered in California but more common elsewhere
Rank4: Plants that have a limited distribution – a watch list

APPENDIX B

Plant species, including mosses and lichens, observed during April to June 2015 surveys.

Scientific Name	Common Name
VASCULAR PLANTS	
Achillea millefolium	Yarrow
Achyrachaena mollis	Blow wives*
Acmispon americanus	Spanish clover
Acmispon brachycarpus	Deervetch
Acmispon parviflorus	Small-flowered lotus
Adenostoma fasciculatum	Chamise
Adiantum jordanii	Maiden hair fern
Aegilops truncialis	Barbed goatgrass*
Aesculus californica	California buckeye
Agrostis exerata	Spike bentgrass*
Agrostis stolonifera	Red top*
Aira caryophyllea	Silver European hairgrass*
Alisma trivale	Water plantain
Allium bolanderi var. bolanderi	Bolander's onion
Anisocarpus madioides	Woodland tarweed
Anthemis cotula	Mayweed*
Anthriscus caucalis	Bur-chervil*
Aphanes occidentalis	Lady's mantle
Arbutus menziesii	Madrone
Arctostaphylos manzanita ssp. *glaucescens*	White leaf manzanita
Artemisia douglasiana	Mugwort
Ascelpias fascicularis	Narrow-leaf milkweed
Avena barbata	Slender wild oat*
Avena fatua	Wild oat
Baccharis glutinosa	Marsh baccharis
Baccharis pilularis	Coyote brush
Bellardia trixago	Mediterranean linseed*
Brassica nigra	Black mustard*
Briza maxima	Large quaking grass*
Briza minor	Small quaking grass*
Brodiaea elegans ssp. *elegans*	Harvey brodiaea
Bromus carninatus	California brome
Bromus caroli-henrici	Poverty brome*
Bromus diandrus	Rip-gut brome*
Bromus hordeaceus	Soft chess*
Bromus laevipes	Woodland brome
Bromus madritensis ssp. *rubens*	Foxtail chess*
Calochortus amabilis	Diogene's lantern

Scientific Name	Common Name
Calycadenia fremontii	Fremont's western rosinweed
Cardamine oligosperma	Bittercress
Carduus pycnocephalus	Itlaian thistle*
Carex tumulicola	Foothill sedge
Ceanothus cuneatus ssp. *cuneatus*	Buckbrush
Centaurea soltitialis	Yellow star-sthistle*
Ceratium glomeratum	Chickweed*
Cercocarpus betuloides	Birch-leaf mountain mahogany
Chlorogalum pomeridianum	Soaproot
Cirsium vulgare	Bull thistle*
Clarkia purpurea ssp. *quadrivulnera*	Wine cups
Claytonia perfoliata	Miner's lettuce
Clinopodium douglasii	Yerba Buena
Collinsia heterophylla	Chinese houses
Cortaderia jubata	Jubata grass*
Croton setiger	Turkey mullein*
Cynodon dactylon	Bermuda grass*
Cynoglossum grande	Hound's tongue
Cynosurus echinatus	Hedgehog dotail grass*
Cyperus eragrostis	Umbrella sedge
Dactylis glomerata	Orchard grass*
Danthonia californica	California oat-grass
Datisca glomerata	Durango root
Datisca glomerata	Durango root
Daucus carota	Queen Anne's lace*
Daucus pusillus	Rattlesnake weed
Delphinium decorum ssp. *tracyi*	larkspur
Deschampsia elongata	Slender hairgrass
Dichelosemma capitatum ssp. *capitatum*	Blue dicks
Dichelosemma congestum	Ookow
Dipascus fullonum	Wild teasel*
Distichlis spicata	Inland saltgrass
Dodecatheon hendersonii	Shooting star
Draba verna	Whitlow-grass
Eleocharis macrostachya	Pale spike rush
Elymus caput-medusae	Medusa head grass*
Elymus glaucus ssp. *glaucus*	Blue wildrye
Elymus triticoides	Creeping wildrye
Epilobium brachycarpum	Panicled willow herb
Epilobium ciliatum	Fringed willow herb
Epilobium sp.	Willow herb
Epilobium torreyi	Torrey's willow herb
Equisetum hyemale ssp. affine	Tall scouring rush
Equisetum telemateia	Giant horsetail

Scientific Name	Common Name
Erigeron canadensis	Horseweed*
Eriodictyon californicum	Yerba santa
Erodium bothrys	Broadleaf filaree*
Erodium cicutarium	Red-stemmed filaree*
Euphorbia crenulata	Chinese caps
Eurybia radulina	Broad-leafed aster
Festuca arundinacea	Tall fescue*
Festuca bromoides	Brome fescue*
Festuca idahoensis	Idaho fescue
Festuca microstachys	Small fescue
Festuca myuros	Rattail fescue*
Festuca perennis	Ryegrass*
Festuca rubra	Red fescue
Foeniculum vulgare	Fennel*
Galium aparine	Goose-grass*
Galium californicum	California bedstraw
Galium parisiense	Wall bedstraw
Galium porrigens	Climbing bedstraw
Gamochaeta ustulata	Spoon-leaf purple everlasting
Gastridium phleoides	Nit grass*
Genista monspessulana	French broom*
Geranium dissectum	Cut-leaf geranium*
Geranium molle	Dove-foot geranium*
Githopsis specularioides	Bluecup
Helenium puberulum	Sneezeweed
Helminthotheca echioides	Bristly ox-tongue*
Hesperevax sparsiflora var. *sparsiflora*	Erect evax
Heteromeles arbutifolia	Toyon
Hieracium album	Hawkweed
Hoita macrostachya (?)	Large leather root
Holcus lanatus	Velvet grass*
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley*
Hordeum murinum ssp. *leporinum*	Hare barley*
Hypericum perforatum	Klamath weed*
Hypochaeris glabra	Smooth cat's-ear*
Hypochaeris radicata	Rough cat's-ear
Iris macrosyphon	Long-tubed iris
Juncus balticus ssp. ater	Baltic rush
Juncus bufonius var. *bufonius*	Toad rush
Juncus bufonius var. *congestus*	Clustered toad rush
Juncus mexicanus	Mexican rush
Juncus occidentalis	Western rush
Juncus patens	Spreading rush
Juncus xiphioides	Iris-leaved rush

Scientific Name	Common Name
Kickxia elatine	Fluellein*
Lactuca saligna	Willow-leaf lettuce*
Lactuca serriola	Pricklylettuce*
Lagophylla ramosissima	Common hareleaf*
Lathyrus hirsutus	Caley pea*
Lathyrus latifolia	Perennial sweet pea*
Lathyrus vestitus	Hillside pea*
Leontodon taraxacoides	Hawkbit*
Leptosiphon bicolor	Bicolored linanthus
Linum bienne	Flax*
Logfia gallica	Narrowleaf cottonweed*
Lotus corniculatus	Bird's-foot trefoil*
Lupinus bicolor	Miniature lupine
Lupinus microcarpus var. *densiflorus*	Chick lupine
Luzula comosa	Wood rush
Lysimachia arvensis	Scarlet pimpernel*
Lythrum hyssopifolium	Hyssop loosestrife*
Madia exigua	Small tarweed
Madia sp.	Madia
Marah fabaceus	California man-root
Marsilea vestita ssp. *vestita*	Water clover
Medicago polymorpha	Bur clover*
Medicago praecox	Medicago*
Melica geyeri	Geyer's onion grass
Melica torreyana	Torrey's melic
Melilotus albus	White sweet clover*
Melilotus indicus	Sour clover*
Mentha pulegium	Penneyroyal*
Micranthes californica	California saxifrage
Micropus californicus	Slender cottonweed
Microseris douglasii	Douglas microseris
Mimulus aurantiacus	Bush monkeyflower
Mimulus guttatus	Seep monkeyflower
Mondardella villosa	Coyote mint
Navarretia intertexta	Needleleaf navarretia
Navarretia pubescens	Downy pincushion plant, purple navarretia
Navarretia squarrosa	Skunkweed
Navarretia tagetina	Marigold navarretia
Nemophila heterophylla	White nemophila
Nemophila menziesii	Baby blue-eyes
Parentucellia viscosa	Yellow glandweed*
Pectocarya pusilla	Little pectocary
Pedicularis densilfora	Indian warrior
Pentagramma triangularis	Gold-back fern

Scientific Name	Common Name
Perideridia kelloggii	Kellogg's yampa
Petrohagia dubia	Grass pink*
Phacelia imbricata ssp. *imbricata*	Imbricate scorpionweed
Phalaris aquatica	Harding grass*
Phalaris paradoxa	Hood canary grass
Plantago coronopus	Cut-leaf plantain*
Plantago erecta	Erect plantain
Plantago lanceolata	English plantain*
Poa pratensis	Kentucky bluegrass*
Poa secunda	Pacific bluegrass
Polygala californica	California milkwort
Polygonum aviculare	Yard knotweed*
Polypogon monspeliensis	Rabbit's foot grass*
Populus fremontii	Fremont's cottonwood
Potomageton natans	Floating-leafed pondweed
Potomageton nodosus	Long-leaved pondweed
Pseudognaphalium luteoalbum	Cudweed
Psilocarphus tenellus	Woolly-heads
Quercus agrifolia	Coast live oak
Quercus douglasii	Blue oak
Quercus garryana	Oregon oak
Quercus kelloggii	Black oak
Quercus lobata	Valley oak
Quercus parvula var. *shrevei*	Shreve oak
Quercus wislizeni	Interior live oak
Ranunculus muricatus	Spiny-fruited buttercup*
Ranunculus occidentalis	Western buttercup
Rosa californica	California rose
Rosa gymnocarpa	Wood rose
Rubus armeniacus	Himalayan blackberry*
Rubus ursinus	California blackberry
Rumex crispus	Curly dock*
Salix exigua	Sandbar willow
Salix laevigata	Red willow
Salix lasiolepis	Arroyo willow
Sanicula bipinnata	Poison sanicle
Sanicula bipinnatifida	Purple sanicle
Sanicula crassicaulis	Gamble weed
Scandix pectin-veneris	Venus' needle
Scutellaria sp.	skullcap
Sherardia arvensis	Field madder*
Sidalcea diploscypha	Fringed checkerbloom
Silene lacinata ssp. *californica*	Indian pink
Silybum marinum	Milk thistle*

Scientific Name	Common Name
Sisrynchium bellum	Blue-eyed grass
Sonchus asper	Prickly sow-thistle*
Spergularia rubra	Red sand-spurrey*
Stachys ajugoides	Hedge-nettle
Stachys rigida var. quercetorum	Rough hedge-nettle
Stellaria media	Common chickweed*
Stipa lepida	Foothill needlegrass
Stipa pulchra	Purple needlegrass
Stuckenia pectinata	Fennel-leaf pondweed
Symphoricarpos albus var. *laegivatus*	Snowberry
Symphoricarpos mollis	Creeping snowberry
Taraxia ovata	Sun cups
Tolpis barbata	European umbrella milkwort*
Torilis arvensis	Japanese hedge parsley*
Torilis nodosa	Short sock-destroyer*
Toxicodendron diversilobum	Poison oak
Toxicoscordion micrantha	Death camus
Tragopogon porrifolius	Salsify*
Trichostemma lanceolatum	Vinegar weed
Trientalis latifolia	Star flower
Trifolium bifidum var. bifidum	Pinole clover
Trifolium dubium	Little hop clover*
Trifolium hirtum	Rose clover*
Trifolium incarnatum	Crimson clover*
Trifolium oliganthum	Few-flowered clover
Trifolium subterraneum	Subterranean clover*
Trifolium willdenovii	Tomcat clover
Triphyseria eriantha ssp. *eriantha*	Butter n' eggs
Triteleia hyacinthina	White brodiaea
Tritelia laxa	Ithuriel's spear
Typha angustifolia	Narrow-leaved cattail
Umbellularia californica	California bay laurel
Uropappus lindleyi	Silver puffs
Verbena lasiostachys var. *lasiostachys*	Western vervain
Vernonica arvensis	Common speedwell*
Vicia sativa ssp. *sativa*	Spring vetch*
Vicia villosa ssp. *villosa*	Hairy vetch*
Vitis californicus	Wild grape
Xanthium strumarium	Cocklebur*
Yabae microcarpa	Yabea
Zeltnera muehlenbergii	Monterey centaury
MOSSES	
Antitrichia californica	
Atrichum selwynii	

Scientific Name	**Common Name**
Claopodium whippleanum	
Dendroalsia abietina	
Dicranella howei	
Dicranoweisia cirrata	
Didymodon insulanus	
Didymodon tophaceus	
Didymodon vinealis	
Fissidens crispus	
Funaria hygrometrica	
Gemmabryum sp.	
Grimmia pulvinata	
Homalothecium nuttalli	
Homalothecium pinnatifidum	
Imbribryum torenni	
Isothecium stononiferum	
Kindbergia oregano	
Orthoticichum lyelii	
Pohlia wahlenbergii	
Polytrichum juniperinum	
Rosulabryum canariense	
Rosulabryum gemmascens	
Scleropodium julaceum	
Scleropodium obstusifolium	
Syntrichia princeps	
Timmiella crassinervis	
HORNWORTS	
Phymatoceros bulbiculosus	
LICHENS	
Cladonia cenotea	
Cladonia fimbriata	
Cladonia trancendans	
Evernia prunastri	
Hypogymnia enteromorpha	
Hypogymnia imshaugii	
Leptogium corniculatum	
Mycoblastus sanguinarius	
Ocrolechia juvenalis	
Platismatia glauca	
Ramalina menziesii	
Usnea arizonica	
Usnea hesperina	

Species with and * are non-native species

APPENDIX F

BIOLOGICAL RESOURCE ASSESSMENT

BIOLOGICAL RESOURCE ASSESSMENT

Ukiah Landfill Closure
City of Ukiah, Mendocino County, California
(APN: 027-020-069)

DRAFT

May 27, 2015

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Ukiah Landfill Closure
City of Ukiah, Mendocino County

Biological Resource Assessment

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DRAFT

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SUMMARY

The Ukiah Landfill Closure project, located at 3100 Vichy Springs Road, is approximately three miles east of Ukiah in Mendocino County, California. The site is located on a saddle, with Sulphur Creek located off-site to the south, and an unnamed tributary to the Russian River located on-site along the northern boundary. The Landfill occupies approximately 40 acres of permitted landfill area on a 284-acre parcel. The Landfill has been graded to form a series of flat terraces stepping down from south to north. The Landfill surface is covered with a combination of native and non-native grasses and forbs. The proposed project area supports a blue line creek and was flowing at the time of the field work.

The proposed project includes closure of the Landfill which will be performed in accordance with the applicable regulatory standards prescribed in the California Code of Regulations (CCR) [i.e., 27 CCR, Chapters 3 and 4 and CFR, Subpart F]. The components and systems required for closure of the Landfill include the final cover and grading design to control storm water, potential infiltration and accommodate future settlement, drainage and erosion control systems, landfill slope stability, landfill gas (LFG) control systems, leachate control systems, and construction quality assurance (CQA). A description of each of these closure components proposed for construction of the Landfill closure improvements is presented in this document.

Wildlife Research Associates and Jane Valerius Environmental Consulting were contracted by the City of Ukiah to perform this Biological Resources Assessment for the federally listed Threatened California red-legged frog (*Rana draytonii*) and the federal and State listed threatened Central Coast steelhead (*Oncorhynchus mykiss irideus*).

The site is dominated by non-native grassland on the landfill with blue oak woodland and mixed chaparral along the edges. The creeks support a riparian tree and shrub cover dominated by willows. Pponds on the site support cattail marsh or spikerush marsh vegetation and there are several small seasonal wetlands within the grassland at the borrow area on the east side. A total of xx acres of potential jurisdiction wetlands and waters was delineated for the site.

As part of this Biological Resource Assessment, we also evaluated the potential for occurrence of 35 special-status plant species, and 19 special-status wildlife species, as well as the potential for California red-legged frog to occur on the site.

There is potential habitat on site for several special status plants to occur. Focused, seasonal special status plant surveys were conducted in April and May with a third and final survey to be conducted in July. As of the date of this report no special status plants have been observed within the project study area.

At this time no trees will be removed as part of the project. However, if in the future trees are to be removed, replacement rations must be in compliance with the Mendocino County General Plan Conservation Element, which is a 2:1 replacement-to-loss ratio.

Steelhead are known to occur within Sulphur Creek and the Russian River. The ephemeral tributary on-site does not support suitable habitat in terms of pool depth and the tributary dries by the end of the summer. In addition, a barrier to fish passage occurs in the ephemeral creek crossing at Redeemer Road (CNDDB 2015). As a result, no steelhead occur within the ephemeral tributary on site.

No California red-legged frog adults or larvae were detected during the field surveys, although

suitable potential habitat for California red-legged frogs occurs on the site. The project site is located outside the range of California red-legged frogs in Mendocino County (USFWS 2009).

Foothill yellow legged frog (*Rana boylii*), a California Species of Special Concern, was observed within the ephemeral tributary within the proposed project area during the survey.

Several nesting passerines (perching birds), such as grasshopper sparrow (*Ammodramus savannarum*) were observed nesting within the project area.

Best Construction Practices and Avoidance and Minimization Measures to prevent take of individuals discussed above are included in this report.

List of Acronyms and Abbreviations

BRA	Biological Resource Assessment
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Base
CRF	California red-legged frog
Corps	US Army Corps of Engineers
FESA	Federal Endangered Species Act
FYF	Foothill yellow-legged frog
OHWM	Ordinary High Water Mark
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
RPW	Relatively Permanent Water
RWQCB	Regional Water Quality Control Board
SSC	California Species of Special Concern
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UTM	Universal Trans Mercator
WPT	Western pond turtle

1.0 INTRODUCTION

The purpose of this Biological Resource Assessment is to provide technical information and to review the proposed City of Ukiah's Sanitary Landfill Closure project site, located in the City of Ukiah, Mendocino County (Appendix A, Figure 1). Wildlife Research Associates and Jane Valerius Environmental Consulting prepared this Biological Resources Assessment to provide sufficient detail to determine the potential effects of the proposed project on the federally listed Threatened steelhead (*Oncorhynchus mykiss irideus*), the federally-listed Threatened California red-legged frog (*Rana draytonii*) (hereafter CRF) and the California Species of Special Concern foothill yellow frog (*Rana boylii*).

This Biological Resource Assessment was also conducted to determine the potential for special-status vegetation communities, plant and animal species to occur within the proposed linear project, and to identify the limitations to potential development of the project, such as riparian and wetland habitat removal. The biological resource assessment is prepared in accordance with legal requirements found in Section 7 (a)(2) of the Endangered Species Act (16 U.S. C 1536(c)) and also provides information required for an Initial Study/Mitigated Negative Declaration as part of the California Environmental Quality Act (CEQA) review for the project. The document presents technical information upon which later decisions regarding project affects are developed.

1.1 REASON FOR THE PROJECT

Waste disposal operations at the Landfill began in 1955 at the eastern end of the landfill footprint and progressed upslope and westward. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the landfill to separate the waste from the realigned creek channel. The method of operation during the Landfill's development was a fill and cover approach in a canyon/gully terrain. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing Ukiah and the surrounding area. The Landfill ceased operations in September 2001.

Environmental monitoring at the Landfill was originally regulated under Waste Discharge Requirements (WDR) Order No. 75-43 in conformance with Title 23 of the California Code of Regulations (23CCR). In September 1993, WDR Order No. 75-43 was amended by WDR Order No.93-83 as a mechanism to implement State Water Resources Control Board Resolution No. 93-62 and federal municipal solid waste regulations (i.e., "Subtitle D") per Title 40 of the Code of Federal Regulations (40 CFR), Parts 257 and 258. Concurrent with this amendment was the preparation of a Report of Waste Discharge (RoWD) (EBA, 1993b) for the purpose of formally updating the Landfill's WDRs and to address groundwater impacts previously identified at the site. The combination of these two documents was subsequently used by the RWQCB to issue new interim closure WDRs (WDR Order No.94-123) for the site in October 1994. WDR Order No. 94-123 represents the current WDR regulating environmental monitoring at the Landfill.

1.2 PROJECT SPONSOR

The Ukiah Landfill Closure project is proposed by the City of Ukiah Public Works Department. The contact person is:

Name: Richard J. Seanor, PE, Deputy Director of Public Works
Address: 300 Seminary Ave, Ukiah, CA 95482-5400
Telephone Number: 707-463-6296

1.3 PROJECT DESCRIPTION

1.3.1 Location

The City of Ukiah Sanitary Landfill Closure project, located at 3100 Vichy Springs Road, approximately three miles east of Ukiah, is situated on the east side of the Ukiah Valley, east of the Russian River and HWY 101, south of Lake Mendocino and west of the Mayacamas Mountains in the rural area of eastern Mendocino County, California (Appendix A, Figure 2). The project area is located in an unsectioned portion of the Yokaya Rancheria in the southeastern portion of the Ukiah 7.5-minute topographic quadrangle, within Township 15N and Range 12W. Surrounding land uses consist of mainly open space lands, ranches and vineyards.

The Landfill occupies approximately 40 acres of permitted landfill area on a 284-acre parcel having a maximum width of approximately 1,000 feet in the north-south direction and a maximum length of about 3,500 feet in the east-west direction. Existing ground surface elevations at the Landfill range from approximately 710 feet above mean sea level (MSL) near the western footprint, to about 970 feet MSL along the southeast footprint. The Landfill has been graded to form a series of flat terraces stepping down from south to north. The Landfill surface is covered with seasonal grasses.

Land adjacent to the Landfill property is zoned primarily as rangeland and is used for grazing. Dwellings within 1,000 feet of the landfill property include a group of structures owned by the Vichy Springs Investment Group that are located within 500 feet of the Landfill's south property line and a single-family residence located approximately 900 feet west of the Landfill's western property boundary. A rural residential development is located approximately ¼-mile west of the Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000 feet southward of the Landfill property boundary and is separated from the Landfill by an intervening ridge.

A City-owned shooting range is situated on the Landfill property approximately 2,000 feet northeast of the waste management unit (WMU) footprint. It should be noted that the City owns an approximate 97-acre parcel (Assessor's Parcel No. 178-210-01) that adjoins a portion of the Landfill's southern property boundary. This property, which has been previously identified as the "Gun Club Parcel", was purchased as a buffer zone to limit future development adjacent to the Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the Landfill property.

A site plan showing the general existing site configuration is presented as Figure 2 (Appendix A).

Landfill Development and History

Waste disposal operations at the Landfill began in 1955 at the eastern end of the landfill footprint and progressed upslope and westward. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the landfill to separate the waste from the realigned creek channel. The method of operation during the Landfill's development was a fill and cover approach in a canyon/gully terrain. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing Ukiah and the surrounding area. The Landfill ceased operations in September 2001.

Environmental monitoring at the Landfill was originally regulated under Waste Discharge Requirements (WDR) Order No. 75-43 in conformance with Title 23 of the California Code of Regulations (23CCR). In September 1993, WDR Order No. 75-43 was amended by WDR Order No.93-83 as a mechanism to implement State Water Resources Control Board Resolution No. 93-62 and federal municipal solid waste regulations (i.e., "Subtitle D") per Title 40 of the Code of Federal Regulations (40 CFR), Parts 257 and 258. Concurrent with this amendment was the preparation of a Report of Waste Discharge (RoWD) (EBA 1993b) for the purpose of formally updating the Landfill's WDRs and to address groundwater impacts previously identified at the site. The combination of these two documents was subsequently used by the RWQCB to issue new interim closure WDRs (WDR Order No.94-123) for the site in October 1994. WDR Order No. 94-123 represents the current WDR regulating environmental monitoring at the Landfill.

1.3.2 Action Area

The Project Action Area is defined as all areas to be affected directly or indirectly by the Federal action, and not merely in the immediate area involved in the action (50 CFR Sect. 402.02). The action area is analyzed for potential direct and indirect effects to federally-listed species. The action area includes a tributary to the Russian River, which is located approximately 1.43 miles east of the Russian River, and 97 acres of upland habitat. Vichy Springs Road, which runs parallel to Sulphur Creek, is part of the action area that will be used for equipment and machines. Sulphur Creek is a blue line creek. The action area is located outside the City of Ukiah in Mendocino County.

The construction activities include 50 feet beyond the existing perimeter road and are included in the action area. All staging areas will be on existing roadways or compacted shoulders adjacent to the landfill. Please refer to Chapter 5.0 for discussion of these potential effects

1.3.3 Proposed Action – Final Closure Plan

1.3.3.1 Final Cover Design

As outlined in 27 CCR, §20950, the primary performance goal for final closure is to minimize the infiltration of water into the waste, thereby minimizing the production of leachate and LFG. The proposed final cover design for the Landfill areas will consist of the following layers, from top to bottom:

- Synthetic erosion-resistant layer;
- A structured geomembrane low hydraulic-conductivity layer that includes a drainage layer; and
- A minimum one foot thick foundation layer.

This final cover design for the Landfill areas is an engineered alternative final cover consistent with 27 CCR, §20080.

Several factors were taken into consideration is establishing the proposed final cover design for the Landfill, including the geometry of the existing landfill, local climatic conditions, final cover material availability, slope stability, erosion protection, and construction cost.

1.3.3.2 Final Grading, Drainage, and Erosion Control

The limits of refuse were established from record information and by a field investigation. The proposed final cover system will cover all areas within the limits of refuse. Due to clearance requirements under existing power lines that run through the Landfill area, excavation and relocation of refuse will be required to maintain clearance between the finish surface and the power lines. The excavated refuse will be placed on other (flatter) sections of the Landfill.

The Final Grading Plan as shown on Figure 3 (Appendix A) illustrates the final landfill footprint and shows the Landfill configuration following foundation layer grading. Final refuse slopes will have a maximum gradient no steeper than 2:1 (horizontal to vertical). The synthetic erosion-resistant layer will essentially eliminate the discharge of sediment from the Landfill surface as no soil component will be utilized in the final cover design.

Proposed drainage facilities consist of a network of benches, ditches and storm drain that drain to 18- and 24-inch diameter corrugated metal pipe (CMP) discharge culverts. To prevent soil erosion in the ephemeral tributary the culverts will be installed with energy dissipaters that measure XX by XX feet. These CMP culverts discharge to the unnamed ephemeral creek channel at various locations along the length of the Landfill's northern boundary. In general, the drainage system is designed to intercept run-off at intervals along the inside edge of berms, benches or access roads. A sedimentation pond is located at the western end of the Landfill to control sediment run-off from slope areas along the western and southern fill boundaries. Three (3) additional sedimentation ponds are also located at the northeastern end of the Landfill to contain sediment run-off from soil borrow areas. Please refer to Figure 2 (Appendix A) for the locations of the respective sedimentation ponds.

Access improvements will include placing aggregate base over portion of the existing perimeter road and along benches to provide all-weather access.

The soil borrow area will be reclaimed by re-grading and re-vegetating (hydroseeding) with native grasses.

1.3.3.3 Landfill Gas Control

The Landfill currently includes a partial perimeter LFG collection system that was installed between the southwestern edge of the Landfill and the property line. In general, the system consists of 17 vertical extraction points installed in native geologic materials and completed at depths ranging from 35 to 133 feet below ground surface. The extraction points are connected to a buried 6-inch diameter, high-density polyethylene (HDPE) header pipe that leads to a vacuum blower located at the western end of the Landfill. The vacuum blower creates a vacuum in the header pipe that draws the LFG from the soil through the extraction points and header pipe, whereupon the collected LFG (diluted) is vented to the atmosphere via a 4-foot tall, 4-inch diameter stack. The system works on the premise that the extraction well field creates a barrier against migration while simultaneously mixing the collected LFG with "clean" soil pore gas that dilutes the LFG to concentrations that can be discharged directly to the atmosphere.

As part of final closure, a LFG extraction, collection, and control system will be installed that will replace the partial perimeter collection system. The design for the system has been developed to meet the requirements of 17 CCR, §95464(b). The design flow rate for the system has been established at 35 to 210 SCFM (at 50 percent methane). This range covers the highest anticipated LFG recovery rate based on the most conservative generation model (180 SCFM), as well as

some excess to allow for extraction from the final cover system's gas relief layer. In addition, the design range can accommodate lower flows to account for future operations as the generation rate continues to decreases over time. Overall, the LFG extraction, collection, and control system will consist of a series of perimeter and interior LFG extraction wells, associated above ground collection system piping, condensate collection provisions, and a flare station for destruction of the LFG, see Figure 4 (Appendix A).

1.3.3.4 Landfill Leachate Control

The Landfill is unlined and is not equipped with an engineered or traditional blanket leachate collection and removal system (LCRS). Instead, leachate collection at the Landfill consists of a series of polyvinyl chloride (PVC) piping and French drain systems installed to collect leachate from seeps occurring along the completed slope faces. Leachate collected by these components is then conveyed by gravity flow to a primary buried pipeline located along the northern toe of the Landfill. The buried pipeline, in turn, drains the leachate westward and ultimately discharges to the leachate management facilities located at the western toe of the Landfill. A description of the leachate management facilities is as follows:

- Discharge from the primary buried pipeline is diverted to a subsurface concrete sedimentation chamber equipped with a valved sediment drain at its base. The clarified leachate within the chamber is then discharged (by gravity flow) to an adjacent pump station wet well (identified herein as the "leachate wet well") via a 10-inch diameter overflow line.

- Clarified leachate discharged to the leachate wet well is then pumped to a leachate storage tank for temporary storage. The leachate wet well is equipped with two (2) 25-gallon per minute (gpm), low-head, submersible pumps that are actuated by high/low water level controls. If the clarified leachate discharge rate exceeds the leachate wet well's pumping capacity (50 gpm), the excess leachate will be diverted to an underground storage tank to be installed as part of final closure.

- As noted above, leachate from the leachate wet well is diverted to the leachate storage tank for temporary storage. The leachate storage tank has a 63,500-gallon volumetric capacity and is constructed of AWWA factory epoxy lined and coated bolted steel. As was the case for the leachate wet well, the leachate storage tank is also equipped with a 10-inch diameter overflow line that will divert leachate to the underground storage in the case of an emergency.

- Leachate stored in the leachate storage tank is subsequently pumped to a sewer line connection located on Vichy Springs Road via a force main/gravity drain. The force main/gravity drain is constructed of 4-inch diameter PVC and is approximately 5,200 feet in length. The pump lift station for the leachate storage tank is equipped with two (2) 45-gpm pumps (one duty, one standby), thereby giving the system a total pumping capacity of 90 gpm.

1.3.3.5 Construction Quality Assurance

The implementation of the Construction Quality Assurance (CQA) Plan will provide documentation that suitable materials and standard construction practices are used to place the final cover and to document that placement is consistent with the closure plan design

specifications in 27 CCR, §20323 and §20324. Elements of the CQA Plan include: project description and definitions, qualifications and responsibilities, requirements for the final cover evaluation, inspection standards, testing frequencies, meetings, and documentation. This information will be collected during construction of the final closure and incorporated into the project's final closure construction CQA Certification Report, which will be submitted to the appropriate agencies for recording and reporting purposes.

1.3.4 Post Closure Maintenance Plan

After closure activities are completed, the Final Post Closure Maintenance Plan (FPCMP) for the Landfill will be implemented by the City of Ukiah in accordance with 27 CCR, Chapters 3 and 4, and 40 CFR, §258.61. Post closure maintenance activities for the Landfill will consist of the following:

- Final cover inspection and maintenance;
- Landfill settlement monitoring and maintenance;
- LFG monitoring and maintenance;
- Groundwater systems monitoring and maintenance;
- Storm water monitoring;
- Access road/bench maintenance;
- Drainage systems inspection and maintenance; and
- Site security inspection and maintenance.

1.3.4.1 Detection Monitoring Program

A Detection Monitoring Program (DMP) is currently implemented at the Landfill in accordance with 27 CCR, §20420 and Waste Discharge Requirements Order No. R1-2002-0061 and is anticipated to continue through the post closure maintenance period. The scope of the DMP includes the following monitoring and sampling activities:

- Monthly monitoring and recording of leachate discharge volumes.

- Quarterly sampling and analysis of leachate samples from the leachate wet well. The scope of analytical testing is in accordance with Table I of Monitoring and Reporting Program No. R1-2002-0061 (M&RP).

- Quarterly monitoring and recording groundwater elevations and groundwater flow directions.

- Quarterly sampling and analysis of groundwater samples from detection monitoring wells and points of compliance monitoring wells. The scope of analytical testing is in accordance with Table II of the M&RP.

- Performance of quarterly statistical analyses of groundwater chemistry data to identify exceedances of applicable concentration limits.

- Quarterly sampling and analysis of surface water samples, including semi-quantitative comparisons between upstream and downstream water chemistry data to identify potential landfill-related surface water quality impacts. The scope of analytical testing is

in accordance with Table III of the M&RP.

- Performance of monthly standard observations to monitor the conditions of the WMU, the landfill perimeter, and receiving waters.

Results and findings from the aforementioned activities are summarized in a Detection Monitoring Report and submitted to the Regional Water Quality Control Board on a quarterly basis. Standard quarterly report submittals include a presentation of the sampling and monitoring procedures (including Standard Operating Procedures), tabulated summaries of leachate, groundwater, and surface water field and laboratory data, statistical analysis results and supporting calculations, groundwater potentiometric surface map, results of standard observations, and copies of Certified Analytical Reports (CARs) and associated chain-of-custody documentation. Annual reports are also prepared that include (in addition to the above information) graphical summaries of monitoring data, an evaluation of the findings.

1.3.5 Extent of Project Effects

The construction of this project will involve temporary direct effects. Temporary effects include staging areas.

1.3.6 Best Construction Practices

The ephemeral tributary will not likely support water after July of any given year. As a result, placement of rock base below dissipaters will likely not affect stream turbidity. However, small pools may be present and may support special status species. For all areas where rock is to be placed and pools are present, the applicant will capture and relocate any native amphibians found at pools nearest to the rock base placement (within 35 feet or based on a biologist recommendation). Captured native animals will be relocated to the closest pool.

1.3.7 Construction Best Management Practices

Construction BMPs will be incorporated in the construction of the project and include, but are not limited to, the following:

A. Work is proposed to be conducted outside the rainy season (defined as October 15-April 15), primarily between June 15 and October 15, after the summer season when the creek flows are low, therefore no erosion or sediment control is expected to be necessary. To avoid debris contamination in the creek, a silt fence will be placed parallel to the project area in the creek to contain spoils from drilling and any concrete that may inadvertently drop into the creek during construction. All debris will be cleared out of the creek before the silt fence is removed.

B. Roosting and Nesting surveys for special-status species (i.e., bats and birds) by a qualified biologist shall be conducted at the appropriate times before construction starts to determine occupancy at the site. If no special-status species are found, no further action other than the Best Management Practices identified above are required. If individuals are found, including nesting birds, a buffer zone around the species or nest will be required at a sufficient distance to prevent take of individual plants, or until after the nesting season.

C. Due to the potential for special-status species to occur, move through, or into the ephemeral tributary portion of the project area, an on-site monitor, shall at a minimum, check the ground

beneath all equipment and stored materials each morning before construction starts to prevent take of individuals. All pipes or tubing 4 inches or greater shall be sealed by the relevant contractor with tape at both ends to prevent animals from entering the pipes at night. All trenches and other excavations shall be backfilled the same day they are opened, or shall have an exit ramp built into the excavation to allow animals to escape.

1.4 PROJECT ALTERNATIVES

There is no project alternative.

2.0 STUDY METHODOLOGY

This Biological Resource Assessment used the best available scientific and commercial data to evaluate the potential effects to biological resources from the proposed project. Literature review, aerial imagery and field surveys informed the descriptions of the vegetation communities, identification of present and past occurrences of special-status species in the vicinity of the proposed project, the assessment of habitats for special-status animal species.

2.1 LITERATURE SEARCH

Information on special-status plant species was compiled through a review of the literature and database search. Database searches for known occurrences of special-status species focused on the Ukiah, Cow Mountain, Purdy's Garden and Elledge Peak U.S. Geologic Service 7.5-minute topographic quadrangles, which provided a 4.8 km (5 mi) radius around the proposed project area. The following sources were reviewed to determine which special-status plant and wildlife species have been documented in the vicinity of the project site:

- U.S. Fish and Wildlife Service (USFWS) quadrangle species lists (USFWS 2015)
- USFWS list of special-status animals for Sonoma County (USFWS 2015)
- California Natural Diversity Database records (CNDDB) (CNDDB 2015)
- California Department of Fish and Wildlife's (CDFW) Special Animals List (CDFW 2015),
- State and Federally Listed Endangered and Threatened Animals of California (CDFW 2015)
- California Native Plant Society (CNPS) Electronic Inventory records (CNPS 2015)
- City of Ukiah General Plan Update (2009)
- CDFG publication "California's Wildlife, Volumes I-III" (Zeiner et al., 1990)

The U.S. Fish and Wildlife Service (USFWS) electronic list of Endangered and Threatened Species was queried electronically (www.fws.gov/sacramento/es_spp_lists-overview.htm). We also reviewed the CalFish IMAPS Viewer (www.calfish.org/DataandMaps/CalFishGeographicData), developed by CDFW Biogeographic Branch for analysis of steelhead Critical Habitat along tributaries to the Russian River.

Other sources of information regarding reported occurrences include locations previously reported to the U.C Berkeley Museum of Vertebrate Zoology and the California Academy of Sciences.

2.2 PERSONNEL AND SURVEY DATES

Trish Tatarian, wildlife biologist of Wildlife Research Associates, and Jane Valerius, botanist and wetland specialist of Jane Valerius Environmental Consulting, conducted an initial daytime survey of the project site on April 15 and 29, 2015, from 1000 to 1600. Trish surveyed the trees for suitable bird nesting habitat, potential bat roosting habitat, and analyzed the on-site habitats for suitability for Steelhead, California red-legged frog and fisher.

Jane evaluated the on-site vegetation communities for their potential to support special status plants and/or wetland communities. Jane Valerius and Geri Hulse-Stephens conducted surveys for special status plants on April 15, 21 and 29 and May 19 and 22, 2015. A final survey for special status plants will be conducted in June or July 2015. A separate report with the findings of all the special status plant surveys will be prepared once surveys are complete.

A delineation of waters of the U.S. was conducted by Jane Valerius on April 29, 2015, with the preliminary findings presented in the *Delineation of Waters of the U.S. for the Ukiah Sanitary Landfill Closure Project* (Jane Valerius Environmental Consulting 2015). This report will be submitted to the U.S. Army Corps of Engineers (Corps) for their verification as part of the permit application for work to be conducted in wetlands associated with the landfill and in the tributary to the Russian River.

2.3 IMPACT ASSESSMENT METHODOLOGY

We examined the on-site vegetation communities, present and past occurrence locations of federally listed species and federal species of concern within close proximity of the proposed project areas, and habitats for special-status plant and animal species. Based on the current site conditions, we evaluated the potential for occurrence on the site for special-status biological resources and used the project description to determine any potential direct or indirect effects.

The USFWS, CDFW, and CNPS guidelines for conducting special status plant surveys were followed for the April, and May site visits in that the survey was floristic in nature, with every plant observed identified to the extent necessary to determine its rarity and listing status. Surveys were conducted the using systematic field techniques in all habitats of the site to ensure a thorough coverage of potential impact areas was well documented.

We based our determination of whether the proposed project may result in adverse impacts to federally-listed special-status species, based on guidelines established by the USFW under Section 7(a) of the Federal Endangered Species Act (FESA), in which a project that may have an adverse effect impact on listed biological resources must be assessed. FESA states that, "each federal agency shall…insure that any *action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered or threatened or result in the destruction or adverse modification of habitat of such species." Thus, components of the proposed project were deemed to have an adverse impact on special-status biological resources if they could result in effects as described in the above statement to any listed species or its habitat.

We based our determination of whether the proposed project may result in adverse impacts to State special-status species based on CEQA, the CDFW and the CNPS guidelines for special status plants and animals.

We also evaluated potential impacts from the project to habitats not occupied by species but for which habitats occurred.

2.4 LIMITATIONS THAT MAY INFLUENCE RESULTS

No focused wildlife surveys for this Biological Resource Assessment were conducted; species opportunistically observed during the field survey were noted. As a result, the potential for a special-status animal species to occur in the project area was based on reported occurrences in the vicinity of and habitats within the project area. The limitation of relying on reported occurrences is that not all lands have been surveyed for their occupancy of special status species. As a result, a lack of findings of a species in a particular area may not be result of no occupancy but rather the result of no focused surveys being conducted.

For those wildlife species that were present (i.e., reported in the CNDDB) in the project area at the time of the Biological Resource Assessment, focused surveys were not conducted. For example, the assessment was conducted in April 2015, but construction is proposed for 2016 and

nesting bird species on or adjacent to the site may change their nesting locations between the survey and the start of construction. No focused surveys for special status wildlife species were conducted given the timeline of this Biological Resource Assessment. Plant species identifiable at the time of the survey were recorded.

Focused surveys for special status plant were conducted and will be completed in June or July when the later flowering summer species will be identifiable. Plant species identifiable at the time of the survey were recorded. A list of plant species observed for the April and May 2015 surveys is provided as Appendix X.

3.0 ENVIRONMENTAL BASELINE

The project area is located within the North Coast Bioregion (Welsh 1994). This bioregion is located within northern California and encompasses the area from southwestern Oregon to southern Monterey County (Welsh 1994). Habitats in this bioregion are delineated by the Pacific Ocean on the west and the Klamath Bioregion on the east and is influenced by the transition from Coast Range montane forest to the dry interior of the Sacramento Valley Bioregion. All of Mendocino County is in this bioregion. Habitats within this bioregion include both mesic (moist) habitats, such as freshwater marsh, and xeric (dry) habitats, such as chaparral, and are typical of a Mediterranean type climate. Average rainfall in the area is 75 inches (Welsh 1994).

Located south of Lake Mendocino, the 50-acre project area is located within the headwaters of an ephemeral tributary to the Russian River. It is located north of Sulphur Creek, a perennial creek, which supports steelhead (*Onchorhynchus mykiss*) and foothill yellow legged frog (*Rana boylii*). There is no hydrologic connection between Sulphur Creek and the ephemeral tributary located on the northern boundary of the site. Although hydrologically connected to the Russian River, an 8-foot tall cement fish barrier occurs at the Redeemer Road crossing, located approximately 1.25 miles west of the project area. See below under Special Status Species for more details.

The Landfill occupies approximately 40 acres of permitted landfill area on a 284-acre parcel having a maximum width of approximately 1,000 feet in the north-south direction and a maximum length of about 3,500 feet in the east-west direction. Existing ground surface elevations at the Landfill range from approximately 710 feet above mean sea level (MSL) near the western footprint, to about 970 feet MSL along the southeast footprint.

3.1 WETLAND AND WATERS OF THE U.S. AND STATE

A formal delineation of waters of the U.S. and state, including wetlands, was conducted for the project study area on April 29 and May 22, 2015 by Jane Valerius Environmental Consulting. A separate delineation report will be prepared and submitted to the U.S. Army Corps of Engineers (Corps) for their review and verification.

There are two unnamed creek drainages within the project study. These creek drainages are mapped as blue-line drainages on the Ukiah USGS 7.5-minute quadrangle and eventually flow into the Russian River west of the landfill. The eastern tributary drainage is an ephemeral drainage that has areas of wetland vegetation and areas that are dry with no wetland vegetation. The upper portion of the main drainage that forms the northern boundary of the study area is dry with mostly no wetland vegetation in the creek channel, although this creek has a well-developed riparian canopy cover of mostly willows and does include some valley oak and cottonwood. The eastern tributary lacks any tree or shrub cover with the exception of a few isolated valley oaks. The lower portion of the northern creek channel from the bridge to the western end of the study area has wetland vegetation within the creek bed and within the ordinary high water mark. The northern creek channel varies in width but has an average width of between 15 to 20 feet within the ordinary high water mark. The eastern tributary channel is more narrow and incised and varies from 5 to 10 feet in width, with an average of about 8-feet wide at the ordinary high water mark.

Areas mapped as jurisdictional wetlands include the three former sediment ponds that occur within the study area. A fourth pond, identified as the leachate pond, has not been identified as jurisdictional because this pond is part of the treatment system for the landfill, even though it supports wetland vegetation. Seven small seasonal wetland were also mapped. Six of these are in the borrow pit area in the northeastern portion of the study area and one occurs along the

entrance road at the southeastern portion of the study area.

3.2 VEGETATION COMMUNITIES

Nomenclature for vegetation types follows *The Manual of California Vegetation* Second Edition (Sawyer, et. al. 2009) where applicable. Nine vegetation communities occur within the project study area. These are: 1) *Avena (barbata, fatua)* semi-natural herbaceous stands or wild oats grasslands; 2) ruderal forbs; 3) *Nasella pulchra* herbaceous alliance or purple needle grass grassland; 4) *Quercus douglasii* woodland alliance or blue oak woodland; 5) *Arctostaphylos manzanita* provisional shrubland alliance or manzanita chaparral; 6) *Salix exigua* shrubland alliance or sandbar willow thickets; 7) *Eleocharis macrostachya* herbaceous alliance or pale spike rush marshes; 8) *Typha angustifolia* herbaceous alliance or cattail marshes; and 9) seasonal wetlands.

1) Wild oats grasslands is the dominant vegetation type within the project study area as this type covers most of the landfill area, borrow area and roadsides. The wild oats grassland is mixed in with the ruderal forbs type. The revegetated portions of the landfill have a mixture of non-native grasses and in some areas non-native forbs (ruderal forbs) are dominant. Plant species commonly found in the wild oats grasslands include wild oats (*Avena barbata, A. fatua*), rip-gut brome (*Bromus diandrus*), soft chess (*Bromus hordaceus*), hare barley (*Hordeum murinum* ssp. *leporinum*), Harding grass (*Phalaris aquatica*), orchard grass (*Dactylis glomerata*), ryegrass (*Festuca perennis*), tall fescue (*Festuca arundinacea*) and rattail fescue (*Festuca myuros*). A few native grass species were also noted in this type including purple needle grass (*Nasella pulchra*), California oatgass (*Danthonia californica*) and six weeks fescue (*Festuca microstachys*). A variety of non-native forb species also occur in this type including hairy vetch (*Vicia villosa*), cut-leaf plantain (*Plantago coronopus*), yellow star thistle (*Centaurea solsititalis*), European umbrella milkwort (*Tolpis barbata*), yellow glandweed (*Parentucellia viscosa*), Mediterranean linseed (*Bellardia trixago*), rose clover (*Trifolium hirtum),* filarees (*Erodium cicutarium, E. botrys*), and rough cat's-ear (*Hypochaeris radicata*). Native forb species included blow wives (*Achyrachaena mollis*), erect plantain (*Plantago erecta*), suncups (*Taraxia ovata*), blue-eyed grass (*Sisrynchium bellum*), soaproot (*Chloragalum pomeridianum*), Pacific sanicle (*Sanicula crassicaulis*), and California buttercup (*Ranunculus californicus*).

2) Ruderal forbs dominate the area on northeastern portion of the project study area in the flat area of the former borrow pit. This area is dominated primarily by non-native forb species such as European umbrella milkwort, lesser hawbit (*Leontodon taraxacoides* ssp. *taraxacoides*), cut-leaf plantain, hairy vetch, yellow star thistle, and rough cat's-ear.

3) Purple needle grass grassland was mapped in several locations in the borrow pit area. Small areas of purple needlegrass occur in other locations on the site but are not large enough to map separately as a stand along grassland community. The areas on the borrow site were large enough to map and identify as a separate plant community.

4) Blue oak woodland occurs along the southern portion of the project study area and also occurs along the northern bank of the unnamed creek that forms the northern boundary of the study area. Blue oak (*Quercus douglasii*) are the dominant species. Other trees and shrubs noted include interior live oak (*Quercus wislenzi* var. *wislizeni*), coast live oak (*Quercus agrifolia*), black oak (*Quercus kelloggii*), Shreve oak (*Quercus parvula* var. *shrevei*), buckeye (*Aesculus californica*), madrone (*Arbutus menziesii*), coyote brush (*Baccharis pilularis*), manzanita (*Arctostaphylos manzanita* ssp. *glaucescens*), toyon (*Heteromeles arbutifolia*), buckbrush (*Ceanothus cuneatus*), mountain mahogany (*Cercocarpus betuloides)* and poison oak (*Toxicodendron diversilobum*). A

diversity of native grasses are found in this type include onion grass (*Melica geyeri, M. torreyana*), blue wildrye (*Elymus glaucus*), Nevada bluegrass (*Poa secunda*) and native fescues (*Festuca rubra and F. idahoensis*). Native forbs include blue dicks (*Dichelostemma capitatum*), for-toothed ookow (*Dicelstemma congestum*), Ithuriels' spear (*Triteleia laxa*), phacelia (*Phacelia* sp.), Pacific sanicle, soaproot, Diogene's lantern (*Calochortus amabilis*), farewell to spring (*Clarkia gracilis*) and fringed checkerbloom (*Sidalcea diploscypha*).

5) Manzanita chaparral occurs primarily on the northern portion of the study area along the north bank of the unnamed creek. Whiteleaf manzanita (*Arctostaphylos manzanita* ssp. *glaucescens*) is dominant and includes other chaparral shrub species such as toyon, buckbrush, coyote brush, mountain mahogany, chamise (*Adenostoma fasciculatum*), sticky monkeyflower (*Mimulus aurantiacus*), and snowberry (*Symphoricarpos albus* var. *laevigatus)*. A variety of native and non-native grasses and forbs occur as understory species including blue-eyed grass, Douglas iris (*Iris douglasiana*), phacelia, hound's tongue (*Cynoglossum grande*), blue dicks, farewell to spring, and Ithurie's spear.

6) Sandbar willow thickets occur along unnamed creek that forms the northern boundary of the study area. Sandbar willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*) are dominant. Other tree and shrub species include valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), madrone, manzanita, coyote brush, Himalayan blackberry (*Rubus armeniacus*) and poison oak. Herbaceous wetland plants noted within the creek bed include scouring rush (*Equisetum hymale*), rushes (*Juncus patens, J mexicanus, J. balticus ssp. ater*), foothill sedge (*Carex tumulicola*, pale spike ush (*Eleocharis macrostachya*) and cattails (*Typha angustifolia*).

7) Pale spike rush marshes occur along the pond margins along with the cattail marsh types and also within vegetated sections of the unnamed creek channel in the eastern portion of the study area. The dominant species is pale spike rush. Other wetland plants noted include penneyroyal (*Mentha pulegium*), curly dock (*Rumex crispus*), umbrella sedge (*Cyperus eragrostis*), rushes and water plantain (*Alisma sp.*).

8) Cattail marshes occur in conjunction with the pale spike rush vegetation type and include the same species. Narrowleaf cattail (*Typha angustifolia*) is dominant and can be a monotypic community type.

9) Seasonal wetlands were mapped in four areas in the eastern portion of the study area. Three seasonal wetlands were mapped in the borrow area and one occurs along the entrance road on the southeastern side of the project study area. Seasonal wetlands occur as relatively small depressions in the flatter areas of the borrow area. The one along the road appears to have developed as a result of water flowing along the inside portion of the roadway. Plant species noted in these areas include penneyroal, cocklebur (*Xanthium strumarium*), rabbitsfoot grass (*Polypogon monspeliensis*), small quaking grass (*Briza minor*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), hyssop loosestrife (*Lythrum hyssopifolium*) and cut-leaf plantain.

3.3 WILDLIFE HABITATS

Wildlife habitat classifications for this report is based on the California Department of Fish and Game's Wildlife Habitat Relationships (WHR) System (CDFG 1988) which places an emphasis on dominant vegetation, vegetation diversity and physiographic character of the habitat. The value of a site to wildlife is influenced by a combination of the physical and biological

components of the immediate environment, and includes such features as type, size, and diversity of vegetation communities present and their degree of disturbance. As a plant community is degraded by loss of understory species, creation of openings, and a reduction in canopy area, a loss of structural diversity generally results. Degradation of the structural diversity of a community typically diminishes wildlife habitat quality, often resulting in a reduction of wildlife species diversity.

Vegetation communities are often classified based on the dominant plant species within the community. Wildlife habitats are typically distinguished by vegetation type, with varying combinations of plant species providing different resources for use by wildlife. As a result, wildlife habitats are often classified on a more inclusive manner of the structure of the habitat rather than the specifics of the plant species, resulting in several vegetation communities occurring under one type of wildlife habitat (Table 1).

Table 1: Vegetation Communities and Wildlife Habitat Corollary

Vegetation Community	Wildlife Habitat (WHR)
wild oats grasslands, ruderal forbs	Non-native grasslands
purple needle grass grassland	Native grasslands
sandbar willow thickets	Valley-foothill riparian
manzanita chaparral	Mixed Chaparral
blue oak woodland	Montane Hardwood
pale spike rush marshes, cattail marshes, seasonal wetlands	Freshwater pond

The following is a discussion of existing habitats found on site and the wildlife species they support.

Non-native Grassland. Grassland habitat, including native and non-native grasslands, provides both primary habitat, such as nesting and foraging, and secondary habitat, such as a movement corridor. Small species using this habitat as primary habitat include reptiles and amphibians, such as southern alligator lizard (*Gerrhonotus multicarinatus*), western fence lizard (*Sceloporus occidentalis*), and Pacific slender salamander (*Batrachoseps attenuatus*), which feed on invertebrates found within and beneath vegetation and boulders within the vegetation community. This habitat also attracts seed-eating and insect-eating species of birds and mammals. California quail (*Lophortyx californicus*), mourning dove (*Zenaidura macroura*), and grasshopper sparrow (*Ammodramus savannarum),* are a few seed-eaters that nest and forage in grasslands. Insect-eaters such as scrub jays (*Aphelocoma coerulescens*) use the habitat for foraging only. Grasslands are important foraging grounds for aerial and ground foraging insect-eating bat species such as myotis (*Myotis* spp.) and pallid bat (*Antrozous pallidus*). A large number of other mammal species such as California vole (*Microtus californicus*), deer mouse (*Peromyscus maniculatus*), Botta's pocket gopher (*Thomomys bottae*), and brush rabbit (*Sylvilagus bachmani*) also forage and nest within grasslands. Small rodents attract raptors (birds of prey) such as owls, as well as red-tailed hawks (*Buteo jamaicensis*) and red-shouldered hawks (*Buteo lineatus*), among others. Black-tailed deer (*Odoicoileus hemionus californicus*) use grassland for grazing and, if the grass is tall enough, for nesting at night. Coyotes (*Canis latrans*) and striped skunk (*Mephitis mephitis*)

also inhabit the grassland.

Valley-Foothill Riparian. This habitat occurs along the ephemeral tributary on the northern boundary. The tributary supports insect diversity attractive to a variety of migratory birds and provides nesting habitat. Typically, diverse foraging substrates, such as foliage, bark and ground substrates, increase feeding availability. Birds that forage for insects in the leaves of plants include Bewick's wren (*Thryomanes bewickii*), and bushtit (*Psaltriparus minimus*). Bark-insect foraging species, such as plain titmouse (*Parus inornatus*) and white-breasted nuthatch (*Sitta carolinensis*) forage for insects in the bark. There are a few species that are adapted to foraging for insects in flight, such as black phoebe (*Sayornis nigricans*), and western wood pewee (*Contopus sordidulus*). Generalist omnivores are species such as the scrub jay (*Aphelocoma caerulescens*) that eat a variety of different foods, from insects to seeds to fruits. Although insects are the primary food source for most species in the riparian habitat, ground dwelling species, such as California quail (*Callipepla californica*) and California towhee (*Pipilo fuscus*), are also present in the riparian habitat feeding on seeds. The reduced vegetation along the north bank within the project area reduces the occupancy of the project area by these species but habitat still exists on the south bank to support many of these species.

The aquatic habitat of the tributary to the Russian River is comprised of pools up to 2 feet deep on either end of the proposed project area with varying degrees of canopy cover. Along the project area, the majority of the streambed structure is riffles with shallow flows, between 2-6 inches of water, at the time of the survey.

The ephemeral drainage located on the north side of the project area does no support steelhead habitat. There is no perennial water and the pools are not deep enough for the water to last for the entire summer period. In addition, there is an eight foot high cement fish barrier at the creek crossing of Redeemer Road. This barrier is part of the culvert system that runs under the roadway.

Mixed Chaparral. Chaparral habitat, often interspersed with other habitats, provides foraging and nesting habitat for species that are attracted to edges of communities. These edge community species include California quail, California thrasher (*Toxostoma redivivum*), mourning dove (*Zenaidura macroura*), and spotted towhee (*Pipilo crissalis*), that forage among the leaf litter for invertebrates. Avian species that use the canopy of the chaparral for catching insects include blue-gray gnatcatcher (*Polioptila caerulea*), and wrentit (*Chamaea fasciata*). Besides insects, flowers of the manzanita and ceonothus attract nectar drinkers such as Anna's hummingbird (*Calypte anna*). If nesting cliffs are nearby prairie flacons (*Falco mexicanus*) will use chaparral for foraging grounds, as well as sharp-shinned hawks, if water is nearby. Mammals use this habitat for protection and foraging grounds, feeding off new shoots of plants. Black-tailed deer (*Odoicoileus hemionius*) often feed in chaparral but this habitat supports a lower density than in oak savannah. Other species include brush rabbits (*Sylvilagus audubonii*), gophers, and deer mice (*Peromyscus maniculatus*). Small mammals attract predators such as long-tailed weasel (*Mustela frenata*), gray fox, and bobcat (*Felis rufous*). Western rattlesnakes (*Crotalus viridis*) inhabit the warm, dry chaparral community, as well as western fence lizards (*Sceloporus occidentalis*).

Montane Hardwood. The woodlands provide habitat for a variety of species, including refugia for reptiles, such as ring-necked snake (*Diadophis punctatus*), amphibians, such as the Pacific slender salamander (*Batrachoseps attenuatus*) and arboreal salamander (*Aneides lugubris*), foraging and nesting habitat for passerines, and roosting habitat for bats. Smaller passerines, such as black-capped chickadee (*Poecile atricapillus*), lazuli bunting (*Passerina amoena),* bushtit (*Psaltriparus minimus*), oak titmouse (*Baeolophus inornatus*) and acorn woodpecker (*Melanerpes*

formicivorus) observed on the site may nest and forage in the woodlands, feeding on insects on the bark. No large cavities that may support the larger raptors, such as great horned owl (*Bubo virginianus*), were observed in any of the trees in the mixed oak woodland. Other species observed foraging on the site include red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), spotted towhee (*Pipilo maculatus*), dark eyed junco (*Junco hyemalis*) and California towhee (*Pipilo crissalis*). Oak trees on the lower west-facing slopes provide potential nesting habitat for tree swallows (*Tachycineta bicolor*) and Coopers hawk (*Accipiter cooperii*). Mammals such as mule deer utilize the understory of this community, i.e. poison oak, and black berry bushes, in the form of shelter and food from the berries. The gray fox also utilizes the poison oak and black berry bushes for food and shelter, foraging on small birds and mammals, insects, fungi and berries. Several of the trees were of a diameter large enough to support roosting bats species, such as long-eared myotis (*Myotis evotis*), long-legged myotis (*Myotis volans*), Yuma myotis (*Myotis yumanensis*), California myotis (*Myotis californicus*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*) and pallid bat (*Antrozous pallidus*), a California Species of Special Concern (SSC) species.

Lacustrine. Lacustrine habitat (pond or lake habitat) contains standing water, from either a dammed river channel or an inland depression. Sizes may vary from pond size, less than one hectre, to reservoir size, comprising several square miles. Most permanent lacustrine systems support fish, while intermittent forms do not. Lacustrine habitats provide a source of water, and cover within riparian areas. The diversity of habitats typically found around lacustrine habitats provide a higher ratio of edge communities and therefore higher wildlife diversity. Wildlife species typically found in this habitat include amphibians and reptiles, such as Sierran tree frog (*Pseudacris sierra*), aquatic garter snake (*Thamnophis couchii*) and western pond turtle (*Clemmys marmorata*), among others. American bullfrog (*Lithobates catesbeianus*) was observed and heard in the ponds. High diversity of invertebrate species provides foraging opportunities for a variety of avian species, including red-winged blackbird (*Agelaius phoeniceus*) and American coot (*Fulica americana*). Snowy egret (*Leocophoyx thula*), black crowned night heron (*Nycticorax nycticorax*) and mallard (*Anas platyrhynchos*) may also forage and nest in this habitat. Mammals common in this habitat are meadow vole (*Microtus californicus*) along the edges of the pond area, raccoon (*Procyon lotor*) that may forage on eggs and invertebrates, with striped skunk (*Mephitis mephitis*) and gray fox (*Urocyon cinereoargenteus*) using the pond as a source of water. This habitat provides important foraging and drinking areas for aerial and ground feeding insectivorous bats, such as *Myotis* species and pallid bat (*Antrozous pallidus*)

3.4 WILDLIFE MOVEMENT CORRIDORS

The proposed project site is located within the Central Coast Ecoregion which supports a wide range of connectivity areas that include natural landscapes that act as corridors to allow for wildlife movement, as well as interstate connections that act as barriers to movement (Spencer, et al. 2010). Wildlife movement includes migration (i.e., usually one way per season), inter-population movement (i.e., long-term genetic flow) and small travel pathways (i.e., daily movement corridors within an animal's territory). While small travel pathways usually facilitate movement for daily home range activities such as foraging or escape from predators, they also provide connection between outlying populations and the main corridor, permitting an increase in gene flow among populations. Barriers to movement include those structures that impede such movements, such as large scale development or major highways with no undercrossings. Roads cause habitat fragmentation because they break large habitat areas into smaller habitat patches that support fewer individuals, which can increase loss of genetic diversity and risk of local extinction. Additionally, roads may prevent access to essential physical or biological features

necessary for breeding, feeding, or sheltering.

As described in the *California Essential Connectivity Project* (Spencer, et al. 2010), the study area is located in North Coast Ecoregion (Fig. 3.2, Spencer, et al. 2010). The natural drainages in the immediate area (e.g., Sulphur Creek) flow west into the Russian River which then flows south and west into Pacific Ocean. The Study Area is considered to be within the #615 Natural Landscape Block (defined as relatively natural habitat blocks that support native biodiversity) that occurs within the Cache Creek and Russian River watersheds. The study area is located in the #36 Essential Connectivity Area (defined as areas that are essential for ecological connectivity between blocks) (Fig. 3.4, Spencer, et al. 2010).

The ephemeral tributary to the Russian River is not considered a movement corridor for fish, such as steelhead, due to the road barrier at Redeemer Road. See under special status species for a specific description of the barrier. Amphibians, such as foothill yellow-legged frog, and mammals, such as striped skunk may use the creek as a movement corridor. Movements by these wildlife species occur between habitats in the Russian River, located downstream, and the ponds located upstream at the headwaters of the creek. The creek provides cover from predators while these movements are being made.

4.0 SPECIAL-STATUS SPECIES AND THEIR NATURAL COMMUNITIES

4.1 REGULATORY REQUIREMENTS

4.1.1 Federal Endangered Species Act (FESA)

To determine whether the proposed project may result in adverse effects to federally listed species, the criteria used was based on guidelines established by the USFW under Section 7(a) of the FESA, in which a project that may have an adverse effect on listed biological resources must be assessed. FESA (16 U.S. Code [USC 1531–1544) provides for the conservation of species that are Endangered or Threatened throughout all or a significant portion of their range, as well as the protection of habitats on which they depend.

Section 7 requires federal agencies to consult with USFWS or NMFS, or both, before performing any action (including actions such as funding a program or issuing a permit) that may affect listed species or designated Critical Habitat. The section 7 consultations are designed to assist Federal agencies in fulfilling their duty to ensure federal actions "do not jeopardize" the continued existence of a species or destroy or adversely modify Critical Habitat.

The USFWS defines temporary and permanent effects as areas denuded, manipulated, or otherwise modified from their pre-project conditions, thereby removing one or more essential components of a listed species' habitat as a result of project activities that include, but are not limited to, construction, staging, storage, lay down, vehicle access, parking, etc. According to the USFWS, temporary effects are limited to one construction season and, at a minimum, are fully restored to baseline habitat values or better within one year following initial disturbance. Permanent effects are not temporally limited and include all effects not fulfilling the criteria for temporary effects.

4.1.2 Federal Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (Title 16, United States Code [USC], Part 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 Code of Federal Regulations [CFR] 21, 50 CFR 10). Most actions that result in taking of, or the permanent or temporary possession of, a protected species constitute violations of the MBTA. The MBTA also prohibits destruction of occupied nests. The Migratory Bird Permit Memorandum (MBPM-2) dated April 15, 2003, clarifies that destruction of most unoccupied bird nests (without eggs or nestlings) is permissible under the MBTA; exceptions include nests of federally threatened or endangered migratory birds, bald eagles (*Haliaeetus leucocephalus*), and golden eagles (*Aquila chrysaetos*). USFWS is responsible for overseeing compliance with the MBTA.

4.1.3 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA)(Title 16, United States Code [USC], Part 1803), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267) enacts the provisions of sovereign rights and exclusive fishery management authority over all fish, and all Continental Shelf fishery resources to promote the protection of essential fish habitat. The 1996 amendments to the Magnuson-Stevens Act set forth a number of new mandates for the National Marine Fisheries Service (NOAA Fisheries), eight regional fishery management councils (Councils), and other federal agencies to identify and protect important marine and anadromous fish habitat. The Councils, with assistance from NOAA Fisheries, are required to

delineate EFH for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NOAA Fisheries regarding the potential effects of their actions on EFH, and respond in writing to the NOAA Fisheries' recommendations.

4.1.4 Army Corps of Engineers

The Corps takes jurisdiction over navigable waters of the U.S., their tributaries and any adjacent wetlands. For tidal waters, the Corps jurisdiction extends to the high tide line or when adjacent non-tidal waters of the U.S. are present, the jurisdiction extends to the limits identified for non-tidal waters of the U.S.

For non-tidal waters, the Corps jurisdiction extends to the ordinary high water mark or, if wetlands are present, the jurisdiction extends beyond the ordinary high water mark to the limit of the adjacent wetlands. When the water of the U.S. consists only of wetlands the jurisdiction extends to the limit of the wetland.

Under Section 404 of the Clean Water Act the Corps regulates the disposal of dredge or fill material into waters of the U.S. This includes all filling activities such as utility lines, outfall structures, road crossings, beach nourishment, riprap, jetties, and some excavation activities.

Under Section 10 of the Rivers and Harbors Act of 1899 the Corps regulates all structures and work within tidal waters and freshwaters that involve dredging, marinas, piers, wharves, floats, intake and outtake pipes, pilings, bulkheads, ramps, fills, overhead transmission lines, etc.

Under Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 the Corps regulates ocean discharge of dredged material.

4.1.5 California Endangered Species Act (CESA)

The California Endangered Species Act (CESA (FGC §§ 2050–2116) is administered by CDFW. The CESA prohibits the "taking" of listed species except as otherwise provided in state law. The CESA includes FGC Sections 2050–2116, and policy of the state to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat. The CESA requires mitigation measures or alternatives to a proposed project to address impacts to any State listed endangered, threatened or candidate species, or if a project would jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with conserving the species or its habitat which would prevent jeopardy. Section 86 of the FGC defines take as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Unlike the ESA, CESA applies the take prohibitions to species under petition for listing (state candidates) in addition to listed species. Section 2081 of the FGC expressly allows CDFW to authorize the incidental take of endangered, threatened, and candidate species if all of the following conditions are met:

- The take is incidental to an otherwise lawful activity.
- The impacts of the authorized take are minimized and fully mitigated.
- Issuance of the permit will not jeopardize the continued existence of the species.
- The permit is consistent with any regulations adopted in accordance with §§ 2112 and 2114 (legislature-funded recovery strategy pilot programs in the affected area).
- The applicant ensures that adequate funding is provided for implementing mitigation measures and monitoring compliance with these measures and their effectiveness.

The CESA provides that if a person obtains an incidental take permit under specified provisions of the ESA for species also listed under the CESA, no further authorization is necessary under CESA if the federal permit satisfies all the requirements of CESA and the person follows specified steps (FGC § 2080.1).

4.1.6 California Fish and Game Code

The California Constitution establishes the California Fish and Game Commission (Commission) (CA Constitution Article 4, § 20). The California Fish and Game Code (FGC) delegates the power to the Commission to regulate the taking or possession of birds, mammals, fish, amphibian and reptiles (FGC § 200). The Commission has adopted regulations setting forth the manner and method of the take of certain fish and wildlife in the California Code of Regulations, Title 14.

4.1.7 California Fish and Game Code- Species Protection

The FGC establishes DFG (FGC § 700) and states that the fish and wildlife resources of the state are held in trust for the people of the state by and through DFG (FGC § 711.7(a)). All licenses, permits, tag reservations and other entitlements for the take of fish and game authorized by FGC are prepared and issued by DFG (FGC § 1050 (a)).

Provisions of the FGC provide special protection to certain enumerated species such as:
§ 3503 protects eggs and nests of all birds.
§ 3503.5 protects birds of prey and their nests.
§ 3511 lists fully protected birds.
§ 3513 protects all birds covered under the federal Migratory Bird Treaty Act.
§ 3800 defines nongame birds.
§ 4150 defines nongame mammals.
§ 4700 lists fully protected mammals.
§ 5050 lists fully protected amphibians and reptiles.
§ 5515 lists fully protected fish species.

4.1.8 Regional Water Quality Control Board

The nine state Regional Water Quality Control Boards regulate Section 401 of the Federal Clean Water Act (CWA). CWA Section 401(a)(1) specifies that any applicant for a federal license or permit to conduct any activity that may result in any discharge into navigable waters shall provide the federal licensing or permitting agency with a certification that any such discharge will not violate state water quality standards. The Regional Water Quality Control Boards (RWQCB) administer the Section 401 program with the intent of prescribing measures for projects that are necessary to avoid, minimize, and mitigate adverse impacts on water quality and ecosystems. The jurisdictional extent of Section 401 water quality regulation is typically the top-of-bank for creeks and streams.

The RWQCB has jurisdiction under the State Porter-Cologne Water Quality Control Act which provides the basis for water quality regulation within the state of California. This act allows the State Water Resources Control Board (SWRCB) to adopt statewide water quality control plans or basin plans. The purpose of the plans is to establish water quality objectives for specific water bodies. Most of the implementation of SWRCB's responsibilities is delegated to the nine regional boards.

The SWRCB, acting through the RWQCBs, must certify that a federal wetland permit action (i.e. Section 404 CWA permit or Section 10 of the Rivers and Harbors Act, described above) meets

state water quality objectives. Under the Porter-Cologne Water Quality Control Act, wetlands and drainages that are considered waters of the United States by USACE are also classified by the state as "waters of the state". The jurisdictional extent for creeks and streams is typically the top-of-bank; however, it can be extended to also include a buffer in riparian settings. No standard buffer distance is described in this law, and is usually at the discretion of the regulator assigned to each case. The selected minimum buffer distance is usually the minimum distance necessary to protect the creek from nearby construction effects, based on proposed type of construction activities and proximity of the creek, type, stability, and depth of creek channel, and overall potential for adverse effects (including protective measures).

4.2 SPECIAL-STATUS SPECIES REVIEWED

For the purposes of this Biological Resources Assessment for the Ukiah Sanitary landfill Closure project, special-status species include those that are federally listed as Endangered, Threatened or Proposed for federal listing (candidate) under the USFWS. Other species also evaluated in this Biological Assessment include non-listed federal and California Species of Special Concern (SSC) and those species that fall under the jurisdiction of the USFWS such as the Migratory Bird Treaty Act (MBTA) and the CDFW, such as CEQA Section 15380(d).

Impacts to special-status species were assessed if: (1) those species occurred in habitats similar to those of the landfill project area, and (2) were known to occur within the project area represented by the Ukiah 7.5-minute topographic quadrangle and within 5 miles, which includes the Cow Mountain, Purdy's Garden and Elledge Peak topographic quadrangles.

Federally Listed Plant Species. Review of the USFWS (USFWS 2012), the CDFW, and the CNDDB (CNDDB 2015) revealed that nine (9) federally listed plant species, one (1) federal candidate, three (3) state-listed species and twenty-two (22) CNPS ranked species have potential to occur in the area. Please refer to Table 2 for a list of these species.

None of the federally listed plant species were observed on the site nor or are expected to occur due to lack of suitable habitat. There are no coastal dunes, coastal prairie, coastal scrub, coastal bluff scrub, volcanic ash flow vernal pools, lower montane coniferous forest, upper montane coniferous forest, North Coast coniferous forest, or closed-cone coniferous forest, within the project area. In addition there is no serpentinite , substrates that would provide the type of microhabitat needed for some of the listed species.

Special Status Plant Species: All of the federally listed species are also state-listed species, except for Red Mountain stonecrop (*Sedum laxum* ssp. *eastwoodiae*) which is a federal candidate for listing with no state listing status. The remainder of the plants in Table 2 are either CNPS Rank 1A, 1B, 2B or 4species (Table 2). These species are protected under CEQA. As stated above there are no coastal dunes, coastal prairie, coastal scrub, coastal bluff scrub, volcanic ash flow vernal pools, lower montane coniferous forest, upper montane coniferous forest, North Coast coniferous forest, or closed-cone coniferous forest and no serpentinite within the project area that would provide habitat for many of these species. Two of the CNPS Ranked special status plants are considered to have a moderate potential to occur: Koch's cord moss (*Entosthodon kochii*); and Toren's grimmia (*Grimmia torenii*). No special status plants have been identified as part of the April and May plant surveys but one more survey will be conducted in June or July. Once the surveys are complete a separate plant survey report will be prepared. If any special status plants are found, once surveys are completed, they will be recorded and report in the special status plant survey report.

Table 2. Potentially Occurring Special-Status Plant Species in the Ukiah Sanitary Landfill Closure Study Area.

Scientific Name Common Name	Status USFWS/ CDFG/ CNPS Rank	Habitat Affinities and Blooming Period	Habitat Present/absent	Occurrence Potential
FEDERAL AND STATE LISTED SPECIES AND FEDERAL SPECIES OF CONCERN				
Arabis macdonaldiana McDonald's rock-cress	FE/CE/1B	Lower montane coniferous forest, upper montane coniferous forest on serpentinite. Blooms May to July. Elevation: 135-1800m.	A	None. No habitat on site.
Arenaria paludicola Marsh sandwort	FE/CE/1B	Marshes and swamps (freshwater or brackish), sandy, openings. Blooms May to August. Elevation 3-170m.	P	None. Potential freshwater marsh habitat on site but not known from Mendocino County. Not observed during surveys.
Chorizanthe howellii Howell's spineflower	FE/CE/1B	Coastal dunes, coastal prairie, coastal scrub. Blooms May to July. Elevation: 0-35m.	A	None. No habitat on site.
Eriogonum kelloggii Red Mountian (Kellogg's) buckwheat	FC/CE/1B	Lower montane coniferous forest (rocky, serpentinite). Blooms May to August.	A	None. No habitat on site.
Erysimum menziesii (includes ssp. yadonii) Menzies's wallflower	FE/CE/1B	Coastal dunes. Blooms March to September. Elevation: 0-35m.	A	None. No habitat on site.
Fritillaria roderickii Roderick's fritillary	-/CE/1B	Coastal bluff scrub, coastal prairie, valley and foothill grassland. Blooms March to May. Elevation: 15-400m.	P	None. Potential grassland habitat present but not observed during surveys.
Howellia aquatilis Water howellia	FT/-/2B	Freshwater marshes and swamps. Blooms June. Elevation: 1085-1290m.	P	None. Potential freshwater march habitat on site. Not observed during surveys.
Lasthenia burkei Burke's goldfields	FE/CE/1B	Meadows and seeps (mesic), vernal pools. Blooms April to June. Elevation: 15-600m.	A	None. Typical habitat not present in study area. Not observed during surveys.

Scientific Name Common Name	Status USFWS/ CDFG/ CNPS Rank	Habitat Affinities and Blooming Period	Habitat Present/absent	Occurrence Potential
Limnanthes bakeri Baker's meadowfoam	-/CR/1B	Meadows and seeps, freshwater marshes and swamps, valley and foothill grassland (vernally mesic), vernal pools. Blooms April to May. Elevation: 175-910m.	A	None. Typical habitat not on site. Not observed during surveys.
Navarretia leucocephala ssp. pauciflora Few-flowered navarretia	FE/CT/1B	Volcanic ash flow vernal pools. Blooms May to June. Elevation: 400-855m.	A	None. No habitat on site.
Navarretia leucocephala ssp. plieantha Many-flowered navarretia	FE/CE/1B	Volcanic ash flow vernal pools. Blooms May to June. Elevation: 30-950m.	A	None. No habitat on site.
Pleuropogon hooverianus North Coast semaphore grass	-/CT/1B	Chaparral, cismontane woodland, valley and foothill grassland/mesic. Blooms April to June. Elevation 10-671m.	P	None. Potential chaparral, cismontane woodland and grassland habitat on site but not observed during surveys.
Sedum laxum ssp. eastwoodiae Red Mountain stonecrop	FC/-/1B	Lower montane coniferous forest (serpentinite). Blooms May to July. Elevation: 600-1200m.	A	None. No habitat on site.
CNPS RANKED SPECIES				
Arctostapylos canescens ssp. sonomensis Sonoma canescent manzanita	-/-/1B	Chaparral, lower montane coniferous forest/sometimes serpentinite. Blooms January to June. Elevation: 180-1675m.	P	None. Potential chaparral habitat on site but not observed during surveys.
Arctostaphylos stanfordiana ssp. raichei Raiche's manzanita	-/-/1B	Chaparral, lower montane coniferous forest (openings)/rocky, often serpentinite. Blooms February to April. Elevation: 450-1000m.	P	None. Potential chaparral habitat on site but not observed during surveys.

Scientific Name Common Name	Status USFWS/ CDFG/ CNPS Rank	Habitat Affinities and Blooming Period	Habitat Present/absent	Occurrence Potential
Astragalus breweri Brewer's milk-vetch	-/-/4	Chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland (open, often gravelly)/often serpentinite, volcanic. Blooms April to June. Elevation 90-730m.	P	None. Potential chaparral, cismontane woodland and grassland habitat on site but not observed during surveys.
Brasenia schreberi Watershield	-/-/2B	Marshes and swamps/freshwater. Blooms June to September. Elevation: 30-2200m.	P	None. Potential freshwater marsh habitat on site. Not observed during surveys.
Carex comosa Bristly sedge	-/-/2B	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland. Blooms May to September. Elevation: 0-625m.	P	None. Potential marsh and grassland habitat on site. Not observed during surveys
Ceanothus confusus Rincon Ridge ceanothus	-/-/1B	Closed-cone coniferous forest, chaparral, cismontane woodland/volcanic or serpentinite. Blooms February to June. Elevation: 75-1065m.	P	None. Potential chaparral and cismontane habitat on site but not observed during surveys.
Cuscuta jepsonii Jepson's dodder	-/-/1B	North Coast coniferous forest/streambanks. Blooms July to September. Elevation: 1200-2300m.	A	None. No habitat on site.
Entosthodon kochii Koch's cord moss	-/-/1B	Cismontane woodland (soil). Elevation: 180-1000m.	P	Moderate. Potential cismontane woodland habitat on site.
Fissidens pauperculus Minute pocket moss	-/-/1B	North Coast coniferous forest (damp coastal soil). Elevation: 10-1024m.	A	None. No habitat on site.
Grimmia torenii Toren's grimmia	-/-/1B	Chaparral, cismontane woodland, lower montane coniferous forest/openings, rocky, boulder and rock walls, carbonate, volcanic. Elevation: 320-1160m.	P	Moderate. Potential chaparral and cismontane woodland habitat on site.

Scientific Name Common Name	Status USFWS/ CDFG/ CNPS Rank	Habitat Affinities and Blooming Period	Habitat Present/absent	Occurrence Potential
Hemizonia congesta ssp. congesta Congested-headed hayfield tarplant	-/-/1B	Valley and foothill grassland/sometimes roadsides. Blooms April to November. Elevation: 20-560m.	P	None. Potential grassland habitat on site but not observed during surveys.
Hesperolinon adenophyllum glandular western flax	-/-/1B	Chaparral, cismontane woodland, valley and foothill grassland/usually serpentinite. Blooms May-Aug. Elevation: 150-1315 m.	A	None. No serpentinite in project area.
Horkelia bolanderi Bolander's horkelia	-/-/1B	Chaparral, lower montane coniferous forest, meadows and seeps, valley and foothill grassland/edges, vernally mesic areas. Blooms June-Aug. Elevation: 450-1100 m.	P	None. Potential chaparral and grassland habitat on site. Not observed during surveys.
Kopsiopsis hookeri Small groundcone	-/-/2B	North Coast coniferous forest. April-Aug. Elevation: 90-885 m.	A	None. No habitat on site.
Layia septentrionalis Colusa layia	-/-/1B	Chaparral, cismontane woodland, valley and foothill grassland/sandy, serpentinite. Blooms April to May. Elevation: 100-1098m.	A	None. No habitat on site – no serpentinite.
Malacothamnus hallii Halls' bush-mallow	-/-/1B	Chaparral, coastal scrub. Blooms May to September (October). Elevation: 10-650m.	P	None. Potential chaparral habitat present but not observed on site.
Malacothamnus mendocinensis Mendocino bush-mallow	-/-/1A	Cismontane woodland. Blooms May to June. Elevation: 425-575m.	P	None. Potential cismontane woodland habitat present but not observed on site.
Navarretia leucocephala ssp. bakeri Baker's navarretia	-/-/1B	Cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools/mesic. Blooms April to June. Elevation: 5-1740m.	P	None. Potential cismontane woodland and grassland habitat on site but not observed during surveys.

Scientific Name Common Name	Status USFWS/ CDFG/ CNPS Rank	Habitat Affinities and Blooming Period	Habitat Present/absent	Occurrence Potential
Plagiobothrys lithocaryus Mayacamas popcorn-flower	-/-/1A	Chaparral, cismontane woodland, valley and foothill grassland/mesic. Blooms April to May. Elevation: 300-450m.	P	None. Potential cismontane woodland and grassland habitat on site but not observed during surveys.
Sanguisorba officinalis Great burnet	-/-/2B	Bogs and fens, broadleafed upland forest, meadows and seeps, marshes and swamps, North Coast coniferous forest, riparian forest/often serpentinite. Blooms July-October. Elevation: 60-1400m.	A	None. Typical habitat not on site. No serpentintie.
Traycina rostrata Beaked tracyina	-/-/1B	Cismontane woodland, valley and foothill grassland. Blooms May to June. Elevation: 90-790m.	P	None. Potential cismontane woodland and grassland habitat present on site but not observed during surveys.
Viburnum ellipticum Oval-leaved viburnum	-/-/2B	Chaparral, cismontane woodland, lower montane coniferous forest. Blooms May to June. Elevation: 215-1400m.	P	None. Potential chaparral and cismontane woodland habitat on site but not observed during surveys.

U.S. Fish and Wildlife Service

FE = federally Ranked Endangered
FT = federally Ranked Threatened
FPE = federally proposed Endangered
SC[1] = federally Species of Concern

California Department of Fish and Wildlife

CE = California Ranked Endangered
CR = California Ranked as Rare
CT = California Ranked as Threatened

California Native Plant Society

Rank 1A: Plants presumed extirpated in California and either rare or extinct elsewhere
Rank 1B: Plants rare and endangered in California and elsewhere

Rank 2B: Plants rare and endangered in California but more common elsewhere
Rank4: Plants that have a limited distribution – a watch list

Special Status Animal Species: Of the 19 special-status animal species identified as potentially occurring in the vicinity of the Ukiah Landfill Closure project area, including a 5 mile radius (CNDDB 2015, USFWS 2015), several additional species have potential to occur on or near the site based on the habitats present (please refer to Table 3). Other species prominent in today's regulatory environment, but with low potential to occur on the site, are also included in the table.

Table 3: Potentially Occurring Special-Status Animal Species in the Ukiah Sanitary Landfill Study area

Common Name Scientific Name	Status USFWS/ CDFG	Habitat Affinities/ Reported Localities in the Project Area	Habitat Present/absent	Occurrence Potential
FEDERAL				
Invertebrates				
Lotis blue butterfly Lycaeides argyrognomon lotis	FE/-	Occurs in wet meadows and sphagnum willow bogs and such. A relatively long adult flight period, extending from mid-April to early July. Host plants are likely native plants in the pea family (Fabaceae). The coast trefoil (also known as seaside bird's-foot trefoil) (*Lotus formosissimus*) is thought to be a larval food plant as well as lupine.	Absent	None: no suitable habitat present.
Behren's silverspot butterfly Speyeria zerene behrensii	FE	Larval host plants include Viola adunca, V. cuneata, V. lobata, V. nuttallii and V. purpurea.	Absent	None: no suitable habitat present.
California freshwater shrimp *Syncaris pacifica*	FE/SE	Endemic to Napa, Sonoma and Marin Counties. Occurs in low elevation and low gradient streams with moderate to heavy riparian cover.	Absent	None: no suitable habitat present.
Fish				
Delta smelt Hypomesus transpacificus	FT/-	Sacramento-San Joaquin delta. Seasonally in Suisun Bay, Carquinez Strait & San Pablo Bay. Seldom found at salinities > 10ppt. Most often at salinities <2ppt.	Absent	None: Outside species range.
Coho salmon - Central California Coast ESU *Onchorhynchus kisutch*	FT/SE	Occurs from Punta Gorda, in northern California, to the San Lorenzo River, in Santa Cruz County, and includes coho salmon populations from several tributaries of San Francisco Bay. Reported on west side of Sonoma County (NOAA 1999).	Absent	None: Outside species range.
steelhead - Central California Coast DPS *Onchorhynchus mykiss*	FT/-	Requires beds of loose, silt-free, coarse gravel for spawning. Also needs cover, cool water and sufficient dissolved oxygen. Fish barrier at Redeemer Road.	Absent	None: No suitable habitat present. Barrier more than 1 mile west of project site.
California coastal Chinook salmon *Oncorhynchus tshawytscha*	FT	Requires gravel diameter of 2 to 3 inches, with depths generally less than 36 inches but more than 20 inches and a velocity of more than 3 ft/sec. Requires water temperatures from 42°F to 51°F.	Absent	None: Outside species range.

Common Name Scientific Name	Status USFWS/ CDFG	Habitat Affinities/ Reported Localities in the Project Area	Habitat Present/absent	Occurrence Potential
Amphibians				
California red-legged frog *Rana draytonii*	FT/-	Prefers semi-permanent and permanent stream pools, ponds and creeks with emergent and/or riparian vegetation. Occupies upland habitat especially during the wet winter months. Outside species range (USFWS 2009).	Present	None: Outside species range.
Birds				
marbled murrelet Brachyramphus marmoratus	FT/SE	Nests in old growth forests and can migrate up to 20 miles inland. This species nests in mature conifer forests with open crown canopies or slopes to provide easy access, and large limbs in trees such as Douglas-fir, western hemlock, Sitka spruce, coastal redwood and mountain hemlock.	Absent	None: No suitable nesting habitat present.
Yellow-billed cuckoo Coccyzus americanus occidentalis	FT/SE	Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles or wild grape.	Absent	None: Habitat not dense enough to support species.
northern spotted owl Strix occidentalis caurina	FT, MB/-	Dense coniferous and hardwood forest, shaded, steep sided canyons.	Absent	None: No suitable nesting habitat present.
Mammals				
Pt Arena Mountain beaver *Aplodontia rufa nigra*	FE	Live in underground burrows dug in forest openings and dense thickets, feeding on various plants, including nettles, blackberry, poison oak, and coyote brush. Found on cool, moist, north-facing slopes in moderately dense coastal scrub.	Absent	None: No suitable nesting habitat present.
Pacific fisher Pekania pennanti	FPT/SCT	Intermediate to large-tree stages of coniferous forests & deciduous riparian areas with high percentage of canopy closure. This species uses cavities, snags, logs & rocky area for cover and denning. Needs large areas of mature, dense forest.	Absent	None: No suitable nesting habitat present.
STATE				
Amphibians				

Common Name Scientific Name	Status USFWS/ CDFG	Habitat Affinities/ Reported Localities in the Project Area	Habitat Present/absent	Occurrence Potential
foothill yellow-legged frog *Rana boylii*	-/SSC	Prefers permanent stream pools, and creeks with emergent and/or riparian vegetation.	Present	**Present**: observed on the site.
Reptiles				
western pond turtle *Emys marmorata*	-/SPT	Prefers permanent, slow-moving creeks, streams, ponds, rivers, marshes and irrigation ditches with basking sites and a vegetated shoreline. Requires upland sites for egg-laying. Species reported in Russian River in Ukiah (CNDDB 2015).	Present	**Low**: suitable aquatic habitat present in ponds.
Birds				
Sharp-shinned hawk *Accipiter striatus*	MB	Dense canopy pine or mixed conifer forest and riparian habitats. Water within one mile required.	Absent	None; no suitable nesting habitat within project area.
Red-shouldered hawk *Buteo lineatus*	MB	Nests in trees along riparian corridors and open fields.	Present	**Low**: suitable habitat occurs along ephemeral tributary.
Peregrine falcon Falco peregrinus anatum	MB	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers or marshes.	Absent	None: no suitable habitat present.
Osprey Pandion haliaetus	-/SSC	Nests in large trees within 15 miles of good fish-producing water body.	Absent	None: no suitable nesting habitat present.
grasshopper sparrow Ammodramus savannarum	MB/SSC	Typically found in tall, dense grass, nesting on the ground at the base of grass tuft.	Present	High: Observed on site.
Mammals				
pallid bat Antrozous pallidus	-/SSC	Day roosts include rock outcrops, mines, caves, buildings, bridges, and hollows and cavities in a wide variety of tree species (Reported from 8 mi NE of Ukiah (CNDDB 2015).	Absent	None: No suitable roosting trees present.

Common Name Scientific Name	Status USFWS/ CDFG	Habitat Affinities/ Reported Localities in the Project Area	Habitat Present/absent	Occurrence Potential
Townsend's big-eared bat *Corynorhinus townsendii*	-/SPT	Roosting sites include caves, mine tunnels, abandoned buildings and other structures. Species reported at Hopland field station, 2.7 mi NE of Hopland (CNDDB 2015).	Absent	None: No suitable roosting habitat present.
Fringed myotis Mytotis thysanodes	-/SSC	Roosts in colonies in caves, cliffs and attics of old buildings. Will also use trees as day roosts.	Absent	None: No suitable roosting habitat present.

* Includes bat species expected to occur in the project region and vicinity based on known roosting ecology and habitat relationships, but not reported in the CNDDB.

U.S. Fish and Wildlife Service

FE = federally listed Endangered
FT = federally listed Threatened
FC = federal candidate for listing
MB = Migratory Bird Treaty Act.

California Department of Fish and Wildlife

SE = State listed Endangered
ST = State listed as Threatened
SSC = State Species of Special Concern

Western Bat Work Group - Priority

California includes multiple regions where a species may have different WBWG Priority ranks, therefore the CNNDB includes categories for Medium-High, and Low-Medium Priority.

The following is a discussion of species having potential to occur on site and/or are species that are prominent in today's regulatory environment, such as the California red-legged frog. This document does not address impacts to species that may occur in the region but for which no habitat occurs on site.

4.3 FEDERALLY THREATENED AND ENDANGERED WILDLIFE SPECIES

Steelhead (*Oncorhynchus mykiss irideus*) Central California Coast Distinct Population Segment
Status: federally listed Threatened in 1997. Critical Habitat was designated in 2005.

Description: The steelhead, also known as coastal rainbow trout, has a more rounded snout, with a bright pink stripe along the lateral line with spotted dorsal fins and a square or slightly forked caudal fin (Behnke 2002).

General Ecology and Distribution: Winter steelhead enter streams from the ocean when rains have increased the stream flows (Moyle 2002). Spawning typically occurs in tributaries to mainstream rivers, after which they return to the ocean. A key characteristic of all breeding streams is cool temperatures, typically between 0° Celsius (winter) and 26°-27° C (summer) (Moyle 2002). Higher temperatures may reduce oxygen levels that are not population sustaining. Different size classes require different microhabitats that are defined by depth, water velocity, substrate and cover (Moyle 2002).

Occurrence in the project area: Although the ephemeral tributary is hydrologically connected to the Russian River, an 8-foot tall cement fish barrier occurs at the Redeemer Road crossing, located approximately 1.25 miles west of the project area, and is identified in the California Fish Passage Assessment Database as Number 23 (Passage ID 25199) in Mendocino County (CNDDB 2015). The crossing has been identified as "RED: the filter determined this crossing fails to meet fish passage criteria for adult steelhead and all age classes due to the extremely perched outlet (more than 7 feet)." No further action regarding this species is required.

California red-legged frog (*Rana draytonii*)(CRF)
Status: federally listed by as Threatened with associated critical habitat and is classified by the CDFG as a State Special Concern species.

General Ecology and Distribution: Breeding habitat for this frog is primarily in ponds, but they will also breed in slow moving streams, or deep pools in intermittent streams. Inhabited ponds are typically permanent and contain emergent and shoreline vegetation. Sufficient pond depth and shoreline cover are both critical, because they provide means of escape from predators for the frogs (Stebbins 1985, CDFG 1988, Tatarian 2008). Additionally, emergent vegetation is necessary for the deposition of eggs. The breeding period begins during heavy rains, from early to late winter, usually November through early May. The larvae mature in 11 to 20 weeks.

Non-breeding CRF have been found in both aquatic and upland habitats. The majority of individuals prefer dense, shrubby or emergent vegetation, closely associated with deep (>0.7 meters) still, or slow moving water. However, some individuals use habitats that are removed from aquatic habitats, seeking cover in ground squirrel burrows, under boulders and logs and in non-native grasslands (Tatarian 2008). Upland refugia habitat includes areas up to 90 meters from a stream corridor and includes natural features, such as boulders, rocks, trees, shrubs, and logs. Incised stream channels with portions narrower than 18 inches and depths greater than 18 inches may also provide habitat. In general, densely vegetated terrestrial areas within the riparian

corridor provide important sheltering habitat during the winter flooding of the streams (Tatarian 2008).

Occurrence in the project area: The project site is located outside the species range, as defined by the USFWS (USFWS 2009), which is located west of HWY 128. No further action for this species is required.

4.4 CRITICAL HABITAT

Critical habitat (CH) is designated for the survival and recovery of species listed as threatened or endangered under the Endangered Species Act (ESA). Critical habitat includes those areas occupied by the species, in which are found physical and biological features that are essential to the conservation of an ESA listed species and which may require special management considerations or protection. Critical habitat may also include unoccupied habitat if the Secretary determines that the unoccupied habitat is essential for the conservation of the species.

Steelhead (Central California Coast) – the project area is located outside the Russian River Hydrologic Unit 1114 (NOAA 2005).

4.5 OTHER SPECIAL-STATUS WILDLIFE SPECIES

Foothill Yellow-legged frog (*Rana boylii*) (FYF)
Status: State Species of Concern

General Ecology and Distribution: This species typically inhabits rocky streams, preferring streams with cobble sized substrates (Jennings and Hayes 1994). Occupied drainages range from sea level to 2,040 meters (6,700 feet) (Jennings and Hayes 1994). Streams in woodland, chaparral or forest with little to no bank vegetation cover are also preferred (Stebbins 1985). *R. boylii* prefers small to moderate sized streams with at least some cobble-sized substrate (Jennings and Hayes 1994). Breeding occurs from mid-March to May, depending on rains, with tadpoles metamorphosing in July or August.

Project Area Occurrence: Two subadult foothill yellow-legged frogs were observed in the ephemeral tributary within the project area.

Western Pond Turtle (*Actinemys marmorata*) (WPT)
Status: State Proposed listing as Threatened

General Ecology and Distribution: This medium sized turtle ranges in size to just over 8 inches (21cm) with a low carapace that is generally olive, brownish or blackish (Stebbins 1985, Jennings and Hayes 1994). Primary habits include permanent water sources such as ponds, streams and rivers. It is often seen basking on logs, mud banks or mats of vegetation, although wild populations are wary and individuals will often plunge for cover after detecting movement from a considerable distance. Although it is an aquatic species with webbed feet, it can move across land in response to fluctuating water level, an apparent adaptation to the variable rainfall and unpredictable flows that occur in many coastal California drainage basins (Rathbun, *et al.* 1993). In addition, it can over-winter on land or in water or remain active in the winter, depending on environmental conditions (Rathbun, *et al.* 1993; Jennings and Hayes 1994). Females travel from aquatic sites into open, grassy areas to lay eggs in a shallow nest (Holland 1992; Rathbun, *et al.* 1993). Nests have been reported from 2-400 meters or more away from water bodies (Jennings and Hayes 1994).

Project Area Occurrence: No individuals were detected during the surveys for this biological resource assessment. The closest reported sighting is more than 1.5 mi west in the Russian River (CNDDB 2015). Although the ponds on the site provide suitable habitat for this species the fish barrier on the ephemeral creek does not allow for upstream passage of turtles from the Russian River. There is potential for individuals to move up Sulphur Creek and then across the hill saddle to the easternmost pond on the site. It is unlikely that individuals would use the upland habitat of the landfill for egg laying based on the compaction of the soil and the steep slopes.

Nesting Passerines – including California towhee (*Pipilo crissalis*), grasshopper sparrow (*Ammodramus savannarum)* and song sparrow (*Melospiza melodia*), among others
Status: Protected under the Federal Migratory Bird Treaty Act and Fish and Game Code 3503.

General Ecology and Distribution: As early as February, passerines begin courtship and once paired, they begin nest building, often around the beginning of March. Nest structures vary in shapes, sizes and composition and can include stick nests, mud nests, matted reeds and cavity nests. Depending on environmental conditions, young birds may fledge from the nest as early as May and, if the prey base is large, the adults may lay a second clutch of eggs.

Project Area Occurrence: No surveys were conducted for these species as part of this biological resource assessment. Several passerine (perching birds) species were observed nesting on the site in the various habitats, including, but not limited to, grasshopper sparrows nesting in the grasslands on the landfill.

Nesting Raptors –Cooper's hawk (*Accipiter cooperii*)
Status: Protected under the Federal Migratory Bird Treaty Act and Fish and Game Code 3503.5

General Ecology and Distribution: Raptors nest in a variety of substrates including, cavities, ledges and stick nests. For example, Cooper's hawks are small bird hunters, hunting on the edges of forests and in broken forest where passerines forage for seeds and insects. In general, the breeding season for raptors occurs in late March through June, depending on the climate, with young fledging by early August.

Project Area Occurrence: No surveys were conducted for these species as part of this biological resource assessment. Suitable nesting trees occur along the ephemeral tributary adjacent and within 100 feet of the proposed project.

Roosting bats – including pallid bat, Townsend's big-eared bat, and western red bat
Status: California Species of Concern, State proposed Threatened, as well as Fish and Wildlife Code Sections 86, 2000, 2014, 3007, Title 14, Sections 15380, 15382.

General Ecology and Distribution: Bats in this region of California are not active year-round. During the maternity season, non-volant young of colonial bats remain in the roost until late summer (end of August), after which they may disperse from the natal roost or remain into or throughout the winter. Obligate tree-roosting bat species, and to some extent, colonial bats, may switch tree roosts frequently, particularly after young are volant, but are sometimes faithful for longer periods (weeks). During winter months, bats typically enter torpor, rousing only occasionally to drink water or opportunistically feed on insects. The onset of torpor is dependent upon environmental conditions, primarily temperature and rainfall. To prevent direct mortality of either non-volant young or torpid bats during winter months, roosts must not be disturbed or destroyed until bats are seasonally active, and only after they have been provide a means of

escape from the roost.

Pallid bats are eclectic in their roosting habitat selection, and to some extent distribution, and can be found in crevices and small cavities in rock outcrops, tree hollows, mines, caves, and a wide variety of man-made structures such as buildings, bridges and culverts, generally in lower to mid-elevation sites. This species forms maternity colonies, composed of dozens to sometimes hundreds of females and their young, and smaller bachelor colonies composed of males and not-yet reproductive females.

Western red bats have a broad, but disjunct, distribution throughout the state, and a wide range of elevations. Reproductive females are more common in the inland portions of the state than the Bay Area, where males are more common during the summer months. This is a foliage-roosting species typically associated with large-leaf trees, such as willows, cottonwoods, and sycamores, and is often found near riparian zones. Western red bats are typically solitary, however females give birth to two to five young, which is atypical compared to other bat species.

Project Area Occurrence: Pallid bats could roost in those trees with cavities, crevices and/or exfoliating bark; these could also support non-CSC bats such as hoary bats (*Lasiurus cinereus*), an obligate tree-roosting species, and Myotis species. In addition, western red bats could potentially roost in the foliage of larger mature trees throughout the project site.

Please refer to the Impacts and Mitigation Measures for details on avoidance measures of roosting bats in trees on this site.

4.6 SPECIAL STATUS NATURAL COMMUNITIES

The purple needle grass grassland is a special status vegetation community. This type occurs on the slopes of the existing former borrow area in the northeast portion of the study area. The sandbar willow thickets, cattail marsh, pale spike rush marshes and seasonal wetland areas are wetland vegetation types and even though they do not have a special status designation they are regulated by the Corps, RWQCB and CDFW and therefore are considered to be sensitive natural communities and any impacts to these communities type will require mitigation.

5.0 EFFECTS ANALYSIS AND MITIGATION MEASURES

This section summarizes the potential temporary biological effects from construction activities within the study area. The analysis of these effects is based on a single reconnaissance-level survey of the study area, a review of existing databases and literature, and personal professional experience with biological resources of the region. Potential effects to federally-listed special-status animal species may occur from the proposed project. Mitigations for these biological effects are provided below.

In addition, impacts to state protected special status species are also included in this section and mitigation measures are proposed to reduce the impacts to less than significant.

5.1 FEDERALLY PROTECTED RESOURCES

5.1.1 Wetlands and Waters of the U.S. and State

Potential Impact: Proposed drainage facilities consist of a network of benches, ditches and storm drain that drain to 18- and 24-inch diameter corrugated metal pipe (CMP) discharge culverts. These CMP culverts discharge to the unnamed creek channel at various locations along the length of the Landfill's northern boundary. The culverts that discharge into the creek will also have rock energy dissipaters. These will impact the bed, bank and ordinary high water mark of the creek falling within the jurisdiction of the Corps, RWQCB and CDFW. In addition, the regrading of Pond B and construction of the proposed new sedimentation basin will impact the wetland area around Pond B and two seasonal wetlands: W3 and W4. Proposed access improvements that include placing aggregate base over portion of the existing perimeter road and along benches to provide all-weather access will also impact seasonal wetland areas W1 and W5.

Mitigation Measure: The City is proposing to mitigate for any permanent loss of wetlands or waters of the U.S. and state on site. Mitigation will be in the form of on-site wetland creation which could occur as part of the sedimentation pond regarding and creation of a new sedimentation basin. Impacts to the creek channel could be mitigated by restoration and enhancement of areas within the project study area that would provide opportunities for riparian tree and shrub restoration. The unnamed tributary that goes to the east lacks any tree or shrub cover and would provide more than adequate areas for riparian tree enhancement and restoration. A wetland and riparian mitigation and monitoring plan will be prepared as part of the permit application process for a Section 404 permit from the Corps, a 401 water quality certification from the RWQCB and a Section 1600 Lake and Streambed Alteration Agreement from CDFW. The mitigation plan will include the following:

1. *Objectives*. A description of the resource type(s) and amount(s) that will be provided, the method of compensation (restoration, establishment, preservation etc.), and how the anticipated functions of the mitigation project will address watershed needs.
2. *Site selection*. A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the mitigation project site.
3. *Site protection instrument*. A description of the legal arrangements and instrument including site ownership, that will be used to ensure the long-term protection of the mitigation project site.
4. *Baseline information*. A description of the ecological characteristics of the proposed mitigation project site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and

mitigation site(s) or the geographic coordinates for those site(s), and other characteristics appropriate to the type of resource proposed as compensation. The baseline information should include a delineation of waters of the United States on the proposed mitigation project site.
5. *Mitigation work plan*. Detailed written specifications and work descriptions for the mitigation project, including: the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water; methods for establishing the desired plant community; plans to control invasive plant species; proposed grading plan; soil management; and erosion control measures. For stream mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings.
6. *Maintenance plan*. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.
7. *Performance standards*. Ecologically-based standards that will be used to determine whether the mitigation project is achieving its objectives.
8. *Monitoring requirements*. A description of parameters monitored to determine whether the mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting monitoring results.
9. *Long-term management plan*. A description of how the mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management.
10. *Adaptive management plan*. A management strategy to address unforeseen changes in site conditions or other components of the mitigation project, including the party or parties responsible for implementing adaptive management measures.
11. *Financial assurances*. A description of financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the mitigation project will be successfully completed, in accordance with its performance standards.

5.2 STATE PROTECTED RESOURCES

5.2.1 Special-Status Natural Communities

Potential Impact: Impacts to riparian and wetland vegetation is discussed in section 5.2.1. Several areas of purple needle grass grassland were mapped for the borrow area. Any impacts to these plant communities will require compensation.

Mitigation Measure: The soil borrow area will be reclaimed by re-grading and re-vegetating (hydroseeding) with native grasses, specifically purple needlegrass. A mitigation plan will be required by CDFW and would have the following elements:

1. Objectives. A description of the resource type(s) and amount(s) that will be provided, the method of compensation (restoration, establishment, preservation etc.).
2. Site selection. A description of the factors considered during the site selection process.
3. Baseline information. A description of the ecological characteristics of the proposed mitigation project site. This may include descriptions of historic and existing plant communities, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other characteristics.
4. Mitigation work plan. Detailed written specifications and work descriptions for the mitigation project, including: the geographic boundaries of the project; construction methods, timing, and sequence; methods for establishing the desired plant community; plans to control invasive plant species; proposed grading plan; soil management; and

erosion control measures.

5. Maintenance plan. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.
6. Performance standards. Ecologically-based standards that will be used to determine whether the mitigation project is achieving its objectives.
7. Monitoring requirements. A description of parameters monitored to determine whether the mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting monitoring results.
8. Long-term management plan. A description of how the mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource.
9. Adaptive management plan. A management strategy to address unforeseen changes in site conditions or other components of the mitigation project, including the party or parties responsible for implementing adaptive management measures.

5.2.2 Special-Status Plants

Potential Impact: No special status plants have been identified during the April and May plants surveys although two species have a moderate potential to occur: Koch's cord moss and Toren's grimmia. Additional plant surveys are scheduled for June or July 2015. If any special status plants are found during these surveys the following mitigation measures will be implemented.

Mitigation Measure: To ensure no take of individuals and be incompliance with CDFW and USFWS guidelines the following mitigation measures will be implemented based on the status of the plant observed:

Endangered, Threatened, or Rare Species and their Habitats: The project shall either avoid take or obtain formal incidental take coverage with the required compensatory measures where avoidance cannot be achieved for the affected categories: state and federally listed or proposed species, state candidates for listing, and California Native Plant Society (CNPS) Rank 1B species.

Listed or CNPS Rank 1B Plants: For species that do not have formal take protection (e.g., CNPS Rank 1B plants and federally-listed plants where there is no federal nexus), the City shall avoid, minimize, and/or compensate (in that order of preference) at the same level of mitigation as those species that are afforded formal take protection.

If listed plant species are found on the project site, then the project applicant shall prepare a mitigation plan that describes the avoidance or compensatory mitigation measures that would be implemented for these populations. As a performance standard, the plan shall provide for no net loss in the quantity or quality of plant populations. The mitigation plan shall be submitted to the USFWS and/or CDFW for approval for federal and state-listed plants, respectively. The mitigation plan shall include the mitigation measures, which are adopted from the CNPS Policy on *Mitigation Guidelines Regarding Impacts to Rare, Threatened and Endangered Plants* (CNPS 1998), described below, or equally effective alternative measures:

1. Mitigation for impacts to listed plants would include avoidance measures, when feasible, and compensatory mitigation when avoidance is not possible. Avoidance measures shall include buffer zones to avoid impacting listed plants; installing exclusion fencing around the existing plant populations prior to and during construction. Compensatory mitigation shall include replanting on site or propagation of plants at a nearby conservation site through seeding or translocation. Mitigation ratios shall be sufficient to achieve

performance criteria of no net loss of plants. Post-project monitoring shall verify that avoidance and mitigation measures are successful.

2. If mitigation for impacts to listed or List 1B plants occurs at a non-bank site, preference would be given to locating the mitigation site in an area as close to the project site as possible. If mitigation sites are not available in the vicinity of the project site, mitigation for listed plants may be accomplished at any site in Mendocino County that is suitable and supports the impacted plant population.

3. A long-term mitigation, monitoring, and management plan shall be developed for plant mitigation and submitted to the USFWS and/or CDFW for approval prior to initiation of construction activities. Mitigation sites shall be monitored for five years after installation. Depending on the actual case-by-case circumstances listed plants within the Project footprint may be salvaged and/or transplanted to a mitigation site approved by the CDFG and/or USFWS. When feasible, seed from plants unavoidably impacted shall be collected and preserved for planting on an approved mitigation site.

4. Impacted plants shall be mitigated at the ratio of 2:1, or as required by resources agencies, for both individuals and area.

5. All storage and staging areas shall be located outside of stands of listed plants.

CNPS Rank 2, 3, or 4 Plant Species: The project shall avoid significant loss of individuals of a CNPS Rank 2, 3, or 4 (sensitive) plant species, to the extent feasible.

Avoidance measures shall include, but not be limited to, buffer zones, to avoid impacting special status plants and installation of exclusion fencing around the existing plant populations prior to and during construction.

If the impacts from the project exceed 15% of the known occurrences or populations in Mendocino County, then plants shall be relocated or compensatory mitigation shall occur. The project applicant shall prepare a mitigation plan that describes the avoidance or compensatory mitigation measures that would be implemented for these populations. The mitigation plan would be submitted to the CDFW for approval and include the following, or equally effective alternative measures:

1. Prior to the initiation of construction, Rank 2, 3 or 4 plants that would be unavoidably impacted during construction shall be salvaged and transplanted or their seeds shall be collected and preserved for subsequent re-planting. The transplanted plants or seeds shall be reestablished on site if possible; otherwise, they shall be established on a mitigation parcel. Mitigation sites shall be monitored for five years after installation.

2. Impacted Rank 2, 3 or 4 plants shall be mitigated at a ratio of 1:1, or as required by resources agencies, for both individuals and area.

5.2.3 Wildlife

Potential Impact: The proposed project could result in "take" of **individual foothill yellow-legged frog** known to occur within this portion of the ephemeral tributary. There is potential for both adults and tadpoles to be affected by the proposed project.

Mitigation Measure: Construction will occur above any existing water. If this is not possible, measures will be taken to isolate the workspace from flowing water to prevent stream sedimentation and turbidity. To prevent take of individuals a pre-construction survey of the ephemeral tributary shall be conducted 3 months in advance of work proposed for the ephemeral tributary. The surveys will determine if individuals are present. If no individuals (e.g., adults, juveniles or tadpoles) are present, no further action is required. If adults are present work in the creek shall occur after the metamorph stage of development, typically after August. This timing will ensure that individuals can leave an area of the own volition.

The project site shall be restored to pre-construction condition or better. Streambank, ground and/or soil exposed as a result of construction, and soil within and above toe-rock shall be revegetated by live planting, seed casting, or hydroseeding prior to November 30 of the project year. All debris, sediment, rubbish, vegetation or other material removed from waterway shall be removed to a location where it will not re-enter the waters of the state.

Potential Impact: The proposed project could result in "take" of **individual western pond turtle** that may move along this portion of the ephemeral tributary and may use the ponds on the site.

Mitigation Measure: To prevent take of individuals a pre-construction survey of the ephemeral tributary and the ponds shall be conducted 3 months in advance of work proposed for either water body. The surveys will determine if individuals are present. If no individuals (e.g., adults, or juveniles) are present, no further action is required. If individuals are present measures to prevent take of individual foothill yellow-legged frog will address concerns for western pond turtle.

Potential Impact: The proposed project could result in the removal **of occupied passerine nests** in the trees and shrubs on the project site. Disturbance during the nesting season may result in nest abandonment and mortality of young. Bird species not protected under CESA or FESA, such as some passerines (including mourning dove and scrub jays) are protected under the Fish and Game Code 3503 and the MBTA, and some raptors (including American kestrel) are protected under Fish and Game Code 3503.5 and the MBTA. These aforementioned species may potentially be impacted by the removal of potential nesting habitat in the trees within the project area. Disturbance during the nesting season (February 15- August 15) may result in the potential nest abandonment and mortality of young, which is considered a "take" of an individual. This is a potentially significant impact.

Mitigation Measure: To avoid "take" and/or further evaluate presence or absence of passerines, the following measures are recommended:

1. Grading or removal of nesting trees should be conducted outside the nesting season, which occurs between approximately March 1 and August 15.
2. If grading between August 15 and March 1 is infeasible and groundbreaking must occur within the breeding season, a pre-construction nesting bird (both passerine and raptor) survey of the grasslands and adjacent trees shall be performed by a qualified biologist within 7 days of ground breaking. If no nesting birds are observed no further action is required and grading shall occur within one week of the survey to prevent "take" of individual birds that could begin nesting after the survey.
3. If bird nests (either passerine and/or raptor) are observed during the pre-construction survey, a disturbance-free buffer zone shall be established around the nest tree(s) until the young have fledged, as determined by a qualified biologist.
4. The radius of the required buffer zone can vary depending on the species, (i.e., 75-100 feet for passerines and 200-300 feet for raptors), with the dimensions of any required

buffer zones to be determined by a qualified biologist in consultation with CDFG.

5. To delineate the buffer zone around a nesting tree, orange construction fencing shall be placed at the specified radius from the base of the tree within which no machinery or workers shall intrude.
6. After the fencing is in place there will be no restrictions on grading or construction activities outside the prescribed buffer zones.

Potential Impact: Removal of trees containing **suitable bat roosting habitat** comprised of cavities, crevices, and/or exfoliating bark, may cause direct mortality of roosting bats if removed during maternity season prior to self-sufficient volancy of pups, or in winter during torpor or hibernation. Removal of larger mature trees has the potential of causing direct mortality of solitary tree-roosting species such as western red bat or hoary bat.

Mitigation Measure: Presence/absence surveys for bats in trees are extremely problematic for several reasons. First, only a small percentage of trees can be effectively surveyed by inspecting crevices or cavities due to limited physical access to the roost features, or complete visual access of the feature. As a result, in most cases, trees must be surveyed at night using night vision and bioacoustic equipment to observe any bats emerging from roost features. Typically, only one, or two adjacent trees can be surveyed by each observer each night. In addition, bats are less site-faithful to trees than other roost types like caves, mines, bridges or buildings, and switch tree roosts frequently when active. Therefore, trees must be removed no more than 24-48 hours after each night emergence survey, to ensure the tree is removed prior to bats moving in subsequent to surveys. Because of these logistical limitations, it is rarely safe to rely on emergence surveys of trees if more than a few are present on a project site. Instead, it is generally more cost-effective to presume presence of roosting bats, then conduct two-step tree removal during seasonal periods of bat activity, so that bats can safely abandon the tree prior to removal. These dates are:

A) between March 1 (or after evening temperatures rise above 45F and 72 hours after rains fall to less than 0.5” in 24 hours) and April 15 (maternity season), after which time non-volant pups are present in maternity roosts, and;

B) between September 1, after young are self-sufficiently volant, and October 15, or before evening temperatures fall below 45F, and 72 hours prior to onset of rains greater than 0.5” in 24 hours.

6.0 CONCLUSIONS AND DETERMINATIONS

6.1 CONCLUSIONS

This project will incorporate reasonable and prudent measures for avoidance and minimization, described in Section 1.4, and species-specific avoidance and minimization measures. As a result, the project is not anticipated to result in take of any of the listed species described in this biological assessment. The project effects are insignificant and primarily temporary in nature. All temporarily disturbed areas will be restored to pre-construction function.

6.2 DETERMINATIONS

A "may affect, but not likely to adversely affect" determination to special-status species is based on guidelines established by the USFWS under Section 7(a) of the Federal Endangered Species Act (FESA). FESA states that, "each federal agency shall…insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any Endangered or Threatened species or result in the destruction or adverse modification of habitat of such species." In addition, the "may affect, but not likely to adversely affect" language means that all effects are either beneficial, insignificant, or discountable, or any combination thereof. Beneficial effects have contemporaneous positive effects without any adverse effects to the species or habitat. Insignificant effects relate to the size of the effect and include those effects that are undetectable, not measurable, or cannot be evaluated. Discountable effects are those extremely unlikely to occur. Thus, components of the proposed project were deemed to have an insignificant effect based on the size and temporal nature of the proposed project.

Steelhead – No suitable habitat occurs in the ephemeral tributary to the Russian River. As a result, we determine that the project *will not likely to adversely affect* steelhead.

California red-legged frog – The project is located outside the species range. No suitable habitat occur sin the ephemeral tributary to the Russian River. This project will not result in mortality of CRF and may result in insignificant effects to potential dispersal habitat. As a result, we determine that the project *will not likely to adversely affect* CRF

Critical Habitat - The Ukiah landfill project will not affect any critical habitat nor adversely modify any critical habitat for steelhead or California red-legged frog.

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Appendix A: Project Figures

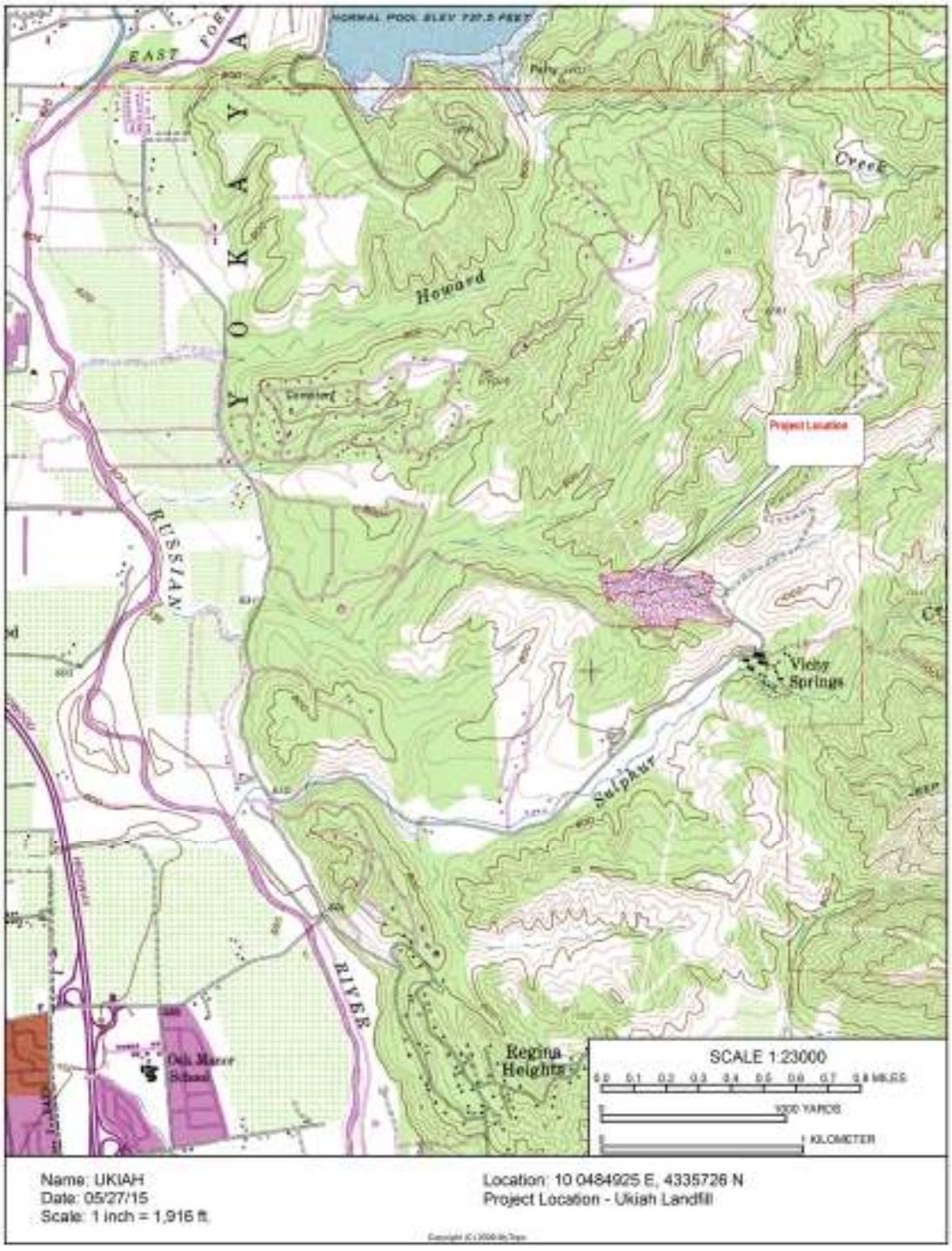

Figure 1: Project Location



Figure 2: Blue oak woodland on southern boundary and wild oats grassland.



Figure 3: Manzanita shrubland along ephemeral tributary.



Figure 4: Willow shrubland long ephemeral tributary.



Figure 5: Spike rush in leachate pond.



Figure 6: Cattails at southeastern pond.



Figure 7: Seasonal wetlands at southeastern portion of project.



Figure 8: Instream pool in ephemeral tributary.



Figure 9: Non-pool habitat in ephemeral tributary.

Appendix B

List of plant species observed on April 15, 21 and 29 and May 19, and 22, 2015.

Scientific Name	Common Name - * are non-native
Achillea millefolium	Yarrow
Achyrachaena mollis	Blow wives*
Acmispon americanus	Spanish clover
Acmispon brachycarpus	deervetch
Acmispon parviflorus	Small-flowered lotus
Adenostoma fasciculatum	Chamise
Adiantum jordanii	California maidenhair
Aegilops truncialis	Barbed goatgrass*
Aesculus californica	California buckeye
Aira caryophyllea	Silver European hairgrass*
Alisma sp.	Water plantain
Allium bolanderi var. *bolanderi*	Bolander's onion
Anisocarpus madioides	Woodland tarweed
Anthemis cotula	Mayweed*
Anthriscus caucalis	Bur-chervil*
Aphanes occidentalis	Lady's mantle
Arbutus menziesii	Madrone
Arctostaphylos manzanita ssp. *glaucescens*	White leaf manzanita
Artemisia douglasiana	Mugwort
Avena barbata	Slender wild oat*
Avena fatua	Wild oat
Baccharis glutinosa	Marsh baccharis
Baccharis pilularis	Coyote brush
Bellardia trixago	Mediterranean linseed*
Brassica nigra	Black mustard*
Briza maxima	Large quaking grass*
Briza minor	Small quaking grass*
Brodiaea elegans ssp. *elegans*	Harvey brodiaea
Bromus carninatus	California brome
Bromus caroli-henrici	Poverty brome*
Bromus diandrus	Rip-gut brome*
Bromus hordeaceus	Soft chess*
Bromus laevipes	Woodland brome
Bromus madritensis ssp. rubens	Foxtail chess*
Calochortus amabilis	Diogene's lantern
Calycadenia fremontii	Fremont's western rosinweed
Cardamine oligosperma	Bittercress
Carduus pycnocephalus	Itlaian thistle*
Carex tumulicola	Foothill sedge
Ceanothus cnuneatus ssp. *cuneatus*	Buckbrush
Centaurea soltitialis	Yellow star-sthistle*
Ceratium glomeraum	Chickweed*
Cercocarpus betuloides	Birch-leaf mountain mahogany
Chlorogalum pomeridianum	Soaproot

Cirsium vulgare	Bull thistle*
Clarkia purpurea ssp. *quadrivulnera*	Wine cups
Claytonia perfoliata	Miner's lettuce
Clinopodium douglasii	Yerba Buena
Collinsia heterophylla	Chinese houses
Cynodon dactylon	Bermuda grass*
Cynoglossum grande	Hound's tongue
Cynosurus echinatus	Hedgehog dotail grass*
Cyperus eragrostis	Umbrella sedge
Dactylis glomerata	Orchard grass*
Danthonia californica	California oat-grass
Datisca glomerata	Durango root
Daucus carota	Queen Anne's lace*
Daucus pusillus	Rattlesnake weed
Delphinium sp.	Larkspur
Deschampsia elongata	Slender hairgrass
Dichelosemma capitatum ssp. *capitatum*	Blue dicks
Dichelosemma congestum	Ookow
Dipascus fullonum	Wild teasel*
Distichlis spicata	Inland salt grass
Dodecatheon hendersonii	Shooting star
Draba verna	Whitlow-grass
Eleocharis macrostachya	Pale spike rush
Elymus caput-medusae	Medusa head grass*
Elymus glaucus ssp. *glaucus*	Blue wildrye
Epilobium brachycarpum	Panicaled willow herb
Epilobium ciliatum	Willow herb
Epilobium sp.	Willow herb
Epilobium torreyi	Torrey's willow herb
Equisetum hyemale ssp. *affine*	Tall scouring rush
Equisetum telemateia	Giant horsetail
Erigeron Canadensis	Horseweed*
Eriodictyon californicum	Yerba santa
Erodium bothrys	Broadleaf filaree*
Erodium cicutarium	Red-stemmed filaree*
Euphorbia crenulata	Chinese caps
Eurybia radulina	Broad-leafed aster
Festuca arundinacea	Tall fescue*
Festuca bromoides	Brome fescue*
Festuca idahoensis	Idaho fescue
Festuca microstachys	Small fescue
Festuca myuros	Rattail fescue*
Festuca perennis	Ryegrass*
Festuca rubra	Red fescue
Foeniculum vulgare	Fennel*
Galium aparine	Goose-grass*
Galium californicum	California bedstraw
Galium parisiense	Wall bedstraw
Galium porrigens	Climbing bedstraw

Gamochaeta ustulata	Spoon-leaf purple everlasting
Gastridium phleoides	Nit grass*
Genista monspessulana	French broom*
Geranium dissectum	Cut-leaf geranium*
Geranium molle	Dove-foot geranium*
Githopsis specularioides	Bluecup
Helenium puberulum	Sneezeweed
Helminthotheca echioides	Bristly ox-tongue*
Hesperevax sparsiflora var. *sparsiflora*	Erect evax
Heteromeles arbutifolia	Toyon
Hieracium album	Hawkweed
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley*
Hordeum murinum ssp. *leporinum*	Hare barley*
Hypericum perforatum	Klamath weed*
Hypochaeris glabra	Smooth cat's-ear*
Hypochaeris radicata	Rough cat's-ear
Iris macrosyphon	Long-tubed iris
Juncus balticus ssp. *ater*	Baltic rush
Juncus bufonius var. *bufonius*	Toad rush
Juncus mexicanus	Mexican rush
Juncus occidentalis	Western rush
Juncus patens	Spreading rush
Juncus xiphioides	Iris-leaved rush
Kickxia elatine	Fluellein*
Lactuca saligna	Willowleaf lettuce*
Lactuca serriola	Pricklylettuce*
Lagophylla ramossisima	Common hareleaf
Lathyrus latifolia	Perennial sweet pea*
Lathyrus vestitus	Hillside pea
Leontodon taraxacoides	Hawkbit*
Leptosiphon bicolor	Bicolored linanthus
Leymus triticoides	Creeping wildrye
Linum bienne	Flax*
Logfia gallica	Narrowleaf cottonweed*
Lotus corniculatus	Bird's-foot trefoil*
Lupinus bicolor	Miniature lupine
Lupinus microcarpus var. *densiflorus*	Chick lupine
Luzula comosa	Wood rush
Lysimachia arvensis	Scarlet pimpernel*
Lythrum hyssopifolium	Hyssop loosestrife*
Madia exigua	Small tarweed
Madia sp.	Madia
Marah fabaceus	California man-root
Marsilea vestita ssp. *vestita*	Water clover
Medicago polymorpha	Bur clover*
Medicago praecox	Medicago*
Melica geyeri	Geyer's onion grass
Melica torreyana	Torrey's melic
Melilotus albus	White sweetclover*

Melilotus indicus	Sour clover*
Mentha pulegium	Penneyroyal*
Micranthes californica	California saxifrage
Micropus californicus	Slender cottonweed
Microseris douglasii	Douglas microseris
Mimulus aurantiacus	Bush monkeyflower
Mimulus guttatus	Seep monkeyflower
Mondardella villosa	Coyote mint
Navarretia intertexta	Needleleaf navarretia
Navarretia pubescens	
Navarretia squarrosa	Skunkweed
Navarretia tagetina	Marigold navarretia
Nemophila heterophylla	
Nemophila menziesii	Baby blue-eyes
Parentucellia viscosa	Yellow glandweed*
Pectocarya pusilla	Little pectocary
Pedicularis densilfora	Indian warrior
Pentagramma triangularis	Gold-back fern
Perideridia kelloggii	Yampa
Petrorhagia dubia	Grass pink*
Phalaris aquatic	Harding grass*
Phalaris paradoxa	Hood canary grass
Plantago coronopus	Cut-leaf plantain*
Plantago erecta	Erect plantain
Plantago lanceolata	English plantain*
Poa pratensis	Kentucky bluegrass*
Poa secunda	Pacific bluegrass
Polygala californica	California milkwort
Polygonum aviculare	Yard knotweed*
Polypogon monspeliensis	Rabbit's foot grass*
Populus fremontii	Fremont's cottonwood
Potamogeton nodosus	Long-leaved pondweed
Pseudognaphalium sp.	Cudweed
Psilocarphus tenellus	Woolly-heads
Quercus agrifolia	Coast live oak
Quercus douglasii	Blue oak
Quercus garryana	Oregon oak
Quercus kelloggii	Black oak
Quercus lobata	Valley oak
Quercus parvula var. *shrevei*	Shreve oak
Quercus wislizeni	Interior live oak
Ranunculus muricatus	Spiny-fruited buttercup*
Ranunculus occidentalis	Western buttercup
Rosa californica	California rose
Rosa gymnocarpa	Wood rose
Rubus armeniacus	Himalayan blackberry*
Rubus ursinus	California blackberry
Rumex crispus	Curly dock*
Salix exigua	Sandbar willow

Salix laevigata	Red willow
Salix lasiolepis	Arroyo willow
Sanicula bipinnata	Poison sanicle
Sanicula bipinnatifida	Purple sanicle
Sanicula crassicaulis	Gamble weed
Scandix pectin-veneris	Venus' needle
Sherardia arvensis	Field madder*
Sidalcea diploscypha	Fringed sidalcea
Sisrynchium bellum	Blue-eyed grass
Sonchus asper	Prickly sow-thistle*
Spergularia rubra	Red sand-spurrey*
Stachys ajugoides	Hedge-nettle
Stachys rigida var. *quercetorium*	Rough hedge-nettle
Stellaria media	Common chickweed*
Stipa lepida	Foothill needlegrass
Stipa pulchra	Purple needlegrass
Stuckenia pectinata	Fennel-leaf pondweed
Symphoricapos mollis	Creeping snowberry
Symphoricarpos albus var. *laegivatus*	Snowberry
Taraxia ovata	Sun cups
Tolpis barbata	European umbrella milkwort*
Torilis arvensis	Japanese hedge parsley*
Torilis nodosa	Short sock destroyer*
Toxicodendron diversilobum	Poison oak
Toxicoscordion sp.	Death camus
Tragopogon porrifolius	Salsify*
Trichostemma lanceolatum	Vinegar weed
Trientalis latifolia	Star flower
Trifolium bifidum var. *bifidum*	Pinole clover
Trifolium dubium	Little hop clover*
Trifolium hirtum	Rose clover*
Trifolium incarnatum	Crimson clover*
Trifolium oliganthum	Few-flowered clover
Trifolium subterraneum	Subterranean clover*
Trifolium willdenovii	Tomcat clover
Triphyseria eriantha ssp. *eriantha*	Butter n' eggs
Triteleia hyacinthine	White brodiaea
Tritelia laxa	Ithuriel's spear
Typha angustifolia	Narrow-leaved cattail
Umbellularia californica	California bay laurel
Uropappus lindleyi	Silver puffs
Vernonica arvensis	Common speedwell*
Vicia sativa ssp. *sativa*	Spring vetch*
Vicia villosa ssp. *villosa*	Hairy vetch*
Vitis californicus	Wild grape
Xanthium strumarium	Cocklebur*
Yabae microcarpa	Yabea
Zeltnera muehlenbergii	Monterey centaury

Appendix C

List of animal species observed on April 15, and 29, 2015.

Scientific Name	**Common Name**
Bufo boreas	Western toad
Pseudacris sierrae	Sierra treefrog
Taricha torosa	California newt
Gambusia affinis	Mosquitofish
Micropterus salmoides	Largemouth bass
Sceloporus occidentalis	Western fence lizard
Pipilo maculatus	Spotted towhee
Meleagris gallopavo	Turkey
Sayornis nigricans	Black phoebe
Buteo jamaicensis	Red-tailed hawk
Sialia mexicana	Western bluebird
Melozone crissalis	California towhee
Callipepla californica	California quail
Branta canadensis	Canada geese
Agelaius phoeniceus	Red-winged blackbird
Sayornis saya	Say's phoebe
Tyrannus verticalis	Western kingbird
Haemorhous maxicanus	House finch
Corvus brachyrhynchos	American crow
Chondestes grammacus	Lark sparrow
Melanerpes formicivorus	Acorn woodpecker
Corvus corax	Common raven
Spizella passerina	Chipping sparrow
Ammodramus savannarum	Grasshopper sparrow
Passerina amoena	Lazuli bunting
Calypte anna	Anna's hummingbird
Colaptes auratus	Northern flicker
Aphelocoma californica	Western scrub jay
Spinus tristis	American goldfinch
Setophaga petechia	American yellow warbler
Vermivora celata	Orange-crowned warbler
Polioptila caerulea	Blue-gray gnatcatcher
Cathartes aura	Turkey vulture
Zonotrichia leucophrys	White-crowned sparrow
Ardea herodias	Great blue heron
Aythya affinis	Lesser scaup

APPENDIX G

WETLAND DELINEATION

DELINEATION OF WATERS OF THE UNITED STATES, INCLUDING WETLANDS FOR THE UKIAH LANDFILL CLOSURE 3100 VICHY SPRINGS RD, UKIAH MENDOCINO COUNTY, CALIFORNIA

PREPARED FOR:

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JUNE 2015

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Appendices
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Figures and Exhibits (located at end of text)
Figure 1: Project Site on USGS quadrangle
Exhibit A: Delineation of Waters of the United States, Including Wetlands

INTRODUCTION AND BACKGROUND INFORMATION

This report and attachments presents findings based on a delineation of potential U.S. Army Corps of Engineers (Corps) waters of the U.S., including wetlands, for the Ukiah Landfill Closure Project located at 3100 Vichy Springs Road, Ukiah, Mendocino County, CA (Figure 1). This work was conducted on behalf of the City of Ukiah, who is the project proponent or applicant. The assessor parcel number (APN) for the project study area is 027-020-069. All maps and appendices referred to in this report are provided at the end of the text.

The Ukiah Landfill Closure project is approximately three miles east of Ukiah in Mendocino County, California. The Landfill occupies approximately 40 acres of permitted landfill area on a 284-acre parcel. The Landfill has been graded to form a series of flat terraces stepping down from south to north. The Landfill surface is covered with seasonal grasses.

The proposed project includes closure of the Landfill which will be performed in accordance with the applicable regulatory standards prescribed in the California Code of Regulations (CCR) [i.e., 27 CCR, Chapters 3 and 4 and CFR, Subpart F]. The components and systems required for closure of the Landfill include the final cover and grading design to control storm water, potential infiltration and accommodate future settlement, drainage and erosion control systems, landfill slope stability, landfill gas (LFG) control systems, leachate control systems, and construction quality assurance (CQA).

Directions to the Site:
From San Francisco take Highway 101 North to the Perkins Rd/Vichy Springs Rd exit. Turn right and go east along Vichy Springs Rd about 1.1 miles. Turn right to stay on Vichy Springs Rd and go about 1.9 miles. The landfill will be off the left at 3100 Vichy Springs Rd.

This delineation was conducted according to the 1987 Corps of Engineers *Wetlands Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0* (U.S. Army Corps of Engineers (2010), and U.S. Army Corps of Engineers, San Francisco District (2007) guidelines. The delineation should be considered preliminary until the U.S. Army Corps of Engineers, San Francisco District, issues a jurisdictional determination of the extent of jurisdictional waters, including wetlands, in the project area. A total of 32,623 square feet (sf) or 0.75 acres of non-vegetated other waters were mapped for the two unnamed tributary creek drainages, along with 44,383 sf (1.02 acres) of vegetated other waters, 119,010 sf (2.73 acres) of vegetated ponds, and 6,130 sf (0.14 acres. The total potential jurisdictional area is 202,146 sf or 4.64 acres.

The client contact for this report is: Mr. Richard J. Seanor, PE
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Ukiah, CA 95482
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REGULATORY BACKGROUND

The U. S. Army Corps of Engineers (Corps) is responsible under Section 404 of the Clean Water Act to regulate the discharge of fill material into waters of the United States. Waters of the United States and their lateral limits are defined in 33 CFR Part 328.3(a) and include streams that are tributaries to navigable waters and their adjacent wetlands. The lateral limits of jurisdiction for a non-tidal stream are measured at the line of the Ordinary High Water Mark (OHWM) (33 CFR Part 328.3(e)) or the limit of adjacent wetlands (33 CFR Part 328.3(b)). Any permanent extension of the limits of an existing water of the United States, whether natural or man-made, results in similar extension of Corps jurisdiction (33 CFR Part 328.5).

Waters of the United States fall into two categories, wetlands and other waters. Wetlands include marshes, meadows, seep areas, floodplains, basins, and other areas experiencing extended seasonal soil saturation. Seasonally or intermittently inundated features such as seasonal pools, ephemeral streams, and tidal marshes are categorized as wetlands if they have hydric soils and support wetland plant communities. Other waters include water bodies and watercourses such as rivers, streams, lakes, springs, ponds, coastal waters, and estuaries. Seasonally inundated water bodies or watercourses that do not exhibit wetland characteristics are classified as other waters.

The Regional Water Quality Control Board (RWQCB) takes jurisdiction over the same areas as the Corps as “waters of the State” and in some cases will expand their jurisdiction beyond the Corps’ boundaries, although typically they will accept the Corps delineation. The main difference for this project is that the RWQCB will take jurisdiction over stream courses from top of bank to top of bank, which is a wider area than the OHWM.

The California Department of Fish and Wildlife (CDFW) is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the Fish and Game Code (Section 1602) requires an entity to notify DFG of any proposed activity that may substantially modify a river, stream, or lake. Notification is required by any person, business, state or local government agency, or public utility that proposes an activity that will: “substantially divert or obstruct the natural flow of any river, stream or lake; substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.” The notification requirement applies to any work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel. If CDFW determines that the activity may substantially adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement will be prepared.

DESCRIPTION OF SITE CHARACTERISTICS

General Description

The Landfill occupies approximately 40 acres of permitted landfill area on a 284-acre parcel having a maximum width of approximately 1,000 feet in the north-south direction and a maximum length of about 3,500 feet in the east-west direction. The project study area is located on a saddle, with Sulphur Creek located off-site to the south, and an unnamed tributary to the Russian River located on-site along the northern boundary. The Landfill has been graded to form a series of flat terraces stepping down from south to north and the Landfill surface is covered with a combination of native and non-native grasses and forbs. The project study area supports a blue line creek and was flowing at the time of the field work.

The project area is located in an unsectioned portion of the Yokaya Rancheria in the southeastern portion of the Ukiah 7.5-minute topographic quadrangle, within Township 15N and Range 12W. Surrounding land uses consist of mainly open space lands, ranches and vineyards. Land adjacent to the Landfill property is zoned primarily as rangeland and is used for grazing. Dwellings within 1,000 feet of the landfill property include a group of structures owned by the Vichy Springs Investment Group that are located within 500 feet of the Landfill's south property line and a single-family residence located approximately 900 feet west of the Landfill's western property boundary. A rural residential development is located approximately ¼-mile west of the Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000 feet southward of the Landfill property boundary and is separated from the Landfill by an intervening ridge.

Hydrology and Topography

Existing ground surface elevations at the Landfill range from approximately 710 feet above mean sea level (MSL) near the western footprint, to about 970 feet MSL along the southeast footprint. The Landfill has been graded to form a series of flat terraces stepping down from south to north. The Landfill surface is covered with seasonal grasses.

Waste disposal operations at the Landfill began in 1955 at the eastern end of the landfill footprint and progressed upslope and westward. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the landfill to separate the waste from the realigned creek channel. The method of operation during the Landfill's development was a fill and cover approach in a canyon/gully terrain. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing Ukiah and the surrounding area. The Landfill ceased operations in September 2001.

Soils

There are three main soils types mapped for the Landfill project study area (Appendix B). These are: 1) pits and dumps; 2) Yorktree-Yorkville loams, 30 to 50 percent slopes; and 3) Yorkville-Hopland loams, 30 to 50 percent slopes. Three other soils types are shown on the soils map but they occur mostly outside of the project study area. One of these, Xerochrepts-Haploxeralfs-

Argixerolls complex, 9 to 30 percent slopes, occurs in the extreme northwestern end of the project area where the realigned creek is now situated.

The pits and dumps map unit covers much of the existing landfill area. Soil material was borrowed from the borrow site to cover the landfill so these are mixed soils. The Yorktree-Yorkville loams, 30 to 50 percent slopes, occurs in the northeastern and south-central portion of the study area. This map unit is on unstable side slopes of hills and mountains. This unit is 50 percent Yorktree loam and 25 percent Yorkville loam. The Yorktree soils is deep and well drained and formed in material weathered from greywacke, shale, siltstone, or sandstone. The Yorkville soils is very deep and moderately well drained and this soil formed in material weathered from graywacke, shale or chloritic schist. The Yorkville-Hopland loams, 30 to 50 percent slopes, occur in the western portion of the study area and include a portion of the landfill. This map unit occurs on spur ridges, ridgetops and unstable side slopes of hills and mountains. The unit is 35 percent Yorkville loam and 35 percent Hopland loam. Hopland soil is moderately deep and well drained and formed from material weathered from sandstone and shale. Xerochrepts-Haploxeralfs-Argixerolls complex, 9 to 30 percent slopes occurs on dissected stream terraces and terrace escarpments.

Vegetation
Several vegetation types occur within the study area. These are described below.

Wild oats grasslands is the dominant vegetation type within the project study area as this type covers most of the landfill area, borrow area and roadsides. The wild oats grassland is mixed in with the ruderal forbs type. The revegetated portions of the landfill have a mixture of non-native grasses and in some areas non-native forbs (ruderal forbs) are dominant. Plant species commonly found in the wild oats grasslands include wild oats (*Avena barbata, A. fatua*), rip-gut brome (*Bromus diandrus*), soft chess (*Bromus hordaceus*), hare barley (*Hordeum murinum* ssp. *leporinum*), Harding grass (*Phalaris aquatica*), orchard grass (*Dactylis glomerata*), ryegrass (*Festuca perennis*), tall fescue (*Festuca arundinacea*) and rattail fescue (*Festuca myuros*). A few native grass species were also noted in this type including purple needle grass (*Nasella pulchra*), California oatgass (*Danthonia californica*) and six weeks fescue (*Festuca microstachys*). A variety of non-native forb species also occur in this type including hairy vetch (*Vicia villosa*), cut-leaf plantain (*Plantago coronopus*), yellow star thistle (*Centaurea solsititalis*), European umbrella milkwort (*Tolpis barbata*), yellow glandweed (*Parentucellia viscosa*), Mediterranean linseed (*Bellardia trixago*), rose clover (*Trifolium hirtum),* filarees (*Erodium cicutarium, E. botrys*), and rough cat's-ear (*Hypochaeris radicata*). Native forb species included blow wives (*Achyrachaena mollis*), erect plantain (*Plantago erecta*), suncups (*Camissonia ovata*), blue-eyed grass (*Sisrynchium bellum*), soaproot (*Chloragalum pomeridianum*), Pacific sanicle (*Sanicula crassicaulis*), and California buttercup (*Ranunculus californicus*).

Ruderal forbs dominate the area on northeastern portion of the project study area in the flat area of the former borrow pit. This area is dominated primarily by non-native forb species such as European umbrella milkwort, lesser hawbit (*Leontodon taraxacoides* ssp. *taraxacoides*), cut-leaf plantain, hairy vetch, yellow star thistle, and rough cat's-ear.

Purple needle grass grassland was mapped in one location in the borrow pit area. Small areas of purple needlegrass occur in other locations on the site but are not large enough to map separately as a stand along grassland community. The area on the borrow site was large enough to map and identify as a separate plant community.

Blue oak woodland occurs along the southern portion of the project study area and also occurs along the northern bank of the unnamed creek that forms the northern boundary of the study area. Blue oak (*Quercus douglasii*) are the dominant species. Other trees and shrubs noted include interior live oak (*Quercus wislenzi* var. *wislizeni*), Shreve oak (*Quercus parvula* var. *shrevei*), buckeye (*Aesculus californica*), madrone (*Arbutus menziesii*), coyote brush (*Baccharis pilularis*), manzanita (*Arctostaphylos manzanita* ssp. *glaucescens*), toyon (*Heteromeles arbutifolia*), buckbrush (*Ceanothus cuneatus*), mountain mahogany (*Cercocarpus betuloides)* and poison oak (*Toxicodendron diversilobum*). A diversity of native grasses are found in this type include onion grass (*Melica* sp.), blue wildrye (*Elymus glaucus*), Nevada bluegrass (*Poa secunda*) and native fescues (*Festuca rubra, F. microstachys, F. idahoensis*). Native forbs include blue dicks (*Dichelostemma capitatum*), for-toothed ookow (*Dicelstemma congestum*), Ithuriels' spear (*Triteleia laxa*), phacelia (*Phacelia* sp.), Pacific sanicle, soaproot, Diogene's lantern (*Calochortus amabilis*), farewell to spring (*Clarkia gracilis*) and fringed checkerbloom (*Sidalcea diploscypha*).

Manzanita chaparral occurs primarily on the northern portion of the study area along the north bank of the unnamed creek. Whiteleaf manzanita (*Arctostaphylos manzanita* ssp. *glaucescens*) is dominant and includes other chaparral shrub species such as toyon, buckbrush, coyote brush, mountain mahogany, sticky monkeyflower (*Mimulus aurantiacus*), and snowberry (*Symphoricarpos albus* var. *laevigatus)*. A variety of native and non-native grasses and forbs occur as understory species including blue-eyed grass, Douglas iris (*Iris douglasiana*), phacelia, hound's tongue (*Cynoglossum grande*), blue dicks, farewell to spring, and Ithuriel's spear.

Sandbar willow thickets occur along unnamed creek that forms the northern boundary of the study area. Sandbar willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*) are dominant. Other tree and shrub species include valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), madrone, manzanita, coyote brush, Himalayan blackberry (*Rubus armeniacus*) and poison oak. Herbaceous wetland plants noted within the creek bed include scouring rush (*Equisetum hymale, E. telemateia*), rushes (*Juncus patens, J. balticus, J. mexicanus*), sedges (*Carex* spp.), pale spike rush (*Eleocharis macrostachya*) and cattails (*Typha angustifolia*).

Pale spike rush marshes occur along the pond margins along with the cattail marsh types and also within vegetated sections of the unnamed creek channel in the eastern portion of the study area. The dominant species is pale spike rush. Other wetland plants noted include penneyroyal (*Mentha pulegium*), curly dock (*Rumex crispus*), umbrella sedge (*Cyperus eragrostis*), rushes and water plantain (*Alisma* sp.).

Cattail marshes occur in conjunction with the pale spike rush vegetation type and include the same species. Narrowleaf cattail (*Typha angustifolia*) is dominant and can be a monotypic community type.

Seasonal wetlands were mapped in seven areas in the eastern portion of the study area. Six seasonal wetlands were mapped in the borrow area and one occurs along the entrance road on the southeastern side of the project study area. Seasonal wetlands occur as relatively small depressions in the flatter areas of the borrow area. The one along the road appears to have developed as a result of water flowing along the inside portion of the roadway. Plant species noted in these areas include penneyroyal, cocklebur (*Xanthium strumarium*), rabbitsfoot grass (*Polypogon monspeliensis*), small quaking grass (*Briza minor*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), hyssop loosestrife (*Lythrum hyssopifolium*) and cut-leaf plantain.

METHODS

Literature Review

Prior to the delineation field survey, literature pertinent to identifying potential wetlands and other waters of the United States in the project area was reviewed, including the USGS 7.5 minute topographic quadrangle map for the area, the detailed topographic/aerial photograph base map prepared for the project area, the soil survey report, and the county hydric soils list.

Field Survey and Map Preparation

A formal delineation was conducted by Jane Valerius, botanist and wetland specialist on April 29, 2015 with additional areas added on May 22, 2015. Areas in which the topography or vegetation suggested that wetlands could exist were sampled using the routine onsite determination method procedures described in the 1987 Corps of Engineers *Wetlands Delineation Manual* (Environmental Laboratory 1987). The *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* U.S. Army Corps of Engineers (2008), U.S. Army Corps of Engineers, San Francisco District (2000) delineation guidelines and the U.S. Army Corps of Engineers San Francisco District November 2007 *Information Requested for Verification of Corps Jurisdiction* guidance was also used as part of the on-site wetlands analysis and report preparation

Drainages within the project area designated as other waters of the United States have an ordinary high water mark (OHWM) that defines the extent of the Corps' jurisdiction of that feature. An OHWM refers to "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area" (33 CFR Section 328.3[e]). The width of the drainage was visually estimated and the average width of the OHWM was recorded for areas designated as other waters.

A total of eighteen (18) soil sample pits were recorded for the project study area. Data sheets are provided in Appendix A. Soils information is provided in Appendix B and site photographs are provided in Appendix C.

RESULTS

Table 1 provides the area calculations for wetlands and other waters as shown on the delineation map. There are two unnamed creek drainages within the project study. The eastern tributary drainage is an ephemeral drainage and is mapped as vegetated other waters. The upper portion of the main drainage that forms the northern boundary of the study area is dry with no wetland vegetation in the creek channel. The lower portion of the northern creek channel from the bridge to the western end of the study area has wetland vegetation within the creek bed and within the ordinary high water mark. The northern creek channel varies in width but has an average width of between 15 to 20 feet within the ordinary high water mark. The eastern tributary channel is more narrow and incised and varies from 8 to 10 feet in width

Areas mapped as potential jurisdictional wetlands include the three former sediment ponds that occur within the study area. A fourth pond, identified as the leachate pond, has not been identified as jurisdictional because this pond is part of the treatment system for the landfill, even though it supports wetland vegetation. Seven small seasonal wetland were also mapped.

A total of 32,623 square feet (sf) or 0.75 acres of non-vegetated other waters were mapped for the two unnamed tributary creek drainages, along with 44,383 sf (1.02 acres) of vegetated other waters, 119,010 sf (2.73 acres) of vegetated ponds, and 6,130 sf (0.14 acres. The total potential jurisdictional area is 202,146 sf or 4.64 acres.

Table 1: Area calculations for wetlands and other waters.

Seasonal Wetlands	Area in Square Feet	Acres
W1	1,117	0.03
W2	340	0.01
W3	1,417	0.03
W4	466	0.01
W5	226	0.01
W6	2279	0.05
W7	285	0.01
Subtotal for seasonal wetlands	***6130***	***0.14***
PONDS		
Pond A	37,154	0.85
Pond B	60,966	1.40
Pond C	20,890	0.48
Subtotal for ponds	***119,010***	***2.73***
Vegetated Other Waters		
15’ wide	34,881	0.80
10’ wide	11,004	0.25
8’ wide	5,805	0.13
Subtotal for vegetated other waters	***44,383***	***1.02***
Other Waters – Not Vegetated		
20’ wide	30,665	0.70
8’ wide	1,958	0.04
Subtotal for other waters –not vegetated	***32,623***	***0.75***
TOTAL FOR ALL AREAS	**202,146**	**4.64**

REFERENCES CITED

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U. S. Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0). ERDC/EL TR-10-3. May. Vicksburg, MS. U. S. Army Engineers Research and Development Center.

Appendix A - Data Sheets

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 1

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): 30%

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorktree-Yorkville loams, 30 to 50% slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:
Along entrance road W1

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Mentha pulegium	50	Y	OBL
2. Xanthium strumarium	5	N	FAC
3. Epilobium	5	N	
4.			
5.			
6.			
7.			
8.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 3/3	95	10YR 5/8	5	C	M	CL	Gravel
1-6"	10YR 3/3	80	10YR 5/8	20	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ✓ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 2

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): planar Slope (%): 30

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorktree - Yorkville loams, 30-50% slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? no Are "Normal Circumstances" present? Yes ___ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ✓	**Is the Sampled Area within a Wetland?** Yes ___ No ✓
Hydric Soil Present?	Yes ___ No ✓	
Wetland Hydrology Present?	Yes ___ No ✓	

Remarks:

VEGETATION

Tree Stratum (Plot size: 5)	Absolute % Cover	Dominant Species?	Indicator Status
1. Prunus sp.	5	N	UPL
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5)			
1. Baccharis pilularis	10	N	UPL
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
Woody Vine Stratum (Plot size: 5)			
1. Rubus armeniacus	80	Y	FACU
2. Toxicodendron diversilobum	20	Y	FACU
	100	= Total Cover	

% Bare Ground in Herb Stratum Ø % Cover of Biotic Crust Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: Ø (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: Ø (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR4/3	100					CL	Mixed colors

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 3

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): 5

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Pits and dumps NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓	No ___	
Wetland Hydrology Present?	Yes ✓	No ___	

Remarks:

Pond

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. Typha angustifolia	80	Y	OBL
2. Plisma trivale	5	N	OBL
3. Helmonthotheca echioides	5	N	FAC
4. Rumex crispus	5	N	FAC
5. Mentha pulegium	5	N	OBL
6.			
7.			
8.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR 4/3	80		20	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

Saturated Soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): _____

Water Table Present? Yes ✓ No _____ Depth (inches): _____

Saturation Present? Yes ✓ No _____ Depth (inches): _____

(includes capillary fringe)

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 4

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): planar Slope (%): 0-5

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Pits and Dumps NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓	
Wetland Hydrology Present?	Yes ____ No ✓	

Remarks:

VEGETATION

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Avena barbata	20	Y	UPL
2. Centaurea solstitialis	10		
3. Vicia villosa	10		
4. Bromus diandrus	20	Y	UPL
5. Vulpia myuros ⇒ Festuca myuros	P		
6.			
7.			
8.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6"	10YR4/3	100						Compacted fill on roadway

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 5

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): 0-5%

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorkville loam, 30 to 50% slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

Creek Channel

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 3 5 ft radius)			
1. Eleocharis macrostachya	60	Y	OBL
2. Typha latifolia	5	N	OBL
3. Rumex crispus	5	N	FAC
4. Grasses - unknown	10	N	
5.			
6.			
7.			
8.			
	80 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR 3/4	90	10YR 5/8	10	C	M	CL	w/ Silt & Sandy

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1) (**Nonriverine**)
- X Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 6

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): planar Slope (%): 30-40%

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorkville loam 30 to 50% slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

Creek bank

VEGETATION

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____	= Total Cover	
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____	= Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. Arena barbata	65	Y	UPL
2. Vicia villosa	20	Y	UPL
3. Anagallis arvensis	5	N	
4.			
5.			
6.			
7.			
8.			
	90	= Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____	= Total Cover	

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR 5/6	60						2 Color
0-12"	10YR 3/2	40						Mixed Soils
								from Fill

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 7

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): 0-5

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorkville loam 30-50% slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ✓ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Seasonal wetland W2

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Polypogon monspeliensis	50	Y	FACW
2. Briza minor	5	N	FAC
3. Festuca perennis	10	N	FAC
4. Parentucellia viscosa	5	N	UPL
5.			
6.			
7.			
8.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- X Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR 5/4	80	10YR 5/1	20	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ✓ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? Yes ✓ No ___ Depth (inches): 6"

(includes capillary fringe)

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 8

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): planar Slope (%): 30

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorkville loam, 30 to 50% slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ✓	**Is the Sampled Area within a Wetland?** Yes ___ No ✓
Hydric Soil Present?	Yes ___ No ✓	
Wetland Hydrology Present?	Yes ___ No ✓	

Remarks:

VEGETATION

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
	___ = Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Avena barbata	20	Y	UPL
2. Festuca perennis	20	Y	FAC
3. Vicia villosa	30	Y	UPL
4. Melilotus officinalis	10	N	NL
5. Parentucellia viscosa	5	N	NL
6. Hordeum marinum	10	N	FAC
7.			
8.			
	95 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR4/3	100					CL	Fill material w/ gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 9

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): 0-5%

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorkville loam 30-50% slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ___ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

Seasonal wetland W3

VEGETATION

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Plantago coronopus	25	Y	FACW
2. Hordeum marinum	10	Y	FAC
3. Leontodon taraxicoides	5	N	FACU
4. Festuca perennis	10	Y	FAC
5.			
6.			
7.			
8.			
	50 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 50 % Cover of Biotic Crust 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	95	10YR 5/8	5	C	M	CL	
4-12	10YR 4/3	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ✓ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____

Wetland Hydrology Present? (Yes) ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 10

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): planar Slope (%): 5

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorkville loam 30-50% Slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ___ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? no Are "Normal Circumstances" present? Yes ___ No ___

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ✓	**Is the Sampled Area within a Wetland?** Yes ___ No ✓
Hydric Soil Present?	Yes ___ No ✓	
Wetland Hydrology Present?	Yes ___ No ✓	

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Plantago coronopus	10	Y	FACW
2. Centaurea solstitialis	10	Y	UPL
3. Lepidium latifolium	10	Y	FACU
4. Avena barbata	5	N	UPL
5. Trifolium hirtum	5	N	UPL
6. Bromus hordeaceus	5	N	FACU
7. Bromus diandrus	5	N	UPL
8.			
	50 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 50 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR4/3	100					Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 11

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): 5

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorkville-Hoplar loams 30-50% Slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

Pond C

VEGETATION

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Eleocharis macrostachys	75	Y	OBL
2. Mentha pulegium	10	N	OBL
3. Cyperus eragrostis	5	N	
4.			
5.			
6.			
7.			
8.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: 11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR 4/4	70	10YR 5/8	30	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1) (**Nonriverine**)
- ✓ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 1"

Water Table Present? Yes ✓ No ___ Depth (inches): 1"

Saturation Present? Yes ✓ No ___ Depth (inches): 0

(includes capillary fringe)

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 12

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): planar Slope (%): 20

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Yorkville-Hopland loam 30-50% slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ✓	**Is the Sampled Area within a Wetland?** Yes ___ No ✓
Hydric Soil Present?	Yes ___ No ✓	
Wetland Hydrology Present?	Yes ___ No ✓	

Remarks:

VEGETATION

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
	___ = Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Bromus hordaeceus	20	Y	FACU
2. Trifolium hirtum	20	Y	UPL
3. Anagallis arvensis	20	Y	UPL
4. Leontodon taraxacoides	20	Y	FACU
5. Centaurea solstitialis	10	N	UPL
6.			
7.			
8.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: 12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10yr 4/4	100					CL	Urban fill w/ gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 13

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): 10%

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Xerochrepts - Haploxeralfs - Argixerolls complex NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓	No ___	
Wetland Hydrology Present?	Yes ✓	No ___	

Remarks:

In creek channel

VEGETATION

Tree Stratum (Plot size: 5')	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix lasiolepis	10		FACW
2. Arbutus menziesii	10		UPL
3.			
4.			
	20	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3')			
1. Baccharis pilularis	10		UPL
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 3 5 ft radius)			
1. Typha angustifolia	30	Y	OBL
2. Equisetum	10	N	OBL
3. Juncus patens	5	N	FACW
4.			
5.			
6.			
7.			
8.			
	45	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 55 % Cover of Biotic Crust Ø

Water

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- X Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: 13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR4/4	80	Gley 1 2.5N	20			SL	Depositional sandy / Sandy Gleyed Soils

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- X Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 24'

Water Table Present? Yes ✓ No _____ Depth (inches): "

Saturation Present? Yes ✓ No _____ Depth (inches): "

(includes capillary fringe)

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 14

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Slope Slope (%): 30-40%

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Xerochrepts-Haploxeralfs-Argixerolls complex NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? no Are "Normal Circumstances" present? Yes __ No ___

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

Creek bank

VEGETATION

Tree Stratum (Plot size: 3)	Absolute % Cover	Dominant Species?	Indicator Status
1. Arbutus menziesii	10	N	UPL
2.			
3.			
4.			
	10	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3)			
1. Baccharis pilularis	10	N	UPL
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 3 ft radius)			
1. Vicia villosa	40	Y	UPL
2. Toxicodendron diversilobum	20	Y	UPL
3. Danthonia californica	10	N	FAC
4. Elymus glaucus	5	N	UPL
5.			
6.			
7.			
8.			
	75	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	____	= Total Cover	

% Bare Ground in Herb Stratum 25 % Cover of Biotic Crust Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: Ø (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: Ø (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: 14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/4	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

5/22/2015

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: ~~April 29, 2015~~

Applicant/Owner: City of Ukiah State: CA Sampling Point: 15

Investigator(s): Valerius Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave Slope (%): 0-5

Subregion (LRR): Lat: Long: Datum:

Soil Map Unit Name: Pits and Dumps NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? no Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

Seasonal Wetland W6

VEGETATION

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Heterotheca sp.	20	Y	OBL
2. Leontodon taraxacoides	10	Y	FACU
3. Hordeum marinum	10	Y	FAC
4.			
5.			
6.			
7.			
8.			
	40 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 60 % Cover of Biotic Crust 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: 15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	2.5YR 4/3	95	7.5YR 4/6	5	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): ____

Saturation Present? Yes ____ No ✓ Depth (inches): ____

(includes capillary fringe)

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

5/22/2015

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: ~~April 29, 2015~~

Applicant/Owner: City of Ukiah State: CA Sampling Point: 16

Investigator(s): Valerius Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): planar Slope (%): 0-5

Subregion (LRR): Lat: Long: Datum:

Soil Map Unit Name: Pits and Dumps NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? no Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No ✓	**Is the Sampled Area within a Wetland?** Yes ___ No ✓
Hydric Soil Present?	Yes ___	No ✓	
Wetland Hydrology Present?	Yes ___	No ✓	

Remarks:

VEGETATION

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
	___ = Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Avena barbata	25	Y	UPL
2. Hordeum marinum	15	N	FAC
3. Leontodon taraxicoides	15	N	FACU
4. Parentucellia viscosa	10	N	UPL
5. Bromus hordeaceus	10	N	FACU
6. Hypochaeris sp.	5	N	OBL
7. Festuca perennis	10	N	FAC
8.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks:

SOIL

Sampling Point: 16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9"	2.5Y4/3	100					CL	NO MOTTLES

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? Yes ___ No ✓ Depth (inches): ___

(includes capillary fringe)

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: ~~April 29, 2015~~ 5/22/2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 17

Investigator(s): Valerius Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): concave Slope (%): 0-5

Subregion (LRR): Lat: Long: Datum:

Soil Map Unit Name: Pits and Dumps NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? no Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ✓	**Is the Sampled Area within a Wetland?** Yes ___ No ✓
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ___ No ✓	

Remarks:

VEGETATION

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
	___ = Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Hordeum marinum	25	Y	FAC
2. Festuca perennis	25	Y	FAC
3. Avena barbata	20	Y	UPL
4. Phalaris aquatica	2	N	FAC
5. Bromus hordaceus	20	Y	FACU
6. Centaurium muhlenbergii	3	N	UPL
7. Vicia villosa	5	N	UPL
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum Ø % Cover of Biotic Crust Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	Ø	x 1 =	
FACW species	Ø	x 2 =	
FAC species	52	x 3 =	156
FACU species	20	x 4 =	80
UPL species	28	x 5 =	140
Column Totals:	100 (A)		376 (B)

Prevalence Index = B/A = 3.76

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: 17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	5Y4/2	95	7.5YR4/6	5	C	m	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): ____

Saturation Present? Yes ____ No ✓ Depth (inches): ____

(includes capillary fringe)

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM

Project/Site: Ukiah Landfill City/County: Ukiah/Mendocino Sampling Date: April 29, 2015

Applicant/Owner: City of Ukiah State: CA Sampling Point: 18

Investigator(s): Valerius Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): planar Slope (%): 0-10%

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Pits and Dumps NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? no Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ___ No ✓
Hydric Soil Present?	Yes ___ No ✓	
Wetland Hydrology Present?	Yes ___ No ✓	

Remarks:

VEGETATION

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
	___ = Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. Festuca perennis	40	Y	FAC
2. Hordeum marinum	25	Y	FAC
3. Avena barbata	5	N	UPL
4. Centaurium muehlenbergii	10	N	UPL
5.			
6.			
7.			
8.			
	80 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: 18

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12"	2.5Y 4/1	100					CL	NO REDOX

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): none

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

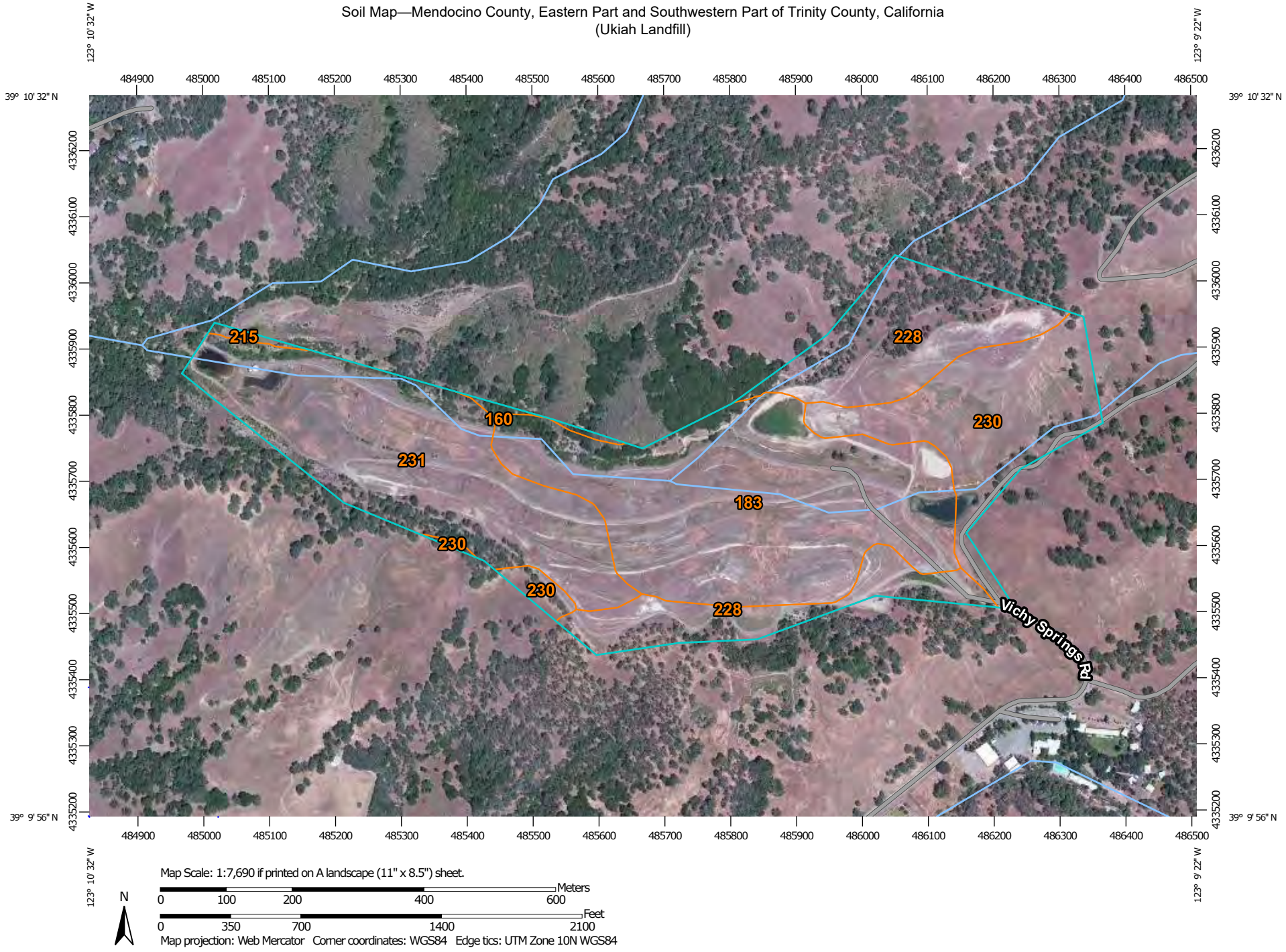
Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix B -
Soils Information

Soil Map—Mendocino County, Eastern Part and Southwestern Part of Trinity County, California
(Ukiah Landfill)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mendocino County, Eastern Part and Southwestern Part of Trinity County, California
Survey Area Data: Version 10, Sep 30, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 16, 2010—Jun 27, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Mendocino County, Eastern Part and Southwestern Part of Trinity County, California (CA687)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
160	Maymen-Etsel-Snook complex, 30 to 75 percent slopes	0.5	0.5%
183	Pits and Dumps	35.8	34.8%
215	Xerochrepts-Haploxeralfs-Argixerolls complex, 9 to 30 percent slopes	0.4	0.4%
228	Yorktree-Yorkville loams, 30 to 50 percent slopes	21.1	20.5%
230	Yorkville loam, 30 to 50 percent slopes	17.1	16.6%
231	Yorkville-Hopland loams, 30 to 50 percent slopes	28.1	27.3%
Totals for Area of Interest		**102.9**	**100.0%**

Appendix C -
Site Photographs

APPENDIX C: SITE PHOTOGRAPHS



Seasonal wetland W1 along roadside at entrance to landfill with pennyroyal.



Seasonal wetland W2 in borrow area dominated by rabbitsfoot grass.

APPENDIX C: SITE PHOTOGRAPHS



Seasonal wetland W6 with data point.



Other waters – dry creek channel.

APPENDIX C: SITE PHOTOGRAPHS



Vegetated creek channel – vegetated other waters. This is a photo of the eastern tributary channel.



Pond A with cattails.

APPENDIX C: SITE PHOTOGRAPHS



Pond B with cattails, pondweed, and other aquatic vegetation.



Pond C.

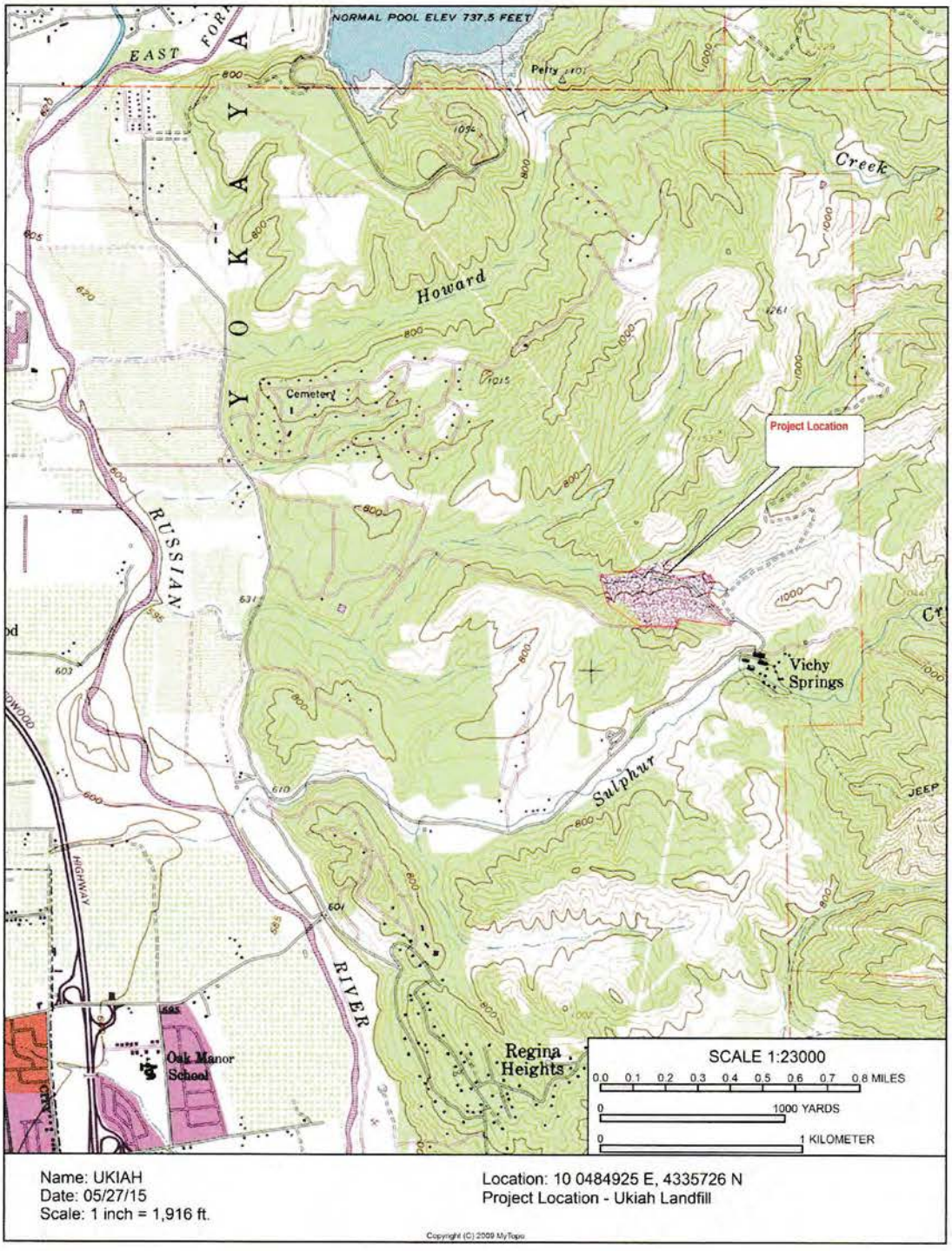


Figure 1: Project Location

APPENDIX H

HYDROLOGY CALCULATIONS

TECHNICAL MEMORANDUM

DATE:	August 31, 2015	**JOB #:** 02-907
PROJECT:	City of Ukiah Final Closure Construction Ukiah, CA	
PREPARED BY:	Damon Morelli, P.E. EBA Engineering 825 Sonoma Avenue Santa Rosa, CA 95404	
SUBJECT:	Final Closure Construction Hydromodification Impacts and Final Closure Best Management Practices	

PROJECT DESCRIPTION

The City of Ukiah Landfill is located at 3100 Vichy Springs Road, which is approximately two miles east of the City of Ukiah in Mendocino County, California. The City of Ukiah Landfill was operated as a Class III solid waste disposal facility and is comprised of a single waste management unit approximately 40 acres in size. The final closure construction will encompass the waste management unit and provide a cover consisting of a 1-foot thick foundation layer, a gas relief/venting system, a LLDPE geomembrane, and an engineered synthetic turf with specific grade and sand infill ballast. Accompanying the cover will be miscellaneous improvements including drainage and erosion control measures, sedimentation basin improvements, access roads, leachate collection system, and a landfill gas collection system.

The drainage improvements for the Final Closure Construction were designed to route off site drainage around the waste management while having the onsite drainage sheet flow to shallow swales and collect into and underground drainage system before out letting into an unnamed drainage course.

Hydromodification Impacts

One of the main purposes of the improvement associated with the Final Closure Improvements is to provide a cover for the waste management unit. When constructed, the cover will provide an impermeable surface protecting the waste management unit from storm water infiltration. As a result, the cover will also increase the amount of storm water leaving the project site. Although there will be an increase in the amount of storm water leaving the project site, when analyzing the watershed upstream of and including the project site, the hydromodification impacts are minimal.

Hydrographs were developed for the pre and post closure construction and when compared, the two showed that there would be an increase in approximately 182,577 cubic feet of storm water in the watershed for a 2 year-24 hour storm event. This is a 5.3% increase. To see how the 5.3% increase would affect the hydrology of the watershed upstream of and including the project site, further calculations were performed. The calculations show that time of concentrations changed from 38.8 minutes to 38.7 minutes or 0.3% increase and for a 2 year storm event, the flows intensities increase from 369.68 cfs to 388.08 cfs or an increase of 5.0%. Further hydraulic calculations were performed to determine the hydraulic capacity of the existing channel. These calculations found that for a 2 year storm event, the flow depth increase from 3.52 feet to 3.60 feet or a 2.2 % increase and the velocity increased from 8.90 feet per second to 8.98 feet per second or a 0.9% increase. All of these increases are considered to have an impact on the overall hydrology/hydraulics of the existing unnamed drainage course.

Hydrology and hydraulic calculations are provided and attached in the attachments.

FINAL CLOSURE BEST MANAGEMENT PRACTICES

To help alleviate some of the minor hydromodification impacts of the Final Closure Improvements, the improvements will include post construction best management practices through the use of a synthetic turf liner, routing portions of the surface drainage into an existing retention basin, and improvements to the existing drainage structures out letting into the unnamed drainage course.

The synthetic turf liner will reduce sediment loads by providing an impermeable liner on relatively steep 2:1 slopes (horizontal to vertical). Although the existing slopes are vegetated, the steep slopes provide a mechanism for sediments to enter the unnamed drainage course. This liner will protect the slopes from erosion and reduce the sediments that would come from them.

Since the project site is very congested, the design maximizes the use of storm water detention/retention through the use of an existing storm water retention basin. A portion of the site will be routed to this existing retention basin to provide storm water storage.

The Final Closure Improvements will also improve existing storm drain outlets into the unnamed drainage course. The existing outlets currently "shotgun" into the drainage course at five to six feet above the flow line, providing the potential for significant erosion. These outlets will be replaced with new ones that allow for the storm drain to outlet near the toe of the bank at an elevation of one foot above the flow line and with rock rip rap energy dissipaters at the end. This will reduce the potential for significant erosion at the storm drain outfalls.

ATTACHMENTS:

ATTACHMENT A: HYDROLOGY MAP

ATTACHMENT B: HYDROGRAPHS

ATTACHMENT C: HYDROLOGY CALCULATIONS

ATTACHMENT D: HYDRAULIC CALCULATIONS

ATTACHMENT A: HYDROLOGY MAP

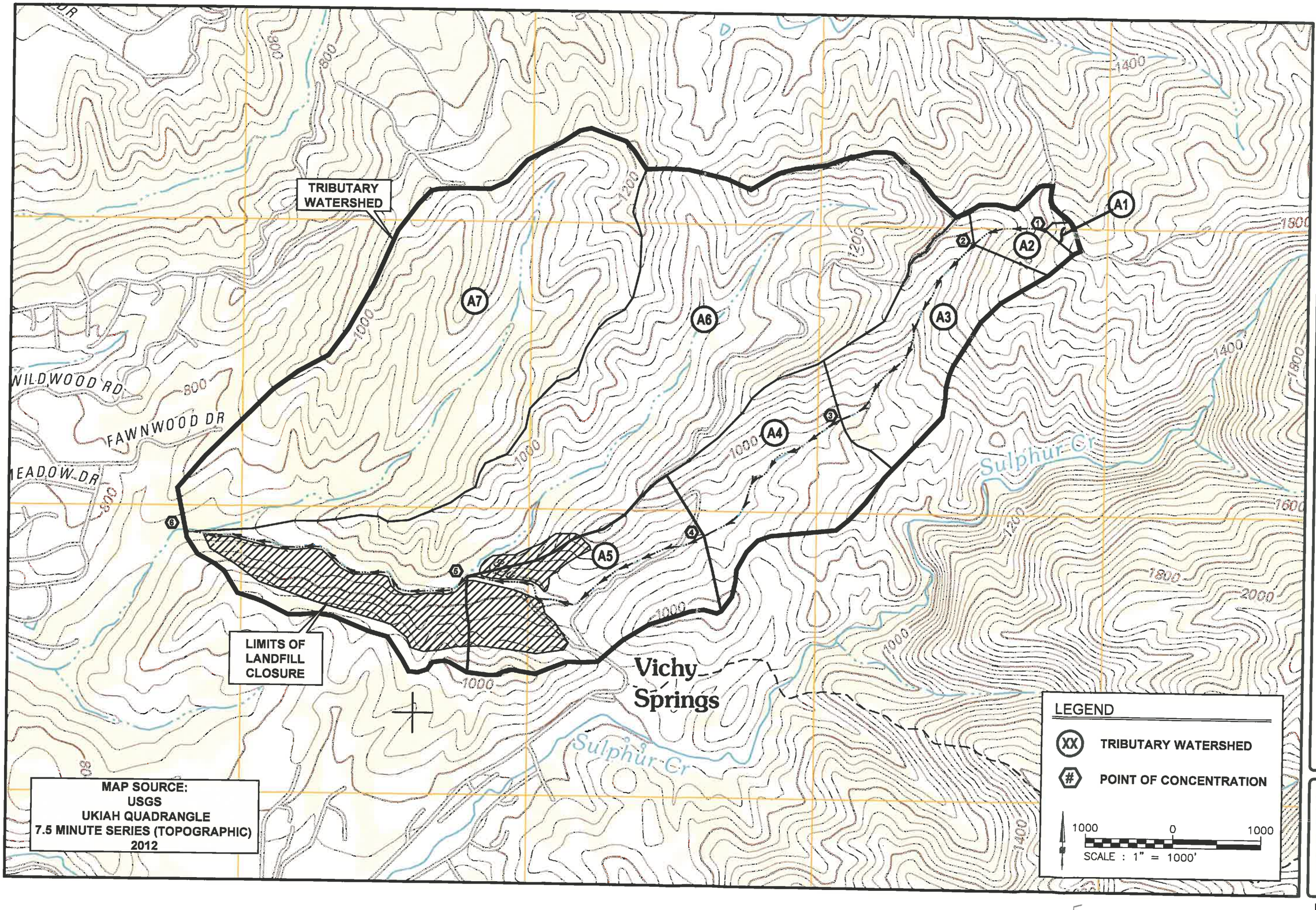


FIGURE **HYD-1** 02-907

OVERALL HYDROLOGY MAP

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

ATTACHMENT B: HYDROGRAPHS

Hydrograph Comparison
City of Ukiah Landfill Final Closure Construction
8/26/2015

Check Hydrograph Comparison for 2 year Storm Event:

Hydrogprahs were created for the pre-closure and post closure conditions for the 2 year-24 hour storm events using the computer program, "Hydrographs Extensions for AutoCAD Civil 3D 2013". The pre-closure and post closure hydrographs were then compared to determine how the closure improvements affected the storm water volumes just downstream of the project location.

Hydrograph Information:

Hydrogaph type:	SCS Runoff	
Storm Frequency:	2 year	
Storm Duration:	24 hour	
Total Precipitation:	3.57 inches	→ See NOAA Atlas 14, Volume 6, Version 2
Drainage Area:	882.55 acres	
Pre Closure Curve Number:	71	→ Based on Table 2-2c, Curve Numbers for other agriculture lands (Pasture Land) and information obtained from the USDA Wed Soil Survey for
Post Closure Curve Number:	72	→ Based on Table 2-2c, Curve Numbers for other agriculture lands (Pasture Land) and information obtained from the USDA Wed Soil Survey for

Pre-Closure Hydrograph:
Volume of storm water created by the 2 year-24 hour storm event just downstream of the project location:

Volume= 3,462,444 cubic feet

Post Closure Hydrograph:
Volume of storm water created by the 2 year-24 hour storm event just downstream of the project location:

Volume= 3,645,001 cubic feet

Comparison:

Pre-closure volume=	3,462,444	cubic feet
Post closure volume=	3,645,001	cubic feet
Difference in Volume=	182,557	→The increase in volume of 182,557 cubic feet (5.3%) is considered insignificant

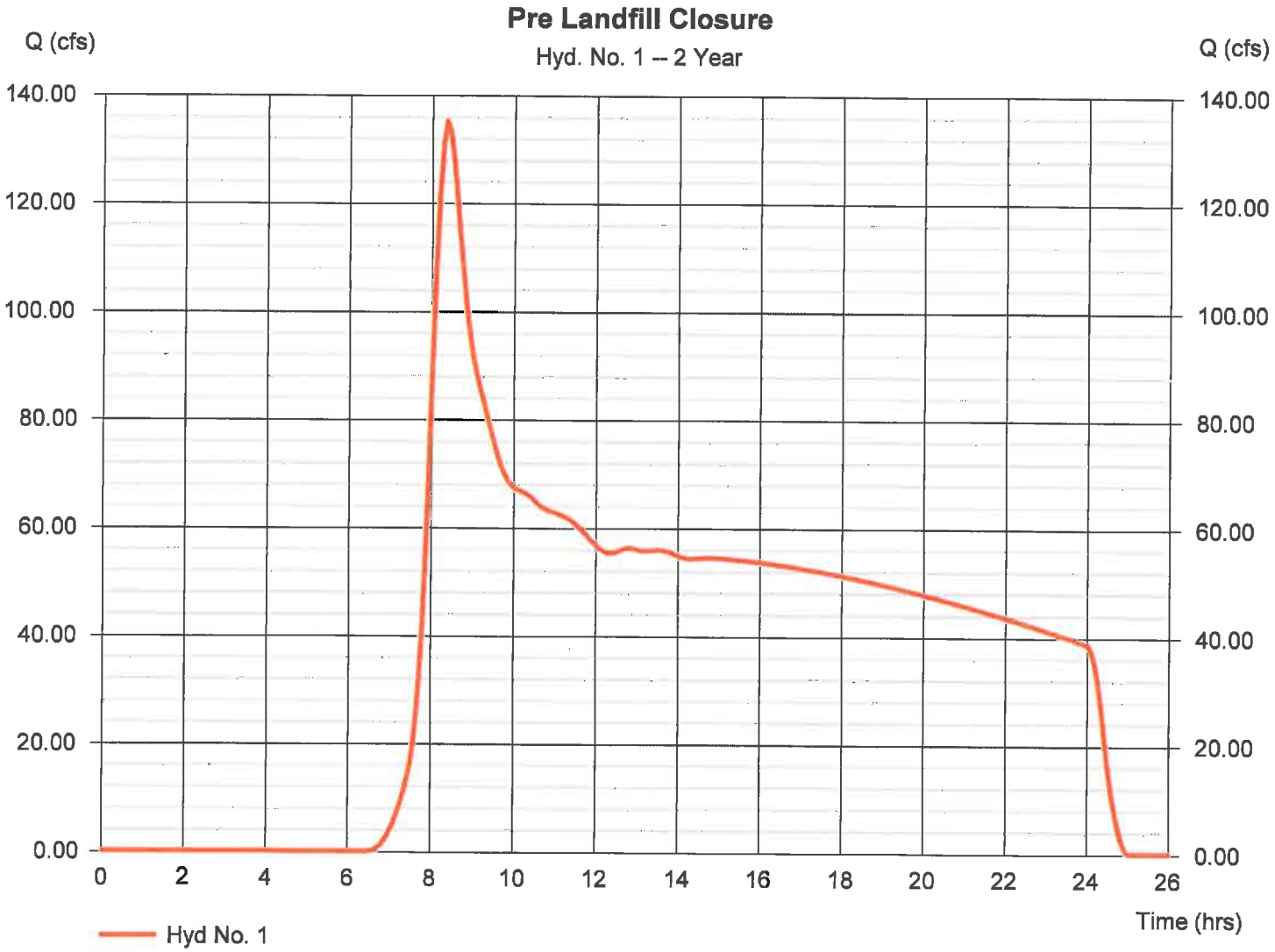
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 — Thursday, 08 / 27 / 2015

Hyd. No. 1

Pre Landfill Closure

Hydrograph type	= SCS Runoff	Peak discharge	= 135.28 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.33 hrs
Time interval	= 5 min	Hyd. volume	= 3,462,444 cuft
Drainage area	= 882.550 ac	Curve number	= 71
Basin Slope	= 7.4 %	Hydraulic length	= 12195 ft
Tc method	= User	Time of conc. (Tc)	= 38.80 min
Total precip.	= 3.57 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 — Thursday, 08 / 27 / 2015

Hyd. No. 2

Post Landfill Closure

Hydrograph type	= SCS Runoff	Peak discharge	= 148.66 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.33 hrs
Time interval	= 5 min	Hyd. volume	= 3,645,001 cuft
Drainage area	= 882.550 ac	Curve number	= 72*
Basin Slope	= 7.4 %	Hydraulic length	= 12195 ft
Tc method	= User	Time of conc. (Tc)	= 38.70 min
Total precip.	= 3.57 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.080 x 98) + (6.450 x 80)] / 882.550



NOAA Atlas 14, Volume 6, Version 2
Location name: Ukiah, California, US*
Latitude: 39.1690°, Longitude: -123.1601°
Elevation: 858 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.117 (0.104–0.134)	0.148 (0.131–0.168)	0.188 (0.166–0.215)	0.222 (0.194–0.256)	0.269 (0.226–0.324)	0.307 (0.252–0.378)	0.347 (0.276–0.439)	0.388 (0.300–0.509)	0.448 (0.329–0.615)	0.495 (0.350–0.709)
10-min	0.168 (0.149–0.192)	0.212 (0.187–0.241)	0.270 (0.238–0.308)	0.318 (0.278–0.367)	0.386 (0.325–0.464)	0.440 (0.361–0.542)	0.497 (0.396–0.630)	0.557 (0.429–0.729)	0.642 (0.471–0.882)	0.710 (0.501–1.02)
15-min	0.203 (0.181–0.232)	0.256 (0.227–0.292)	0.326 (0.288–0.373)	0.385 (0.336–0.444)	0.467 (0.392–0.561)	0.532 (0.436–0.656)	0.601 (0.479–0.761)	0.673 (0.519–0.882)	0.776 (0.570–1.07)	0.859 (0.606–1.23)
30-min	0.295 (0.262–0.336)	0.371 (0.329–0.423)	0.473 (0.418–0.541)	0.558 (0.488–0.645)	0.678 (0.570–0.814)	0.772 (0.633–0.952)	0.872 (0.695–1.11)	0.977 (0.754–1.28)	1.13 (0.827–1.55)	1.25 (0.880–1.78)
60-min	0.430 (0.381–0.489)	0.540 (0.479–0.616)	0.688 (0.608–0.788)	0.812 (0.710–0.938)	0.986 (0.829–1.19)	1.12 (0.921–1.38)	1.27 (1.01–1.61)	1.42 (1.10–1.86)	1.64 (1.20–2.25)	1.81 (1.28–2.59)
2-hr	0.648 (0.575–0.738)	0.799 (0.708–0.911)	0.996 (0.880–1.14)	1.16 (1.01–1.34)	1.37 (1.16–1.65)	1.54 (1.26–1.90)	1.71 (1.36–2.17)	1.89 (1.46–2.47)	2.13 (1.56–2.93)	2.31 (1.63–3.31)
3-hr	0.837 (0.742–0.953)	1.02 (0.906–1.17)	1.26 (1.11–1.44)	1.46 (1.27–1.68)	1.71 (1.44–2.06)	1.91 (1.57–2.35)	2.11 (1.68–2.67)	2.31 (1.78–3.02)	2.58 (1.90–3.55)	2.79 (1.97–3.99)
6-hr	1.29 (1.15–1.47)	1.57 (1.39–1.79)	1.92 (1.69–2.19)	2.19 (1.92–2.53)	2.56 (2.15–3.07)	2.83 (2.32–3.49)	3.10 (2.47–3.93)	3.37 (2.60–4.41)	3.73 (2.74–5.12)	3.99 (2.82–5.71)
12-hr	1.90 (1.68–2.16)	2.35 (2.08–2.68)	2.92 (2.58–3.34)	3.36 (2.94–3.88)	3.94 (3.31–4.73)	4.36 (3.57–5.37)	4.77 (3.80–6.05)	5.18 (3.99–6.78)	5.71 (4.19–7.85)	6.10 (4.31–8.73)
24-hr	2.80 (2.51–3.18)	3.57 (3.20–4.06)	4.52 (4.05–5.16)	5.27 (4.68–6.05)	6.23 (5.37–7.37)	6.93 (5.86–8.36)	7.62 (6.30–9.39)	8.30 (6.69–10.5)	9.17 (7.13–12.0)	9.82 (7.40–13.3)
2-day	3.75 (3.37–4.26)	4.76 (4.27–5.42)	6.06 (5.42–6.91)	7.09 (6.29–8.14)	8.45 (7.28–10.0)	9.46 (8.01–11.4)	10.5 (8.67–12.9)	11.5 (9.28–14.5)	12.8 (9.98–16.9)	13.9 (10.4–18.8)
3-day	4.37 (3.93–4.97)	5.53 (4.96–6.29)	7.03 (6.29–8.01)	8.23 (7.31–9.45)	9.83 (8.47–11.6)	11.0 (9.34–13.3)	12.3 (10.1–15.1)	13.5 (10.9–17.1)	15.1 (11.8–19.9)	16.4 (12.4–22.2)
4-day	4.92 (4.42–5.60)	6.22 (5.58–7.08)	7.89 (7.06–8.99)	9.22 (8.19–10.6)	11.0 (9.47–13.0)	12.3 (10.4–14.9)	13.7 (11.3–16.8)	15.0 (12.1–19.0)	16.8 (13.1–22.0)	18.2 (13.7–24.6)
7-day	6.17 (5.54–7.02)	7.77 (6.97–8.84)	9.77 (8.74–11.1)	11.3 (10.1–13.0)	13.4 (11.5–15.8)	14.8 (12.6–17.9)	16.3 (13.5–20.1)	17.7 (14.3–22.4)	19.6 (15.2–25.7)	21.0 (15.8–28.4)
10-day	7.16 (6.43–8.14)	9.00 (8.07–10.2)	11.3 (10.1–12.9)	13.0 (11.6–15.0)	15.2 (13.1–18.0)	16.9 (14.3–20.3)	18.4 (15.2–22.7)	19.9 (16.1–25.2)	21.8 (17.0–28.7)	23.3 (17.5–31.5)
20-day	9.66 (8.68–11.0)	12.2 (10.9–13.9)	15.2 (13.6–17.4)	17.5 (15.5–20.1)	20.3 (17.5–24.1)	22.3 (18.9–26.9)	24.2 (20.0–29.9)	26.0 (21.0–32.9)	28.2 (22.0–37.1)	29.8 (22.5–40.4)
30-day	11.9 (10.7–13.5)	15.0 (13.5–17.1)	18.7 (16.8–21.4)	21.5 (19.1–24.7)	24.9 (21.5–29.5)	27.3 (23.1–32.9)	29.5 (24.4–36.3)	31.5 (25.4–39.9)	34.1 (26.5–44.7)	35.9 (27.0–48.6)
45-day	14.8 (13.3–16.8)	18.7 (16.8–21.3)	23.3 (20.8–26.6)	26.7 (23.7–30.6)	30.8 (26.5–36.4)	33.6 (28.4–40.5)	36.2 (29.9–44.6)	38.6 (31.2–48.8)	41.5 (32.3–54.5)	43.6 (32.8–59.0)
60-day	17.6 (15.8–20.0)	22.2 (19.9–25.3)	27.5 (24.6–31.4)	31.5 (27.9–36.1)	36.2 (31.2–42.8)	39.4 (33.3–47.5)	42.4 (35.1–52.2)	45.1 (36.4–57.0)	48.4 (37.6–63.6)	50.7 (38.2–68.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

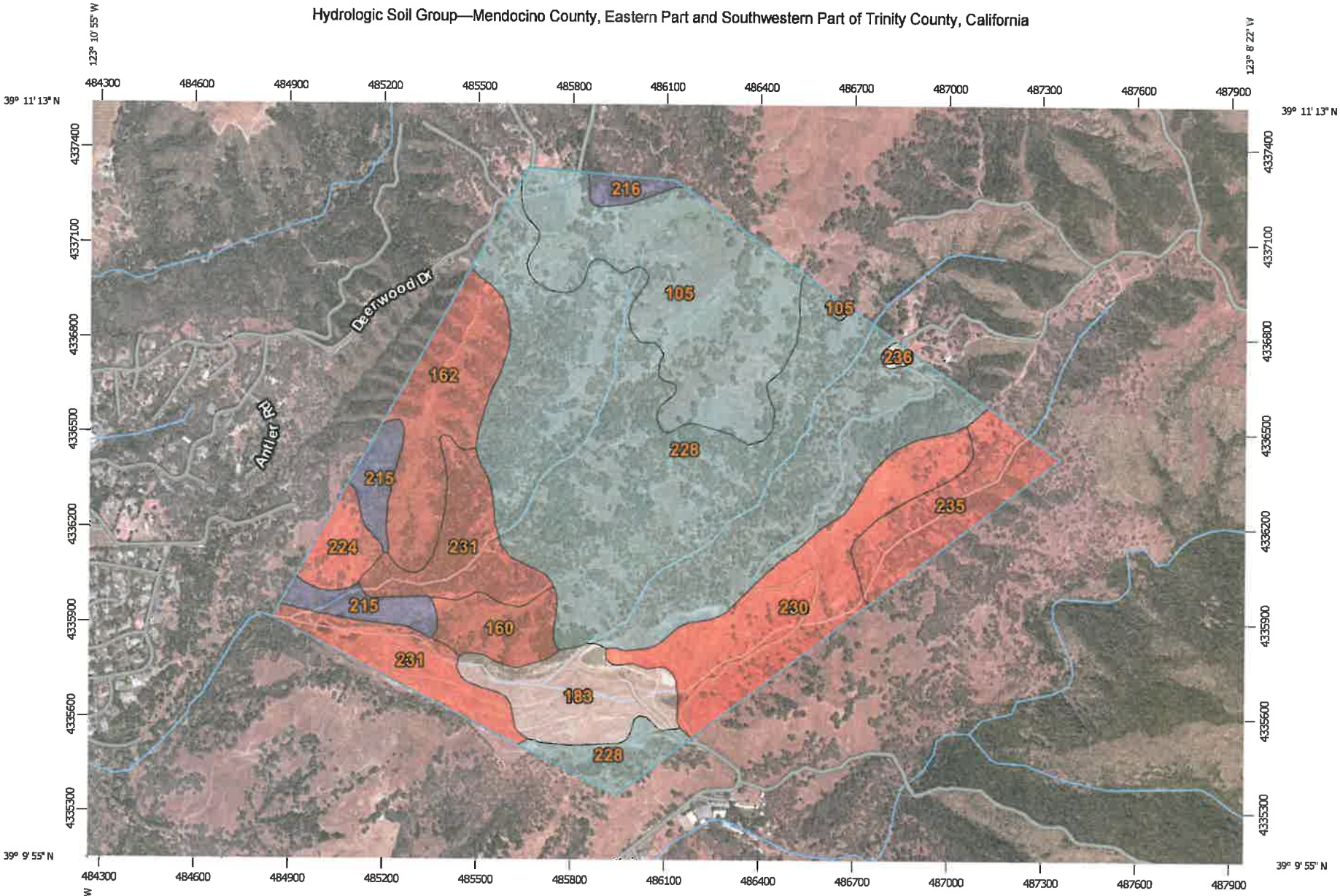
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Mendocino County, Eastern Part and Southwestern Part of Trinity County, California (CA687)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
105	Bearwallow-Hellman-Witherell complex, 30 to 50 percent slopes	C	102.4	15.0%
160	Maymen-Etsel-Snook complex, 30 to 75 percent slopes	D	17.8	2.6%
162	Maymen-Woodin-Etsel complex, 50 to 75 percent slopes	D	47.1	6.9%
183	Pits and Dumps		36.1	5.3%
215	Xerochrepts-Haploxeralfs-Argixerolls complex, 9 to 30 percent slopes	B	20.1	2.9%
216	Xerochrepts-Haploxeralfs-Argixerolls complex, 30 to 50 percent slopes	B	5.3	0.8%
224	Yokayo-Pinole-Pinnobie complex, 0 to 15 percent slopes	D	12.4	1.8%
228	Yorktree-Yorkville loams, 30 to 50 percent slopes	C	282.0	41.3%
230	Yorkville loam, 30 to 50 percent slopes	D	67.5	9.9%
231	Yorkville-Hopland loams, 30 to 50 percent slopes	D	56.5	8.3%
235	Yorkville-Yorktree-Squawrock complex, 30 to 50 percent slopes	D	34.3	5.0%
236	Water		1.5	0.2%
Totals for Area of Interest			**682.9**	**100.0%**

Hydrologic Soil Group—Mendocino County, Eastern Part and Southwestern Part of Trinity County, California



USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

8/27/2015
Page 1 of 4

13,

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mendocino County, Eastern Part and Southwestern Part of Trinity County, California
Survey Area Data: Version 10, Sep 30, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 16, 2010—Jun 27, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

14.

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

ATTACHMENT C: HYDROLOGY CALCULATIONS

Overall Hydrology Calculations - Pre Landfill Closure
City of Ukiah Landfill Final Closure Construction
10-Year Storm Event
August 26, 2015

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Overall Hydrology															
1	A1					15.0	2.18	0.45	1.85	1.85	1.00	0.83	0.83	1.82	Q @ Point #1
		871	0.2755	10.00	1.5	16.5									Travel time from Point 1 to Point 2
2	add A2					16.5	2.08	0.45	15.87	17.72	1.00	7.14	7.97	16.59	Q @ Point #2
		2602	0.1384	11.82	3.7	20.1									Travel time from Point 2 to Point 3
3	add A3					20.1	1.88	0.45	69.17	86.89	1.00	31.13	39.10	73.34	Q @ Point #3
		2142	0.0560	10.40	3.4	23.6									Travel time from Point 3 to Point 4
4	add A4					23.6	1.73	0.45	75.34	162.23	1.00	33.90	73.00	126.22	Q @ Point #4
		3066	0.0144	7.00	7.3	30.9									Travel time from Point 4 to Point 5
5	add A5					30.9	1.50	0.45	85.24	247.47	1.00	38.36	111.36	167.48	Q @ Point #5
		3514	0.0099	7.39	7.9	38.8									Travel time from Point 5 to Point 6
6	add A6 & A7					38.8	1.34	0.45	635.08	882.55	1.00	285.79	397.15	530.73	Q @ Point #6

NOTES:
Flow depths, velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are measured as Vertical/Horizontal.

Pre Closure t_c Calculations
City of Ukiah Landfill Final Closure Construction
10 Year Storm Event
8/26/2015

Determine t_c:

t_c @ Point 1= 15.00 min

* Initial t_c per County of Mendocino Standards

Determine t_c from Point 1 to Point 2:

Q @ Point 1=	1.8	cfs
Estimated Q @ Point 2=	17.7	cfs
Average Q in reach=	9.8	cfs

** Based on 1 cfs/acre

Assume Triangular Channel Flow:

Q=	9.8	cfs
n=	0.035	
side slopes=	2:1	
slope=	0.2755	
velocity=	10.0	fps
flow length=	871	ft
travel time=	1.5	min

*** Per Channel Report, pg. 21

t_c @ Point 2= 16.5 min

Determine t_c from Point 2 to Point 3:

Q @ Point 2=	16.6	cfs	
Estimated Q @ Point 3=	86.9	cfs	** Based on 1 cfs/acre
Average Q in reach=	51.8	cfs	

Assume Triangular Channel Flow:

Q=	51.8	cfs	
n=	0.035		
side slopes=	2:1		
slope=	0.1384		
velocity=	11.8	fps	*** Per Channel Report, pg. 22
flow length=	2602	ft	
travel time=	3.7	min	

t_c @ Point 3= 20.2 min

Determine t_c from Point 3 to Point 4:

Q @ Point 3=	73.3	cfs	
Estimated Q @ Point 4=	162.2	cfs	** Based on 1 cfs/acre
Average Q in reach=	117.8	cfs	

Assume Triangular Channel Flow:

Q=	117.8	cfs	
n=	0.035		
side slopes=	2:1		
slope=	0.0560		
velocity=	10.4	fps	*** Per Channel Report, pg. 23
flow length=	2142	ft	
travel time=	3.4	min	

t_c @ Point 4= 23.6 min

Determine t_c from Point 4 to Point 5:

Q @ Point 4=	126.2	cfs	
Estimated Q @ Point 5=	247.5	cfs	** Based on 1 cfs/acre
Average Q in reach=	186.9	cfs	

Assume Triangular Channel Flow:

Q=	186.9	cfs	
n=	0.035		
side slopes=	2:1		
slope=	0.0144		
velocity=	7.0	fps	*** Per Channel Report, pg. 24
flow length=	3066	ft	
travel time=	7.3	min	

t_c @ Point 5= 30.9 min

Determine t_c from Point 5 to Point 6:

Q @ Point 5=	167.5	cfs	
Estimated Q @ Point 6=	635.1	cfs	** Based on 1 cfs/acre
Average Q in reach=	401.3	cfs	

Assume Triangular Channel Flow:

Q=	401.3	cfs	
n=	0.035		
side slopes=	2:1		
slope=	0.0099		
velocity=	7.4	fps	*** Per Channel Report, pg. 25
flow length=	3514	ft	
travel time=	7.9	min	

t_c @ Point 6= 38.8 min

PRE CLOSURE
Tc Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Thursday, Aug 27 2015

Point 1 to Point 2

Triangular

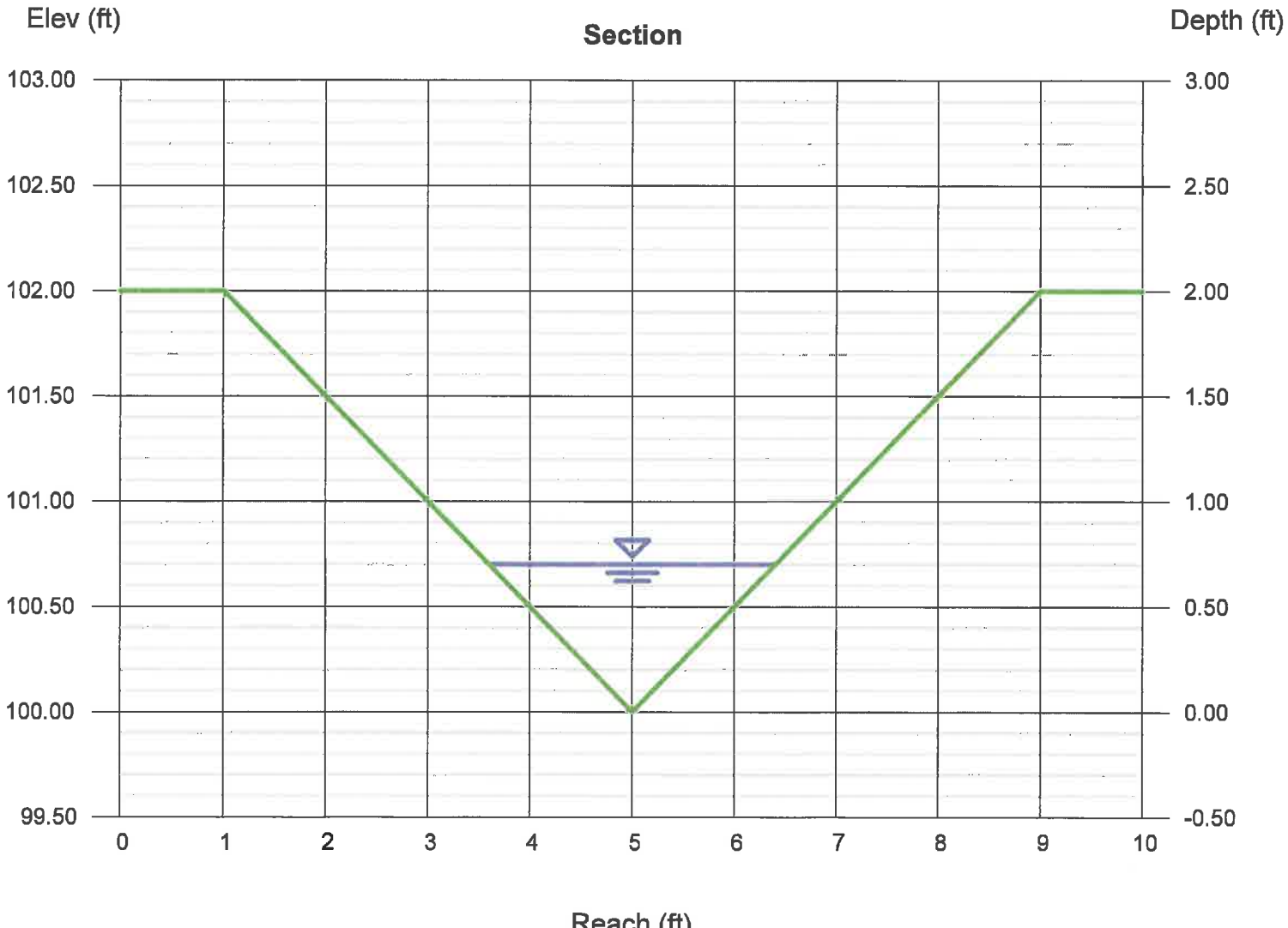
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 27.55
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 9.80

Highlighted

Depth (ft)	= 0.70
Q (cfs)	= 9.800
Area (sqft)	= 0.98
Velocity (ft/s)	= 10.00
Wetted Perim (ft)	= 3.13
Crit Depth, Yc (ft)	= 1.09
Top Width (ft)	= 2.80
EGL (ft)	= 2.25



PRE CLOSURE
t_c Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Thursday, Aug 27 2015

Point 2 to Point 3

Triangular

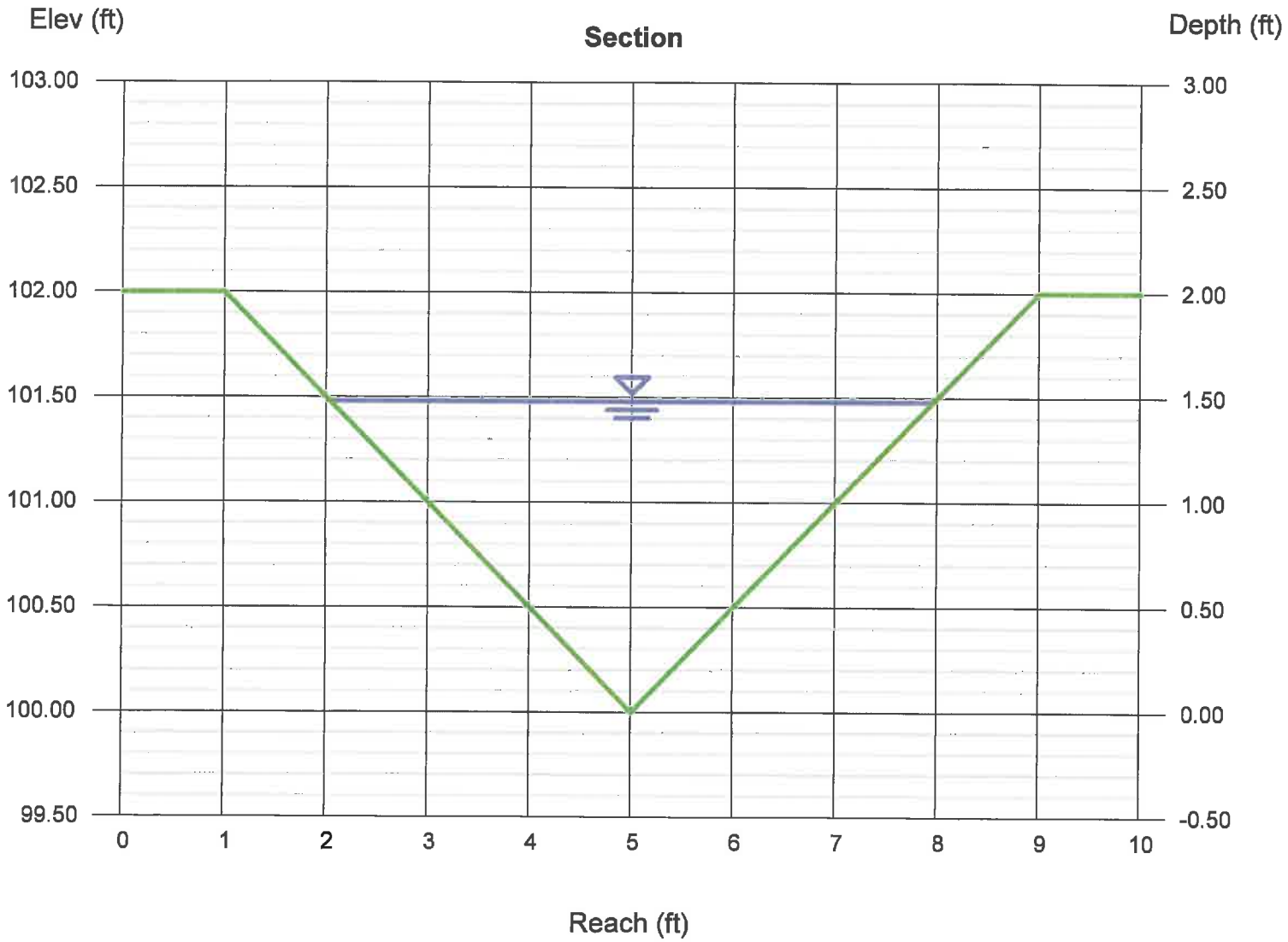
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 13.84
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 51.80

Highlighted

Depth (ft)	= 1.48
Q (cfs)	= 51.80
Area (sqft)	= 4.38
Velocity (ft/s)	= 11.82
Wetted Perim (ft)	= 6.62
Crit Depth, Yc (ft)	= 2.00
Top Width (ft)	= 5.92
EGL (ft)	= 3.65



22.

PRE CLOSURE
tc Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Thursday, Aug 27 2015

Point 3 to Point 4

Triangular

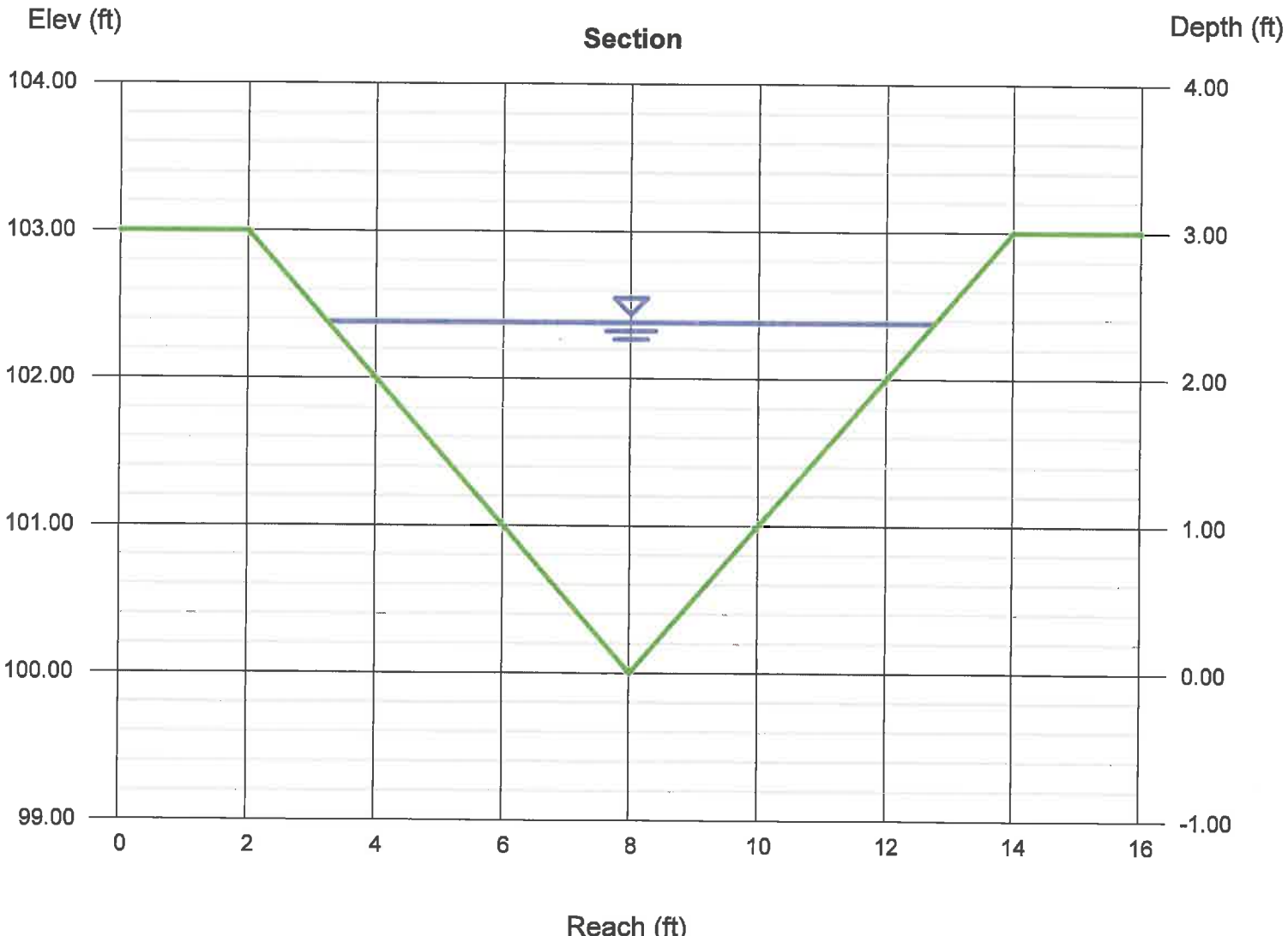
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 5.60
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 117.80

Highlighted

Depth (ft)	= 2.38
Q (cfs)	= 117.80
Area (sqft)	= 11.33
Velocity (ft/s)	= 10.40
Wetted Perim (ft)	= 10.64
Crit Depth, Yc (ft)	= 2.93
Top Width (ft)	= 9.52
EGL (ft)	= 4.06



23.

PRE CLOSURE & Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Thursday, Aug 27 2015

Point 4 to Point 5

Triangular

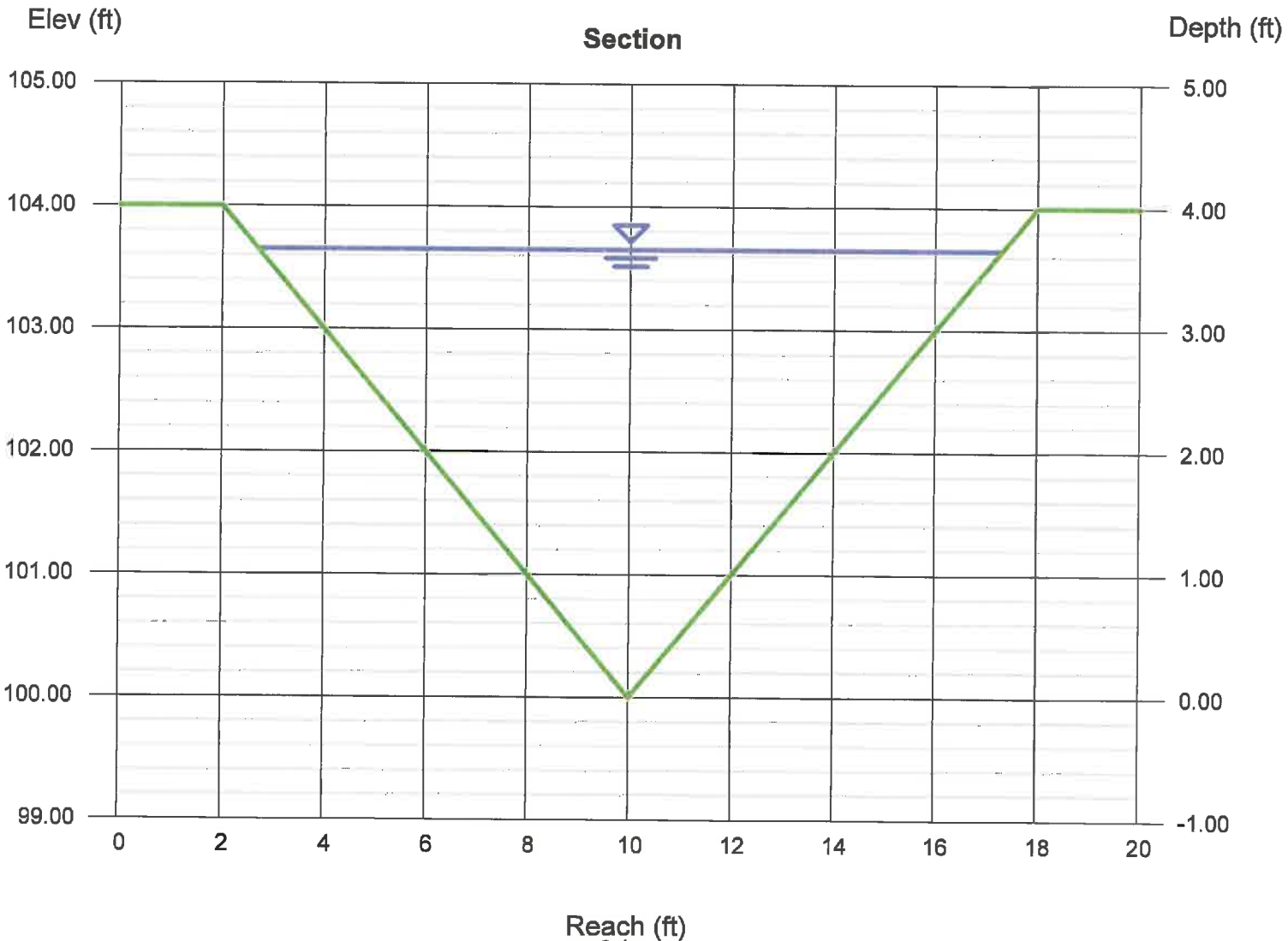
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.44
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 186.90

Highlighted

Depth (ft)	= 3.65
Q (cfs)	= 186.90
Area (sqft)	= 26.64
Velocity (ft/s)	= 7.01
Wetted Perim (ft)	= 16.32
Crit Depth, Yc (ft)	= 3.53
Top Width (ft)	= 14.60
EGL (ft)	= 4.41



24.

PRE CLOSURE
tc Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Thursday, Aug 27 2015

Point 5 to Point 6

Triangular

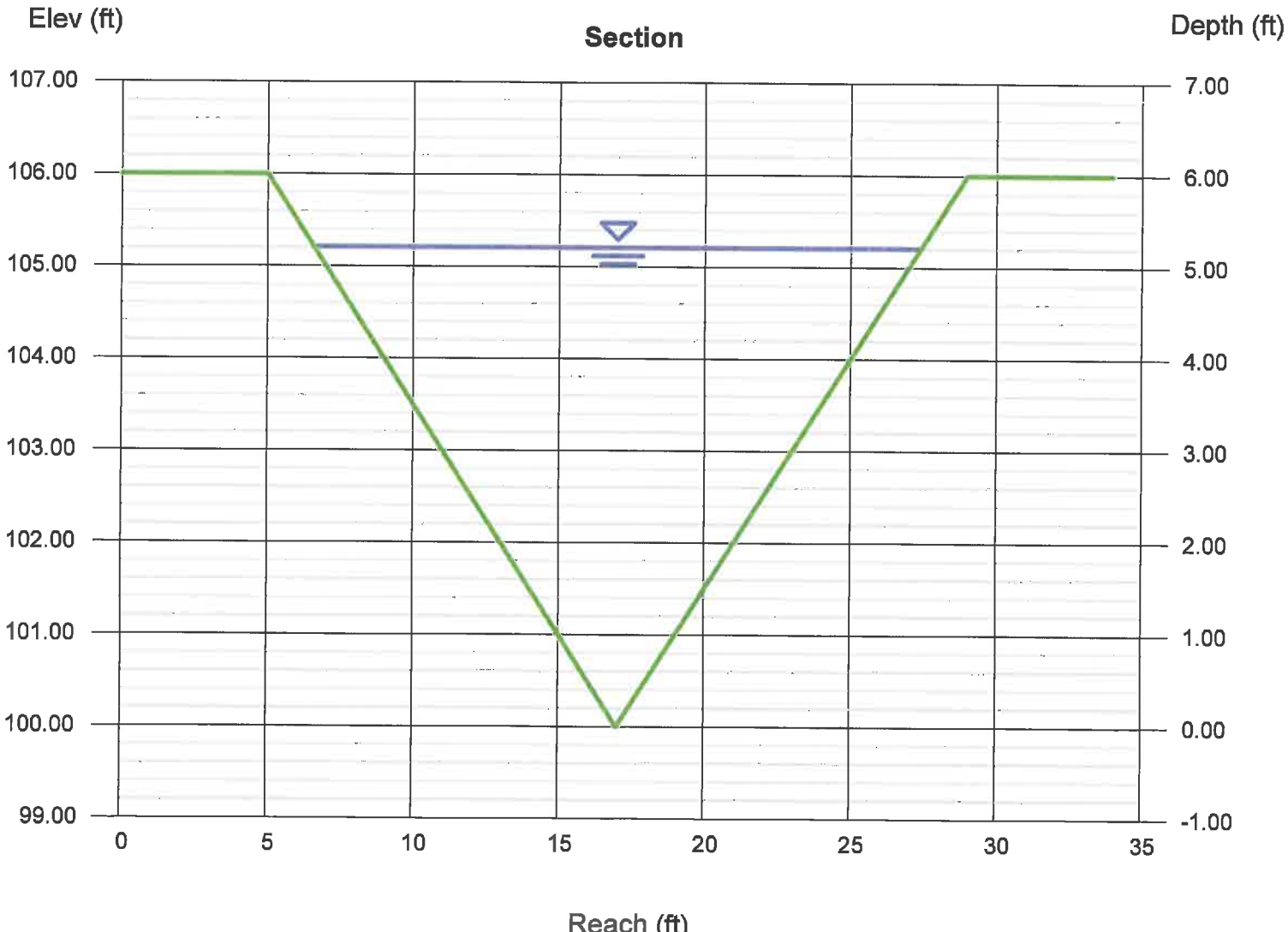
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 6.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.99
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 401.30

Highlighted

Depth (ft)	= 5.21
Q (cfs)	= 401.30
Area (sqft)	= 54.29
Velocity (ft/s)	= 7.39
Wetted Perim (ft)	= 23.30
Crit Depth, Yc (ft)	= 4.79
Top Width (ft)	= 20.84
EGL (ft)	= 6.06



25.

Overall Hydrology Calculations - Post Landfill Closure
City of Ukiah Landfill Final Closure Construction
10-Year Storm Event
August 26, 2015

Point of Conc. (POC)	Shed Area	Dist. (ft.)	Average Slope V/H	Average Velocity (fps)	Travel Time (min)	Total Time (min)	Intensity I (in./hr.)	C	Area (acres)	Sum Area (acres)	K	KAC	Sum KAC	Q ACI (cfs)	Design
Overall Hydrology															
1	A1					15.0	2.18	0.45	1.85	1.85	1.00	0.83	0.83	1.82	Q @ Point #1
		871	0.2755	10.00	1.5	16.5									Travel time from Point 1 to Point 2
2	add A2					16.5	2.08	0.45	15.87	17.72	1.00	7.14	7.97	16.59	Q @ Point #2
		2602	0.1384	11.82	3.7	20.1									Travel time from Point 2 to Point 3
3	add A3					20.1	1.88	0.45	69.17	86.89	1.00	31.13	39.10	73.34	Q @ Point #3
		2142	0.0560	10.40	3.4	23.6									Travel time from Point 3 to Point 4
4	add A4					23.6	1.73	0.45	75.34	162.23	1.00	33.90	73.00	126.22	Q @ Point #4
		3066	0.0144	7.00	7.3	30.9									Travel time from Point 4 to Point 5
5	add A5					30.9	1.50	0.53	85.24	247.47	1.00	45.18	118.18	177.73	Q @ Point #5
		3514	0.0099	7.43	7.9	38.7									Travel time from Point 5 to Point 6
6	add A6 & A7					38.7	1.34	0.47	635.08	882.55	1.00	298.49	416.67	557.14	Q @ Point #6

NOTES:
Flow depths, velocities & top widths determined using Hydraflow Express
Initial Time of Concentration of 15 minutes was used based on Mendocino County Standards

$I=8.8428/(T_c)^{-0.5166}$

where I is intensity (in./hr.) and Tc is the time of concentration (County of Mendocino Std D11G)
Slopes are measured as Vertical/Horizontal.

Post Closure t_c Calculations
City of Ukiah Landfill Final Closure Construction
10 Year Storm Event
8/26/2015

Determine t_c:

t_c @ Point 1= 15.00 min

* Initial t_c per County of Mendocino Standards

Determine t_c from Point 1 to Point 2:

Q @ Point 1=	1.8	cfs
Estimated Q @ Point 2=	17.7	cfs
Average Q in reach=	9.8	cfs

** Based on 1 cfs/acre

Assume Triangular Channel Flow:

Q=	9.8	cfs
n=	0.035	
side slopes=	2:1	
slope=	0.2755	
velocity=	10.0	fps
flow length=	871	ft
travel time=	1.5	min

*** Per Channel Report, pg. 30

t_c @ Point 2= 16.5 min

Determine t_c from Point 2 to Point 3:

Q @ Point 2=	16.6	cfs	
Estimated Q @ Point 3=	86.9	cfs	** Based on 1 cfs/acre
Average Q in reach=	51.8	cfs	

Assume Triangular Channel Flow:

Q=	51.8	cfs	
n=	0.035		
side slopes=	2:1		
slope=	0.1384		
velocity=	11.8	fps	*** Per Channel Report, pg. 31
flow length=	2602	ft	
travel time=	3.7	min	

t_c @ Point 3= 20.2 min

Determine t_c from Point 3 to Point 4:

Q @ Point 3=	73.3	cfs	
Estimated Q @ Point 4=	162.2	cfs	** Based on 1 cfs/acre
Average Q in reach=	117.8	cfs	

Assume Triangular Channel Flow:

Q=	117.8	cfs	
n=	0.035		
side slopes=	2:1		
slope=	0.0560		
velocity=	10.4	fps	*** Per Channel Report, pg. 32
flow length=	2142	ft	
travel time=	3.4	min	

t_c @ Point 4= 23.6 min

Determine t_c from Point 4 to Point 5:

Q @ Point 4=	126.2	cfs	
Estimated Q @ Point 5=	247.5	cfs	** Based on 1 cfs/acre
Average Q in reach=	186.9	cfs	

Assume Triangular Channel Flow:

Q=	186.9	cfs	
n=	0.035		
side slopes=	2:1		
slope=	0.0144		
velocity=	7.0	fps	*** Per Channel Report, pg. 33
flow length=	3066	ft	
travel time=	7.3	min	

t_c @ Point 5= 30.9 min

Determine t_c from Point 5 to Point 6:

Q @ Point 5=	177.7	cfs	
Estimated Q @ Point 6=	635.1	cfs	** Based on 1 cfs/acre
Average Q in reach=	406.4	cfs	

Assume Triangular Channel Flow:

Q=	406.4	cfs	
n=	0.035		
side slopes=	2:1		
slope=	0.0099		
velocity=	7.4	fps	*** Per Channel Report, pg. 34
flow length=	3514	ft	
travel time=	7.9	min	

t_c @ Point 6= 38.8 min

POST CLOSURE
& Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Wednesday, Aug 26 2015

Point 1 to Point 2

Triangular

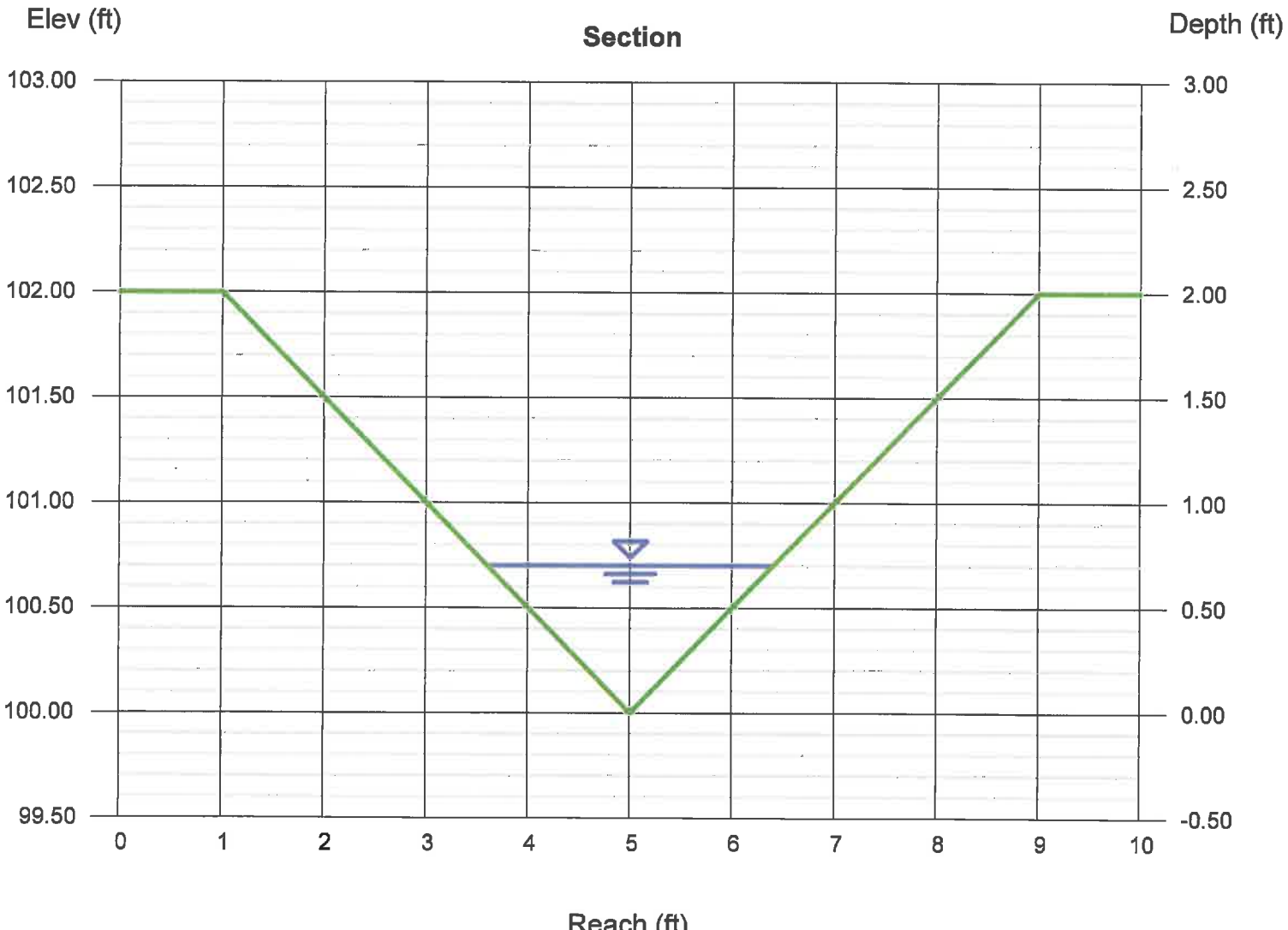
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 27.55
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 9.80

Highlighted

Depth (ft)	= 0.70
Q (cfs)	= 9.800
Area (sqft)	= 0.98
Velocity (ft/s)	= 10.00
Wetted Perim (ft)	= 3.13
Crit Depth, Yc (ft)	= 1.09
Top Width (ft)	= 2.80
EGL (ft)	= 2.25



POST CLOSURE
& Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Wednesday, Aug 26 2015

Point 2 to Point 3

Triangular

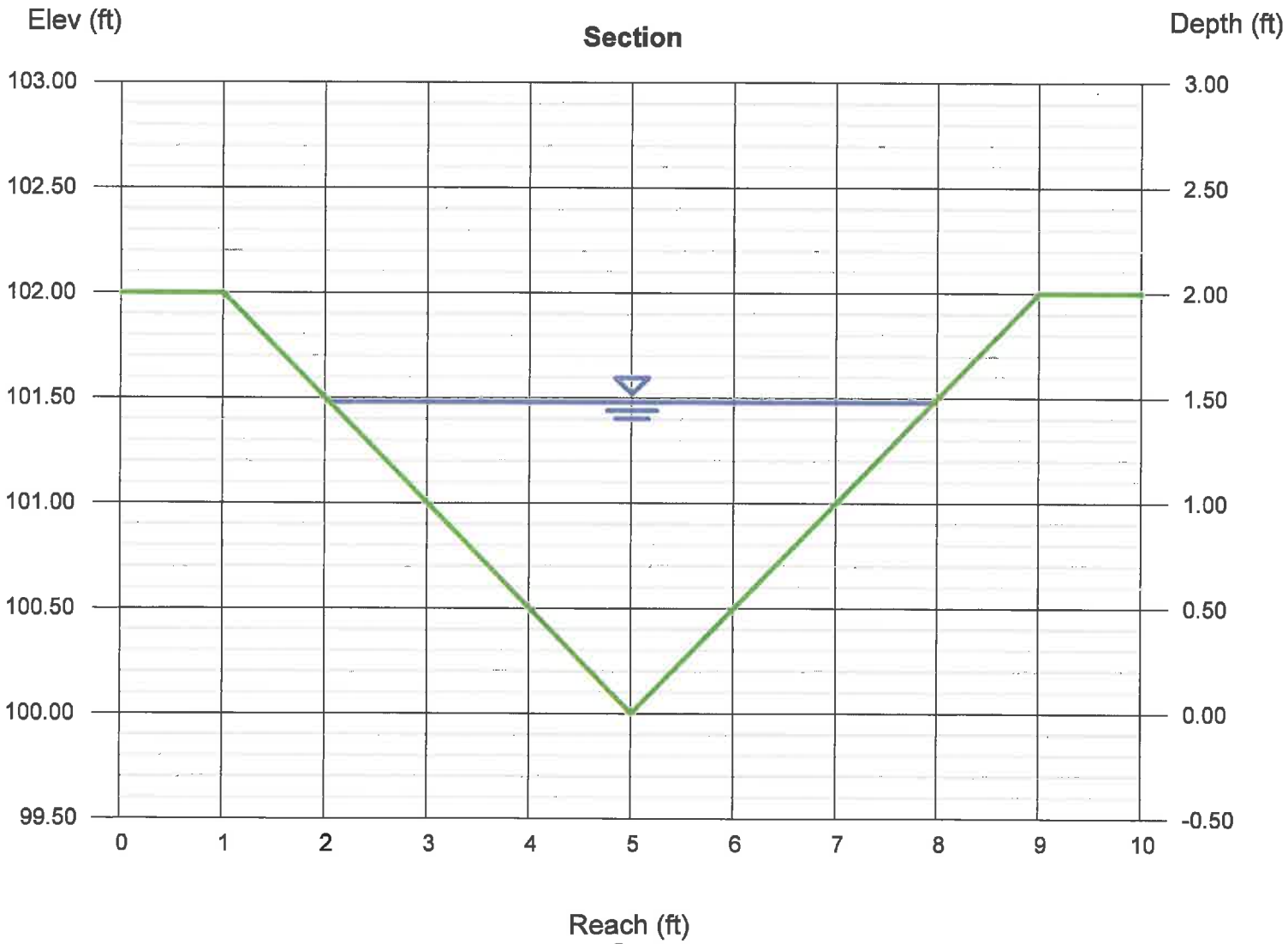
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 13.84
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 51.80

Highlighted

Depth (ft)	= 1.48
Q (cfs)	= 51.80
Area (sqft)	= 4.38
Velocity (ft/s)	= 11.82
Wetted Perim (ft)	= 6.62
Crit Depth, Yc (ft)	= 2.00
Top Width (ft)	= 5.92
EGL (ft)	= 3.65



POST CLOSURE
tc Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Thursday, Aug 27 2015

Point 3 to Point 4

Triangular

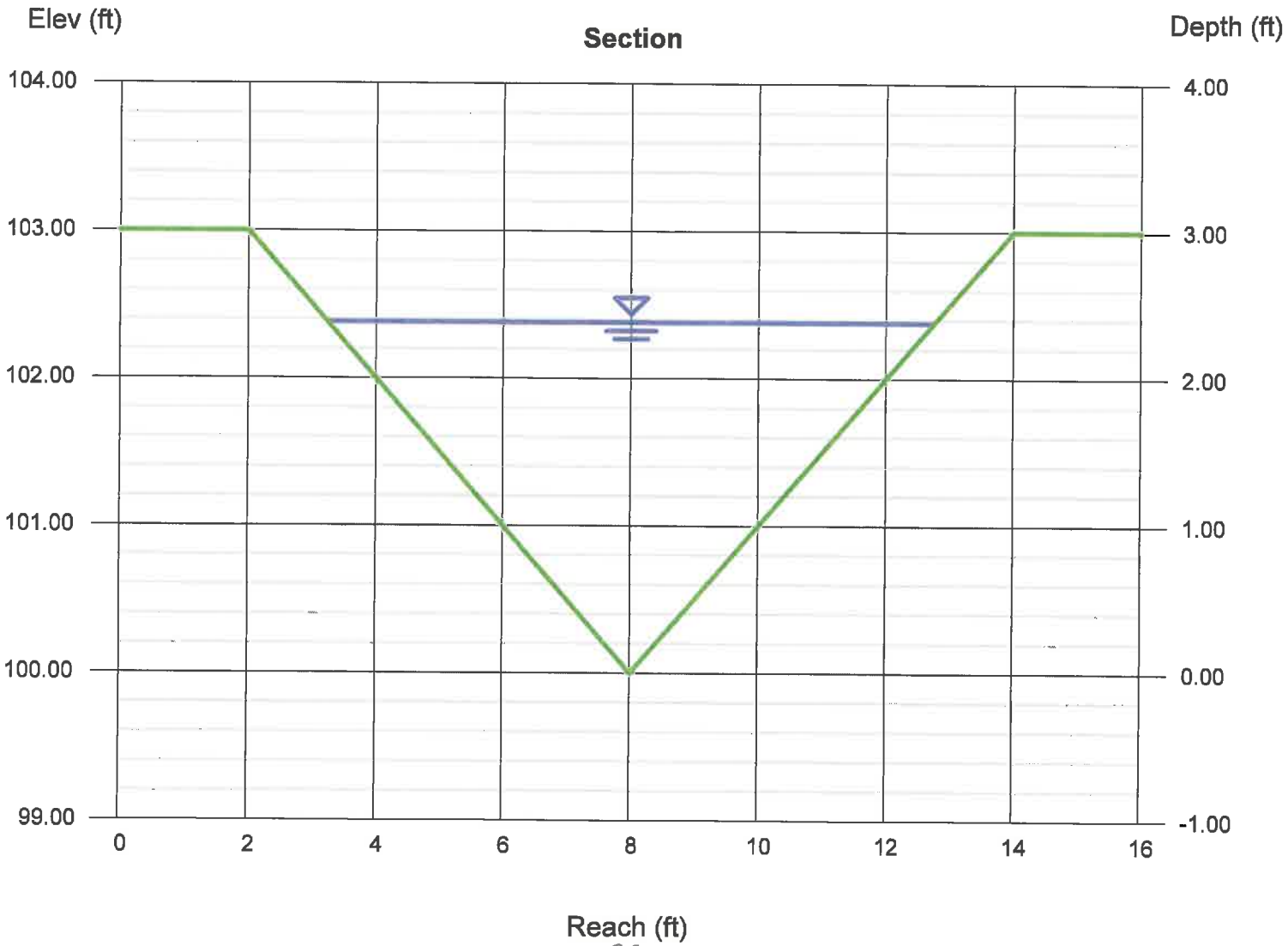
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 5.60
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 117.80

Highlighted

Depth (ft)	= 2.38
Q (cfs)	= 117.80
Area (sqft)	= 11.33
Velocity (ft/s)	= 10.40
Wetted Perim (ft)	= 10.64
Crit Depth, Yc (ft)	= 2.93
Top Width (ft)	= 9.52
EGL (ft)	= 4.06



POST CLOSURE
tc Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Wednesday, Aug 26 2015

Point 4 to Point 5

Triangular

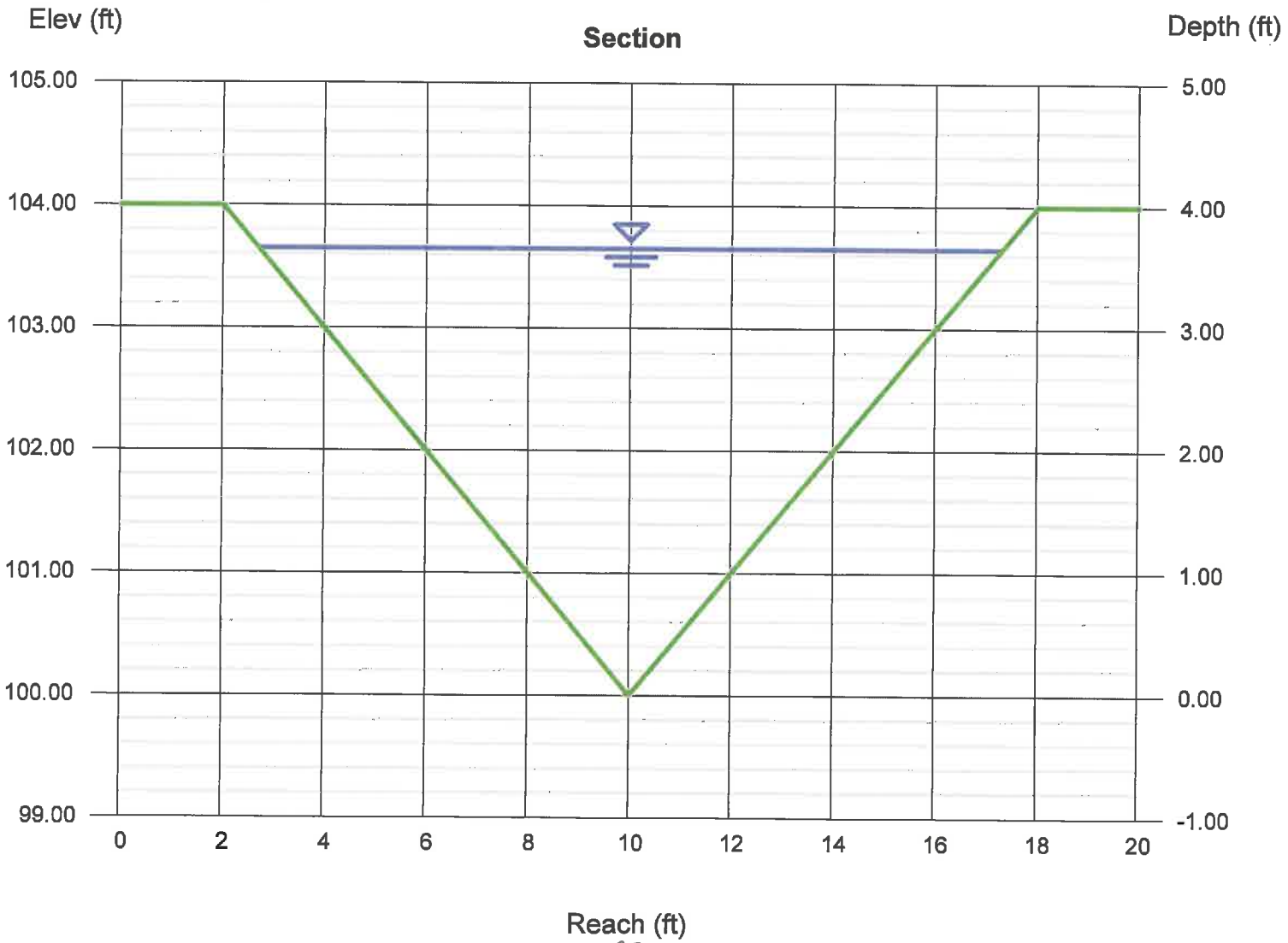
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.44
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 186.90

Highlighted

Depth (ft)	= 3.65
Q (cfs)	= 186.90
Area (sqft)	= 26.64
Velocity (ft/s)	= 7.01
Wetted Perim (ft)	= 16.32
Crit Depth, Yc (ft)	= 3.53
Top Width (ft)	= 14.60
EGL (ft)	= 4.41



POST CLOSURE
& Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Thursday, Aug 27 2015

Point 5 to Point 6

Triangular

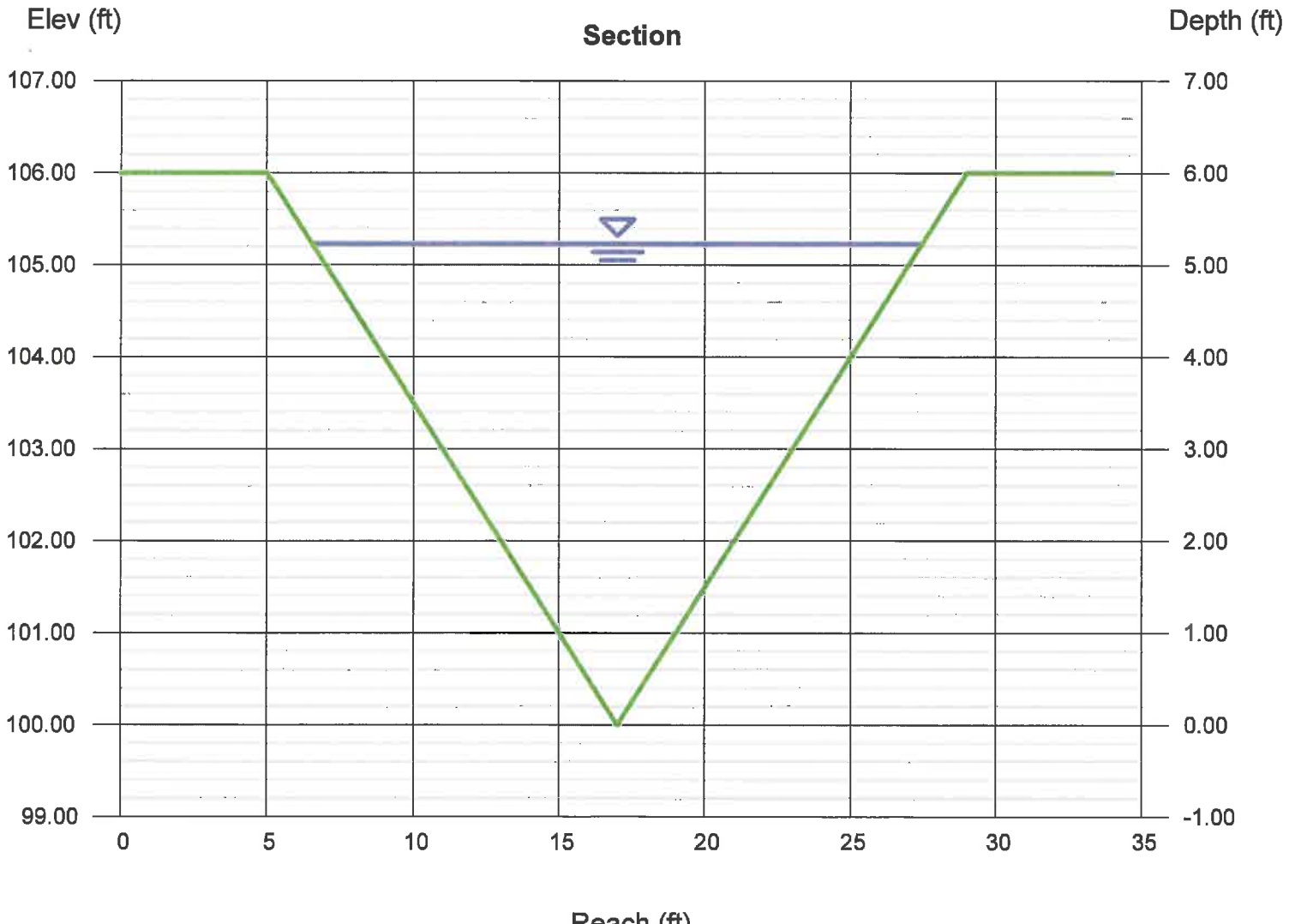
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 6.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.99
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 406.40

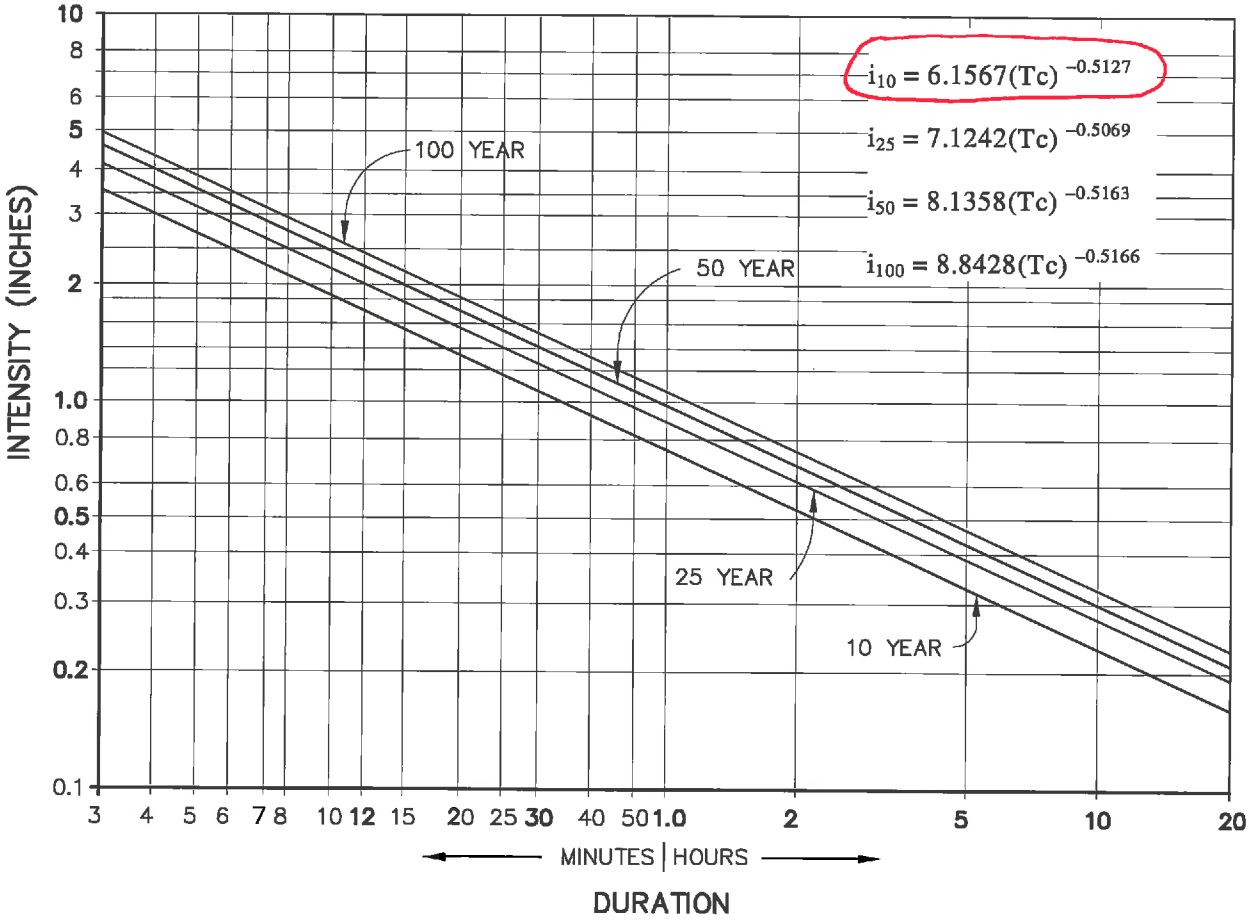
Highlighted

Depth (ft)	= 5.23
Q (cfs)	= 406.40
Area (sqft)	= 54.71
Velocity (ft/s)	= 7.43
Wetted Perim (ft)	= 23.39
Crit Depth, Yc (ft)	= 4.81
Top Width (ft)	= 20.92
EGL (ft)	= 6.09



PLOT DATE: 23-AUG-10

INTENSITY–DURATION–FREQUENCY CHART

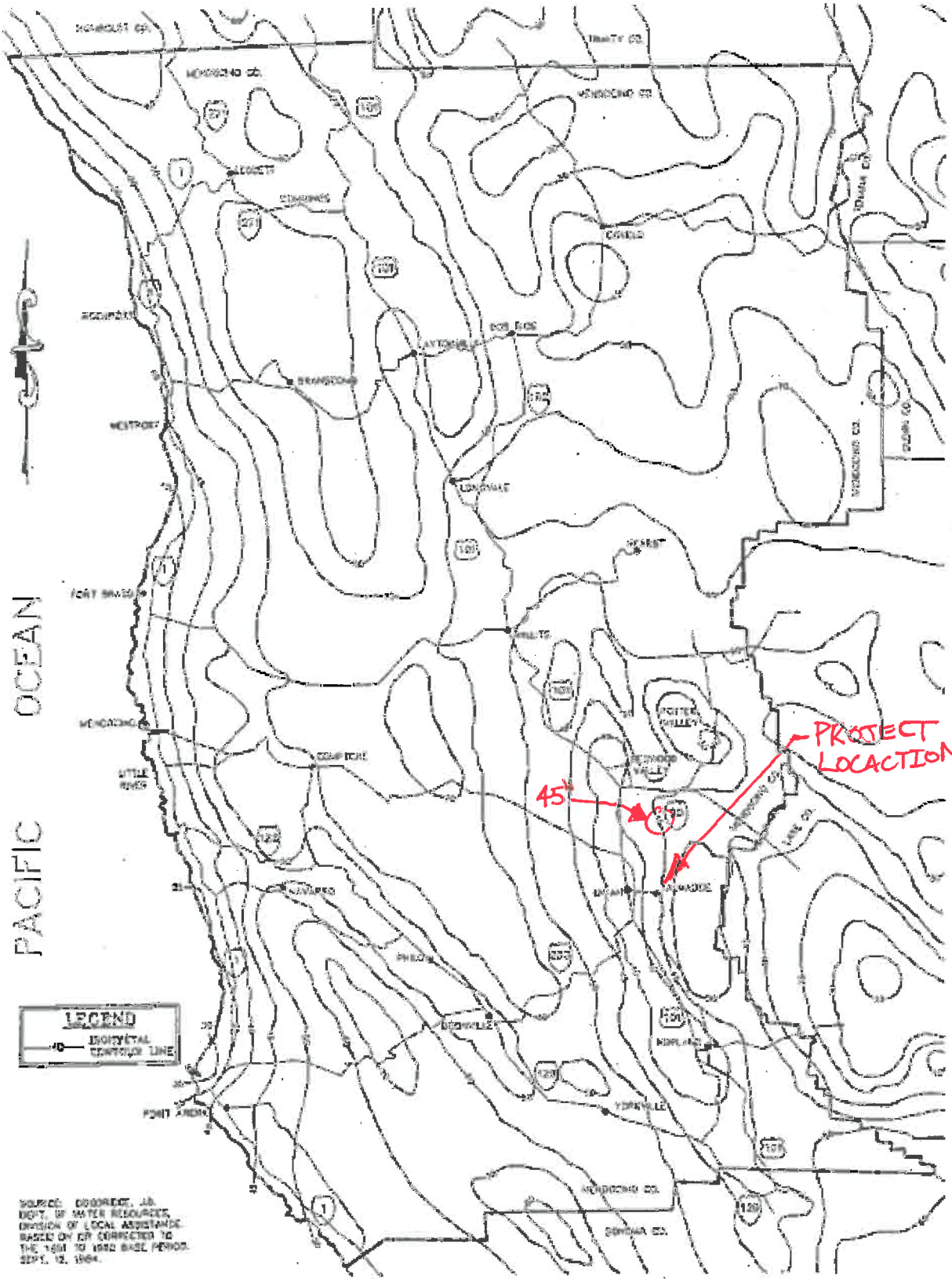


STATION DATA	
LONGITUDE:	123.183
LATITUDE:	39.233
ALTITUDE:	670
YEARS OF DATA:	1972–1986

MENDOCINO COUNTY	INTENSITY/DURATION/FREQUENCY CHART UKIAH–LAKE MENDOCINO DAM				MENDOT STD. NO. D11G
	SCALE: NONE	DESIGN: RCW	DRAWN: LMM	OCT. 2000	PAGE: A–57

FILE: CLFS1:\LDD PROJECTS\22301\MEN-D11G.DWG

35.



MEAN SEASONAL PRECIPITATION IN INCHES

MENDOT STD. NO. D10

SCALE: NONE | DESIGN: RCW | DRAWN: CLG | OCT. 2000 | PAGE: A-50

PLOT DATE: 23-AUG-00

FILE: CLF31:\LDD PROJECTS\223u1\MEN-D10.DWG XREF: MENDOCO.DWG

ATTACHMENT D: HYDRAULIC CALCULATIONS

Hydraulic Calculations
City of Ukiah Landfill Final Closure Construction
8/26/2015

Check Channel Capacity for 2 year Storm Event:

Channel capacity checked at near Point 6.

Pre-Closure

Q_{10}=	530.73	cfs	→ See hydrology calcs. pg. 16
Q_1~	$0.65Q_{10}$		
Q_1~	344.97	cfs	

Use straight line interpolation between Q_1 and Q_{10} to determine Q_2

Q_2~	369.68	cfs

Assume trapezoidal channel flow to determine flow depth and velocity:

Q_2=	369.68	cfs	
side slopes=	2:1		
bottom width=	3	ft	
n=	0.035		
slope=	0.0189		
depth=	5.00	ft	
flow depth=	*3.52*	*ft*	→ SEE CHANNEL REPORT, PG. 44
velocity=	*8.90*	*ft/s*	→ SEE CHANNEL REPORT, PG. 44

Post Closure

Q_{10}=	557.14	cfs	→ See hydrology calcs. pg. 16
Q_1~	$0.65Q_{10}$		
Q_1~	362.14	cfs	

Use straight line interpolation between Q_1 and Q_{10} to determine Q_2

Q_2~	388.08	cfs

Assume trapezoidal channel flow to determine flow depth:

Q_2=	388.08	cfs	
side slopes=	2:1, 3:1		
bottom width=	3	ft	
n=	0.035		
slope=	0.0189		
depth=	5.00	ft	
flow depth=	*3.60*	*ft*	→ SEE CHANNEL REPORT, PG. 45
velocity=	*8.98*	*ft/s*	→ SEE CHANNEL REPORT, PG. 45

Comparison

Pre-closure flow depth=	3.52	ft
Post closure flow depth=	3.60	ft

Post closure flow depth increase=	0.08 ft	→The increase in flow depth of 0.08' (2.2%) is considered insignificant

Pre-closure velocity=	8.90	ft/s
Post closure velocity=	8.98	ft/s

Post closure velocity increase=	0.08 ft/s	→The increase in velocity of 0.08 ft/s (0.9%) is considered insignificant

Check Channel Capacity for 10 year Storm Event:

Channel capacity checked at near Point 6.

Pre-Closure

Q_{10}=	530.73	cfs	→ See hydrology calcs. pg. 16

Assume trapezoidal channel flow to determine flow depth:

Q_{10}=	530.73	cfs	
side slopes=	2:1		
bottom width=	3	ft	
n=	0.035		
slope=	0.0189		
depth=	5.00	ft	
flow depth=	*4.11*	*ft*	→ SEE CHANNEL REPORT, PG. 46
velocity=	*9.73*	*ft/s*	→ SEE CHANNEL REPORT, PG. 46

Post Closure

Q_{10}=	530.73	cfs	→ See hydrology calcs. pg.

Assume trapezoidal channel flow to determine flow depth:

Q_{10}=	530.73	cfs	
side slopes=	2:1, 3:1		
bottom width=	3	ft	
n=	0.035		
slope=	0.0189		
depth=	5.00	ft	
flow depth=	*4.19*	*ft*	→ SEE CHANNEL REPORT, PG. 47
velocity=	*9.87*	*ft/s*	→ SEE CHANNEL REPORT, PG. 47

Comparison

Pre-closure flow depth=	4.11	
Post closure flow depth=	4.19	
Post closure flow depth increase=	0.08 ft	→The increase in flow depth of 0.08' (1.9%) is considered insignificant
Pre-closure velocity=	9.73	ft/s
Post closure velocity=	9.87	ft/s
Post closure velocity increase=	0.14 ft/s	→The increase in velocity of 0.14 ft/s (1.4%) is considered insignificant

Check Channel Capacity for 100 year Storm Event:

Channel capacity checked at near Point 6.

Pre-Closure

Q_{10}=	530.73	cfs	→ See hydrology calcs. pg. 16
Q_{100}~	$1.5Q_{10}$		
Q_{100}~	796.10	cfs	

Assume trapezoidal channel flow to determine flow depth:

Q_{100}=	796.10	cfs	
side slopes=	2:1		
bottom width=	3	ft	
n=	0.035		
slope=	0.0189		
depth=	5.00	ft	
flow depth=	*4.87*	*ft*	→ SEE CHANNEL REPORT, PG. 48
velocity=	*10.77*	*ft/s*	→ SEE CHANNEL REPORT, PG. 48

Post Closure

Q_{10}=	557.14	cfs	→ See hydrology calcs. pg. 16
Q_{100}~	$1.5Q_{10}$		
Q_{100}~	835.71	cfs	

Assume trapezoidal channel flow to determine flow depth:

Q_{100}=	835.71	cfs
side slopes=	2:1, 3:1	
bottom width=	3	ft
n=	0.035	
slope=	0.0189	
depth=	5.00	ft

flow depth=	*4.96*	*ft*	→ SEE CHANNEL REPORT, PG. 49
velocity=	*10.94*	*ft/s*	→ SEE CHANNEL REPORT, PG. 49

Comparison

Pre-closure flow depth=	4.87	ft
Post closure flow depth=	4.96	ft

Post closure flow depth increase=	0.09 ft	→The increase in flow depth of 0.09' (1.8%) is considered insignificant

Pre-closure velocity=	10.77	ft/s
Post closure velocity=	10.94	ft/s

Post closure velocity increase=	0.17 ft/s	→The increase in velocity of 0.17 ft/s (1.6%) is considered insignificant

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Friday, Aug 28 2015

Pre Closure Existing Channel - 2 Year Storm Event

Trapezoidal

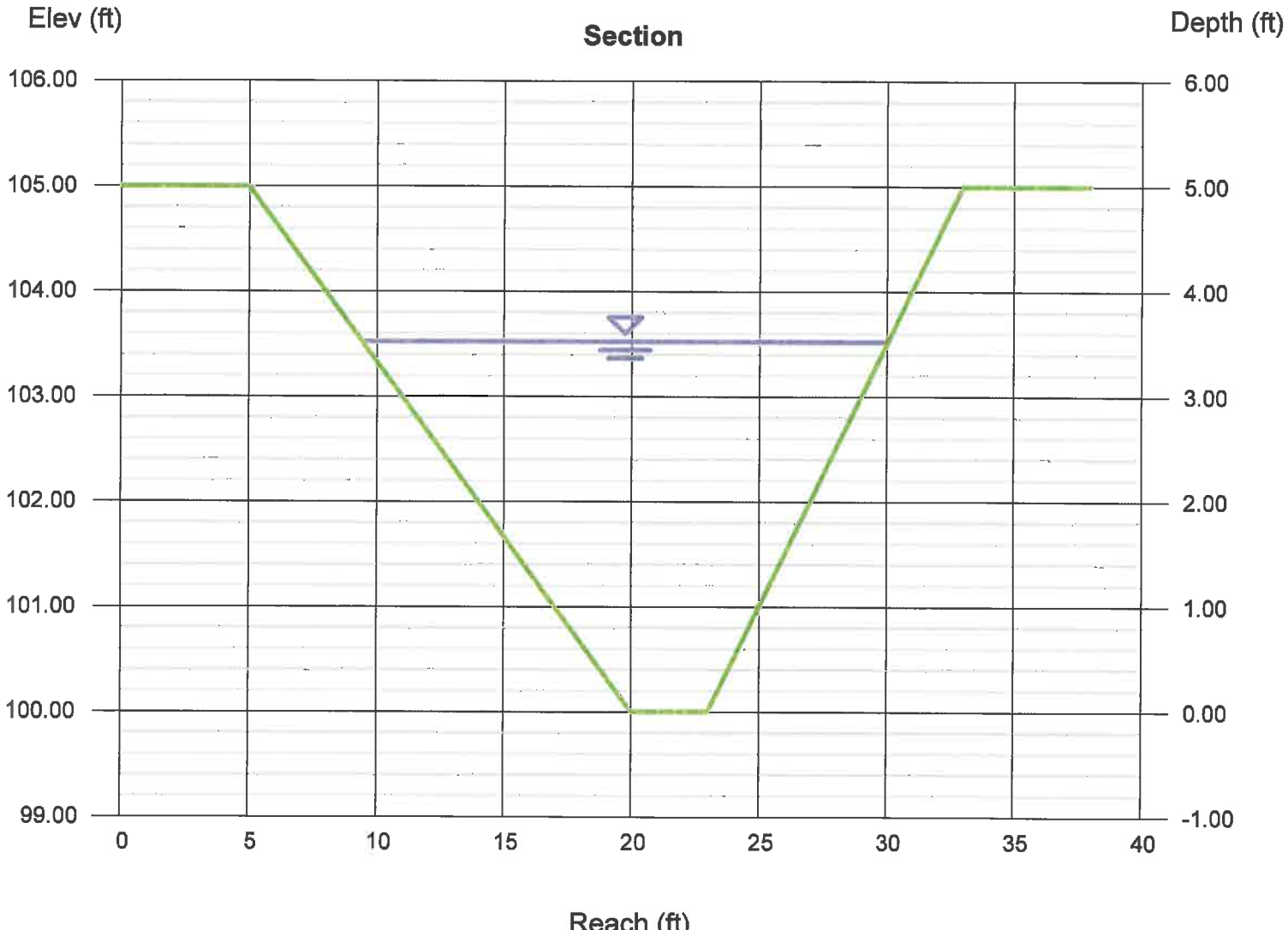
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 2.00
Total Depth (ft)	= 5.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.89
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 369.68

Highlighted

Depth (ft)	= 3.52
Q (cfs)	= 369.68
Area (sqft)	= 41.54
Velocity (ft/s)	= 8.90
Wetted Perim (ft)	= 22.00
Crit Depth, Yc (ft)	= 3.69
Top Width (ft)	= 20.60
EGL (ft)	= 4.75



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Friday, Aug 28 2015

Post Closure Existing Channel - 2 Year Storm Event

Trapezoidal

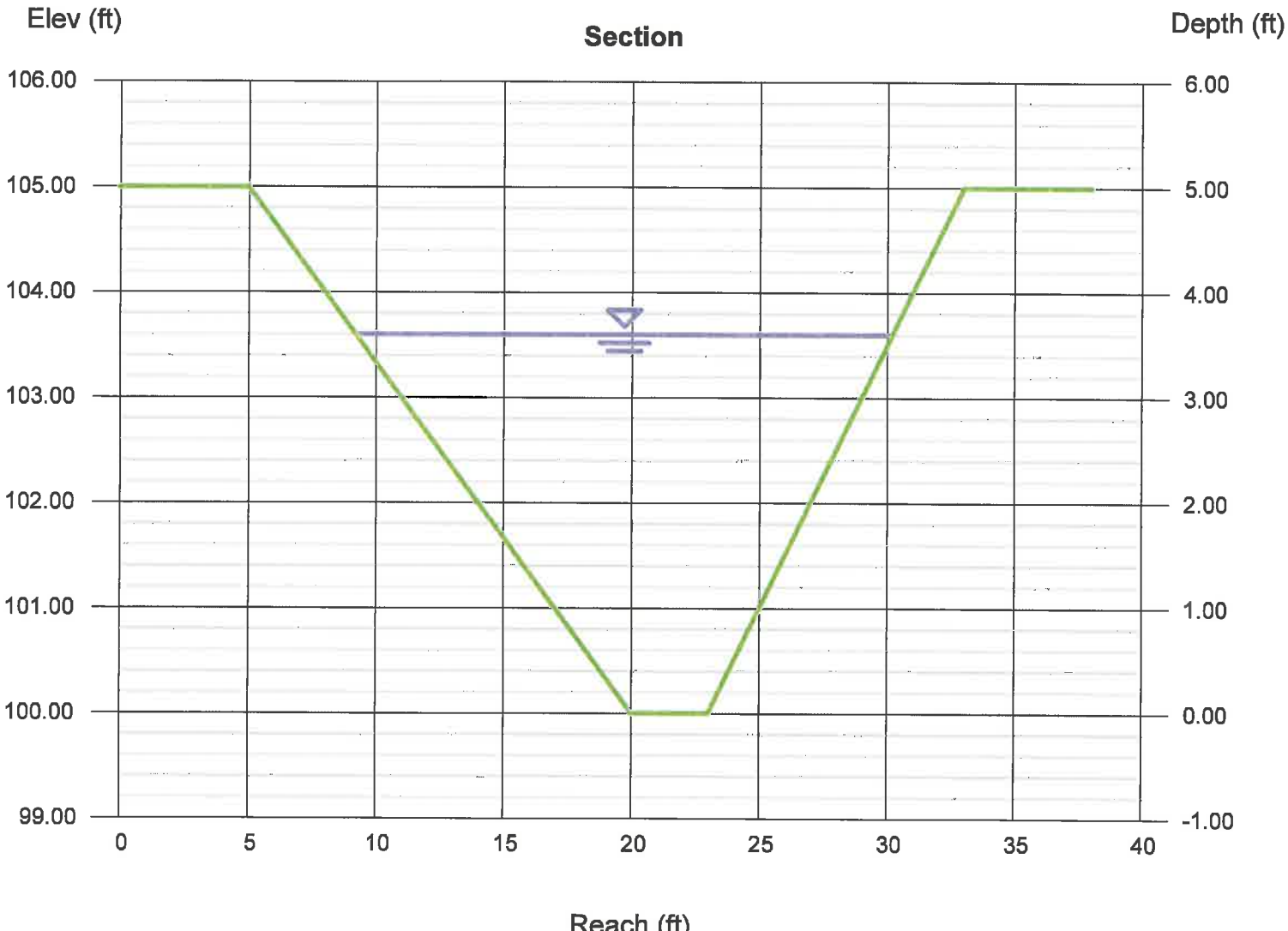
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 2.00
Total Depth (ft)	= 5.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.89
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 388.08

Highlighted

Depth (ft)	= 3.60
Q (cfs)	= 388.08
Area (sqft)	= 43.20
Velocity (ft/s)	= 8.98
Wetted Perim (ft)	= 22.43
Crit Depth, Yc (ft)	= 3.77
Top Width (ft)	= 21.00
EGL (ft)	= 4.85



45.

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Friday, Aug 28 2015

Pre Closure Existing Channel - 10 Year Storm Event

Trapezoidal

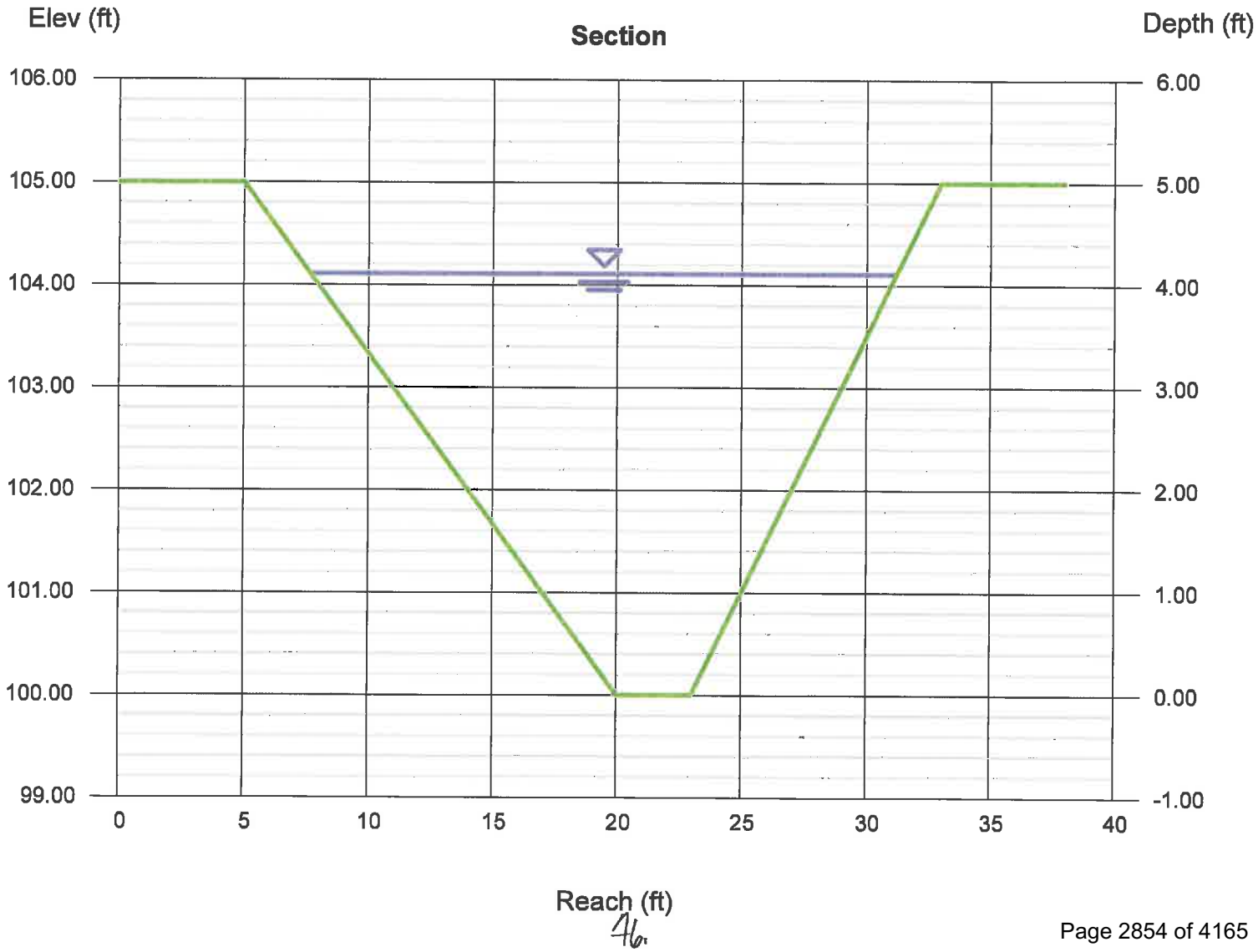
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 2.00
Total Depth (ft)	= 5.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.89
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 530.73

Highlighted

Depth (ft)	= 4.11
Q (cfs)	= 530.73
Area (sqft)	= 54.56
Velocity (ft/s)	= 9.73
Wetted Perim (ft)	= 25.19
Crit Depth, Yc (ft)	= 4.34
Top Width (ft)	= 23.55
EGL (ft)	= 5.58



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Friday, Aug 28 2015

Post Closure Existing Channel - 10 Year Storm Event

Trapezoidal

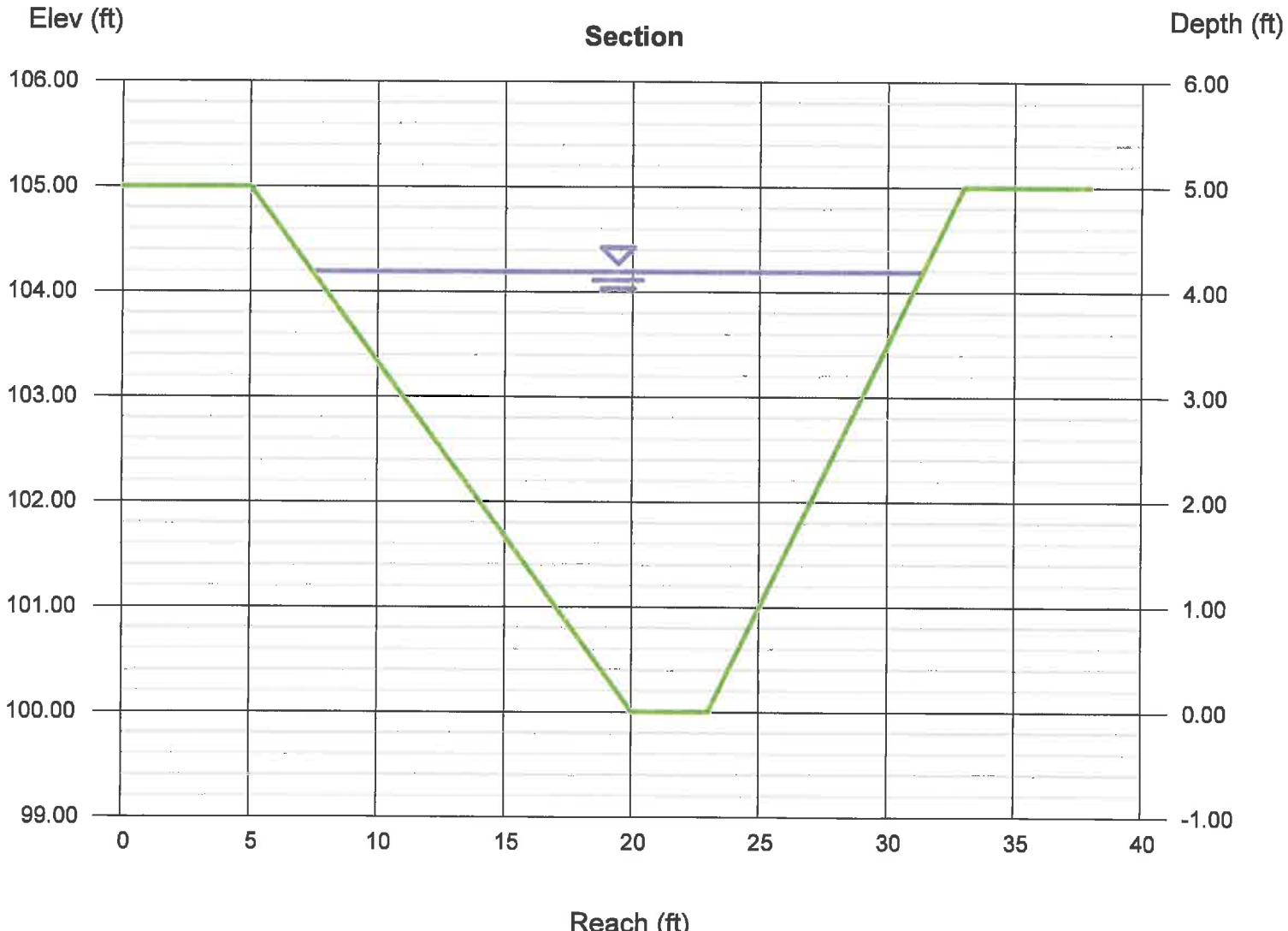
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 2.00
Total Depth (ft)	= 5.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.89
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 557.14

Highlighted

Depth (ft)	= 4.19
Q (cfs)	= 557.14
Area (sqft)	= 56.46
Velocity (ft/s)	= 9.87
Wetted Perim (ft)	= 25.62
Crit Depth, Yc (ft)	= 4.44
Top Width (ft)	= 23.95
EGL (ft)	= 5.70



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Friday, Aug 28 2015

Pre Closure Existing Channel - 100 Year Storm Event

Trapezoidal

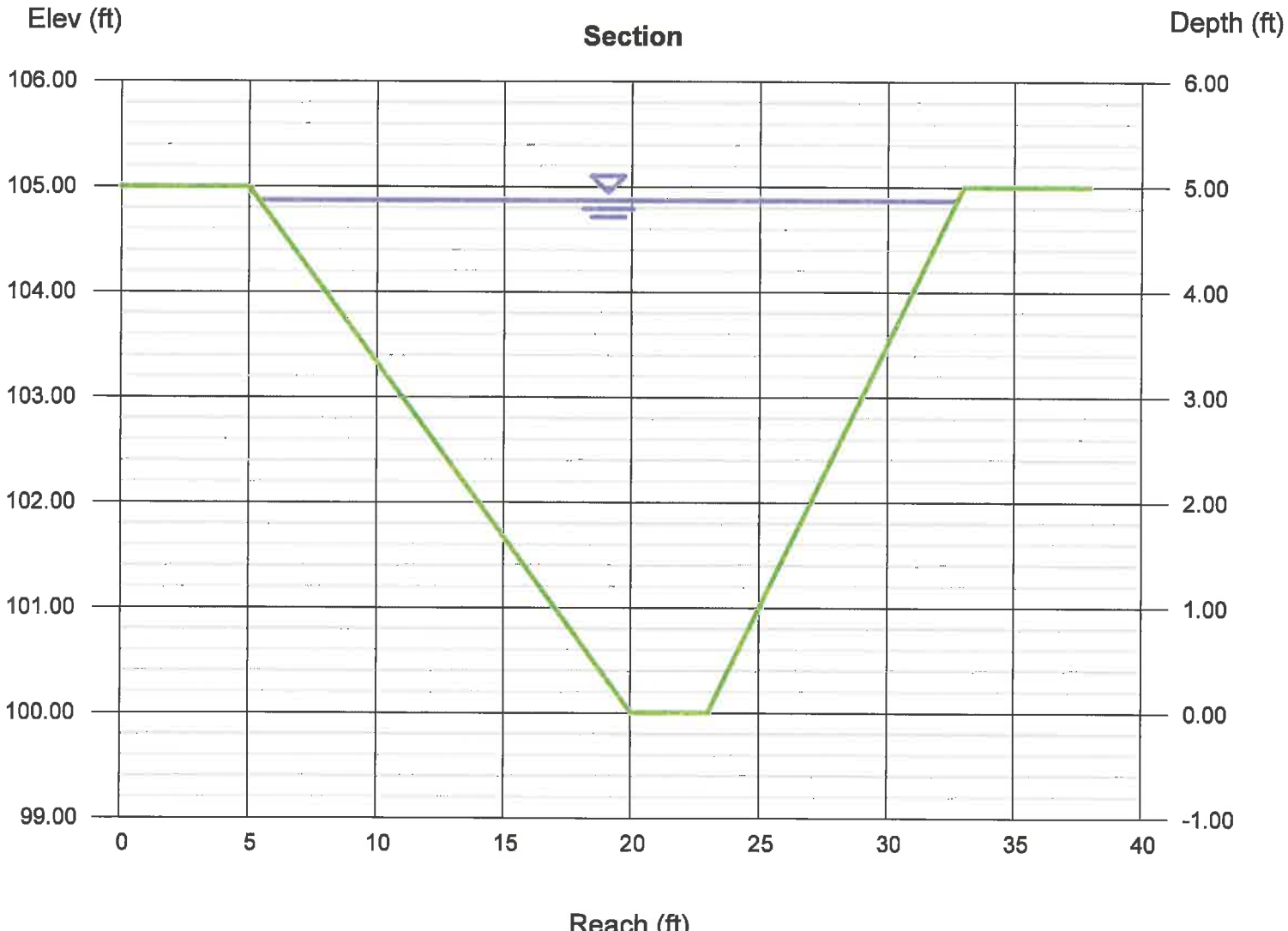
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 2.00
Total Depth (ft)	= 5.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.89
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 796.10

Highlighted

Depth (ft)	= 4.87
Q (cfs)	= 796.10
Area (sqft)	= 73.90
Velocity (ft/s)	= 10.77
Wetted Perim (ft)	= 29.29
Crit Depth, Yc (ft)	= 5.00
Top Width (ft)	= 27.35
EGL (ft)	= 6.67



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Friday, Aug 28 2015

Post Closure Existing Channel - 100 Year Storm Event

Trapezoidal

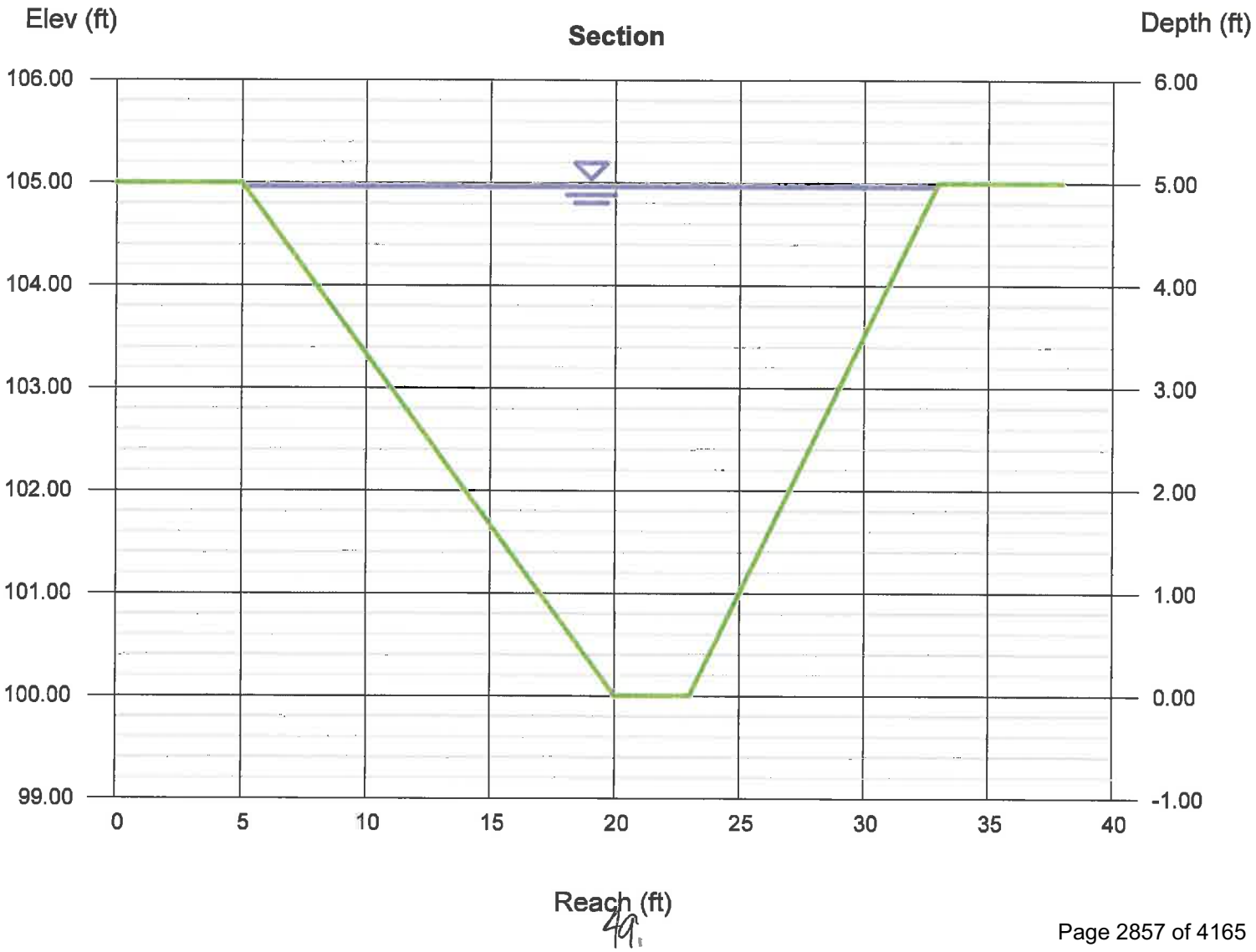
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 2.00
Total Depth (ft)	= 5.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.89
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 835.71

Highlighted

Depth (ft)	= 4.96
Q (cfs)	= 835.71
Area (sqft)	= 76.38
Velocity (ft/s)	= 10.94
Wetted Perim (ft)	= 29.78
Crit Depth, Yc (ft)	= 5.00
Top Width (ft)	= 27.80
EGL (ft)	= 6.82



Appendix C

Notice of Preparation

NOTICE OF PREPARATION

ENVIRONMENTAL IMPACT REPORT
CITY OF UKIAH LANDFILL CLOSURE PROJECT

Pursuant to the California Environmental Quality Act (CEQA), the City of Ukiah (City) plans to prepare an environmental impact report (EIR) on its proposed Ukiah Landfill Closure Project (Project, or Proposed Project). The City will be the lead agency under CEQA.

Project Location and Background

As shown in Figure 1, the Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah landfill is part of a 283.5-acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01.

Waste disposal operations at the Landfill began in 1955 at the eastern end of the landfill footprint and progressed upslope and westward. During the 1970's, the unnamed ephemeral creek was realigned northward to maximize the available fill area, and a soil berm was constructed along the toe of the landfill to separate the waste from the realigned creek channel. The method of operation during the Landfill's development was a fill and cover approach in a canyon/gully terrain. The Landfill operated as a nonhazardous Class III solid waste disposal site servicing the City of Ukiah and the surrounding area. The types of waste received included garbage, rubbish, demolition and construction waste, brush, stumps, large appliances diverted as scrap metal and street refuse. The Landfill ceased operations in September 2001.

Environmental monitoring at the Landfill was originally regulated under Order 75-43 in conformance with Title 23 of the California Code of Regulations (23 CCR). In September 1993, Order 75-43 was amended by Order 93-83 as a mechanism to implement State Water Resources Control Board Resolution No. 93-62 and federal municipal solid waste regulations (i.e., "Subtitle D") per Title 40 of the Code of Federal Regulations (40 CFR), Parts 257 and 258. Concurrent with this amendment was the preparation of a Report of Waste Discharge for the purpose of formally updating the Landfill's WDRs and to address groundwater impacts previously identified at the site. The combination of these two documents was subsequently used by the NCRWQCB to issue new WDRs (Order 94-123) for the site in October 1994.

In the Fall of 1995, an Engineering Feasibility Study (EFS) was conducted to evaluate corrective action alternatives for the mitigation of groundwater impacts and to assess potential leachate management options. Findings from the EFS included recommendations to upgrade the groundwater monitoring network, performance of a health-based risk assessment, and modification of the leachate collection/management facilities. The monitoring system upgrades and health-based risk assessment were subsequently completed in the Fall of 1996. Modifications to the leachate collection/management facilities, which included the diversion of collected leachate to an aboveground storage tank and pumping to the City's sewer piping system via a combination force main/gravity drain, were also completed in the Fall of

1996.

Following completion of the respective corrective action measures, the site was monitored on a quarterly basis in accordance with Order 94-123. On June 27, 2002, the NCRWQCB adopted the current WDRs (Order R1- 2002-0061) for the site to address interim closure, corrective action needs, and submittal of plans to complete cap construction in accordance with 27 CCR. Order R1-2002-0061 is the currently monitoring document for the project site.

In 2014, the City prepared Final Construction Plans for the closure of the Ukiah Landfill and then in 2016, the City prepared an Initial Study/Mitigated Negative Declaration and through that process determined that the City would prepare an EIR to satisfy the requirements of CEQA. The Initial Study/Mitigated Negative Declaration is available for review by the public on the City's website at https://cityofukiah.box.com/UkiahLandfillClosureProject.

Goals and Objectives

The overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, groundwater/surface water monitoring systems, and site security.

Project Description

Closure of the Ukiah Landfill will be performed in accordance with the applicable regulatory standards. The components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water monitoring systems, and site security. A description of each of these closure components will be included in the EIR. The final cover design is described below.

As outlined in 27 CCR, §20950, the primary performance goal for final closure is to minimize the infiltration of water into the waste, thereby minimizing the production of leachate and LFG. The proposed final cover design for the Landfill areas will consist of the following layers, from top to bottom:

- Synthetic erosion-resistant layer;
- A structured geomembrane low hydraulic-conductivity layer that includes a drainage layer; and
- A minimum one-foot thick foundation layer.

This final cover design for the Landfill areas is an engineered alternative final cover consistent with 27 CCR, §20080. A copy of the Final Grade Construction Plans are included on the City's website at https://cityofukiah.box.com/UkiahLandfillClosureProject. Several factors were taken into consideration is establishing the proposed final cover design for the Landfill, including the geometry of the existing landfill, local climatic conditions, final cover material availability, slope

stability, erosion protection, and construction cost.

Scope and Contents of the EIR

"Scope" is a term that describes the breadth and depth of an EIR (i.e. the content, as well as the level of analysis and discussion). The City identified the appropriate scope for this EIR by preparing an Initial Study/Mitigated Negative Declaration (see the City's website at https://cityofukiah.box.com/UkiahLandfillClosureProject.) and engaging appropriate state and local agencies and the public to provide input. As required by CEQA, this Draft EIR will focus on significant environmental effects expected to result from the Proposed Project (CEQA Guidelines, Section 15143).

Based on responses to and the results of the Initial Study/Mitigated Negative Declaration, the identified environmental resources that require further analysis in the EIR are as follows:

- Aesthetics/Visual
- Air Quality/Greenhouse Gasses
- Hydrology
- Geology
- Noise

Based on responses to and the results of the Initial Study/Mitigated Negative Declaration, substantial evidence exists to exclude the following identified environmental resources from further analysis in the EIR are as follows:

- Agriculture and Forest Resources
- Biological Resources
- Cultural Resources
- Hazards and Hazardous Materials
- Land Use and Planning
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems

Any mitigation measures identified in the 2016 Initial Study/Mitigated Negative Declaration that are not revisited in the forthcoming EIR will be carried forward and will be included in the Mitigation Monitoring and Reporting Program to verify compliance.

Further, the Draft EIR will characterize the existing environmental resources within the vicinity of the Proposed Project, analyze potential impacts to those resources, and identify mitigation measures to reduce impacts. Other CEQA-related issues, such as cumulative and growth inducing effects that could result from the Proposed Project will also be analyzed. It is anticipated that at least two (2) alternatives, including a "No-Project" Alternative, will be analyzed in this Draft EIR.

Public Participation

As part of the environmental review process, the City would like to know the views of you and/or your agency as to the scope and content of the environmental information, which is germane to your interests or your agency's statutory responsibilities in connection with the Proposed Project. If you are representing an agency, your agency may need to use this EIR when considering your permit authority or approval of the Proposed Project. Whether you are a public agency, stakeholder, rate payer, adjacent landowner, and/or interested member(s) of the general public, you are encouraged to help participate in the preparation of the EIR by attending the scoping meetings and/or providing written comments as further discussed below.

Scoping Meetings. Two scoping meetings will be conducted to seek public and agency input on alternatives, environmental issues and concerns to be addressed in the EIR. The schedule and location of the scoping meetings are as follows:

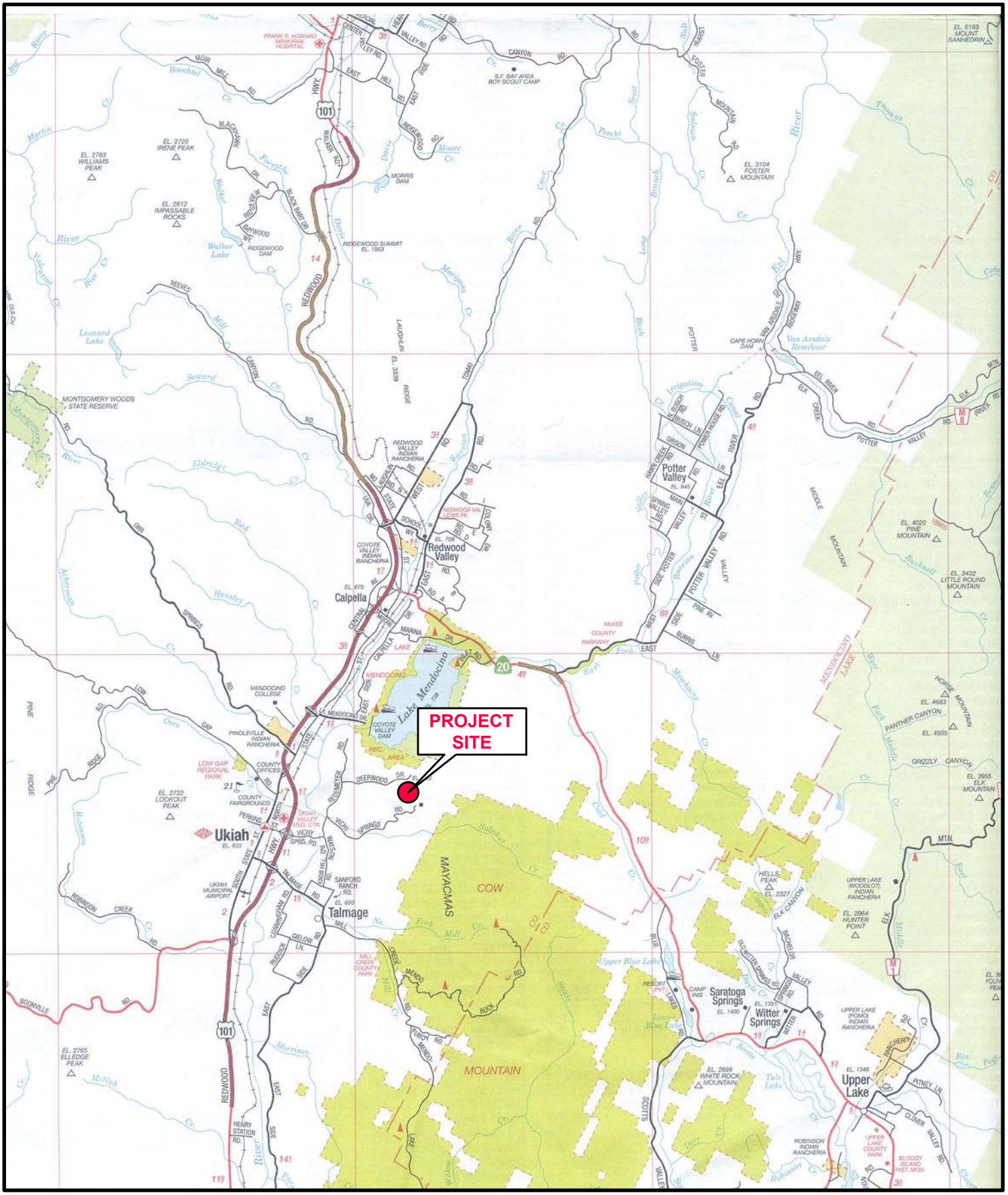
2:00 pm Tuesday, February 21, 2017
City of Ukiah
300 Seminary Avenue.
Ukiah, CA 95482

6:00 pm Tuesday, February 21, 2017
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Written Comments. In addition to the opportunity to provide input during the scoping meetings, written comments on the scope, content, alternatives, and the environmental issues to be addressed in the EIR are also encouraged. Due to the time limits mandated by state law, your written response needs to be received by March 7, 2017. Please send your written comments to:

Jarod Thiele, Management Analyst
The City of Ukiah
300 Seminary Avenue
Ukiah, California 95482-5400

Please make sure that you provide your name, agency you are representing, title, as well as your address and phone number so that we can contact you and keep you informed throughout the EIR process. If you should have any questions or need additional information, please call Mr. Jarod Thiele at 707-463-6755. The City estimates that the Draft EIR will be available for public review in June/July 2017.


PROJECT SITE
Ukiah
Talmage
Redwood Valley
Calpella
Potter Valley
Lake Mendocino
Saratoga Springs
Witter Springs
Upper Lake
MAYACMAS MOUNTAIN
COW
MONTGOMERY WOODS STATE RESERVE
MENDOCINO COLLEGE
COUNTY FAIRGROUNDS
UKIAH MUNICIPAL AIRPORT
REDWOOD VALLEY INDIAN RANCHERIA
COYOTE VALLEY INDIAN RANCHERIA
PINOLEVILLE INDIAN RANCHERIA
UPPER LAKE (WOODLOT) INDIAN RANCHERIA
UPPER LAKE (POMO) INDIAN RANCHERIA
ROBINSON INDIAN RANCHERIA
LOW GAP REGIONAL PARK
UPPER LAKE COUNTY PARK
EL. 2783 WILLIAMS PEAK
EL. 2720 IRENE PEAK
EL. 2612 IMPASSABLE ROCKS
EL. 2722 LOOKOUT PEAK
EL. 2765 ELLEDGE PEAK
EL. 3104 FOSTER MOUNTAIN
EL. 4020 PINE MOUNTAIN
EL. 3432 LITTLE ROUND MOUNTAIN
EL. 4683 HORSE MOUNTAIN
EL. 4505 PANTHER CANYON
EL. 3955 ELK MOUNTAIN
EL. 2327 HELLS PEAK
EL. 2964 HUNTER POINT
EL. 2696 WHITE ROCK MOUNTAIN
EL. 6183 MOUNT SANHEDRIN
RIDGEWOOD SUMMIT EL. 1953
EL. 3339 LAUGHLIN RIDGE
EL. 1400
EL. 1348
EL. 1351
EL. 945
EL. 708
EL. 670
EL. 635
EL. 620
EL. 738
EL. 1953
EL. 3339

Appendix D

Air Quality Emissions Calculations

Ukiah Landfill Closure Construction Emissions

Mendocino-Rural Inland South County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	50.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	86
Climate Zone	1			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Annual

Project Characteristics -

Land Use - Landfill and soil borrow area make up approximately 50 acres

Construction Phase - EBA Engineering, January 2016.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Grading - Lanfill and soil borrow area make up approixmately 50 acres

Trips and VMT - 723 trucks, 1,446 total one ways trips, all assumed to occur before final cover construction phase (over 35 days).

Construction Off-road Equipment Mitigation - Regulation 1, Rule 1-420 required BMPs for construction and grading activities.

Table Name	Column Name	Default Value	New Value
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tblConstructionPhase	NumDays	50.00	5.00
tblConstructionPhase	NumDays	75.00	20.00
tblConstructionPhase	NumDays	740.00	40.00
tblConstructionPhase	NumDays	30.00	10.00
tblConstructionPhase	NumDays	740.00	15.00
tblConstructionPhase	NumDays	55.00	15.00
tblConstructionPhase	PhaseEndDate	6/7/2024	11/27/2020
tblConstructionPhase	PhaseEndDate	1/5/2024	9/18/2020
tblConstructionPhase	PhaseEndDate	10/9/2020	8/7/2020

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Annual

tblConstructionPhase	PhaseEndDate	3/5/2021	9/18/2020
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tblConstructionPhase	PhaseEndDate	11/20/2020	8/21/2020
tblConstructionPhase	PhaseStartDate	3/23/2024	11/2/2020
tblConstructionPhase	PhaseStartDate	3/6/2021	9/7/2020
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tblConstructionPhase	PhaseStartDate	1/6/2024	9/19/2020
tblConstructionPhase	PhaseStartDate	10/10/2020	8/8/2020
tblLandUse	LotAcreage	0.00	50.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
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tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType	Air Compressors	Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType	Concrete/Industrial Saws	Tractors/Loaders/Backhoes
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tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType	Generator Sets	Bore/Drill Rigs
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
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tblOffRoadEquipment	UsageHours	8.00	6.00
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tblTripsAndVMT	WorkerTripNumber	15.00	5.00
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2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.1492	1.5639	1.1318	2.4800e-003	14.1662	0.0694	14.2356	1.4562	0.0650	1.5213	0.0000	220.1550	220.1550	0.0449	0.0000	221.2773
Maximum	**0.1492**	**1.5639**	**1.1318**	**2.4800e-003**	**14.1662**	**0.0694**	**14.2356**	**1.4562**	**0.0650**	**1.5213**	**0.0000**	**220.1550**	**220.1550**	**0.0449**	**0.0000**	**221.2773**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.1492	1.5639	1.1318	2.4800e-003	7.0794	0.0694	7.1489	0.7251	0.0650	0.7901	0.0000	220.1548	220.1548	0.0449	0.0000	221.2771
Maximum	**0.1492**	**1.5639**	**1.1318**	**2.4800e-003**	**7.0794**	**0.0694**	**7.1489**	**0.7251**	**0.0650**	**0.7901**	**0.0000**	**220.1548**	**220.1548**	**0.0449**	**0.0000**	**221.2771**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**50.03**	**0.00**	**49.78**	**50.21**	**0.00**	**48.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	8-3-2020	9-30-2020	1.0208	1.0208
		Highest	1.0208	1.0208

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/3/2020	8/7/2020	5	5	
2	Site Preparation	Site Preparation	8/8/2020	8/21/2020	5	10	
3	Grading	Grading	8/22/2020	9/18/2020	5	20	
4	Well Drilling	Building Construction	9/7/2020	9/18/2020	5	10	
5	Final Cover	Building Construction	9/19/2020	11/13/2020	5	40	
6	Utilities	Trenching	11/2/2020	11/27/2020	5	20	
7	LFG Flare Station	Building Construction	11/9/2020	11/27/2020	5	15	
8	Paving	Paving	11/9/2020	11/27/2020	5	15	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 50

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Utilities	Excavators	1	6.00	158	0.38
Utilities	Generator Sets	1	4.00	84	0.74
Demolition	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Utilities	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Utilities	Welders	1	4.00	46	0.45
Well Drilling	Bore/Drill Rigs	1	8.00	221	0.50
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Annual

Well Drilling	Cranes	1	7.00	231	0.29
Demolition	Rubber Tired Dozers	1	4.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Well Drilling	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Final Cover	Cranes	1	7.00	231	0.29
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Demolition	Excavators	3	8.00	158	0.38
Well Drilling	Forklifts	3	8.00	89	0.20
LFG Flare Station	Cranes	1	4.00	231	0.29
Final Cover	Forklifts	3	8.00	89	0.20
LFG Flare Station	Excavators	1	8.00	158	0.38
Final Cover	Generator Sets	2	6.00	84	0.74
LFG Flare Station	Forklifts	3	8.00	89	0.20
Paving	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Well Drilling	Generator Sets	1	8.00	84	0.74
Paving	Rollers	1	8.00	80	0.38
Final Cover	Tractors/Loaders/Backhoes	2	4.00	97	0.37
LFG Flare Station	Tractors/Loaders/Backhoes	2	4.00	97	0.37
Final Cover	Welders	2	6.00	46	0.45
LFG Flare Station	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Well Drilling	Welders	1	8.00	46	0.45

LFG Flare Station	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	5.00	0.00	206.57	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	413.14	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	7	18.00	0.00	826.29	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	8	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Final Cover	10	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	4	10.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
LFG Flare Station	9	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	8.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.4900e-003	0.0431	0.0417	7.0000e-005		2.2300e-003	2.2300e-003		2.0900e-003	2.0900e-003	0.0000	6.0262	6.0262	1.6000e-003	0.0000	6.0661
Total	**4.4900e-003**	**0.0431**	**0.0417**	**7.0000e-005**		**2.2300e-003**	**2.2300e-003**		**2.0900e-003**	**2.0900e-003**	**0.0000**	**6.0262**	**6.0262**	**1.6000e-003**	**0.0000**	**6.0661**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.6000e-004	0.0312	5.6000e-003	8.0000e-005	1.3952	1.5000e-004	1.3954	0.1394	1.4000e-004	0.1396	0.0000	7.8892	7.8892	2.4000e-004	0.0000	7.8951
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.4000e-004	1.1100e-003	0.0000	0.1418	0.0000	0.1418	0.0142	0.0000	0.0142	0.0000	0.1363	0.1363	1.0000e-005	0.0000	0.1365
Total	**1.1100e-003**	**0.0313**	**6.7100e-003**	**8.0000e-005**	**1.5370**	**1.5000e-004**	**1.5372**	**0.1536**	**1.4000e-004**	**0.1537**	**0.0000**	**8.0254**	**8.0254**	**2.5000e-004**	**0.0000**	**8.0316**

3.2 Demolition - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.4900e-003	0.0431	0.0417	7.0000e-005		2.2300e-003	2.2300e-003		2.0900e-003	2.0900e-003	0.0000	6.0261	6.0261	1.6000e-003	0.0000	6.0661
Total	**4.4900e-003**	**0.0431**	**0.0417**	**7.0000e-005**		**2.2300e-003**	**2.2300e-003**		**2.0900e-003**	**2.0900e-003**	**0.0000**	**6.0261**	**6.0261**	**1.6000e-003**	**0.0000**	**6.0661**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.6000e-004	0.0312	5.6000e-003	8.0000e-005	0.6979	1.5000e-004	0.6980	0.0697	1.4000e-004	0.0698	0.0000	7.8892	7.8892	2.4000e-004	0.0000	7.8951
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.4000e-004	1.1100e-003	0.0000	0.0709	0.0000	0.0709	7.0800e-003	0.0000	7.0800e-003	0.0000	0.1363	0.1363	1.0000e-005	0.0000	0.1365
Total	**1.1100e-003**	**0.0313**	**6.7100e-003**	**8.0000e-005**	**0.7688**	**1.5000e-004**	**0.7689**	**0.0768**	**1.4000e-004**	**0.0769**	**0.0000**	**8.0254**	**8.0254**	**2.5000e-004**	**0.0000**	**8.0316**

3.3 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0301	0.0000	0.0301	0.0166	0.0000	0.0166	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.4400e-003	0.0672	0.0321	6.0000e-005		3.4400e-003	3.4400e-003		3.1700e-003	3.1700e-003	0.0000	5.1170	5.1170	1.6500e-003	0.0000	5.1584
Total	**6.4400e-003**	**0.0672**	**0.0321**	**6.0000e-005**	**0.0301**	**3.4400e-003**	**0.0336**	**0.0166**	**3.1700e-003**	**0.0197**	**0.0000**	**5.1170**	**5.1170**	**1.6500e-003**	**0.0000**	**5.1584**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.9200e-003	0.0624	0.0112	1.7000e-004	2.7904	2.9000e-004	2.7907	0.2788	2.8000e-004	0.2791	0.0000	15.7783	15.7783	4.8000e-004	0.0000	15.7902
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-004	2.7000e-004	2.2200e-003	0.0000	0.2836	0.0000	0.2836	0.0283	0.0000	0.0283	0.0000	0.2726	0.2726	2.0000e-005	0.0000	0.2731
Total	**2.2200e-003**	**0.0626**	**0.0134**	**1.7000e-004**	**3.0741**	**2.9000e-004**	**3.0743**	**0.3072**	**2.8000e-004**	**0.3074**	**0.0000**	**16.0509**	**16.0509**	**5.0000e-004**	**0.0000**	**16.0632**

3.3 Site Preparation - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0136	0.0000	0.0136	7.4500e-003	0.0000	7.4500e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.4400e-003	0.0672	0.0321	6.0000e-005		3.4400e-003	3.4400e-003		3.1700e-003	3.1700e-003	0.0000	5.1170	5.1170	1.6500e-003	0.0000	5.1584
Total	**6.4400e-003**	**0.0672**	**0.0321**	**6.0000e-005**	**0.0136**	**3.4400e-003**	**0.0170**	**7.4500e-003**	**3.1700e-003**	**0.0106**	**0.0000**	**5.1170**	**5.1170**	**1.6500e-003**	**0.0000**	**5.1584**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.9200e-003	0.0624	0.0112	1.7000e-004	1.3957	2.9000e-004	1.3960	0.1394	2.8000e-004	0.1396	0.0000	15.7783	15.7783	4.8000e-004	0.0000	15.7902
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-004	2.7000e-004	2.2200e-003	0.0000	0.1418	0.0000	0.1418	0.0142	0.0000	0.0142	0.0000	0.2726	0.2726	2.0000e-005	0.0000	0.2731
Total	**2.2200e-003**	**0.0626**	**0.0134**	**1.7000e-004**	**1.5376**	**2.9000e-004**	**1.5379**	**0.1535**	**2.8000e-004**	**0.1538**	**0.0000**	**16.0509**	**16.0509**	**5.0000e-004**	**0.0000**	**16.0632**

3.4 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0867	0.0000	0.0867	0.0360	0.0000	0.0360	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0421	0.4779	0.2869	5.7000e-004		0.0206	0.0206		0.0189	0.0189	0.0000	49.9473	49.9473	0.0162	0.0000	50.3511
Total	**0.0421**	**0.4779**	**0.2869**	**5.7000e-004**	**0.0867**	**0.0206**	**0.1073**	**0.0360**	**0.0189**	**0.0549**	**0.0000**	**49.9473**	**49.9473**	**0.0162**	**0.0000**	**50.3511**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.8300e-003	0.1246	0.0224	3.3000e-004	5.5809	5.8000e-004	5.5815	0.5577	5.6000e-004	0.5582	0.0000	31.5185	31.5185	9.5000e-004	0.0000	31.5422
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1300e-003	1.9500e-003	0.0160	2.0000e-005	2.0421	2.0000e-005	2.0421	0.2040	2.0000e-005	0.2040	0.0000	1.9624	1.9624	1.4000e-004	0.0000	1.9660
Total	**5.9600e-003**	**0.1265**	**0.0384**	**3.5000e-004**	**7.6230**	**6.0000e-004**	**7.6236**	**0.7617**	**5.8000e-004**	**0.7622**	**0.0000**	**33.4810**	**33.4810**	**1.0900e-003**	**0.0000**	**33.5082**

3.4 Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0390	0.0000	0.0390	0.0162	0.0000	0.0162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0421	0.4779	0.2869	5.7000e-004		0.0206	0.0206		0.0189	0.0189	0.0000	49.9472	49.9472	0.0162	0.0000	50.3511
Total	**0.0421**	**0.4779**	**0.2869**	**5.7000e-004**	**0.0390**	**0.0206**	**0.0596**	**0.0162**	**0.0189**	**0.0351**	**0.0000**	**49.9472**	**49.9472**	**0.0162**	**0.0000**	**50.3511**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.8300e-003	0.1246	0.0224	3.3000e-004	2.7915	5.8000e-004	2.7921	0.2787	5.6000e-004	0.2793	0.0000	31.5185	31.5185	9.5000e-004	0.0000	31.5422
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1300e-003	1.9500e-003	0.0160	2.0000e-005	1.0213	2.0000e-005	1.0213	0.1019	2.0000e-005	0.1019	0.0000	1.9624	1.9624	1.4000e-004	0.0000	1.9660
Total	**5.9600e-003**	**0.1265**	**0.0384**	**3.5000e-004**	**3.8127**	**6.0000e-004**	**3.8133**	**0.3806**	**5.8000e-004**	**0.3812**	**0.0000**	**33.4810**	**33.4810**	**1.0900e-003**	**0.0000**	**33.5082**

3.5 Well Drilling - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.7700e-003	0.0913	0.0705	1.5000e-004		4.6800e-003	4.6800e-003		4.4200e-003	4.4200e-003	0.0000	12.8289	12.8289	3.2300e-003	0.0000	12.9096
Total	**9.7700e-003**	**0.0913**	**0.0705**	**1.5000e-004**		**4.6800e-003**	**4.6800e-003**		**4.4200e-003**	**4.4200e-003**	**0.0000**	**12.8289**	**12.8289**	**3.2300e-003**	**0.0000**	**12.9096**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Well Drilling - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.7700e-003	0.0913	0.0705	1.5000e-004		4.6800e-003	4.6800e-003		4.4200e-003	4.4200e-003	0.0000	12.8289	12.8289	3.2300e-003	0.0000	12.9096
Total	**9.7700e-003**	**0.0913**	**0.0705**	**1.5000e-004**		**4.6800e-003**	**4.6800e-003**		**4.4200e-003**	**4.4200e-003**	**0.0000**	**12.8289**	**12.8289**	**3.2300e-003**	**0.0000**	**12.9096**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Final Cover - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0430	0.3658	0.3176	5.3000e-004		0.0209	0.0209		0.0199	0.0199	0.0000	44.9886	44.9886	9.0300e-003	0.0000	45.2143
Total	**0.0430**	**0.3658**	**0.3176**	**5.3000e-004**		**0.0209**	**0.0209**		**0.0199**	**0.0199**	**0.0000**	**44.9886**	**44.9886**	**9.0300e-003**	**0.0000**	**45.2143**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Final Cover - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0430	0.3658	0.3176	5.3000e-004		0.0209	0.0209		0.0199	0.0199	0.0000	44.9885	44.9885	9.0300e-003	0.0000	45.2143
Total	**0.0430**	**0.3658**	**0.3176**	**5.3000e-004**		**0.0209**	**0.0209**		**0.0199**	**0.0199**	**0.0000**	**44.9885**	**44.9885**	**9.0300e-003**	**0.0000**	**45.2143**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Utilities - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.6000e-003	0.0539	0.0634	1.0000e-004		2.9600e-003	2.9600e-003		2.8400e-003	2.8400e-003	0.0000	8.5456	8.5456	1.8400e-003	0.0000	8.5917
Total	**6.6000e-003**	**0.0539**	**0.0634**	**1.0000e-004**		**2.9600e-003**	**2.9600e-003**		**2.8400e-003**	**2.8400e-003**	**0.0000**	**8.5456**	**8.5456**	**1.8400e-003**	**0.0000**	**8.5917**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1800e-003	1.0800e-003	8.8900e-003	1.0000e-005	1.1345	1.0000e-005	1.1345	0.1133	1.0000e-005	0.1133	0.0000	1.0902	1.0902	8.0000e-005	0.0000	1.0922
Total	**1.1800e-003**	**1.0800e-003**	**8.8900e-003**	**1.0000e-005**	**1.1345**	**1.0000e-005**	**1.1345**	**0.1133**	**1.0000e-005**	**0.1133**	**0.0000**	**1.0902**	**1.0902**	**8.0000e-005**	**0.0000**	**1.0922**

3.7 Utilities - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.6000e-003	0.0539	0.0634	1.0000e-004		2.9600e-003	2.9600e-003		2.8400e-003	2.8400e-003	0.0000	8.5456	8.5456	1.8400e-003	0.0000	8.5917
Total	**6.6000e-003**	**0.0539**	**0.0634**	**1.0000e-004**		**2.9600e-003**	**2.9600e-003**		**2.8400e-003**	**2.8400e-003**	**0.0000**	**8.5456**	**8.5456**	**1.8400e-003**	**0.0000**	**8.5917**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1800e-003	1.0800e-003	8.8900e-003	1.0000e-005	0.5674	1.0000e-005	0.5674	0.0566	1.0000e-005	0.0566	0.0000	1.0902	1.0902	8.0000e-005	0.0000	1.0922
Total	**1.1800e-003**	**1.0800e-003**	**8.8900e-003**	**1.0000e-005**	**0.5674**	**1.0000e-005**	**0.5674**	**0.0566**	**1.0000e-005**	**0.0566**	**0.0000**	**1.0902**	**1.0902**	**8.0000e-005**	**0.0000**	**1.0922**

3.8 LFG Flare Station - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0139	0.1212	0.1172	1.9000e-004		7.0100e-003	7.0100e-003		6.6200e-003	6.6200e-003	0.0000	16.0311	16.0311	3.8000e-003	0.0000	16.1262
Total	**0.0139**	**0.1212**	**0.1172**	**1.9000e-004**		**7.0100e-003**	**7.0100e-003**		**6.6200e-003**	**6.6200e-003**	**0.0000**	**16.0311**	**16.0311**	**3.8000e-003**	**0.0000**	**16.1262**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.8 LFG Flare Station - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0139	0.1212	0.1172	1.9000e-004		7.0100e-003	7.0100e-003		6.6200e-003	6.6200e-003	0.0000	16.0311	16.0311	3.8000e-003	0.0000	16.1262
Total	**0.0139**	**0.1212**	**0.1172**	**1.9000e-004**		**7.0100e-003**	**7.0100e-003**		**6.6200e-003**	**6.6200e-003**	**0.0000**	**16.0311**	**16.0311**	**3.8000e-003**	**0.0000**	**16.1262**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.9 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0117	0.1213	0.1298	2.0000e-004		6.6400e-003	6.6400e-003		6.1100e-003	6.1100e-003	0.0000	17.3687	17.3687	5.6200e-003	0.0000	17.5092
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0117**	**0.1213**	**0.1298**	**2.0000e-004**		**6.6400e-003**	**6.6400e-003**		**6.1100e-003**	**6.1100e-003**	**0.0000**	**17.3687**	**17.3687**	**5.6200e-003**	**0.0000**	**17.5092**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.1000e-004	6.5000e-004	5.3300e-003	1.0000e-005	0.6807	1.0000e-005	0.6807	0.0680	1.0000e-005	0.0680	0.0000	0.6542	0.6542	5.0000e-005	0.0000	0.6553
Total	**7.1000e-004**	**6.5000e-004**	**5.3300e-003**	**1.0000e-005**	**0.6807**	**1.0000e-005**	**0.6807**	**0.0680**	**1.0000e-005**	**0.0680**	**0.0000**	**0.6542**	**0.6542**	**5.0000e-005**	**0.0000**	**0.6553**

3.9 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0117	0.1213	0.1298	2.0000e-004		6.6400e-003	6.6400e-003		6.1100e-003	6.1100e-003	0.0000	17.3687	17.3687	5.6200e-003	0.0000	17.5091
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0117**	**0.1213**	**0.1298**	**2.0000e-004**		**6.6400e-003**	**6.6400e-003**		**6.1100e-003**	**6.1100e-003**	**0.0000**	**17.3687**	**17.3687**	**5.6200e-003**	**0.0000**	**17.5091**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.1000e-004	6.5000e-004	5.3300e-003	1.0000e-005	0.3404	1.0000e-005	0.3404	0.0340	1.0000e-005	0.0340	0.0000	0.6542	0.6542	5.0000e-005	0.0000	0.6553
Total	**7.1000e-004**	**6.5000e-004**	**5.3300e-003**	**1.0000e-005**	**0.3404**	**1.0000e-005**	**0.3404**	**0.0340**	**1.0000e-005**	**0.0340**	**0.0000**	**0.6542**	**0.6542**	**5.0000e-005**	**0.0000**	**0.6553**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.482880	0.047259	0.194207	0.134290	0.040793	0.006520	0.016829	0.066591	0.001581	0.001384	0.005439	0.001112	0.001115

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Ukiah Landfill Closure Construction Emissions

Mendocino-Rural Inland South County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	50.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	86
Climate Zone	1			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Summer

Project Characteristics -

Land Use - Landfill and soil borrow area make up approximately 50 acres

Construction Phase - EBA Engineering, January 2016.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Grading - Lanfill and soil borrow area make up approixmately 50 acres

Trips and VMT - 723 trucks, 1,446 total one ways trips, all assumed to occur before final cover construction phase (over 35 days).

Construction Off-road Equipment Mitigation - Regulation 1, Rule 1-420 required BMPs for construction and grading activities.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	10
tblConstructionPhase	NumDays	740.00	10.00
tblConstructionPhase	NumDays	50.00	5.00
tblConstructionPhase	NumDays	75.00	20.00
tblConstructionPhase	NumDays	740.00	40.00
tblConstructionPhase	NumDays	30.00	10.00
tblConstructionPhase	NumDays	740.00	15.00
tblConstructionPhase	NumDays	55.00	15.00
tblConstructionPhase	PhaseEndDate	6/7/2024	11/27/2020
tblConstructionPhase	PhaseEndDate	1/5/2024	9/18/2020
tblConstructionPhase	PhaseEndDate	10/9/2020	8/7/2020

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Summer

tblConstructionPhase	PhaseEndDate	3/5/2021	9/18/2020
tblConstructionPhase	PhaseEndDate	3/22/2024	11/13/2020
tblConstructionPhase	PhaseEndDate	11/20/2020	8/21/2020
tblConstructionPhase	PhaseStartDate	3/23/2024	11/2/2020
tblConstructionPhase	PhaseStartDate	3/6/2021	9/7/2020
tblConstructionPhase	PhaseStartDate	11/21/2020	8/22/2020
tblConstructionPhase	PhaseStartDate	1/6/2024	9/19/2020
tblConstructionPhase	PhaseStartDate	10/10/2020	8/8/2020
tblLandUse	LotAcreage	0.00	50.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType	Air Compressors	Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType	Concrete/Industrial Saws	Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType	Generator Sets	Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType	Forklifts	Excavators
tblOffRoadEquipment	OffRoadEquipmentType	Pavers	Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	0.00	206.57
tblTripsAndVMT	HaulingTripNumber	0.00	413.14
tblTripsAndVMT	HaulingTripNumber	0.00	826.29
tblTripsAndVMT	WorkerTripNumber	15.00	5.00
tblTripsAndVMT	WorkerTripNumber	18.00	8.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	6.7327	78.6135	56.7318	0.1223	1,005.8187	3.1600	1,008.8716	103.1976	2.9751	106.0310	0.0000	12,059.6918	12,059.6918	2.6079	0.0000	12,124.8881
Maximum	**6.7327**	**78.6135**	**56.7318**	**0.1223**	**1,005.8187**	**3.1600**	**1,008.8716**	**103.1976**	**2.9751**	**106.0310**	**0.0000**	**12,059.6918**	**12,059.6918**	**2.6079**	**0.0000**	**12,124.8881**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	6.7327	78.6135	56.7318	0.1223	502.5686	3.1600	505.6215	51.3715	2.9751	54.2050	0.0000	12,059.6918	12,059.6918	2.6079	0.0000	12,124.8881
Maximum	**6.7327**	**78.6135**	**56.7318**	**0.1223**	**502.5686**	**3.1600**	**505.6215**	**51.3715**	**2.9751**	**54.2050**	**0.0000**	**12,059.6918**	**12,059.6918**	**2.6079**	**0.0000**	**12,124.8881**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**50.03**	**0.00**	**49.88**	**50.22**	**0.00**	**48.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/3/2020	8/7/2020	5	5	
2	Site Preparation	Site Preparation	8/8/2020	8/21/2020	5	10	
3	Grading	Grading	8/22/2020	9/18/2020	5	20	
4	Well Drilling	Building Construction	9/7/2020	9/18/2020	5	10	
5	Final Cover	Building Construction	9/19/2020	11/13/2020	5	40	
6	Utilities	Trenching	11/2/2020	11/27/2020	5	20	
7	LFG Flare Station	Building Construction	11/9/2020	11/27/2020	5	15	
8	Paving	Paving	11/9/2020	11/27/2020	5	15	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 50

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Utilities	Excavators	1	6.00	158	0.38
Utilities	Generator Sets	1	4.00	84	0.74

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Summer

Demolition	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Utilities	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Utilities	Welders	1	4.00	46	0.45
Well Drilling	Bore/Drill Rigs	1	8.00	221	0.50
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Well Drilling	Cranes	1	7.00	231	0.29
Demolition	Rubber Tired Dozers	1	4.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Well Drilling	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Final Cover	Cranes	1	7.00	231	0.29
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Demolition	Excavators	3	8.00	158	0.38
Well Drilling	Forklifts	3	8.00	89	0.20
LFG Flare Station	Cranes	1	4.00	231	0.29
Final Cover	Forklifts	3	8.00	89	0.20
LFG Flare Station	Excavators	1	8.00	158	0.38
Final Cover	Generator Sets	2	6.00	84	0.74
LFG Flare Station	Forklifts	3	8.00	89	0.20
Paving	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Well Drilling	Generator Sets	1	8.00	84	0.74
Paving	Rollers	1	8.00	80	0.38
Final Cover	Tractors/Loaders/Backhoes	2	4.00	97	0.37

LFG Flare Station	Tractors/Loaders/Backhoes	2	4.00	97	0.37
Final Cover	Welders	2	6.00	46	0.45
LFG Flare Station	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Well Drilling	Welders	1	8.00	46	0.45
LFG Flare Station	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	5.00	0.00	206.57	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	413.14	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	7	18.00	0.00	826.29	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	8	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Final Cover	10	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	4	10.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
LFG Flare Station	9	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	8.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7976	17.2552	16.6956	0.0276		0.8928	0.8928		0.8372	0.8372		2,657.0754	2,657.0754	0.7052		2,674.7058
Total	**1.7976**	**17.2552**	**16.6956**	**0.0276**		**0.8928**	**0.8928**		**0.8372**	**0.8372**		**2,657.0754**	**2,657.0754**	**0.7052**		**2,674.7058**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3778	12.4146	2.1359	0.0335	730.0054	0.0577	730.0631	72.9234	0.0552	72.9786		3,509.1653	3,509.1653	0.0999		3,511.6618
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0546	0.0490	0.4421	6.2000e-004	74.2031	6.0000e-004	74.2037	7.4102	5.5000e-004	7.4108		61.3144	61.3144	4.3300e-003		61.4226
Total	**0.4325**	**12.4637**	**2.5780**	**0.0341**	**804.2086**	**0.0583**	**804.2668**	**80.3336**	**0.0557**	**80.3893**		**3,570.4797**	**3,570.4797**	**0.1042**		**3,573.0843**

3.2 Demolition - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7976	17.2552	16.6956	0.0276		0.8928	0.8928		0.8372	0.8372	0.0000	2,657.0754	2,657.0754	0.7052		2,674.7058
Total	**1.7976**	**17.2552**	**16.6956**	**0.0276**		**0.8928**	**0.8928**		**0.8372**	**0.8372**	**0.0000**	**2,657.0754**	**2,657.0754**	**0.7052**		**2,674.7058**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3778	12.4146	2.1359	0.0335	365.0834	0.0577	365.1410	36.4312	0.0552	36.4864		3,509.1653	3,509.1653	0.0999		3,511.6618
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0546	0.0490	0.4421	6.2000e-004	37.1050	6.0000e-004	37.1056	3.7004	5.5000e-004	3.7010		61.3144	61.3144	4.3300e-003		61.4226
Total	**0.4325**	**12.4637**	**2.5780**	**0.0341**	**402.1884**	**0.0583**	**402.2466**	**40.1316**	**0.0557**	**40.1873**		**3,570.4797**	**3,570.4797**	**0.1042**		**3,573.0843**

3.3 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.0221	0.0000	6.0221	3.3102	0.0000	3.3102			0.0000			0.0000
Off-Road	1.2890	13.4374	6.4113	0.0116		0.6881	0.6881		0.6331	0.6331		1,128.1110	1,128.1110	0.3649		1,137.2324
Total	**1.2890**	**13.4374**	**6.4113**	**0.0116**	**6.0221**	**0.6881**	**6.7102**	**3.3102**	**0.6331**	**3.9433**		**1,128.1110**	**1,128.1110**	**0.3649**		**1,137.2324**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3778	12.4146	2.1359	0.0335	730.0054	0.0577	730.0631	72.9234	0.0552	72.9786		3,509.1653	3,509.1653	0.0999		3,511.6618
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0546	0.0490	0.4421	6.2000e-004	74.2031	6.0000e-004	74.2037	7.4102	5.5000e-004	7.4108		61.3144	61.3144	4.3300e-003		61.4226
Total	**0.4325**	**12.4637**	**2.5780**	**0.0341**	**804.2086**	**0.0583**	**804.2668**	**80.3336**	**0.0557**	**80.3893**		**3,570.4797**	**3,570.4797**	**0.1042**		**3,573.0843**

3.3 Site Preparation - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.7099	0.0000	2.7099	1.4896	0.0000	1.4896			0.0000			0.0000
Off-Road	1.2890	13.4374	6.4113	0.0116		0.6881	0.6881		0.6331	0.6331	0.0000	1,128.1110	1,128.1110	0.3649		1,137.2324
Total	**1.2890**	**13.4374**	**6.4113**	**0.0116**	**2.7099**	**0.6881**	**3.3980**	**1.4896**	**0.6331**	**2.1227**	**0.0000**	**1,128.1110**	**1,128.1110**	**0.3649**		**1,137.2324**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3778	12.4146	2.1359	0.0335	365.0834	0.0577	365.1410	36.4312	0.0552	36.4864		3,509.1653	3,509.1653	0.0999		3,511.6618
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0546	0.0490	0.4421	6.2000e-004	37.1050	6.0000e-004	37.1056	3.7004	5.5000e-004	3.7010		61.3144	61.3144	4.3300e-003		61.4226
Total	**0.4325**	**12.4637**	**2.5780**	**0.0341**	**402.1884**	**0.0583**	**402.2466**	**40.1316**	**0.0557**	**40.1873**		**3,570.4797**	**3,570.4797**	**0.1042**		**3,573.0843**

3.4 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	4.2051	47.7849	28.6905	0.0568		2.0570	2.0570		1.8925	1.8925		5,505.7469	5,505.7469	1.7807		5,550.2636
Total	**4.2051**	**47.7849**	**28.6905**	**0.0568**	**8.6733**	**2.0570**	**10.7304**	**3.5965**	**1.8925**	**5.4890**		**5,505.7469**	**5,505.7469**	**1.7807**		**5,550.2636**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3774	12.3997	2.1333	0.0335	730.0140	0.0576	730.0716	72.9242	0.0551	72.9793		3,504.9272	3,504.9272	0.0997		3,507.4206
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1966	0.1765	1.5917	2.2300e-003	267.1313	2.1500e-003	267.1335	26.6769	1.9800e-003	26.6789		220.7319	220.7319	0.0156		221.1213
Total	**0.5740**	**12.5761**	**3.7250**	**0.0357**	**997.1453**	**0.0598**	**997.2051**	**99.6011**	**0.0571**	**99.6582**		**3,725.6591**	**3,725.6591**	**0.1153**		**3,728.5419**

3.4 Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.9030	0.0000	3.9030	1.6184	0.0000	1.6184			0.0000			0.0000
Off-Road	4.2051	47.7849	28.6905	0.0568		2.0570	2.0570		1.8925	1.8925	0.0000	5,505.7468	5,505.7468	1.7807		5,550.2636
Total	**4.2051**	**47.7849**	**28.6905**	**0.0568**	**3.9030**	**2.0570**	**5.9600**	**1.6184**	**1.8925**	**3.5109**	**0.0000**	**5,505.7468**	**5,505.7468**	**1.7807**		**5,550.2636**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3774	12.3997	2.1333	0.0335	365.0876	0.0576	365.1452	36.4315	0.0551	36.4867		3,504.9272	3,504.9272	0.0997		3,507.4206
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1966	0.1765	1.5917	2.2300e-003	133.5780	2.1500e-003	133.5802	13.3215	1.9800e-003	13.3235		220.7319	220.7319	0.0156		221.1213
Total	**0.5740**	**12.5761**	**3.7250**	**0.0357**	**498.6656**	**0.0598**	**498.7253**	**49.7531**	**0.0571**	**49.8102**		**3,725.6591**	**3,725.6591**	**0.1153**		**3,728.5419**

3.5 Well Drilling - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9536	18.2525	14.0953	0.0298		0.9362	0.9362		0.8839	0.8839		2,828.2859	2,828.2859	0.7119		2,846.0826
Total	**1.9536**	**18.2525**	**14.0953**	**0.0298**		**0.9362**	**0.9362**		**0.8839**	**0.8839**		**2,828.2859**	**2,828.2859**	**0.7119**		**2,846.0826**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.5 Well Drilling - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9536	18.2525	14.0953	0.0298		0.9362	0.9362		0.8839	0.8839	0.0000	2,828.2859	2,828.2859	0.7119		2,846.0826
Total	**1.9536**	**18.2525**	**14.0953**	**0.0298**		**0.9362**	**0.9362**		**0.8839**	**0.8839**	**0.0000**	**2,828.2859**	**2,828.2859**	**0.7119**		**2,846.0826**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.6 Final Cover - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.1500	18.2901	15.8803	0.0264		1.0423	1.0423		0.9929	0.9929		2,479.5704	2,479.5704	0.4977		2,492.0119
Total	**2.1500**	**18.2901**	**15.8803**	**0.0264**		**1.0423**	**1.0423**		**0.9929**	**0.9929**		**2,479.5704**	**2,479.5704**	**0.4977**		**2,492.0119**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.6 Final Cover - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.1500	18.2901	15.8803	0.0264		1.0423	1.0423		0.9929	0.9929	0.0000	2,479.5704	2,479.5704	0.4977		2,492.0119
Total	**2.1500**	**18.2901**	**15.8803**	**0.0264**		**1.0423**	**1.0423**		**0.9929**	**0.9929**	**0.0000**	**2,479.5704**	**2,479.5704**	**0.4977**		**2,492.0119**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.7 Utilities - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6596	5.3918	6.3346	0.0100		0.2959	0.2959		0.2836	0.2836		941.9950	941.9950	0.2032		947.0758
Total	**0.6596**	**5.3918**	**6.3346**	**0.0100**		**0.2959**	**0.2959**		**0.2836**	**0.2836**		**941.9950**	**941.9950**	**0.2032**		**947.0758**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1092	0.0980	0.8843	1.2400e-003	148.4063	1.1900e-003	148.4075	14.8205	1.1000e-003	14.8216		122.6288	122.6288	8.6500e-003		122.8452
Total	**0.1092**	**0.0980**	**0.8843**	**1.2400e-003**	**148.4063**	**1.1900e-003**	**148.4075**	**14.8205**	**1.1000e-003**	**14.8216**		**122.6288**	**122.6288**	**8.6500e-003**		**122.8452**

3.7 Utilities - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6596	5.3918	6.3346	0.0100		0.2959	0.2959		0.2836	0.2836	0.0000	941.9950	941.9950	0.2032		947.0758
Total	**0.6596**	**5.3918**	**6.3346**	**0.0100**		**0.2959**	**0.2959**		**0.2836**	**0.2836**	**0.0000**	**941.9950**	**941.9950**	**0.2032**		**947.0758**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1092	0.0980	0.8843	1.2400e-003	74.2100	1.1900e-003	74.2112	7.4009	1.1000e-003	7.4020		122.6288	122.6288	8.6500e-003		122.8452
Total	**0.1092**	**0.0980**	**0.8843**	**1.2400e-003**	**74.2100**	**1.1900e-003**	**74.2112**	**7.4009**	**1.1000e-003**	**7.4020**		**122.6288**	**122.6288**	**8.6500e-003**		**122.8452**

3.8 LFG Flare Station - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8547	16.1595	15.6256	0.0249		0.9343	0.9343		0.8822	0.8822		2,356.1678	2,356.1678	0.5592		2,370.1472
Total	**1.8547**	**16.1595**	**15.6256**	**0.0249**		**0.9343**	**0.9343**		**0.8822**	**0.8822**		**2,356.1678**	**2,356.1678**	**0.5592**		**2,370.1472**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.8 LFG Flare Station - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8547	16.1595	15.6256	0.0249		0.9343	0.9343		0.8822	0.8822	0.0000	2,356.1678	2,356.1678	0.5592		2,370.1472
Total	**1.8547**	**16.1595**	**15.6256**	**0.0249**		**0.9343**	**0.9343**		**0.8822**	**0.8822**	**0.0000**	**2,356.1678**	**2,356.1678**	**0.5592**		**2,370.1472**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.9 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5657	16.1777	17.2996	0.0264		0.8853	0.8853		0.8145	0.8145		2,552.7654	2,552.7654	0.8256		2,573.4058
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5657**	**16.1777**	**17.2996**	**0.0264**		**0.8853**	**0.8853**		**0.8145**	**0.8145**		**2,552.7654**	**2,552.7654**	**0.8256**		**2,573.4058**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0874	0.0784	0.7074	9.9000e-004	118.7250	9.5000e-004	118.7260	11.8564	8.8000e-004	11.8573		98.1031	98.1031	6.9200e-003		98.2761
Total	**0.0874**	**0.0784**	**0.7074**	**9.9000e-004**	**118.7250**	**9.5000e-004**	**118.7260**	**11.8564**	**8.8000e-004**	**11.8573**		**98.1031**	**98.1031**	**6.9200e-003**		**98.2761**

3.9 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5657	16.1777	17.2996	0.0264		0.8853	0.8853		0.8145	0.8145	0.0000	2,552.7654	2,552.7654	0.8256		2,573.4058
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5657**	**16.1777**	**17.2996**	**0.0264**		**0.8853**	**0.8853**		**0.8145**	**0.8145**	**0.0000**	**2,552.7654**	**2,552.7654**	**0.8256**		**2,573.4058**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0874	0.0784	0.7074	9.9000e-004	59.3680	9.5000e-004	59.3690	5.9207	8.8000e-004	5.9216		98.1031	98.1031	6.9200e-003		98.2761
Total	**0.0874**	**0.0784**	**0.7074**	**9.9000e-004**	**59.3680**	**9.5000e-004**	**59.3690**	**5.9207**	**8.8000e-004**	**5.9216**		**98.1031**	**98.1031**	**6.9200e-003**		**98.2761**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.482880	0.047259	0.194207	0.134290	0.040793	0.006520	0.016829	0.066591	0.001581	0.001384	0.005439	0.001112	0.001115

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Ukiah Landfill Closure Construction Emissions

Mendocino-Rural Inland South County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	50.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	86
Climate Zone	1			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Winter

Project Characteristics -

Land Use - Landfill and soil borrow area make up approximately 50 acres

Construction Phase - EBA Engineering, January 2016.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Off-road Equipment - EBA Engineering, 2019.

Grading - Lanfill and soil borrow area make up approixmately 50 acres

Trips and VMT - 723 trucks, 1,446 total one ways trips, all assumed to occur before final cover construction phase (over 35 days).

Construction Off-road Equipment Mitigation - Regulation 1, Rule 1-420 required BMPs for construction and grading activities.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	10
tblConstructionPhase	NumDays	740.00	10.00
tblConstructionPhase	NumDays	50.00	5.00
tblConstructionPhase	NumDays	75.00	20.00
tblConstructionPhase	NumDays	740.00	40.00
tblConstructionPhase	NumDays	30.00	10.00
tblConstructionPhase	NumDays	740.00	15.00
tblConstructionPhase	NumDays	55.00	15.00
tblConstructionPhase	PhaseEndDate	6/7/2024	11/27/2020
tblConstructionPhase	PhaseEndDate	1/5/2024	9/18/2020
tblConstructionPhase	PhaseEndDate	10/9/2020	8/7/2020

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Winter

tblConstructionPhase	PhaseEndDate	3/5/2021	9/18/2020
tblConstructionPhase	PhaseEndDate	3/22/2024	11/13/2020
tblConstructionPhase	PhaseEndDate	11/20/2020	8/21/2020
tblConstructionPhase	PhaseStartDate	3/23/2024	11/2/2020
tblConstructionPhase	PhaseStartDate	3/6/2021	9/7/2020
tblConstructionPhase	PhaseStartDate	11/21/2020	8/22/2020
tblConstructionPhase	PhaseStartDate	1/6/2024	9/19/2020
tblConstructionPhase	PhaseStartDate	10/10/2020	8/8/2020
tblLandUse	LotAcreage	0.00	50.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType	Air Compressors	Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType	Concrete/Industrial Saws	Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType	Generator Sets	Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType	Forklifts	Excavators
tblOffRoadEquipment	OffRoadEquipmentType	Pavers	Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	0.00	206.57
tblTripsAndVMT	HaulingTripNumber	0.00	413.14
tblTripsAndVMT	HaulingTripNumber	0.00	826.29
tblTripsAndVMT	WorkerTripNumber	15.00	5.00
tblTripsAndVMT	WorkerTripNumber	18.00	8.00

2.0 Emissions Summary

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Winter

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	6.7895	78.8583	56.7910	0.1215	1,005.8187	3.1600	1,008.8733	103.1976	2.9751	106.0326	0.0000	11,980.3296	11,980.3296	2.6192	0.0000	12,045.8100
Maximum	**6.7895**	**78.8583**	**56.7910**	**0.1215**	**1,005.8187**	**3.1600**	**1,008.8733**	**103.1976**	**2.9751**	**106.0326**	**0.0000**	**11,980.3296**	**11,980.3296**	**2.6192**	**0.0000**	**12,045.8100**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	6.7895	78.8583	56.7910	0.1215	502.5686	3.1600	505.6232	51.3715	2.9751	54.2066	0.0000	11,980.3296	11,980.3296	2.6192	0.0000	12,045.8100
Maximum	**6.7895**	**78.8583**	**56.7910**	**0.1215**	**502.5686**	**3.1600**	**505.6232**	**51.3715**	**2.9751**	**54.2066**	**0.0000**	**11,980.3296**	**11,980.3296**	**2.6192**	**0.0000**	**12,045.8100**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**50.03**	**0.00**	**49.88**	**50.22**	**0.00**	**48.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/3/2020	8/7/2020	5	5	
2	Site Preparation	Site Preparation	8/8/2020	8/21/2020	5	10	
3	Grading	Grading	8/22/2020	9/18/2020	5	20	
4	Well Drilling	Building Construction	9/7/2020	9/18/2020	5	10	
5	Final Cover	Building Construction	9/19/2020	11/13/2020	5	40	
6	Utilities	Trenching	11/2/2020	11/27/2020	5	20	
7	LFG Flare Station	Building Construction	11/9/2020	11/27/2020	5	15	
8	Paving	Paving	11/9/2020	11/27/2020	5	15	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 50

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Utilities	Excavators	1	6.00	158	0.38
Utilities	Generator Sets	1	4.00	84	0.74

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Winter

Demolition	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Utilities	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Utilities	Welders	1	4.00	46	0.45
Well Drilling	Bore/Drill Rigs	1	8.00	221	0.50
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Well Drilling	Cranes	1	7.00	231	0.29
Demolition	Rubber Tired Dozers	1	4.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Well Drilling	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Final Cover	Cranes	1	7.00	231	0.29
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Demolition	Excavators	3	8.00	158	0.38
Well Drilling	Forklifts	3	8.00	89	0.20
LFG Flare Station	Cranes	1	4.00	231	0.29
Final Cover	Forklifts	3	8.00	89	0.20
LFG Flare Station	Excavators	1	8.00	158	0.38
Final Cover	Generator Sets	2	6.00	84	0.74
LFG Flare Station	Forklifts	3	8.00	89	0.20
Paving	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Well Drilling	Generator Sets	1	8.00	84	0.74
Paving	Rollers	1	8.00	80	0.38
Final Cover	Tractors/Loaders/Backhoes	2	4.00	97	0.37

LFG Flare Station	Tractors/Loaders/Backhoes	2	4.00	97	0.37
Final Cover	Welders	2	6.00	46	0.45
LFG Flare Station	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Well Drilling	Welders	1	8.00	46	0.45
LFG Flare Station	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	5.00	0.00	206.57	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	413.14	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	7	18.00	0.00	826.29	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	8	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Final Cover	10	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	4	10.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
LFG Flare Station	9	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	8.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Ukiah Landfill Closure Construction Emissions - Mendocino-Rural Inland South County, Winter

3.2 Demolition - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7976	17.2552	16.6956	0.0276		0.8928	0.8928		0.8372	0.8372		2,657.0754	2,657.0754	0.7052		2,674.7058
Total	**1.7976**	**17.2552**	**16.6956**	**0.0276**		**0.8928**	**0.8928**		**0.8372**	**0.8372**		**2,657.0754**	**2,657.0754**	**0.7052**		**2,674.7058**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3919	12.6176	2.3839	0.0328	730.0054	0.0593	730.0647	72.9234	0.0568	72.9801		3,436.2056	3,436.2056	0.1112		3,438.9845
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0665	0.0607	0.4586	6.0000e-004	74.2031	6.0000e-004	74.2037	7.4102	5.5000e-004	7.4108		59.5115	59.5115	4.3500e-003		59.6202
Total	**0.4584**	**12.6783**	**2.8424**	**0.0334**	**804.2086**	**0.0599**	**804.2685**	**80.3336**	**0.0573**	**80.3909**		**3,495.7171**	**3,495.7171**	**0.1155**		**3,498.6047**

3.2 Demolition - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7976	17.2552	16.6956	0.0276		0.8928	0.8928		0.8372	0.8372	0.0000	2,657.0754	2,657.0754	0.7052		2,674.7058
Total	**1.7976**	**17.2552**	**16.6956**	**0.0276**		**0.8928**	**0.8928**		**0.8372**	**0.8372**	**0.0000**	**2,657.0754**	**2,657.0754**	**0.7052**		**2,674.7058**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3919	12.6176	2.3839	0.0328	365.0834	0.0593	365.1427	36.4312	0.0568	36.4879		3,436.2056	3,436.2056	0.1112		3,438.9845
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0665	0.0607	0.4586	6.0000e-004	37.1050	6.0000e-004	37.1056	3.7004	5.5000e-004	3.7010		59.5115	59.5115	4.3500e-003		59.6202
Total	**0.4584**	**12.6783**	**2.8424**	**0.0334**	**402.1884**	**0.0599**	**402.2483**	**40.1316**	**0.0573**	**40.1889**		**3,495.7171**	**3,495.7171**	**0.1155**		**3,498.6047**

3.3 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.0221	0.0000	6.0221	3.3102	0.0000	3.3102			0.0000			0.0000
Off-Road	1.2890	13.4374	6.4113	0.0116		0.6881	0.6881		0.6331	0.6331		1,128.1110	1,128.1110	0.3649		1,137.2324
Total	**1.2890**	**13.4374**	**6.4113**	**0.0116**	**6.0221**	**0.6881**	**6.7102**	**3.3102**	**0.6331**	**3.9433**		**1,128.1110**	**1,128.1110**	**0.3649**		**1,137.2324**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3919	12.6176	2.3839	0.0328	730.0054	0.0593	730.0647	72.9234	0.0568	72.9801		3,436.2056	3,436.2056	0.1112		3,438.9845
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0665	0.0607	0.4586	6.0000e-004	74.2031	6.0000e-004	74.2037	7.4102	5.5000e-004	7.4108		59.5115	59.5115	4.3500e-003		59.6202
Total	**0.4584**	**12.6783**	**2.8424**	**0.0334**	**804.2086**	**0.0599**	**804.2685**	**80.3336**	**0.0573**	**80.3909**		**3,495.7171**	**3,495.7171**	**0.1155**		**3,498.6047**

3.3 Site Preparation - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.7099	0.0000	2.7099	1.4896	0.0000	1.4896			0.0000			0.0000
Off-Road	1.2890	13.4374	6.4113	0.0116		0.6881	0.6881		0.6331	0.6331	0.0000	1,128.1110	1,128.1110	0.3649		1,137.2324
Total	**1.2890**	**13.4374**	**6.4113**	**0.0116**	**2.7099**	**0.6881**	**3.3980**	**1.4896**	**0.6331**	**2.1227**	**0.0000**	**1,128.1110**	**1,128.1110**	**0.3649**		**1,137.2324**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3919	12.6176	2.3839	0.0328	365.0834	0.0593	365.1427	36.4312	0.0568	36.4879		3,436.2056	3,436.2056	0.1112		3,438.9845
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0665	0.0607	0.4586	6.0000e-004	37.1050	6.0000e-004	37.1056	3.7004	5.5000e-004	3.7010		59.5115	59.5115	4.3500e-003		59.6202
Total	**0.4584**	**12.6783**	**2.8424**	**0.0334**	**402.1884**	**0.0599**	**402.2483**	**40.1316**	**0.0573**	**40.1889**		**3,495.7171**	**3,495.7171**	**0.1155**		**3,498.6047**

3.4 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	4.2051	47.7849	28.6905	0.0568		2.0570	2.0570		1.8925	1.8925		5,505.7469	5,505.7469	1.7807		5,550.2636
Total	**4.2051**	**47.7849**	**28.6905**	**0.0568**	**8.6733**	**2.0570**	**10.7304**	**3.5965**	**1.8925**	**5.4890**		**5,505.7469**	**5,505.7469**	**1.7807**		**5,550.2636**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3914	12.6024	2.3810	0.0328	730.0140	0.0593	730.0733	72.9242	0.0567	72.9809		3,432.0556	3,432.0556	0.1110		3,434.8311
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2394	0.2185	1.6509	2.1700e-003	267.1313	2.1500e-003	267.1335	26.6769	1.9800e-003	26.6789		214.2413	214.2413	0.0157		214.6327
Total	**0.6309**	**12.8209**	**4.0319**	**0.0349**	**997.1453**	**0.0614**	**997.2067**	**99.6011**	**0.0587**	**99.6597**		**3,646.2969**	**3,646.2969**	**0.1267**		**3,649.4638**

3.4 Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.9030	0.0000	3.9030	1.6184	0.0000	1.6184			0.0000			0.0000
Off-Road	4.2051	47.7849	28.6905	0.0568		2.0570	2.0570		1.8925	1.8925	0.0000	5,505.7468	5,505.7468	1.7807		5,550.2636
Total	**4.2051**	**47.7849**	**28.6905**	**0.0568**	**3.9030**	**2.0570**	**5.9600**	**1.6184**	**1.8925**	**3.5109**	**0.0000**	**5,505.7468**	**5,505.7468**	**1.7807**		**5,550.2636**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.3914	12.6024	2.3810	0.0328	365.0876	0.0593	365.1468	36.4315	0.0567	36.4882		3,432.0556	3,432.0556	0.1110		3,434.8311
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2394	0.2185	1.6509	2.1700e-003	133.5780	2.1500e-003	133.5802	13.3215	1.9800e-003	13.3235		214.2413	214.2413	0.0157		214.6327
Total	**0.6309**	**12.8209**	**4.0319**	**0.0349**	**498.6656**	**0.0614**	**498.7270**	**49.7531**	**0.0587**	**49.8118**		**3,646.2969**	**3,646.2969**	**0.1267**		**3,649.4638**

3.5 Well Drilling - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9536	18.2525	14.0953	0.0298		0.9362	0.9362		0.8839	0.8839		2,828.2859	2,828.2859	0.7119		2,846.0826
Total	**1.9536**	**18.2525**	**14.0953**	**0.0298**		**0.9362**	**0.9362**		**0.8839**	**0.8839**		**2,828.2859**	**2,828.2859**	**0.7119**		**2,846.0826**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.5 Well Drilling - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9536	18.2525	14.0953	0.0298		0.9362	0.9362		0.8839	0.8839	0.0000	2,828.2859	2,828.2859	0.7119		2,846.0826
Total	**1.9536**	**18.2525**	**14.0953**	**0.0298**		**0.9362**	**0.9362**		**0.8839**	**0.8839**	**0.0000**	**2,828.2859**	**2,828.2859**	**0.7119**		**2,846.0826**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.6 Final Cover - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.1500	18.2901	15.8803	0.0264		1.0423	1.0423		0.9929	0.9929		2,479.5704	2,479.5704	0.4977		2,492.0119
Total	**2.1500**	**18.2901**	**15.8803**	**0.0264**		**1.0423**	**1.0423**		**0.9929**	**0.9929**		**2,479.5704**	**2,479.5704**	**0.4977**		**2,492.0119**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.6 Final Cover - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.1500	18.2901	15.8803	0.0264		1.0423	1.0423		0.9929	0.9929	0.0000	2,479.5704	2,479.5704	0.4977		2,492.0119
Total	**2.1500**	**18.2901**	**15.8803**	**0.0264**		**1.0423**	**1.0423**		**0.9929**	**0.9929**	**0.0000**	**2,479.5704**	**2,479.5704**	**0.4977**		**2,492.0119**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.7 Utilities - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6596	5.3918	6.3346	0.0100		0.2959	0.2959		0.2836	0.2836		941.9950	941.9950	0.2032		947.0758
Total	**0.6596**	**5.3918**	**6.3346**	**0.0100**		**0.2959**	**0.2959**		**0.2836**	**0.2836**		**941.9950**	**941.9950**	**0.2032**		**947.0758**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1330	0.1214	0.9172	1.2000e-003	148.4063	1.1900e-003	148.4075	14.8205	1.1000e-003	14.8216		119.0230	119.0230	8.7000e-003		119.2404
Total	**0.1330**	**0.1214**	**0.9172**	**1.2000e-003**	**148.4063**	**1.1900e-003**	**148.4075**	**14.8205**	**1.1000e-003**	**14.8216**		**119.0230**	**119.0230**	**8.7000e-003**		**119.2404**

3.7 Utilities - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6596	5.3918	6.3346	0.0100		0.2959	0.2959		0.2836	0.2836	0.0000	941.9950	941.9950	0.2032		947.0758
Total	**0.6596**	**5.3918**	**6.3346**	**0.0100**		**0.2959**	**0.2959**		**0.2836**	**0.2836**	**0.0000**	**941.9950**	**941.9950**	**0.2032**		**947.0758**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1330	0.1214	0.9172	1.2000e-003	74.2100	1.1900e-003	74.2112	7.4009	1.1000e-003	7.4020		119.0230	119.0230	8.7000e-003		119.2404
Total	**0.1330**	**0.1214**	**0.9172**	**1.2000e-003**	**74.2100**	**1.1900e-003**	**74.2112**	**7.4009**	**1.1000e-003**	**7.4020**		**119.0230**	**119.0230**	**8.7000e-003**		**119.2404**

3.8 LFG Flare Station - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8547	16.1595	15.6256	0.0249		0.9343	0.9343		0.8822	0.8822		2,356.1678	2,356.1678	0.5592		2,370.1472
Total	**1.8547**	**16.1595**	**15.6256**	**0.0249**		**0.9343**	**0.9343**		**0.8822**	**0.8822**		**2,356.1678**	**2,356.1678**	**0.5592**		**2,370.1472**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.8 LFG Flare Station - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8547	16.1595	15.6256	0.0249		0.9343	0.9343		0.8822	0.8822	0.0000	2,356.1678	2,356.1678	0.5592		2,370.1472
Total	**1.8547**	**16.1595**	**15.6256**	**0.0249**		**0.9343**	**0.9343**		**0.8822**	**0.8822**	**0.0000**	**2,356.1678**	**2,356.1678**	**0.5592**		**2,370.1472**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.9 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5657	16.1777	17.2996	0.0264		0.8853	0.8853		0.8145	0.8145		2,552.7654	2,552.7654	0.8256		2,573.4058
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5657**	**16.1777**	**17.2996**	**0.0264**		**0.8853**	**0.8853**		**0.8145**	**0.8145**		**2,552.7654**	**2,552.7654**	**0.8256**		**2,573.4058**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1064	0.0971	0.7337	9.6000e-004	118.7250	9.5000e-004	118.7260	11.8564	8.8000e-004	11.8573		95.2184	95.2184	6.9600e-003		95.3923
Total	**0.1064**	**0.0971**	**0.7337**	**9.6000e-004**	**118.7250**	**9.5000e-004**	**118.7260**	**11.8564**	**8.8000e-004**	**11.8573**		**95.2184**	**95.2184**	**6.9600e-003**		**95.3923**

3.9 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5657	16.1777	17.2996	0.0264		0.8853	0.8853		0.8145	0.8145	0.0000	2,552.7654	2,552.7654	0.8256		2,573.4058
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5657**	**16.1777**	**17.2996**	**0.0264**		**0.8853**	**0.8853**		**0.8145**	**0.8145**	**0.0000**	**2,552.7654**	**2,552.7654**	**0.8256**		**2,573.4058**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1064	0.0971	0.7337	9.6000e-004	59.3680	9.5000e-004	59.3690	5.9207	8.8000e-004	5.9216		95.2184	95.2184	6.9600e-003		95.3923
Total	**0.1064**	**0.0971**	**0.7337**	**9.6000e-004**	**59.3680**	**9.5000e-004**	**59.3690**	**5.9207**	**8.8000e-004**	**5.9216**		**95.2184**	**95.2184**	**6.9600e-003**		**95.3923**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.482880	0.047259	0.194207	0.134290	0.040793	0.006520	0.016829	0.066591	0.001581	0.001384	0.005439	0.001112	0.001115

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

EMISSION CALCULATIONS (UPDATED MAY 19, 2016)
CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

LANDFILL GAS (LFG) PARAMETERS

Temperature:	153	F
Methane Concentration (Max):	55	percent
Methane Concentration (Min):	30	percent
Carbon Dioxide Concentration (Max):	40	percent
Carbon Dioxide Concentration (Min):	30	percent
NMOC Concentration (Max):	1200	ppmv
NMOC Molecular Weight (Assumed):	50	lbs/lb-mole
Methane Heating Value:	895	BTU/scf
LFG Molar Equivalent Volume:	379	scf/lb-mole
Methane Molecular Weight:	16	lbs/lb-mole
Total Sulfur Concentration (Assumed):	30	ppmv
SO2 Molecular Weight:	64	lbs/lb-mole

DESIGN PARAMETERS

LFG Flow Rate (at maximum conc.):	210	scfm
LFG Flow Rate (at minimum conc.):	53	scfm
NMOC/SO2 Flare Efficiency:	98	percent
Residual NMOC/SO2 Flare Efficiency:	2	percent
NOX Generation:	0.06	lbs/MMBTU
CO Generation:	0.2	lbs/MMBTU
Op. Temperature (Minimum):	1400	F
Op. Temperature (Expected):	1600	F
Methane Flare Efficiency:	99	percent
Residual Methane Flare Efficiency:	1	percent

HEATING VALUE CHARACTERISTICS

Max LFG Heating Value = Methane Heating Value x Max Methane Concentration:	492.3	BTU/scf (Higher Heat Value)
Min LFG Heating Value = Methane Heating Value x Min Methane Concentration:	268.5	BTU/scf (Higher Heat Value)
Max LFG Heat Release = Max LFG Flow Rate x Max LFG Heating Value:	6.2	MMBTU/hr
Min LFG Heat Release = Min LFG Flow Rate x Min LFG Heating Value:	0.9	MMBTU/hr

	@ Maximum Influent Methane Concentration		@ Minimum Influent Methane Concentration	
METHANE EMISSION CALCULATIONS				
Hourly Methane Generation Rate (scf/hr) = LFG Flow Rate x Methane Concentration:	6930	scf/hr	954	scf/hr
Hourly Methane Emission Rate (scf/hr) = Hourly Methane Generation Rate x Residual Flare Efficiency:	69.3	scf/hr	9.54	scf/hr
Hourly Methane Emission Rate (lb-mole/hr) = Hourly Methane Emission Rate (scf/hr) / LFG Molar Equivalent Volume:	0.183	lb-mole/hr	0.025	lb-mole/hr
Hourly Methane Emission Rate (lbs/hr) = Hourly Methane Emission Rate (lb-mole/hr) x Methane Molecular Weight:	2.9	lbs/hr	0.40	lbs/hr
NMOC EMISSION CALCULATIONS				
Hourly NMOC Generation Rate (scf/hr) = LFG Flow Rate x NMOC Concentration:	15	scf/hr	4	scf/hr
Hourly NMOC Emission Rate (scf/hr) = Hourly NMOC Generation Rate x Residual Flare Efficiency:	0.3024	scf/hr	0.07632	scf/hr
Hourly NMOC Emission Rate (lb-mole/hr) = Hourly NMOC Emission Rate (scf/hr) / LFG Molar Equivalent Volume:	0.00080	lb-mole/hr	0.00020	lb-mole/hr
Hourly NMOC Emission Rate (lbs/hr) = Hourly NMOC Emission Rate (lb-mole/hr) x NMOC Molecular Weight:	0.04	lbs/hr	0.01	lbs/hr
SO2 EMISSION CALCULATIONS				
Hourly Sulfur Generation Rate (scf/hr) = LFG Flow Rate x Total Sulfur Concentration:	0.378	scf/hr	0.095	scf/hr
Total Sulfur to SO2 Conversion = Hourly Total Sulfur Generation Rate (scf/hr) x Flare Efficiency:	0.370	scf/hr	0.093	scf/hr
Hourly SO2 Emission Rate (lb-mole/hr) = Hourly SO2 Emission Rate (scf/hr) / LFG Molar Equivalent Volume:	0.0010	lb-mole/hr	0.0002	lb-mole/hr
Hourly SO2 Emission Rate (lbs/hr) = Hourly SO2 Emission Rate (lb-mole/hr) x SO2 Molecular Weight:	0.06	lbs/hr	0.02	lbs/hr
NOX EMISSION CALCULATIONS				
Hourly NOX Emission Rate (lbs/hr) = NOX Generation x LFG Heat Release:	0.37	lbs/hr	0.05	lbs/hr
CO EMISSION CALCULATIONS				
Hourly CO Emission Rate (lbs/hr) = CO Generation x LFG Heat Release:	1.2	lbs/hr	0.17	lbs/hr

Supplemental Flare Emissions Calculations **July, 2019**

	NMOC	NOX	CO	PM	SO2	CO2	CH4		
lbs/hr	0.04	0.37	1.20	0.01	0.06	711.85	2.90		
lbs/day	0.96	8.88	28.80	0.17	1.44	17084.38	69.60		
tons/year	0.18	1.62	5.26	0.03	0.26	3117.90	12.70	317.55 CO2e	GWP 25

Total CO2e 3435.45 per year

Notes:

1 PM: flared particulate emissions were based on the emission factor guidance provided in AP-42 Section 2.4 (11/98) (17 lb PM/ 10^6 dscf methane).
6930 scf methane/hr 0.00693 lbs/hr of PM

2 CO2: emission factor based on EPA, 2016.
https://www.epa.gov/sites/production/files/2016-03/documents/stationaryemissions_3_2016.pdf
52.07 kg CO2/ mmBtu 6.2 mmBtu per hour (maximum)

3 Emission calculations based on assumptions in Emission Calculations (Updated May 19, 2016).

Appendix E

Special Status Species Lists

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Ukiah (3912322) OR Cow Mountain (3912321) OR Purdys Gardens (3912311) OR Elledge Peak (3912312))
 AND Taxonomic Group IS (Fish OR Amphibians OR Reptiles OR Birds OR Mammals OR Mollusks OR Arachnids OR Crustaceans OR Insects)

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
fisher - West Coast DPS *Pekania pennanti*	AMAJF01021	None	Threatened	G5T2T3Q	S2S3	SSC
foothill yellow-legged frog *Rana boylii*	AAABH01050	None	Candidate Threatened	G3	S3	SSC
grasshopper sparrow *Ammodramus savannarum*	ABPBXA0020	None	None	G5	S3	SSC
North American porcupine *Erethizon dorsatum*	AMAFJ01010	None	None	G5	S3	
obscure bumble bee *Bombus caliginosus*	IIHYM24380	None	None	G4?	S1S2	
osprey *Pandion haliaetus*	ABNKC01010	None	None	G5	S4	WL
pallid bat *Antrozous pallidus*	AMACC10010	None	None	G5	S3	SSC
red-bellied newt *Taricha rivularis*	AAAAF02020	None	None	G4	S2	SSC
Townsend's big-eared bat *Corynorhinus townsendii*	AMACC08010	None	None	G3G4	S2	SSC
western bumble bee *Bombus occidentalis*	IIHYM24250	None	None	G2G3	S1	
western pond turtle *Emys marmorata*	ARAAD02030	None	None	G3G4	S3	SSC

Record Count: 11

IPaC Information for Planning and Consultation **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

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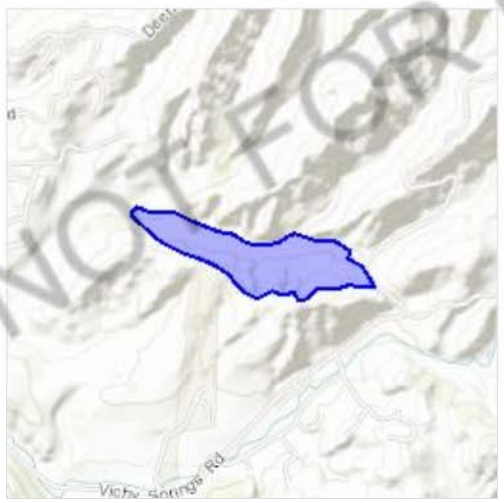
Location

Mendocino County, California



Local office

Arcata Fish And Wildlife Office

(707) 822-7201
(707) 822-8411

1655 Heindon Road

Arcata, CA 95521-4573

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Fisher Pekania pennanti No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3651	Proposed Threatened

Birds

NAME	STATUS
Northern Spotted Owl Strix occidentalis caurina There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1123	Threatened
Western Snowy Plover Charadrius nivosus nivosus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8035	Threatened
Yellow-billed Cuckoo Coccyzus americanus There is **proposed** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened

Flowering Plants

NAME	STATUS
Burke's Goldfields Lasthenia burkei No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4338	Endangered

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Contra Costa Goldfields Lasthenia conjugens — Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/7058

Showy Indian Clover Trifolium amoenum — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/6459

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

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Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee

that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

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NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Allen's Hummingbird Selasphorus sasin This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9637	Breeds Feb 1 to Jul 15
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Aug 31
California Thrasher Toxostoma redivivum This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Jul 31

Clark's Grebe Aechmophorus clarkii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Dec 31
Common Yellowthroat Geothlypis trichas sinuosa This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/2084	Breeds May 20 to Jul 31
Costa's Hummingbird Calypte costae This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9470	Breeds Jan 15 to Jun 10
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Lawrence's Goldfinch Carduelis lawrencei This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9464	Breeds Mar 20 to Sep 20
Lewis's Woodpecker Melanerpes lewis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Nuttall's Woodpecker Picoides nuttallii This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9410	Breeds Apr 1 to Jul 20
Oak Titmouse Baeolophus inornatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9656	Breeds Mar 15 to Jul 15

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Rufous Hummingbird selasphorus rufus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds elsewhere
Song Sparrow Melospiza melodia This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Feb 20 to Sep 5
Spotted Towhee Pipilo maculatus clementae This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/4243	Breeds Apr 15 to Jul 20
Tricolored Blackbird Agelaius tricolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	Breeds Mar 15 to Aug 10
Wrentit Chamaea fasciata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 10

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is

0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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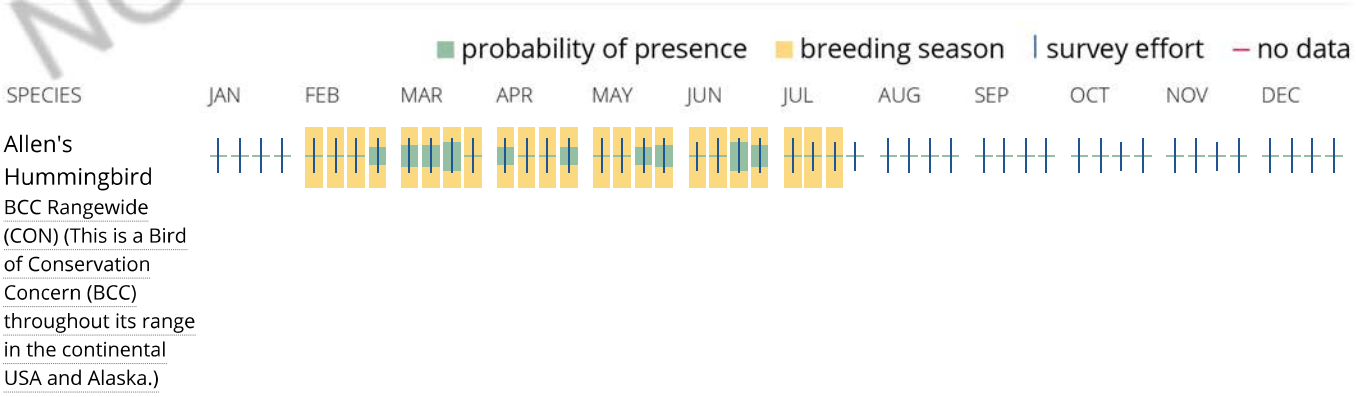
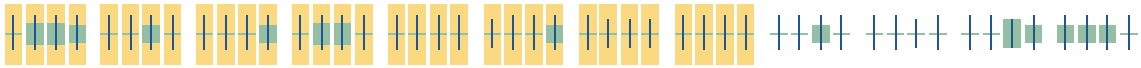
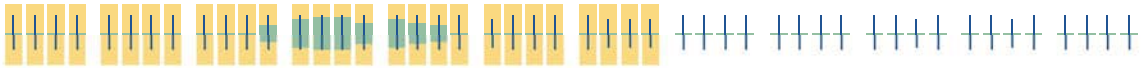


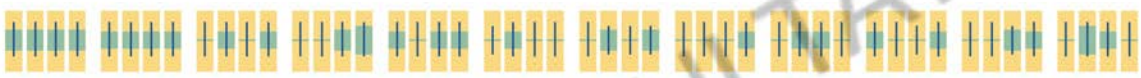
Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



California Thrasher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Costa's Hummingbird
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



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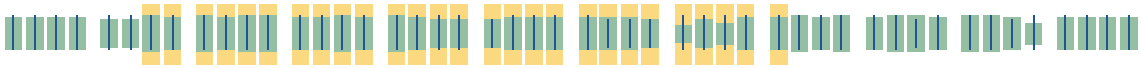
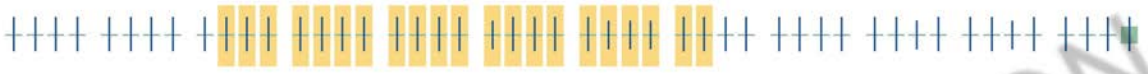
Song Sparrow
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Spotted Towhee
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Tricolored Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Wrentit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year,

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including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

R4SBA

A full description for each wetland code can be found at the National Wetlands Inventory website

NOT FOR CONSULTATION

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local

government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Appendix F

Native American Consultation

February 3, 2017

Native American Heritage Commission
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691

Subject: **Sacred Land Files and Native American Contact List Request for the City of Ukiah's Landfill Closure Project**

To Whom It May Concern:

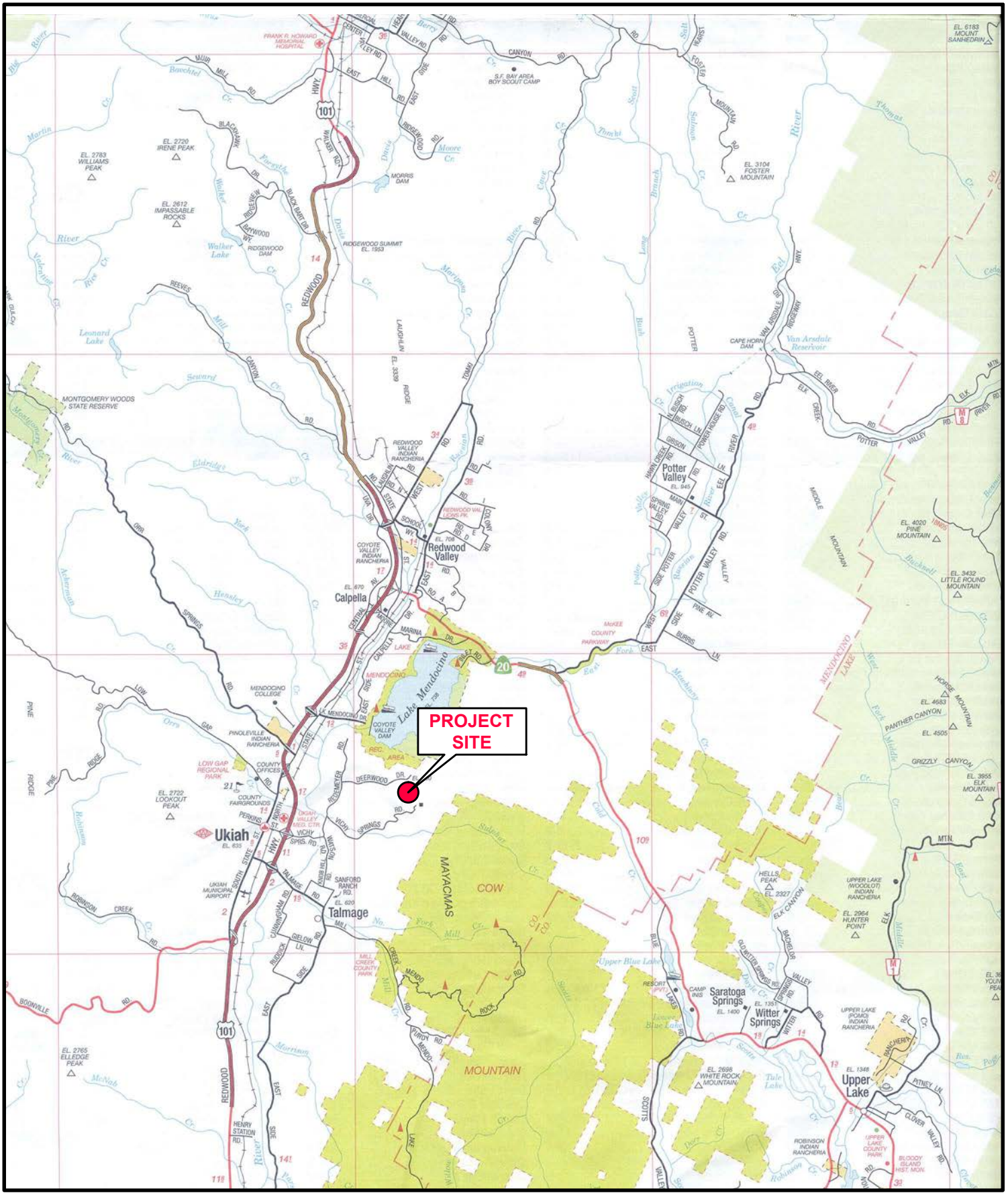
SMB Environmental is assisting the City of Ukiah on its Landfill Closure Project. The Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah landfill is part of a 283.5-acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01. Please see the attached map.

For purposes of Section 106 compliance, we would appreciate your checking of the Sacred Lands Files to see if there are any culturally sensitive areas within the immediate project vicinity. We would also like to receive a list of Native American organizations that may have knowledge or interest in the Proposed Project area and we will attempt to contact them to solicit their written input/concerns about the Proposed Project.

Thank you for your cooperation and assistance. I look forward to your earliest possible reply. If any questions, please feel free to contact me at 916-517-2189 or at steve@smbenvironmental.com.

Sincerely,

Steve Brown
Principal



EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

LOCATION MAP

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

FIGURE
1-1

02–907

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710
(916) 373-5471 Fax

February 7, 2017

Steve Brown
SMB Environmental

Sent by: Steve@smbenvironmental.com

RE: Ukiah Landfill Closure Project, Mendocino County

Dear Mr. Brown,

Attached is a list of tribes that have cultural and traditional affiliation to the area of potential project effect (APE) referenced above. I suggest you contact all of those listed, if they cannot supply information, they might recommend others with specific knowledge. The list should provide a starting place to locate areas of potential adverse impact within the APE. By contacting all those on the list, your organization will be better able to respond to claims of failure to consult, as may be required under particular state statutes. If a response has not been received within two weeks of notification, the Native American Heritage Commission (NAHC) requests that you follow-up with a telephone call to ensure that the project information has been received.

The NAHC also recommends that project proponents conduct a record search of the NAHC Sacred Lands File (SLF) at the appropriate regional archaeological Information Center of the California Historic Resources Information System (CHRIS) (http://ohp.parks.ca.gov/?page_id=1068) to determine if any tribal cultural resources are located within the area(s) affected by the proposed action. The SFL, established under Public Resources Code section 5094, are sites submitted for listing to the NAHC by California Native American tribes. The SFL, established under Public Resources Code section 5094, are sites submitted for listing to the NAHC by California Native American tribes. A record search of the SLF was completed for the APE referenced above with negative results. Please note records maintained by the NAHC and CHRIS is not exhaustive, and a negative response to these searches does not preclude the existence of tribal cultural resources. A tribe may be the only source of information regarding the existence of tribal cultural resources.

If you receive notification of change of addresses and phone numbers from any of these tribes, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact via email: frank.lienert@nahc.ca.gov

Sincerely,

Frank Lienert
Associate Governmental Program Analyst

Native American Heritage Commission
Native American Contacts

2/7/2017

Coyote Valley Band of Pomo Indians
Michael Hunter, Chairperson
P.O. Box 39/ 7901 Hwy 10, Pomo
Redwood , CA 95470
(707) 485-8723

(707) 485-1247 Fax

Guidiville Rancheria of California
Merlene Sanchez, Chairperson
P.O. Box 339 Pomo
Talmage , CA 95481
admin@guidiville.net
(707) 462-3682

(707) 462-9183 Fax

Hopland Band of Pomo Indians
Iyesha Miller Chairperson
3000 Shanel Road Shokowa
Hopland , CA 95449 Sokow
selliott@hoplandtribe.com Shanel
(707) 472-2100 Pomo

(707) 744-1506

Cahto Tribe
Sonny Elliot, EPA Director
P.O. Box 1239 Cahto
Laytonville , CA 95454 Kato
Environmental@cahto.org Pomo
(707) 984-6197, Ext. 111

(707) 984-6201 Fax

Manchester Band of Pomo Indians
Jaime Cobarrubia, Chairperson
P.O. Box 623 Pomo
Point Arena , CA 95468
(707) 882-2788

(707) 882-3417 Fax

Pinoleville Pomo Nation
Leona Willams, Chairperson
500 B Pinoleville Drive Pomo
Ukiah , CA 95482
(707) 463-1454

(707) 463-6601 Fax

Potter Valley Tribe
Salvador Rosales, Chairperson
2251 South State Street Pomo
Ukiah , CA 95482
pottervalleytribe@pottervalleytribe.com
(707) 462-1213

(707) 462-1240 - Fax

Redwood Valley or Little River Band of Pomo
Debra Ramirez, Chairperson
3250 Road I Pomo
Redwood Valley , CA 95470
rvrsecretary@comcast.net
(707)485-0361

(707) 485-5726 Fax

Round Valley Indian Tribes of the Round Valley Reservation
James Russ, President
77826 Covelo Road Yuki ; Nomlaki
Covelo , CA 95428 Pit River
tribalcouncil@rvit.org Pomo
(707) 983-6126 Concow
(707) 983-6128 Fax Wailaki; Wintun

Kashia Band of Pomo Indians of the Stewarts Point
Reno Keoni Franklin, Chairperson
1420 Guerneville Rd. Ste 1 Pomo
Santa Rosa , CA 95403
reno@stewartspoint.org
(707) 591-0580 Office

(707) 591-0583 Fax

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code

This list is only applicable for contacting local Native Americans with regard to cultural resources assessments for the Ukiah Landfill Closure Project, Mendocino County

Native American Heritage Commission
Native American Contacts

2/7/2017

Noyo River Indian Community
Harriet L. Stanley-Rhoades
P.O. Box 91 — North Coastal Pomo
Fort Bragg , CA 95437 — Coast Yuki
noyojetty1@earthlink.net

Cahto Tribe
Aimie R. Lucas, Chairperson
P.O. Box 1239 — Cahto
Laytonville , CA 95454 — Kato
(707) 984-6197 — Pomo

(707) 984-6201 Fax

Coyote Valley Band of Pomo Indians
Michael Hunter, Chairperson
P.O. Box 39/ 7901 Hwy 10, — Pomo
Redwood , CA 95470
(707) 485-8723

(707) 485-1247 Fax

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City of Ukiah

June 7, 2019

Cahto Tribe
Sonny Elliot, EPA Director
P.O. Box 1239
Laytonville, CA 95454

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

Dear Sir or Madam,

As shown in the attached figure, the Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah landfill is part of a 283.5-acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01. the overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water/leachate monitoring systems, and site security.

The Native American Heritage Commission was contacted about the Proposed Project and provided us with a list of Native American individuals and organizations that may have knowledge of tribal and/or cultural resources in the Project Area as part of the AB52 requirements. As a result, we are requesting that you please provide us with any information you may have about cultural resources or sites in the project area so that we can determine ways to protect those sites, including archeological sites and other locations of special value to Native Americans.

Thank you for your cooperation and assistance. I look forward to your earliest possible reply. If we do not receive a request from you (or your organization) within 30 days, we will assume that you do not want to have a formal consultation and agree that the Proposed Project would not have any impacts to known Tribal Cultural Resources that you are aware of. If you have any questions, please feel free to contact me at 707-463-6755 or at jthiele@cityofukiah.com.

Sincerely,

Jarod Thiele
Public Works Management Analyst

City of Ukiah

June 7, 2019

Cahto Tribe
Aimie R. Lucas, Chairperson
P.O. Box 1239
Laytonville, CA 95454

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

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Sincerely,

Jarod Thiele
Public Works Management Analyst

City of Ukiah

June 7, 2019

Coyote Valley Band of Pomo Indians
Michael Hunter, Chairperson
P.O. Box 39
Rewood Valley , CA 95470

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

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Sincerely,

Jarod Thiele

Jarod Thiele
Public Works Management Analyst

300 Seminary Avenue • Ukiah • CA • 95482-5400
Phone: (707)463-6200 · Fax: (707)463-6204 · www.cityofukiah.com

City of Ukiah

June 7, 2019

Guidiville Rancheria
Merlene Sanchez, Chairperson
P.O. Box 339
Talmage, CA 95481

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

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Sincerely,

Jarod Thiele

Jarod Thiele
Public Works Management Analyst

City of Ukiah

June 7, 2019

Hopland Band of Pomo Indians
Iyesha Miller, Chairperson
3000 Shanel Road
Hopland, CA 95449

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

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Sincerely,

Jarod Thiele
Public Works Management Analyst

City of Ukiah

June 7, 2019

Kashia Band of Pomo Indians of the Stewarts Point Rancheri
Reno KeoniFranklin Jr., Chairperson
1420 Guerneville Rd. Ste 1
Santa Rosa , CA 95403

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

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Sincerely,

Jarod Thiele
Public Works Management Analyst

300 Seminary Avenue • Ukiah • CA • 95482-5400
Phone: (707)463-6200 · Fax: (707)463-6204 · www.cityofukiah.com

City of Ukiah

June 7, 2019

Manchester Band of Pomo Indians
Jamie Cobarrubia, Chairperson
P.O. Box 623
Point Arena, CA 95468

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

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Sincerely,

Jarod Thiele

Jarod Thiele
Public Works Management Analyst

City of Ukiah

June 7, 2019

Noyo River Indian Community
Harriet L. Stanley-Rhoades
P.O. Box 91
Fort Bragg, CA 95437

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

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Sincerely,

Jarod Thiele

Jarod Thiele
Public Works Management Analyst

City of Ukiah

June 7, 2019

Pinoleville Pomo Nation
Leona Williams, Chairperson
500 B Pinoleville Drive
Ukiah, CA 95482

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

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Sincerely,

Jarod Thiele
Public Works Management Analyst

300 Seminary Avenue • Ukiah • CA • 95482-5400
Phone: (707)463-6200 · Fax: (707)463-6204 · www.cityofukiah.com

City of Ukiah

June 7, 2019

Potter Valley Tribe
Salvador Rosales, Chairperson
2251 South State Street
Ukiah, CA 95482

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

Dear Sir or Madam,

As shown in the attached figure, the Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah landfill is part of a 283.5-acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01. the overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water/leachate monitoring systems, and site security.

The Native American Heritage Commission was contacted about the Proposed Project and provided us with a list of Native American individuals and organizations that may have knowledge of tribal and/or cultural resources in the Project Area as part of the AB52 requirements. As a result, we are requesting that you please provide us with any information you may have about cultural resources or sites in the project area so that we can determine ways to protect those sites, including archeological sites and other locations of special value to Native Americans.

Thank you for your cooperation and assistance. I look forward to your earliest possible reply. If we do not receive a request from you (or your organization) within 30 days, we will assume that you do not want to have a formal consultation and agree that the Proposed Project would not have any impacts to known Tribal Cultural Resources that you are aware of. If you have any questions, please feel free to contact me at 707-463-6755 or at jthiele@cityofukiah.com.

Sincerely,

Jarod Thiele
Public Works Management Analyst

300 Seminary Avenue • Ukiah • CA • 95482-5400
Phone: (707)463-6200 · Fax: (707)463-6204 · www.cityofukiah.com

City of Ukiah

June 7, 2019

Redwood Valley or Little River Band of Pomo Indians
Debra Ramirez, Chairperson
3250 Road I
Redwood Valley, CA 95470

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

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As shown in the attached figure, the Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah landfill is part of a 283.5-acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01. the overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water/leachate monitoring systems, and site security.

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Sincerely,

Jarod Thiele
Public Works Management Analyst

City of Ukiah

June 7, 2019

Round Valley Indian Tribes of the Round Valley Reservation
James Russ, President
77826 Covelo Road
Covelo , CA 95428

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

Dear Sir or Madam,

As shown in the attached figure, the Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah landfill is part of a 283.5-acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01. the overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water/leachate monitoring systems, and site security.

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Sincerely,

Jarod Thiele
Public Works Management Analyst

300 Seminary Avenue • Ukiah • CA • 95482-5400
Phone: (707)463-6200 · Fax: (707)463-6204 · www.cityofukiah.com

City of Ukiah

June 7, 2019

Sherwood Valley Band of Pomo Indians
Michael Knight, Chairperson
190 Sherwood Hill Drive
Willits , CA 95490

Subject: **Request for Government-to-Government Consultation under Assembly Bill 52 (AB-52) for City of Ukiah's Landfill Closure Project**

Dear Sir or Madam,

As shown in the attached figure, the Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Ukiah landfill is part of a 283.5-acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01. the overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water/leachate monitoring systems, and site security.

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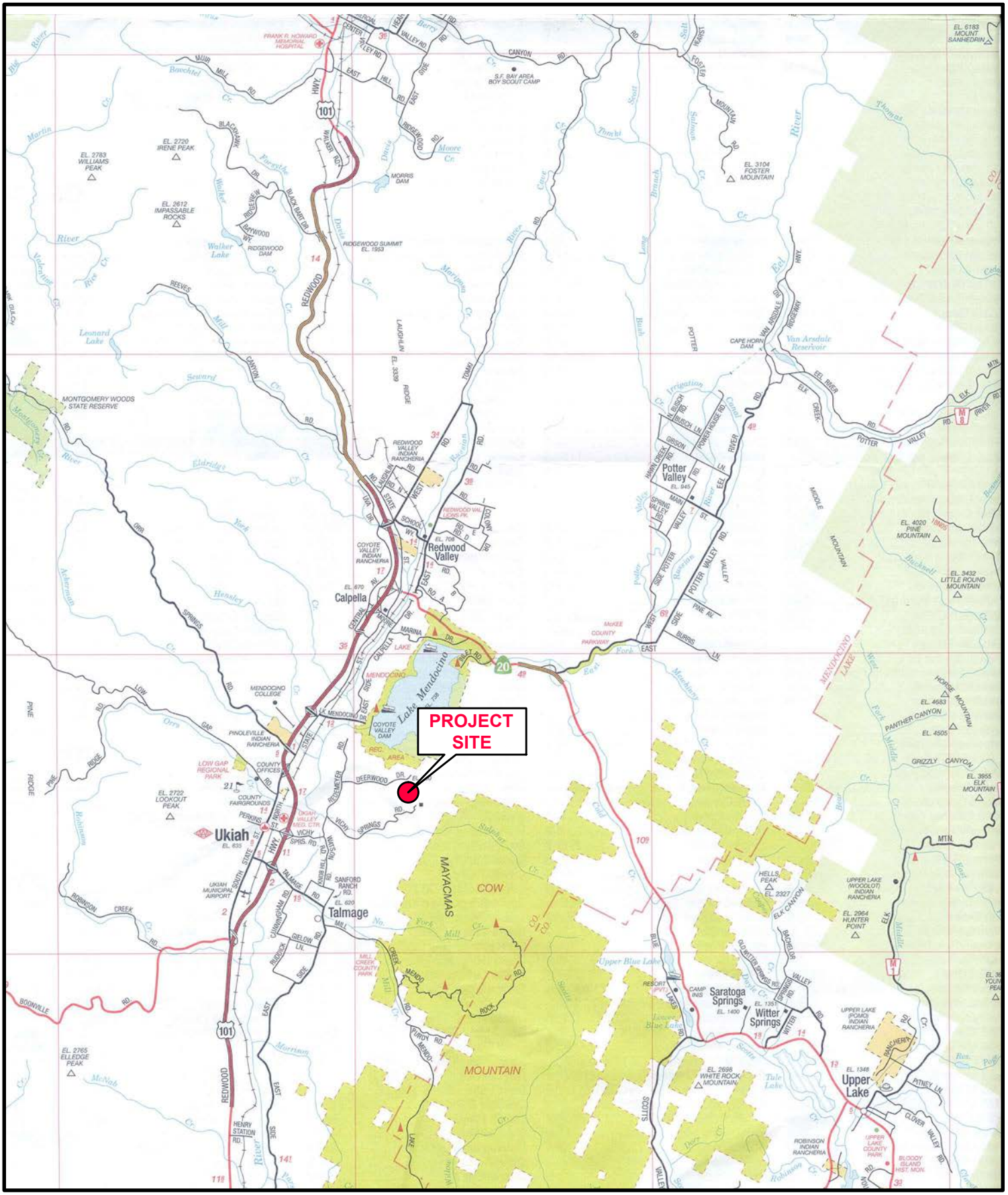
Sincerely,

Jarod Thiele

Jarod Thiele
Public Works Management Analyst



EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

LOCATION MAP

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

FIGURE
1-1

02–907

Environmental Impact Report
City of Ukiah's Landfill Closure Project

SCH#: 2017022009



City of Ukiah

SMB ENVIRONMENTAL

April 2020

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Chapter 1 Introduction

On November 13, 2019, the City of Ukiah (City) released for public review the Draft Environmental Impact Report (Draft EIR or DEIR) (State Clearinghouse Number: 2017022009) to provide the public and responsible agencies with information about the potential environmental effects of the City's proposed Landfill Closure Project (Project or Proposed Project). The City is the lead agency under the California Environmental Quality Act (CEQA) and has principal responsibility for approving the Proposed Project.

1.1 Purpose of the Environmental Impact Report

The purpose of the EIR is to provide the public and responsible and trustee agencies with information about the potential environmental effects of the Proposed Project. The Draft EIR was prepared in compliance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000et seq.) of 1970 (as amended), and the CEQA Guidelines (California Code of Regulations, Title 14). As described in CEQA guidelines Section 15121(a), an EIR is a public information document that assesses potential environmental effects of the Proposed Project, and identifies mitigation measures and alternatives to the Proposed Project that would reduce or avoid adverse environmental impacts. CEQA requires that state and local government agencies consider the environmental consequences of projects over which they have discretionary authority.

1.2 Public Review and Responses to Comments

In accordance with Sections 15087 and 15105 of the State CEQA Guidelines, the Draft EIR was circulated for public review and comment to lead and responsible agencies, as well as members of the public, for 45-days (November 13 through December 31, 2019 and was then extended through January 9, 2020). The City also held a public meeting on December 18, 2019 to receive comments on the Draft EIR. Written comment letters received on the Draft EIR are provided in their entirety in Chapter 2, "Comments Received". Chapter 3 "Responses to Comments" provides responses to each of the comments received and are provided in this document as part of the final environmental impact report (Final EIR). Although some of the comments have resulted in changes to the text of the Draft EIR (see Chapter 4, "Revisions to the Draft EIR"), none of the changes constitute "significant new information", which would require recirculation of the Draft EIR. Significant new information is defined in Section 15088.5(a) of the State CEQA Guidelines as follows:

(1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.

(2) A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.

(3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project's proponents decline to adopt it.

(4) The Draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

None of these circumstances has arisen from comments on the Draft EIR; therefore, recirculation is not required. Copies of the Draft EIR and the Final EIR are available for review on line on the City's website at https://cityofukiah.box.com/s/riyausatlqil1qbjuk9v2a34ciipahh8 and at the address below.

City of Ukiah, Public Works Administration
300 Seminary Avenue
Ukiah, CA 95482

As required by State CEQA Guidelines Section 15088(b), the City has provided an electronic copy (through the City's website; see prior discussion) to each public agency that submitted written comments on the Draft EIR with written responses to that public agency's comments at least 10 days prior to certifying the Final EIR.

1.3 Organization of the Responses to Comments

Chapter 2 of the Final PEIR consists of the written comments received on the Draft EIR, and presents responses to environmental issues raised in the comments (as required by State CEQA Guidelines Section 15132). The focus of the responses to comments is on the disposition of significant environmental issues that are raised in the comments, as required by Section 15088(c) of the State CEQA Guidelines. Each comment letter has been given a letter designation in the order it was received and reproduced with individual comments bracketed and numbered. Responses to the comments follow each letter. For example, the response to the second comment of the first letter would be indicated as Response to Comment A-2. In some instances, clarifications of the text of the Draft EIR may be required. In those cases, the text of the Draft EIR is revised and the changes compiled in Chapter 4 - Revisions to the Draft EIR. The text deletions are shown in strikeout (~~strikeout~~) and additions are shown in underline (underline).

1.4 Project Decision Process

This document and the Draft EIR together constitute the Final EIR, which will be considered by the City prior to a decision on whether to approve the project. If deciding to approve the project, the City, as required by State CEQA Guidelines Section 15090, must first certify that the Final EIR was completed in compliance with CEQA's requirements, was reviewed and considered by the City, and reflects the City's independent judgment and analysis. The City would then be required to adopt Findings of Fact (a separate Document) on the disposition of each significant environmental impact, as required by State CEQA Guidelines Section 15091. If significant and unavoidable impacts (those that cannot be mitigated to less than significant) would result from the project and the City chooses to approve the project, the City would need to adopt a statement of overriding considerations, pursuant to Section 15093, explaining the overriding factors that the City deems allow the project to move forward. A Mitigation Monitoring and Reporting Program, which is required by CEQA Guidelines Section 15091(d), has been included as part of Appendix A of this Final EIR.

Chapter 2 Comments Received

During the 45-day public review period (November 13 through December 31, 2019 and then extended through January 9, 2020) the City received a total of four (4) comment letters on the Draft EIR and a letter from the State of California's Governor's Office of Planning and Research (i.e. State Clearinghouse) confirming the end of the 45-day public review period. The City also received verbal comments from Vichy Springs resort at the Public Hearing which was held on December 18, 2019 as well as two written comment letters. In comparing the notes from that meeting and the written comments provided by Vichy Springs Resort, it appears that all of the substantive elements of their verbal comments are covered by their written comment letters. As a result, this Final EIR addresses all of their comments through their written comment letters. The City has reviewed and considered all of the written comments received as follows in Table 2-1 below. The letters including the letter from the State Clearinghouse are attached.

TABLE 2-1
AGENCY COMMENT LETTERS RECEIVED

Date	Commenting Agency	Comment Letter
December 19, 2019	Christine Karl, Environmental Scientist California Department of Resources Recycling and Recovery 1001 I Street Sacramento, CA 95814	A
January 9, 2020	Terri Cia, Engineering Geologist North Coast Regional Water Quality Control Board 5550 Skylane Boulevard, Suite A Santa Rosa, CA 95403	B
January 9, 2020	Paul Stanton Kibel, Attorney for Vichy Springs Resort Water and Power Law Group 57 Post Street, Suite 804 San Francisco, CA 94104	C
January 9, 2020	Gilbert Ashoff, President Vichy Springs Resort 2605 Vichy Springs Road Ukiah, CA 95482	D

California Environmental Protection Agency

Gavin Newsom
California Governor

CalRecycle
Department of
Resources Recycling and Recovery

Jared Blumenfeld
Secretary for
Environmental Protection

Scott Smithline
CalRecycle Director

December 19, 2019

Governor's Office of Planning & Research

DEC 19 2019

STATE CLEARINGHOUSE

Jarod Thiele
City of Ukiah
300 Seminary Road
Ukiah, CA 95482
jthiele@cityofukiah.com

Subject: SCH No. 2017022009 - Draft Environmental Impact Report (EIR) for the Ukiah Landfill Closure Project, Facility No. 23-AA-0019, Mendocino County

Dear Mr.Thiele:

Thank you for allowing the Department of Resources Recycling and Recovery (CalRecycle) to provide comments on the proposed project. CalRecycle staff offer the following comments for this proposed project as part of the California Environmental Quality Act (CEQA) process. If the proposed project description below varies substantially from the project as understood by CalRecycle as a responsible Agency, CalRecycle staff requests clarifications of any comments or interpretations of the project references be included in the Final Environmental Impact Report.

PROJECT DESCRIPTION

The proposed project is located at 3100 Vichy Springs Road Ukiah CA and is owned and operated by the City of Ukiah. The landfill operated from 1955 to September 2001. Closure of the Ukiah Landfill will be performed in accordance will applicable regulatory standards. The components and systems required for a landfill include final cover, and grading design to control storm water, prevent infiltration, and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, ground water/surface water/leachate monitoring systems, and site security.

COMMENTS

A closure permit should be issued when the Final EIR is certified to enable the LEA to enforce the Final Closure Post Closure Maintenance Plan. **A-1**

Solid Waste Regulatory Oversight

The Mendocino County Department of Environmental Health is the Local Enforcement Agency (LEA) and is responsible for providing regulatory oversight of solid waste handling activities, including inspections. The contact person is Gary Leonard at 707-234-6649 or Leonardg@mendocounty.org. A-2

CONCLUSION

CalRecycle staff thanks the Lead Agency for the opportunity to review and comment on the environmental document. CalRecycle may have further comments on the project as proposed copies of the Final Environmental Impact Report, Findings and Statement of Overriding Considerations (if one is required), Mitigation Monitoring and Reporting Program, Public Notices and any Notices of Determination. A-3

If the environmental document is adopted during a public hearing, CalRecycle staff requests 10 days advance notice of this hearing. If the document is adopted without a public hearing, CalRecycle staff requests 10 days advance notification of the date of the adoption and proposed project approval by the decision-making body. A-4

If you have any questions regarding these comments, please contact me at 916.341.6305 or e-mail me at Christine.Karl@calrecycle.ca.gov.

Sincerely,

Christine Karl
Environmental Scientist
Permitting & Assistance Branch, North Section
Waste Permitting, Compliance & Mitigation Division

cc: Gary Leonard, Mendocino County Environmental Health Department

California Water Boards

Gavin Newsom
Governor

Jared Blumenfeld
Secretary for
Environmental Protection

North Coast Regional Water Quality Control Board

January 9, 2020

Mr. Tim Eriksen
Mr. Jarod Thiele
City of Ukiah Public Works Department
300 Seminary Avenue
Ukiah, CA 95482-5400
teriksen@cityofukiah.com
jthiele@cityofukiah.com

Dear Mr. Eriksen and Mr. Thiele:

Subject: State Clearinghouse Document
Draft EIR, Ukiah Landfill Closure Project
(SCH# 2017022009)

File: Ukiah, City of, Solid Waste Disposal Site, 3100 Vichy Springs Road, Ukiah, CA Mendocino County; WDID No. 1B75043OMEN; Geotracker ID L10008371863

The North Coast Regional Water Quality Control Board (Regional Water Board) is a responsible agency under the California Environmental Quality Act (CEQA) and we appreciate the opportunity to comment. Regional Water Board staff has received the City of Ukiah's Draft Environmental Impact Report (DEIR) on November 18, 2019, titled, "Ukiah Landfill Closure Project" developed by SMB Environmental. The Proposed Project includes designs and plans to construct a landfill cap along with a landfill gas collection system and flare for the Ukiah Solid Waste Disposal Site (Site) located at 3100 Vichy Springs Road in Mendocino County. The landfill footprint occupies approximately 40 acres of the roughly 238 acre parcel within APN 178-130-01 outside the Ukiah City limits. Through circulation of the DEIR, the City of Ukiah is providing detailed information germane to our agency's statutory responsibilities for permitting considerations of the Proposed Project.

We have reviewed the DEIR for the Proposed Project and have the following permitting comments and considerations:

1. Waste Discharge Requirements, Superior Alternative and eliminated alternatives: **B-1**

The City of Ukiah operates the Ukiah Solid Waste Disposal Site under Waste Discharge Requirements Order No. R1-2002-0061 issued by our agency.

Closure requirements within the exiting Order permit and provide for the use of a prescriptive cap (compacted clay liner) in accordance with Title 27, California Code of Regulations (T27, CCR). Order No. R1-2002-0061 also has provisions for use of an Engineered Alternative Design cap subject to various demonstrations required under T27, CCR, Section 20080(b) including requirements for economic cost analyses, demonstration of equivalent protection, infeasibility, unnecessary burden etc.

In our February 27, 2018, project status review correspondence with the City of Ukiah we provided the following:

> *CEQA COMPLIANCE*
>
> *We understand the City of Ukiah has chosen to develop an Environmental Impact Report to comply with CEQA and that one of the project components will consider various closure design options. Please ensure that the analyses include review and consideration of a prescriptive cap, which is contained within the exiting Waste Discharge Requirements, Order No. R1-2002-0061, along with any other engineered alternative the City of Ukiah is considering.*

The DEIR proposes to construct a cap using a synthetic geomembrane liner with a turf and sand-based cover system as the Proposed Project and Superior Alternative. The use of this Proposed Project design is considered an Engineered Alternative Design under T27, CCR.

Of concern, the DEIR considers the Proposed Project turf cover design against a No Project Alternative opting for the Proposed Project design. As you are aware, the No Project Alternative is not a viable regulatory option. The Ukiah Solid Waste Disposal Site is required to construction close in accordance with T27, CCR and the No Project Alternative is not an alternative we can consider.

Further, based on a narrative discussion of potential impacts, maintenance considerations and economic factors the DEIR discusses, but dismisses and eliminates both the prescriptive liner (compacted clay liner) Alternative, as well as use of a geosynthetic clay liner (GCL) Alternative. And yet, no detailed economic analyses are provided within the DEIR in support of the narrative discussions and eliminated Alternatives. The DEIR would be improved, enhanced and better supported by including the economic cost analyses that supports each discussed Alterative including those that have been dismissed and eliminated.

Lastly, regarding the Proposed Project turf-based design, Regional Water Board staff has reviewed and expressed concerns unique to a turf-based system with the City of Ukiah representatives. Given the State of California's recent experiences with catastrophic wildland fires which resulted in significant infrastructure loss and damage, the Proposed Project's synthetic turf design has an inherent surface-based vulnerability in this regard. Also, the surface-based

turf system and underlying synthetic geomembrane liner have a greater exposure to ultraviolet light, weather/temperature impacts and potential degradation and cracking over the buried type of liner systems.

For these reasons we have requested the required financial assurance mechanism to address a possible replacement scenario in the event the surface-based liner systems fails. The Proposed Project description should adequately reflect this.

2. Post-Closure Land Use **B-2**

The Project as proposed is to cap and close the site as an industrial facility while maintaining engineered environmental controls systems, including active landfill gas collection systems with a landfill gas flare in a manner secured from the public.

In December of 2018 Regional Board staff commented on a City of Ukiah Mitigated Negative Declaration (SCH # 2018102056) to develop the same parcel, APN No 178-130-01 as a public park known as the Vichy Hills Trail Project. We wish to point out that the landfill design and post-closure land use proposed under this current DEIR and the Final Closure and Postclosure Maintenance Plan is to retain the site as a closed industrial facility with site security. The DEIR does not address development of the site as a park nor does it propose public uses or any needed environmental safety concerns, considerations, safety factors or mitigations that could result from public access. Should the City of Ukiah propose future development of the closed landfill site for public access all relative permitting considerations and any needed mitigations will need to be revisited and/or re-permitted at that time in accordance with T27, CCR.

3. Water Quality Certification: **B-3**

The Proposed Project will result in placement of fill within jurisdictional waters protected under Sections 401 and 404 of the Clean Water Act. Water Quality Certification (401 Certification) permitting is required for this work. Regional Board staff will continue to work with the City of Ukiah to address permitting requirements and any needed mitigations for work within jurisdictional waters requiring 401 Certification.

4. Construction Stormwater permitting: **B-4**

Disturbed soils on the Project will exceed one-acre in area, therefore, this project is required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Construction General Permit Order No. 2009-0009-DWQ (As amended by 2010-0014-DWQ and 2012-0006-DWQ): https://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml.

The Construction General Permit also requires the development of a Storm Water Pollution Prevention Plan (SWPPP) by a certified Qualified SWPPP Developer which must be implemented, monitored, and maintained.

We look forward to working closely with the City of Ukiah on this project. Please be aware that several departments within our office may ultimately be involved in this construction project and we would appreciate receiving two hard copies of all CEQA documents to assist with various department reviews.

Should you have any questions or concerns please feel free contact me at 707-576-2668 or Terri.Cia@waterboards.ca.gov .

Sincerely,

Digitally signed by Terri Cia
Date: 2020.01.09 15:34:47 -08'00'

Water Boards

Terri Cia
Engineering Geologist

200109_TAC_mc_Ukiah_DEIR

cc: Governor's Office of Planning and Research:
State Clearinghouse state.clearinghouse@opr.ca.gov
Charissa Martinez, Charissa.Martinez@opr.ca.gov
California Department of Fish and Wildlife, Yountville:
Wesley Stokes, Wesley.Stokes@wildlife.ca.gov

California Department of Resources Recycling and Recovery (CalRecyle):
Richard Castle, Richard.Castle@CalRecycle.ca.gov
Jon Whitehill, Jon.Whitehill@CalRecycle.ca.gov
Michael Wochnick, Michael.Wochnick@CalRecycle.ca.gov

City of Ukiah:
Rick Seanor, rseanor@cityofukiah.com
Michele Irace, mirace@cityofukiah.com

EBA Wastechnologies:
Mike Delmanowski, mdelmanowski@ebagroup.com

Mendocino County Air Quality Management District:
Barbara Moed, mcaqmd@co.mendocino.ca.us

Mendocino County Health Department-LEA:
Trey Strickland, stricklt@co.mendocino.ca.us

SMB Environmental:
Steve Brown, Steve@smbenvironmental.com

SWRCB, Land Disposal Program:
Brianna St. Pierre, Brianna.St.Pierre@waterboards.ca.gov
Josh Munn, Josh.Munn@waterboads.ca.gov

Vichy Springs Resort, Gilbert Ashoff, 2605 Vichy Springs Road, Ukiah, CA 95482

WATER AND POWER
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OTHER OFFICES
BERKELEY
WASHINGTON, D.C.

Via Electronic Mail and United States Mail

January 9, 2020

Jarod Thiele, Management Analyst
City of Ukiah
300 Seminary Avenue
Ukiah, California 95482-5400
jthiele@cityofukiah.com

Re: Comments of Vichy Springs Resort on Draft Environmental Impact Report (DEIR) Prepared by City of Ukiah for Landfill Closure Plan

Dear Mr. Thiele:

This comment letter is submitted on behalf of Vichy Springs Resort, which is located immediately adjacent to the City of Ukiah landfill, and immediately adjacent to the site of the landfill closure plan that is the subject of the Draft Environmental Impact Report (the "DEIR"). This comment letter follows up and expands upon issues that I raised in my oral testimony at the December 17, 2019 hearing in Ukiah on the DEIR. As I noted at the December 17, 2019 hearing, in addition to working as an environmental attorney with Water and Power Law Group, I am also a professor of environmental law at Golden Gate University School of Law, where I teach a course on California Environmental Law that provides extensive coverage of the California Environmental Quality Act ("CEQA"). C-1

I. INTRODUCTION – ENSURING THE LANDFILL CLOSURE IS DONE CORRECTLY

For those us that work on issues related to compliance with CEQA, we are familiar with the NIMBY dynamic (and by NIMBY I mean "*Not In My Backyard*"). The NIMBY dynamics is where neighbors who are opposed to a particular project try to use the CEQA process and CEQA litigation to "stop" a project they do not want to go forward. It is important to highlight that this NIMBY dynamic is not what is involved with the Vichy Springs Resort's concerns regarding the proposed landfill closure project. C-2

More specifically, Vichy Springs Resort is not trying to "stop" or "prevent" the City of Ukiah from moving forward with its landfill closure plan. Quite to the contrary, for the past decade, Vichy Springs Resort has consistently pressed the City to properly close the landfill. While Vichy Springs Resort wants the landfill closure process to move forward, the Resort believes this closure needs to take place in an environmentally responsible manner – so that this closure does not leave a permanent visual eyesore on the landscape, so that this closure is scheduled to reduce impacts on hikers and recreational users, and so that this closure does not cause damage to the springs at the Resort.

Vichy Springs Resort's comments on the DEIR are therefore not about stopping the landfill closure plan but about ensuring the landfill closure plan is done correctly.

In this letter, in addition to noting some of the more technical issues related to the DEIR, Vichy Springs Resort also will address certain preliminary legal issues, particularly issues that relate to the range of alternatives evaluated in the DEIR. More specifically, it is the view of Vichy Springs Resort that the range of alternatives considered in the DEIR – which is really one alternative – is violative of the requirements of CEQA.

II. PREVIOUS WRITTEN COMMENTS SUBMITTED BY VICHY SPRINGS RESORT ON THE PROPOSED NEGATIVE DECLARATION AND ON THE SCOPING DOCUMENT FOR THE EIR

C-3

In 2016, in connection with the Landfill Closure Project, the City of Ukiah initially proposed to comply with CEQA not by preparing an Environmental Impact Report (an "EIR"), but by preparing a Negative Declaration. After receiving written comments from Vichy Springs Resort on the Negative Declaration in April 2016, the City of Ukiah decided to prepare an EIR.

In 2017, consistent with CEQA, the City of Ukiah then released a "Scoping Document" that discussed the scope of issues to be addressed and excluded in the EIR that would be prepared for the Landfill Closure Project. Again, Vichy Springs Resort submitted written comments to the City of Ukiah expressing concern about the proposed scope of the EIR.

In the 2016 written comments Vichy Springs Resort submitted on the Negative Declaration, and in the 2017 written comments Vichy Springs Resort submitted on the EIR Scoping Document, the following concerns were identified.

First, Vichy Springs Resort expressed concern about the adverse visual impact of the artificial synthetic cover that was proposed for the landfill. This artificial synthetic cover would be situated on a highly visible hillside, and would clash with the natural surrounding vegetation. For example, the proposed synthetic cover is green, and in late spring, summer, and early fall the surrounding hillsides are brown. Vichy Springs Resort suggested the alternative of a clay cover with natural vegetation on top – the cover used at most former landfill sites in California – be evaluated. With this natural cover, the color and texture of the vegetation growing on top of the landfill would be the same as the surrounding hillsides during all seasons, thereby reducing adverse visual impacts. **C-3a**

Second, Vichy Springs Resort explained that there are extensive hiking trails on the Vichy Springs property where guests come to enjoy the quiet and tranquility of the area. Vichy Springs Resort's peak season for guests is late spring through early fall. The sound impacts associated with the construction activities related to the landfill closure will be very noisy due to trucks and equipment. This noise will ruin the quiet and tranquility for Vichy Springs Resort guests using the hiking trails. Vichy Springs therefore proposed that the landfill closure construction activities take place "off-season" or during hours of the day when there would be fewer guests and/or less use of the hiking trails. In its previous comments on the Negative Declaration and EIR Scoping Document, Vichy Springs Resort had also proposed other measures to reduce the noise impacts on Resort guests, such as forgoing the use of back-up beepers on trucks and equipment (and instead using additional construction staff to address safety issues). **C-3b**

Third, Vichy Springs Resort noted that as part of the landfill closure process, groundwater monitoring wells will be operated. Many years ago, right after the groundwater monitoring wells were installed across the road from the Resort office, the springs at the resort suffered a drastic reduction in pressure and temperature. As the name Vichy Springs Resort **C-3c**

suggests, a major reason guests come to the Resort is to enjoy the springs. Vichy Springs therefore proposed that before operation of the existing wells was resumed, additional hydrology studies were needed to ensure the wells would not again adversely impact the pressure, flow and temperature of the springs.

Vichy Springs Resort has raised these concerns consistently for many years, and proposed specific feasible mitigation measures that would address these concerns. Vichy Springs Resort therefore reasonably expected that these concerns would be meaningfully addressed and considered as part of the EIR that was being prepared.

III. INADEQUATE RANGE OF ALTERNATIVES CONSIDERED IN THE DEIR

C-4

The DEIR for the landfill closure plan only considered two alternatives – (1) the proposed landfill closure plan; and (2) the "no project" alternative (which was not having any closure plan for the landfill). No other alternatives were considered. The limited alternatives analysis in the DEIR is violative of CEQA's requirements for several reasons.

First, pursuant to CEQA Guideline 151526(d)(5), an EIR is required to select and discuss a "reasonable range" of alternatives that is sufficient to foster public participation and "informed decision-making." Pursuant to the California Supreme Court's 1988 decision in *Laurel Heights Improvement Association v. Regents of the University of California*, an EIR must discuss project alternatives even if the project's significant environmental impacts will be avoided or reduced through mitigation measures. In this way, under CEQA, the alternatives analysis required in an EIR is different from the alternative analysis required in a Negative Declaration. Pursuant to CEQA, a Negative Declaration is not required to evaluate alternatives to the proposed project if it found that all significant environmental impacts have been reduced to a less than significant level. With an EIR, however, CEQA requires the evaluation of a reasonable range of alternatives even if the EIR asserts that all environmental impacts have been mitigated to a less than significant level.

C-4 Cont'd

Second, under the particular circumstances concerning the City's landfill, the "no project" alternative is in fact not an alternative at all because the California Health & Safety

C-4 Cont'd

Code requires the preparation and implementation of a landfill closure plan. This landfill closure plan is not something that the City of Ukiah can decide to do or not do, it is something that the law obligates the City of Ukiah to do. Under CEQA, the idea of the "no project" alternative relates to voluntary projects that are not required, such as the construction of new homes. With a voluntary project such as a new residential project, the "no project" alternative (not doing the project) is in fact a viable alternative. In the case of landfill closure plan, however, the "no project" alternative is in fact a "non-alternative" because the preparation and implementation of a landfill closure plan is required by law.

C-4 Cont'd

The fact that the "No Project" alternative is in fact a "non-alternative" in this situation was explicitly acknowledged in the DEIR for the landfill closure project. Section ES.8 of the DEIR's Executive Summary concedes: "The No Project alternative would not meet any of the goals and objectives of the Proposed Project. Under the No Project Alternative, the Ukiah Landfill would not be properly closed according to state and local regulations…Under the No Action Alternative, the City would be potentially susceptible for a variety of water quality and air quality violations and fines."

C-4 Cont'd

Third, CEQA Guideline 15126.6(e)(2) provides: "If the environmentally superior alternative is the 'no project' alternative, the EIR shall also identify an environmentally superior alternative among the **other** alternatives." (bold added.) This CEQA Guideline clearly anticipates that "other" alternatives will be considered in an EIR in addition to the "No Project" alternative.

C-4 Cont'd

Finally, the Association of Environmental Professionals ("AEP") has provided the following guidance in terms of CEQA alternative analysis: "It is generally uncommon…for an EIR to evaluate only the No Project alternative. In such a case, the Lead Agency has the relatively difficult legal burden of establishing that, given the circumstances at hand, no other feasible alternatives could satisfy the project objectives while resulting in fewer environmental impacts than the proposed project." (2014 AEP CEQA Portal Topic Paper, p. 3). A copy of the AEP CEQA Portal Topic paper is attached as **Exhibit A** to this letter.

C-4 Cont'd

Taken together, the fact that the DEIR for the City's landfill closure plan only considered the "No Project" alternative (which as explained is really a non-alternative in this situation), and considered no other alternatives, constitutes a black-letter violation of CEQA law. While there may be some room for disagreement about what constitutes a "reasonable range of alternatives," for a project such as the landfill closure project, it is clear that the consideration of no other alternative other than the proposed project is not a "reasonable range" of alternatives in this instance.

C-4 Cont'd

IV. FAILURE OF DEIR TO EVALUATE ALTERNATIVE OF NATURAL COVER VERSUS ARTIFICAL SYNTHETIC COVER

C-5

There are several flaws and defects in the section of the DEIR on "Aesthetic/Visual Impacts" (Section 3) as it relates to the artificial synthetic cover.

C-5a

First, the DEIR claims that the artificial synthetic green cover "is designed to look like an irrigated agricultural field." The DEIR states: "Olive green was chosen as the best color of the three options (olive green, tan, or blend) in order to blend into the natural surrounding environment. It was designed to blend into the olive-green grass in the winter or wet-season and look like an irrigated field in the summer dry months." This analysis is flawed, however, because the surrounding hills around the landfill are not in fact irrigated in the summer and dry season, and hence these surrounding hills are brown. The surrounding natural brown hills would therefore present a strikingly un-natural contrast with the artificial synthetic green cover over the landfill.

C-5b

The sharp visual contrast between the proposed artificial monotone green cover and the surrounding natural brown hillsides was made clear in the DEIR itself. More specifically, Figure 3.1-3 in the DEIR (titled 'Simulated Aerial View of Post-Constructed Ukiah Landfill') depicts a uniform synthetic monotone green cover set in the natural landscape of brown hillsides. As Figure 3.1-3 of the DEIR illustrates, there is nothing about the proposed artificial cover that "blends in" with its surroundings. To the contrary, the proposed artificial cover sticks out visually like a giant artificial green thumb.

C-5c

Not only are the hillsides surrounding the landfill site natural revegetation that changes color and texture with the seasons of the year, there is presently natural vegetation on the landfill itself that changes color and texture with the seasons of the year (and that blends in seamlessly with the surrounding hillsides). For purposes of CEQA compliance, the natural vegetation that is presently on the landfill constitutes the "baseline conditions" or "environmental setting" against which a comparative evaluation of the visual impacts of the proposed monotone artificial synthetic cover needs to be based. This aspect of CEQA compliance – comparison of the visual impacts of the artificial cover against current natural vegetation conditions – is something that Vichy Spring Resort has been highlighting for the City for many years. In its April 2016 letter to the City regarding landfill closure plans and CEQA requirements, legal counsel for Vichy Springs Resort explained:

C-5d

> In regard to the environmental setting (baseline conditions) against which scenic impacts are evaluated, the Initial Study has not provided adequate or accurate information about existing views. The Initial Study states that the "project site has been significantly altered by past landfilling activities" but does not actually provide any information about the current scenic conditions of the landfill property. More specifically, the Initial Study does not acknowledge that, since the landfill ceased operations in 2001, the area on top of the landfill has been naturally revegetated with grasses that have allowed the landfill site to increasingly blend in with its natural surroundings. The natural grass vegetation that has developed in the project area over the past 15 years is depicted in the photograph attached as Exhibit C to this letter.
>
> As part of the Final Landfill Closure Plan, the natural grasses that have returned to the landfill area since 2001 will be torn out and replaced with a "geosynthetic" cover – more commonly known as "astroturf." The result will be a 40-acre patch of geosynthetic astroturf in the middle of a natural grass landscape. The Initial Study section on aesthetics provides no information about the visual aspects of the proposed astroturf landfill cover to enable a determination to be made as to whether the astroturf cover results in a potentially significant adverse scenic impact vis-à-vis the existing natural grass conditions on the project site.

The missing aspects of the visual impact analysis in the 2016 CEQA Initial Study have unfortunately been carried forward into the 2019 CEQA DEIR – namely a failure to provide an accurate description and depiction of baseline visual conditions on the landfill site and to compare those baseline visual conditions to the artificial synthetic cover being proposed. A

C-5e

complete copy of Vichy Springs Resort's April 2016 letter to the City (including the photograph showing the natural revegetation conditions existing at the landfill site) is attached as **Exhibit B** to this letter.

Second, the DEIR contains claims that its impact analysis need not consider views of the artificial synthetic cover from more than 1,000 feet away on the following theory: "As demonstrated in Figure 3.1-2 [of the DEIR] anything over 1,000 feet is not considered to be a 'Known Observation Point' with a significant view." This 1,000-foot standard makes no sense in terms of an enormous 40-acre swatch of uniform synthetic color in the context of extensive natural hillsides. Clearly, this type of feature would be visible farther away than 1,000 feet. To support reliance on this 1,000-foot standard, Figure 3.2-2 of the DEIR shows photographs of man holding a sign (who becomes difficult to see 1,000 feet away). An individual person (six feet high) bears absolutely no relation to a 40-square acre synthetic green cover on a hillside. **C-5f**

Third, the DEIR claims that there were no "Known Observation Points" of the location of the landfill from either Vichy Springs Resort property or from any homes in the El Dorado Estates development or Deerwood Park development or from nearby public roads. The absence of any "Known Observation Points" was essential to the DEIR's determination that the proposed monotone artificial synthetic cover would not result in any significant adverse visual/scenic impacts. The DEIR's claims regarding the absence of "Known Observation Points," however, is incorrect. Attached as **Exhibit C** to this letter are photographs taken from various trails on the Vichy Spring Resort property, which have direct views of the landfill. Attached as **Exhibit D** to this letter are photographs taken from the road is front of residences in El Dorado Estates, which have direct views of the landfill. Attached as **Exhibit E** are photographs taken from residences in the Deerwood Park development, which have with direct views of the landfill. Attached as **Exhibit F** is a photograph taken from Vichy Spring Road, again with a direct view of the landfill. These photographs were taken in late December 2019 and early January 2020 by Gilbert Ashoff, owner of Vichy Springs Resort, with the areas where the landfill is located outlined in blue. As such, contrary to the claims in the DEIR, there are in fact numerous "Known Observation Points" of the landfill and the DEIR contains no analysis of how the views from **C-5g**

these locations would be adversely impacted by the proposed incompatible monotone artificial synthetic cover.

Fourth, Section 4.3 of the DEIR states that the document eliminated the natural cover from further consideration as an alternative because it was not "feasible" in that natural covers present an "unreasonably high risk" of slippage. Yet, the DEIR conveniently fails to disclose that the use of natural covers for former landfills is the standard default approach used on the vast majority of landfill sites around the State of California, and has been repeatedly approved by state regulators as an appropriate cover. Hundreds of former landfills all over the state (many of them on slopes) use natural covers. The DEIR's finding that such natural covers are not "feasible" because it presents an "unreasonably high risk" of slippage is contradicted by the widespread use of such natural covers throughout California. If natural covers presented such an "unreasonably high risk" they would not have been adopted by state regulators as the standard cover. **C-5h**

Title 27 of California Code of Regulations (27 CCR), section 21090, sets forth the standard requirements for a landfill cover. Section 21090 provides that this cover shall contain a top layer of soil at least 1 foot thick "capable of sustaining vegetation." Pursuant to this regulation, the State of California therefore anticipates that a landfill cover that will allow for natural revegetation is the standard approach, and that this approach is consistent with health and safety concerns. The DEIR's finding that this standard approach is in fact not "feasible" is in direct contradiction to the requirements of section 21090. While it is correct that in recent years a few landfill covers have been permitted that deviate from the prescriptive natural revegetation standards set forth in section 21090, the infrequent use of such alternative covers in no way suggests that the standard cover with natural revegetation is somehow "unfeasible." **C-5i**

To highlight this point, **Exhibit G** to this letter is a 2015 article from Waste 360 magazine, titled "*Clay Remains a Top Choice for Final Landfill Cover*." According to this article, "Despite the availability of a number of alternative landfill capping methods, clay covers are still the go-to system in most areas of the country." This article continues: "Other capping systems with man-made materials, such as high-density polyethylene (HDPE) have been tested, **C-5i Cont'd**

but it is uncertain that these systems can match federal requirements that they provide the same or better protective quality as clay." The DEIR's claim that the use of clay covers (with natural vegetation above the clay cover) is not a "feasible" alternative ignores the widespread use and regulatory/scientific acceptance of this landfill cover design.

Fifth, Section 4.3 of the DEIR claims that use of a natural cover is not "feasible" because of the additional costs it would add to the landfill closure project. Yet this claim is contradicted by information presented in the DEIR, in the table on page D-6 of the August 2015 Memo to city staff entitled "Engineered Alternative Analysis." This table of page D-6 of the memo indicates that cost of the "synthetic cover" option would be $7,348,890 while the cost of the "natural cover" option would be $7,768,500. So, according to the information presented in the DEIR, although the natural cover would cost about $420,000 more, the cost of the two options are comparable given the overall project costs involved. **C-5j**

On the question of "costs" associated with an alternative, and whether additional costs render an "alternative" unfeasible, the California Court of Appeals 1988 decision in *Citizens of Goleta Valley v. Board of Supervisors* is particularly worth noting. In *Citizens of Goleta Valley*, the Court held that an environmentally superior alternative cannot be considered economically unfeasible in the absence of evidence that the additional costs would be so severe that the project would not be economically viable. Clearly, no such showing can be made in this instance, where the additional costs for the natural cover versus the artificial synthetic cover are relatively small given the overall project budget (amounting to perhaps 5% of the total project costs). **C-5j Cont'd**

V. FAILURE OF DEIR TO EVALUATE ALTERNATIVE OF SCHEDULING CONSTRUCTION ACTIVITES TO AVOID ADVERSE NOISE IMPACTS ON RECREATIONAL RESOURCES **C-6**

In its written comments on both the Negative Declaration and the EIR Scoping Document, Vichy Springs Resort requested consideration of the alternative of scheduling the landfill closure plan construction activities outside of the resort's peak season or during limited hours during weekdays, to reduce noise impacts on the Resort's guests, particularly on persons using the hiking trails in close proximity to the project site. **C-6a**

There are clearly feasible alternatives that could have been evaluated, that would reduce the noise and recreational impacts of the project, yet the DEIR contains no analysis whatsoever of the alternative of scheduling construction activities outside Vichy Springs Resort's peak season or during limited hours of the day. The DEIR's defects in this regard relate both to its failure to analyze impacts on "recreational resources" and the inadequacy of its analysis of "noise impacts." **C-6b**

In terms of the DEIR's evaluation of project impacts on "recreational resources", there is none. Section 1.3.2 of the DEIR, titled "Scope of this EIR," states the following: "Substantial evidence exists to exclude the following identified resources from further analysis in the EIR…Recreation. Because no residential development that would create a demand for parks and recreational facilities in the County is proposed, the Proposed Project would not result in any impact to those facilities. Therefore, no mitigation measures are required." While it may be true the creation of new residential units can create additional demand for recreational resources, it does not follow that a non-residential project (such as the City's landfill closure project) may not create adverse environmental impacts (such as construction-related noise or degradation of viewsheds) on existing recreational resources. The DEIR's claim that its elimination of "recreational resources" from evaluation in the document is supported by "substantial evidence" is therefore without merit. The only "evidence" relied upon for this elimination was the observation that no additional demands on recreational resources would result because the landfill closure project was not a residential project. **C-6c**

Section 3.8 of the DEIR, on noise impacts, focused on what are referred to as "sensitive receptors." In terms of noise impacts on Vichy Springs Resort, the DEIR focuses exclusively on the "cabins" where guests at the Resort are staying and sleeping. These are the only "sensitive receptors" analyzed in regard to the project's noise impacts on the Resort. The DEIR states: "The majority of construction activities would occur greater than 1,000 feet from the northernmost cabin of Vichy Springs Resort. At this distance, maximum noise levels from construction (as shown in Table 3.8) would be…considered less than significant." **C-6d**

Yet, unlike in a standard motel, guests at the Vichy Springs Resort do not just stay in their cabin rooms. They come to enjoy the extensive outdoor recreational resources of the Resort, the springs and the hiking trails. They walk fence lines, the creek, to a waterfall, to enjoy the panoramic views of the surrounding hillsides (including views of the hillside where the landfill is located). In fact, many guests of the Resort come just for the day and do not stay overnight at all. And the Resort guests using the hiking trails at Vichy Springs Resort have ears. The quiet and tranquility of the experience these guests seek on these hiking trails will be adversely impacted by the truck and equipment noise associated with the landfill closure project. Yet, there is no mention or evaluation of this in the DEIR. **C-6e**

The DEIR's approach to noise impacts and recreational resource impact analysis resulting from landfill closure construction activities is inconsistent with CEQA Guidelines and with the approach taken in other CEQA EIRs. More specifically, Appendix G to the CEQA Guidelines sets forth a series of questions for lead agencies to ask to determine whether a proposed project may or will have significant adverse environmental impacts. In terms of "noise impacts" of proposed project, Appendix G to the CEQA Guidelines calls upon lead agencies to evaluate and determine whether there would be "a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?" Significantly, this evaluation of whether a project will result in "substantial temporary or periodic increases in ambient noise levels" is separate and distinct from Appendix G's requirement that CEQA lead agencies also evaluate and determine whether "exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies." **C-6f**

The City's DEIR for the landfill closure plan included analysis of whether construction activities might violate local noise ordinance levels, but contained no analysis (which Appendix G requires) of whether such construction activities would cause "substantial temporary or periodic increases in ambient noise levels" (such as substantial increased ambient noise levels on the recreational hiking trails on the Vichy Springs Property). The City DEIR improperly treated these two required noise impact inquiries as if they were one and the same – as if the absence of **C-6g**

data showing a specific violation of a local noise ordinance somehow also established that the project would not result in substantial increased ambient noise levels. But that is not what Appendix G of the CEQA Guidelines provides and requires.

C-6g Cont'd

An example of the approach to noise impact analysis that Appendix G of the CEQA Guidelines provides can be found in the 2004 CEQA EIR prepared for the Los Angeles International Airport Master Plan (the "LAX Master Plan EIR"). In Section 4.26.3 of the LAX Master Plan EIR (a complete copy of Section 4.26.3 is included as **Exhibit H** to this letter), the document discloses how it will approach CEQA thresholds of significance for evaluating project impacts on recreational resources, explaining that in addition to looking at impacts related to additional demand on recreational resources caused by potential project-related population growth, the EIR will also evaluate the extent to which project activities such as construction degrade recreational facilities or substantially and adversely alter recreational facilities. This approach to CEQA thresholds of significance for impact on recreational resources can be compared with the highly restrictive approach taken in the City's DEIR for the landfill closure plan, which only considered whether the project would create additional "demand" for recreational facilities.

C-6h

Section 4.26.3 of the LAX Master Plan EIR then went on to evaluate project impacts on eight (8) different recreation areas in the vicinity of the airport expansion project. For each of these eight (8) different recreation areas, Section 4.26.3 of the LAX Master Plan EIR evaluated the impacts of additional construction-related noise on the experience of users of these recreation areas, to determine whether construction noise would result in significant degradation or impairment of use of these different recreational resources. Section 4.26.3 of the LAX Master Plan EIR considered how these noise impacts on recreation areas might be reduced under some of the alternatives considered in the EIR, including Alternative D which would reduce construction hours to reduce construction-related noise impacts. The approach taken in the LAX Master Plan EIR provides a template for how the City's DEIR for the landfill closure plan could have and should have proceeded pursuant to CEQA – by identifying recreation areas in the vicinity of the landfill closure project (including Vichy Springs Resort's hiking trails), by

C-6h Cont'd

evaluating the construction-related noise impacts of the landfill closure project on these recreation areas, and by identifying feasible mitigation measures to reduce or avoid these construction-related noise impacts on recreational resources.

C-6h Cont'd

In addition to proposing changes in the season for construction activities, in its previous comments on the Negative Declaration and the EIR Scoping Document, Vichy Springs Resort had also proposed other measures to reduce noise impacts on guests. For example, Vichy Springs Resort proposed that instead of the use of backup beepers on trucks and equipment (which can be quite loud and noisy), additional construction staff could be used to address the safety concerns that the backup beepers are meant to address. As another example, instead of scheduling weekday construction activities from 7am to 7pm, construction activities could be scheduled either in the morning or the afternoon, so that guests at Vichy Springs Resort would be able to use the hiking trails in either the morning or the afternoon without being subject to construction-related noise from the adjacent property. These scheduling approaches to reducing construction noise impacts on nearby recreation areas were considered in Alternative D in the LAX Master Plan EIR discussed above (again highlighting the failure of the City's DEIR to consider a reasonable range of alternatives). These other mitigation measures would all reduce the adverse noise-related impacts on nearby recreational resources such as Vichy Springs Resort hiking trails, yet none of these other proposed measures were either incorporated into the proposed project or evaluated in the DEIR.

C-6i

Is it possible that the use of additional construction staff in lieu of backup beepers might result in some incremental additional costs for the landfill closure project? Yes, it is foreseeable that this approach might result in some incremental additional project costs. However, as discussed above (see discussion regarding 1988 *Citizens of Goleta Valley* case), the fact that an alternative or mitigation measure may involve some additional costs does not render the alternative or mitigation measure economically unfeasible absent information demonstrating that these additional costs are of such magnitude that the entire project would become financially unviable.

C-6i Cont'd

Consider if there was a construction project (say construction of a new road) with noise impacts that took place in Yosemite National Park, in close proximity to hiking trails in the Park. **C-6j**

- And imagine if the environmental impact document for the Yosemite road-building project eliminated consideration of impacts on recreational resources based on the logic that the new road was not a residential project and therefore did not create any new demand for parks and recreation.
- And imagine if an environmental impact document for the Yosemite road-building project was prepared that only considered the noise impacts on cabins many miles away down in Yosemite Valley, but completely ignored the noise impacts of park visitors using Yosemite's hiking trails near the road-building project. **C-6j Cont'd**
- And imagine if an environmental impact document for the Yosemite road-building project failed to evaluate the alternative of scheduling such road construction at times of the year or hours of the day when there was more limited use of these nearby hiking trails because there were less visitors to the Park or failed to consider alternatives to the use of truck/equipment backup beepers to reduce construction-related noise impacts. **C-6j Cont'd**

It seems clear that such a cramped and restrictive noise impact analysis – one that completely ignored the impacts on Yosemite's recreational resources and on those persons using Yosemite's hiking trails – would be legally inadequate. It also seems clear that the failure to consider the alternative of scheduling such activities or conducting such activities in a manner to avoid or lessen such impacts on recreational resources and hikers would also be inadequate. The same reasoning applies in the case of noise impacts on persons using the hiking trails at Vichy Springs Resort. The complete disregard of these recreational resource impacts, and the failure to consider these scheduling and operational alternatives, cannot be justified under CEQA. **C-6j Cont'd**

Based on consultations with Alisto Engineering, a revised DEIR should be prepared that includes noise impact modeling that considers the following: baseline noise levels on hiking trails at Vichy Springs Resort property; increase in noise levels on hiking trails at Vichy Springs **C-6k**

Resort due to construction activities including but not limited to back-up truck/equipment beepers used during construction; evaluation of whether increase in noise levels on such hiking trails is significant when compared to baseline noise conditions; reductions in noise levels on hiking trails at Vichy Springs Property that could be achieved by prohibiting use of backup beepers; additional costs associated with relying on additional construction staff versus use of backup beepers.

C-6k Cont'd

VI. FAILURE TO ANALYZE THE IMPACT OF PROJECT GROUNDWATER WELLS ON PRESSURE AND TEMPERATURE OF THE SPRINGS AT VICHY SPRINGS RESORT

C-7

Section 3.7 of the DEIR (on Hydrology) states that in 1994 the City of Ukiah commissioned a study on the impacts of landfill groundwater wells on the springs at Vichy Springs Resort. This study was prompted by the information provided to the City indicating that the springs at Vichy Springs Resort experienced dramatic and severe reductions in pressure and temperature when the landfill groundwater wells were installed. Damon Brown, the City's engineer, was warned by Gilbert Ashoff (owner of Vichy Springs Resort) that drilling in the vicinity of pressurized springs was dangerous and why so. The City ignored Ashoff's concerns and commenced the well drilling with the result being the springs' flow dropped by 50% and, due to an adiabatic reaction, the springs' temperature dropped 20 degrees Fahrenheit.

Relying on this 1994 study, Section 3.7 of the DEIR determined that there was not the potential for adverse impacts by the landfill closure project (which involved multiple groundwater wells) on the springs of Vichy Springs Resort because the chemical constituents of the water in the wells and in the spring water were different. This analysis of chemical constituents (even if correct), however, does not address the alleged causes of the impact on the springs, which was the wells' redirection of carbon dioxide ("CO2") that led to the pressure drop and flow decrease. An analysis of the respective chemical constituents of well water and spring water therefore does not address the problem involved, which is redirection of CO2, so therefore does not provide any support for the finding that the groundwater wells associated with the landfill do not have the potential to adversely impact the temperature and pressure of springs at Vichy Springs Resort.

In its April 2016 letter to the City (which is part of the administrative record for these CEQA proceedings), Vichy Springs Resort included as an attachment a letter from Al Sevilla of Alisto Engineering that specifically addressed these concerns regarding the impact of the landfill groundwater wells on the CO2 pressure for the springs at Vichy Springs Resort. This letter from Alisto Engineering detailed the ways that the groundwater wells previously impacted CO2 pressure with resulting reductions in flow and temperature for the springs. The DEIR's hydrology analysis is non-responsive to the technical analysis and information presented in the previous letter from Alisto Engineering, focusing on chemical constituents of waters in the springs and the groundwater wells rather than CO2 pressure interactions.

In its previous written comments on the Negative Declaration and the EIR Scoping Document, Vichy Springs Resort requested that additional testing and modeling of CO2 pressure and related adiabatic reactions (affecting temperature) be undertaken prior to committing to renewed long-term operation of the groundwater wells as part of the post-closure plan for the landfill. The DEIR ignored this recommendation, and it does not appear that testing or modeling of CO2 pressure and related adiabatic reactions was done or is proposed to be done. As a result, there is not substantial evidence to support the DEIR's determinations concerning the impact of the groundwater wells on the springs at Vichy Springs Resort. As such, the analysis and findings regarding this impact fail to satisfy CEQA.

More specifically, CEQA requires that the lead agency preparing the EIR provide an adequate description of "baseline conditions" – the environmental setting at the time the EIR is prepared. The EIR then must then compare the anticipated effects of a proposed project against these baseline conditions. If the EIR has not done a credible analysis of the baseline conditions regarding the hydrologic effect of the landfill closure groundwater wells on CO2 pressure for the adjacent springs at Vichy Springs Resort, however, then there is no basis to evaluate the impact of the continued operation of these groundwater wells on the springs. This is why Vichy Springs Resort has repeatedly asserted that this testing and analysis of CO2 pressure needs to be done before the groundwater wells are put back into operation, and this testing and analysis has yet to be done.

It should also be noted that there have been repeated problems with the link the City provided to the electronic copy of the DEIR, and these problems impacted the ability of Alisto Engineering to prepare a supplemental opinion letter on the issue of CO2 pressure impacts on the springs resulting from operation of the landfill groundwater wells. More specifically, in the period from January 17, 2019 until after the New Year, Alisto Engineering tried multiple times to open the DEIR link provided by the City but was unsuccessful (which delayed their review of the portions of the DEIR dealing with this issue). The City was eventually able to resolve the DEIR link the issue in early January 2020, but by that time Alisto Engineering no longer had availability to provide supplemental review and comments.

VII. IN CONCLUSION – THE DEIR NEEDS TO BE REVISED AND RECIRCULATED PRIOR TO CERTIFICATION

C-8

Per the issues addressed above in this letter and in the exhibits to this letter, the following have been established: that clay covers with natural vegetation on top is a feasible and commonly used option for landfill covers; that there are numerous “known observation points” with direct views of the landfill and the DEIR did not contain any analysis of adverse visual impacts from these locations associated with the proposed artificial monotone cover; that the analysis of construction noise impacts on existing recreation areas is standard practice in CEQA EIRs and was not undertaken in the City’s DEIR for the landfill closure plan; and that the testing and modeling of CO2 pressure impacts is needed to evaluate the impacts of project groundwater wells on the springs at Vichy Springs Resort and that this CO2 pressure testing and modeling were not done.

Beyond these more technical defects in the DEIR, however, there is the more glaring fundamental legal defect of the failure of the DEIR to evaluate a reasonable range of alternatives. The alternatives analysis in the DEIR, being limited to the proposed project and the No Project alternative (which as explained above is in fact a non-alternative because the City is legally obligated to implement a landfill closure plan) is simply not allowed under CEQA.

For these reasons, Vichy Springs Resort respectfully requests that a revised draft of the DEIR be prepared that corrects these defects, and that this revised DEIR be recirculated for public comment before being certified by the City of Ukiah.

Yours,



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Attorney for VICHY SPRINGS RESORT

Exhibit A: 2014 AEP CEQA Portal Topic Paper
Exhibit B: Vichy Springs Resort April 2016 Letter to City of Ukiah
Exhibit C: Photographs Showing Views of Landfill from Vichy Springs Resort
Exhibit D: Photographs Showing Views of Landfill from Residences in El Dorado Estates
Exhibit E: Photographs Showing Views of Landfill from Residences in Deerwood Park
Exhibit F: Photographs Showing Views of Landfill from Vichy Springs Road
Exhibit G: 2015 Article *Clay Remains Top Choice for Landfill Covers*
Exhibit H: Section 4.26.3 of 2004 LAX Master Plan EIR

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CEQA Portal Topic Paper

Alternatives

What Are Alternatives?

Alternatives, in the context of the California Environmental Quality Act (CEQA), are optional ways that the project proponent could achieve most of their objectives, while also reducing or eliminating the environmental impacts of the proposed project (California Public Resources Code [PRC] Section 21002; *see also Friends of the Old Trees v. Department of Forestry & Fire Protection* (1997)).

Alternatives typically involve changes to the location, scope, design, extent, intensity, or method of construction or operation of the proposed project. The Lead Agency is required to evaluate and compare the environmental impacts of alternatives to the proposed project in an Environmental Impact Report (EIR), though not at the same level of detail as the proposed project (CEQA Guidelines Section 15126.6(d)).

Why Are Project Alternatives Important?

A fundamental mandate of CEQA is that "public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of the project" (PRC Sections 21002, 21081). Therefore, as part of the decision making process for projects involving the preparation of an EIR, governmental agencies are required under CEQA to consider alternatives to proposed actions affecting the environment (PRC Section 21001(g)).

One of the purposes of an EIR is to identify alternatives to a proposed project and evaluate the comparative merits of feasible alternatives (CEQA Guidelines Section 15126.6(d)). By examining a range of alternatives, the Lead Agency can demonstrate that it has taken a "hard look" at the project objectives to select alternatives that allow for meaningful comparison (*See Residents Ad Hoc Stadium Committee v. Board of Trustees* (1979)).

Courts have overturned many EIRs due to an improper or incomplete analysis of alternatives (*See Cleveland National Forest Foundation v. San Diego Association of Governments* (2017); *North Coast Rivers Alliance v. Kawamura* (2015); *Habitat and Watershed Caretakers v. City of Santa Cruz* (2013); *Watsonville Pilots Association v. City of Watsonville* (2010).

An EIR can also be overturned if it analyzes a range of alternatives, but fails to identify a preferred alternative as the project. A broad range of alternatives without a stable project presents the public with a moving target and an obstacle to informed participation. (See *Washoe Meadows Community v. Department of Parks & Recreation* (2017)).

Is an Analysis of Alternatives Required in an IS/MND?

No, the purpose of an alternative analysis is to look at ways to avoid or reduce the significant environmental impacts of a proposed project. Negative Declarations (NDs) or Mitigated Negative Declarations (MNDs) are only prepared for projects that are demonstrated not to have any significant environmental impacts, or where mitigation can be adopted to reduce all significant impacts to a less-than-significant level. Therefore, because projects supported by NDs or MNDs have been determined to have no significant environmental impacts, no analysis of alternatives is required in these documents.

However, although it is not required, a Lead Agency's consideration of alternatives in support of an ND is not prohibited. An exploration and analysis of alternatives to: a project; a specific aspect of a project with the most potential to result in environmental impacts; or methods or technologies used in project construction or operations (e.g., handling of contaminated sediments) may be useful to minimize the environmental impacts of a proposed project, even where such impacts are already less than significant. Such an exploration of alternatives to the proposed project may also be helpful to the Lead Agency in other ways, such as identifying alternative approaches, designs, or locations that would reduce environmental effects or are more efficient, effective, or cost effective.

Is an Analysis of Alternatives Required in an EIR?

Yes, an evaluation of alternatives is required in all EIRs. CEQA Guidelines Section 15126.6(a) states:

> "An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decisionmaking and public participation. An EIR is not required to consider alternatives which are infeasible."

What Alternatives are Required in an EIR?

An EIR must always evaluate a "No Project" alternative (CEQA Guidelines Section 15126.6(e)(1)). Evaluation of a No Project alternative compares impacts of the proposed project with impacts that would occur if the proposed project were not approved and implemented. Beyond evaluation of the No Project alternative, CEQA requires that a "reasonable range" of alternatives be evaluated in an EIR, but does not specify other alternatives that must be evaluated (CEQA Guidelines Section 15126.6(a)).

How Do I Develop A Reasonable Range of Alternatives?

What is a "Reasonable Range" of Alternatives?

The EIR must always evaluate the No Project alternative as well as a "reasonable range" of feasible "build" alternatives (CEQA Guidelines Section 15126.6(e)). Apart from the analysis of the No Project alternative however, there is no ironclad rule governing the nature or scope of the "reasonable range" of other alternatives to be discussed, other than the "rule of reason" (CEQA Guidelines Section 15126.6(a) & (f); see also *Citizens of Goleta Valley v. Board of Supervisors (1990)*; *Laurel Heights Improvement Association v. Regents of the University of California (1988)*).

What constitutes a "reasonable range" of alternatives will vary with the facts of each project and should be guided only by the purpose of offering substantial environmental advantages over the project proposal which may be "feasibly accomplished in a successful manner" considering the economic, environmental, social and technological factors involved (See *Citizens of Goleta Valley v. Board of Supervisors (1990)* (citing PRC Sections 21002, 21061.1; CEQA Guidelines Section 15364)).

An EIR need not consider every conceivable alternative to a project (CEQA Guidelines Section 15126.6(a); *Mount Shasta Bioregional Ecology Center v. County of Siskiyou (2012)*). The alternatives considered may include alternative approaches, sites, or both (CEQA Guidelines Section 15126.6(a)).

Consistent with this rule of reason, it is generally uncommon (though not strictly prohibited) for an EIR to evaluate only the No Project alternative. In such a case, the Lead Agency has the relatively difficult legal burden of establishing that, given the circumstances at hand, <u>no</u> other feasible alternatives could satisfy the project objectives while resulting in fewer environmental impacts than the proposed project (S*ee Mount Shasta Bioregional Ecology Center v. County of Siskiyou* (2012)).

How Do I Develop Alternatives?

Because alternatives must meet most (though not all) of the project objectives, one should begin with reviewing the project objectives (CEQA Guidelines Section 15126.6(c); *In re: Bay-Delta etc.* (2008)). According to the CEQA Guidelines, "A clearly written statement of objectives will help the Lead Agency develop a reasonable range of alternatives to evaluate in the EIR . . . ." (CEQA Guidelines Section 15124(b)); *see also* Project Objectives Topic Paper).

Proper development and analysis of alternatives should also be tied closely to the known or likely significant environmental impacts of the proposed project, as the purpose of the alternatives is to reduce or eliminate these impacts. The project setting can also influence the choice of alternatives (e.g., infill vs. greenfield, site geotechnical constraints, slope, and presence of biological or cultural resources). When developing the alternatives:

- Identify the known or likely significant construction or operational impacts of the project;
- Focus on finding alternatives that avoid or minimize those significant impacts;
- Consider offsite locations, when possible;
- Consider alternative site plans on the proposed site;
- Consider reductions in project size or intensity of uses;
- Consider alternative construction methods or materials;
- Consider alternative project operations; and
- Confirm whether each alternative meets most of the basic project objectives.

How Do I Define The No Project Alternative?

The No Project alternative represents conditions in the study area in the absence of approval of the proposed project (CEQA Guidelines Section 15126.6(e)(1)). The No Project Alternative must discuss current conditions as well as reasonably foreseeable future conditions expected to occur if the project were not approved (CEQA Guidelines Section 15126.6(e)(2)).

However, the analysis of the No Project alternative should not be confused with comparison of the proposed project to Existing Conditions (the baseline for determining the project's environmental impacts) (CEQA Guidelines Section 15126.6(e)(1)). The purpose of describing and analyzing a No Project alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project (*Id.*). The analysis of the No Project alternative, as with the analysis of other alternatives, is usually a comparative or qualitative assessment (CEQA Guidelines Section 15126.6(d)(e)).

The first step in the process is to establish the existing uses on the project site. The No Project alternative often represents conditions on the project site at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced (CEQA Guidelines Section 15126.6(e)(2)).

If the proposed project is not expected to be completed and operating for many years, the next step is to determine what reasonably foreseeable changes to the project site and environs are likely to occur unrelated to the proposed project. This may include projects that have been approved, but not yet completed, projects that have been proposed but have not yet been approved, and infrastructure projects planned to be completed within the timeframe established for the evaluation (CEQA Guidelines Section 15126.6(e)(3)(C)).

The analysis of the impacts of the No Project alternative can be accomplished in two general ways, depending on the nature of the proposed project:

1. When the project involves the revision of an existing land use or regulatory plan, a policy, or ongoing operations, the No Project alternative will be defined as the continuation into the future of the existing plan, policy, or operation. The existing plan, policy, or operations should be assumed to continue and to apply to other projects implemented during the timeframe of the analysis. Thus, the projected impacts of the proposed plan or alternative plans would be compared to the impacts that would occur under the existing plan (CEQA Guidelines Section 15126.6(e)(3)(A)).

or,

2. If the project is a specific development project on identifiable property, the No Project alternative should be defined as the conditions that would occur if the proposed project were not implemented. The discussion should compare the environmental effects of the property remaining in its existing state against the environmental effects that would occur if the project were approved and implemented. If disapproval of the project under consideration would result in predictable actions by others, such as the proposal of some other project, the consequences of these actions should be discussed as part of the environmental effects of the No Project alternative. In some circumstances, the failure to proceed with the proposed project would not result in the preservation of existing environmental conditions, but perhaps in another project being implemented; the analysis in that case should identify the practical result of the project's non-approval based on current plans and consistent with available infrastructure and community services. However, the Lead Agency is not required to speculate, or create and analyze a set of

artificial assumptions about what would occur in the future, if it cannot reasonably be known (CEQA Guidelines Section 15126.6(e)(3)(B)).

After defining the No Project alternative using one of these approaches, the Lead Agency should proceed to analyze the impacts of the No Project alternative by projecting what would reasonably be expected to occur in the foreseeable future if the project were not approved. This can often be done based on projections in the Lead Agency's local planning documents (e.g., a General Plan or applicable Specific Plan, and/or the CEQA documents prepared for those documents) (CEQA Guidelines Section 15126.6(e)(3)(C)).

Do I Need to Consider Offsite Alternatives?

Offsite alternatives should be considered. Zoning, environmental conditions, and availability are significant factors in evaluating an offsite alternative. To be analyzed in the EIR, the offsite alternative must be "feasible", and it must be possible for the project proponent to acquire the property. The proposed uses on the property should either be consistent with the applicable general plan designation for the property, or it should be reasonable to expect that a general plan amendment would be successful. There may be situations, however, where an offsite alternative is not feasible, for example, because the primary objective of the project is a modification of an existing facility. (*California Native Plant Society v. City of Santa Cruz* (2009).

Do I Need to Consider Speculative Alternatives?

An EIR need not consider an alternative whose effects cannot be reasonably evaluated because insufficient detail regarding the alternative is available, and whose implementation is remote and speculative (CEQA Guidelines Sections 15126.6(f)(3), 15145; see also *Residents Ad Hoc Stadium Committee v. Board of Trustees* (1979)*; Laurel Heights Improvement Association v. Regents of the University of California* (1993)).

Do I Need to Consider Alternatives Recommended by Others?

A Lead Agency should consider alternatives brought to its attention during the public scoping process (in a draft EIR), or during the public review period (in a final EIR), provided that the alternatives meet the above criteria (CEQA Guidelines Section 15126.6(c)). While not required, alternatives brought to the lead agency's attention after the public review period of an EIR may also be considered (PRC Section 21091(d)(1) & (2); CEQA Guidelines Section 15162(a)(3)(C); see also *Citizens of Goleta Valley v. Board of Supervisors* (1990)). In such circumstances, the lead agency may address the alternative by means of administrative findings (*see Citizens of Goleta Valley v. Board of Supervisors* (1990)).

However, Lead Agencies need not respond to late comments suggesting new alternatives (PRC Section 21091(d)(1); CEQA Guidelines Section 15207). Indeed, a Lead Agency may properly reject alternatives raised after the close of the public comment period; in such instances, the Lead Agency is not required to provide reasons for rejecting those alternatives (*see South County Citizens for Smart Growth v. County of Nevada* (2013)).

Are All Changes To A Project Considered Alternatives?

No, not all changes made to a project should be considered as separate alternatives. For example, minor changes in methods used (or rejected) in carrying out the project are typically not considered alternatives to the project (*Town of Atherton v. California High-Speed Rail Authority* (2014)). However, a number or group of such minor changes taken together, especially if they result in changes to the types or intensity of environmental impacts, may be considered an alternative.

May A Lead Agency Include Alternatives that Do Not Result in Reduced Environmental Impacts?

Yes. While the analysis of an alternative that does not result in the reduction or elimination of an environmental impact of the proposed project is allowable, it is not a substitute for the consideration of other alternatives that reduce or eliminate the project's impacts (CEQA Guidelines Section 15126.6(a); *Cleveland National Forest Foundation v. San Diego Association of Governments* (2017)).

What Must Be Included in an Analysis of Alternatives in an EIR?

Under CEQA, alternatives do not need to be described or analyzed at the same level of detail as the proposed project (CEQA Guidelines Section 15126.6(d)). However, they need to be described in enough detail to allow a comparative analysis of the alternatives against the proposed project (*see Residents Ad Hoc Stadium Committee v. Board of Trustees* (1979). That is, it must be in sufficient detail for the Lead Agency to differentiate the impacts between the alternatives and to select the Environmentally Preferred Alternative (*see Laurel Heights Improvement Association v. Regents of the University of California* (1988)).

The EIR should briefly describe the rationale for selecting the alternatives to be discussed. The EIR should also identify any alternatives that were considered by the lead agency during the scoping process, but rejected as infeasible, and briefly explain the reasons why these alternatives were rejected (see *Alternatives Considered but Rejected* below for more detail). For an alternative suggested during the public comment period on the draft EIR, the final EIR should either analyze the suggested alternative at the appropriate level of detail, or explain that

the suggested alternative was considered but rejected from further analysis. Additional information explaining the choice of alternatives may be included in the administrative record (CEQA Guidelines Section 15126.6(c).

The EIR may include a summary comparison table that lists each environmental resource analyzed, the relative environmental impacts of each alternative with respect to each resource, and how they compare to the impacts of the proposed project (CEQA Guidelines Section 15126.6(d)). The following are useful ways to compare alternatives:

- Describe if impacts are greater, lesser, similar to the proposed project and other alternatives;
- Summarize the overall environmental impacts of each alternative;
- Discuss the extent to which each alternative attains project objectives;
- Discuss any concerns with the feasibility of each alternative; and
- Most importantly, support any conclusions with evidence and include such evidence in the administrative record.

The following is an abbreviated example of a summary table.

Topic	Project	No Project	Alt 1	Alt 2
Air Quality	S	LTS	SUI	SUI
Noise	LTS	LTS	LTSM	LTS
Biology	LTSM	LTS	LTSM	LTS
Geology	LTSM	LTS	LTSM	LTSM

S=Significant Impact; SUI=Significant Unmitigated Impact; LTS=Less Than Significant Impact; LTSM=Less Than Significant Impact with Mitigation

Alternatives Considered but Rejected.

An analysis of alternatives in an EIR should include a list of alternatives considered but rejected, and include an explanation of why alternatives were rejected. (If this discussion is not included in an EIR, it must exist elsewhere in the administrative record). The Lead Agency may, as part of the scoping process, make an initial determination as to which alternatives are potentially feasible and merit in-depth consideration, and which do not. (CEQA Guidelines Section 15126.6(c)).

As noted above, remote or speculative alternatives need not be considered and may be rejected from further evaluation.

What Factors May be Considered in Determining the Feasibility of Alternatives?

As statutorily defined, "'Feasible' means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors." (PRC Section 21061.1; see also CEQA Guidelines, Section 15364 [same definition but with addition of "legal" factors].) "'[F]easibility' under CEQA encompasses 'desirability' to the extent that desirability is based on a reasonable balancing of the relevant economic, environmental, social, and technological factors." (*City of Del Mar v. City of San Diego* (1982); *Sequoyah Hills Homeowners Association. v. City of Oakland* (1993)).

The issue of whether an alternative is feasible arises at two different points in the CEQA process: first, in the assessment of alternatives in the EIR; and second, during the Lead Agency's consideration of whether to approve the project. The standard for determining whether an alternative should be analyzed in an EIR is whether the alternative is *potentially* feasible. Subsequently, the Lead Agency must determine whether the alternatives included in the EIR are actually feasible, based on the analysis in the EIR as well as factors external to the environmental analysis, e.g., social or economic concerns (see *California Native Plant Society v. City of Santa Cruz* (2009)).

While there is no bright line between these two assessments, generally the EIR should refrain from reaching conclusions regarding *actual* feasibility and should focus the analysis on whether an alternative is *potentially* feasible, and then undertake the comparison of the environmental effects of the project and alternatives.

Screening criteria may be developed to determine the feasibility of potential alternatives. Among the factors that may be taken into account when addressing the feasibility of alternatives are:

- Site suitability for the proposed use(s);
- Economic viability;
- Availability of infrastructure to serve the site;
- General plan consistency, other plans or regulatory limitations;
- Jurisdictional boundaries (projects with a regionally significant impact should consider the regional context); and

- Whether the proponent can reasonably acquire, control or otherwise have access to an alternative site (or the site is already owned by the proponent)

(CEQA Guidelines Section 15126.6(f)(1); see also *Citizens of Goleta Valley v. Board of Supervisors* (1990); *Save Our Residential Environment v. City of West Hollywood* (1992).

By applying the criteria to each potential alternative, infeasible alternatives can be screened out, and a reasonable range of feasible alternatives that meet most of the project objectives and substantially avoid or lessen the proposed project's significant environmental effects will result (see *In re: Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* (2008)).

Under CEQA, an alternative may be eliminated for any of the following reasons:

- The alternative fails to meet most of the basic project objectives;
- The alternative is infeasible;
- The alternative does not avoid significant environmental impacts; or
- Implementation of the alternative is remote and speculative and the effects cannot be reasonably ascertained.

(CEQA Guidelines Section 15126.6(f)).

Alternatives may not be rejected merely because they are beyond an agency's authority, would require new legislation, or would be too expensive (CEQA Guidelines Section 15126.6(f)(2)).

When economics is used as a factor to support a finding of infeasibility, the fact that an alternative may be more expensive than the project does not necessarily make it infeasible (*see Citizens of Goleta Valley v. Board of Supervisors* (1988); *Association of Irritated Residents v. County of Madera* (2003)). The Lead Agency must support the finding with specific data that shows the additional cost or lost profits are great enough to make it impractical to proceed with the project (see *Citizens of Goleta Valley v. Board of Supervisors* (1988)); *Foundation for San Francisco's Architectural Heritage v. City and County of San Francisco* (1980); *San Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002)).

Identification of Environmentally Superior Alternative.

CEQA requires that EIRs identify the Environmentally Superior Alternative, and discuss the facts that support that selection. (*See* PRC Section 21081.5; CEQA Guidelines Sections 15091, 15126.6(e)(2)). The Lead Agency is not, however, obligated to select the Environmentally Superior Alternative for implementation if

it would not accomplish the basic project objectives and/or is infeasible (see State CEQA Guidelines Section 15126.6(a), (c) & (f)).

Selection of the Environmentally Superior Alternative may be difficult, especially when the differences between the impacts of the alternatives involve trade-offs between types of impacts (e.g., between impacts on traffic and impacts on cultural resources, or between impacts on one species or habitat and impacts on other species or habitats). As with other aspects of CEQA, an explanation of the decision is often more important than the decision itself; as long as the explanation in an EIR is supported with substantial evidence in the administrative record, decisions by Lead Agencies are afforded deference by reviewing courts (CEQA Guidelines Sections 15151, 15384).

In many cases, the No Project alternative would have the fewest or least intense impacts. However, the State CEQA Guidelines Section 15126.6(e)(2) states that "If the environmentally superior alternative is the 'no project' alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives".

Should the Lead Agency change its determine of the Environmentally Superior Alternative ***after*** circulation of the draft EIR but before the EIR's certification by the Lead Agency, and that newly identified Environmentally Superior Alternative is ***not*** adopted as the proposed project, revisions to the draft EIR and recirculation of same are likely required (CEQA Guidelines Section 15088.5(a)(3); *South County Citizens for Smart Growth v. County of Nevada* (2013)). Arguably, recirculation is warranted even if the project proponent accepts the newly identified Environmentally Superior Alternative, in order to afford effective public comment on the Lead Agency's determinations (PRC Section 21092.1; CEQA Guidelines Section 15088.5(a)(4); see also *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007)).

If the Lead Agency's determination of the Environmentally Superior Alternative changes ***after*** certification of the EIR, but before approval of the project, the proposed project likely requires CEQA to be re-opened and a subsequent or supplemental EIR to be prepared (CEQA Guidelines Sections 15162(a)(3)(C), 15163(a)(1)). Any subsequent EIR shall again be subject to the same public notice and review provisions (CEQA Guidelines Sections 15162(d), 15072)). However, "[o]nce a project has been approved, the Lead Agency's role in the project approval is completed, unless further discretionary approval on that project is required" (CEQA Guidelines Section 15162(c)). Therefore, if the Lead Agency's determination of the Environmentally Superior Alternative changes ***after*** the approval of the project, no additional CEQA review is required unless the project is subject to additional discretionary approvals (CEQA Guidelines Section 15162(c)). In this case, the Lead Agency with jurisdiction over the next discretionary approval shall conduct any additional CEQA review required.

Analysis of Alternatives Under NEPA

While Lead Agencies under CEQA are not required to evaluate the environmental impacts of alternatives to the same level of detail as the proposed project (CEQA Guidelines Section 15126.6(d)), the National Environmental Policy Act ("NEPA") requires a "co-equal" analysis of the alternatives (see 40 Code of Federal Regulations ("C.F.R.") Section 1502.14(b)). Stated differently, under NEPA, the analysis of the impacts of alternatives must be at the same level of detail as the analysis of impacts of the proposed action (NEPA's term for the proposed project).

This usually means that each alternative must be defined at a comparable level of detail. Section 1502.14 of the Council on Environmental Quality (CEQ) Guidelines states that in the "Alternatives" section of an Environmental Impact Statement (EIS), agencies shall "[d]evote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits."

Whereas an analysis of alternatives is not required in an Initial Study under CEQA, an alternatives analysis is required in initial Environmental Assessments (EAs) . However, alternatives analyses in EAs are typically less rigorous than those contained in EISs (Federal Highway Administration *Alternatives Analysis White Paper*).

CEQ and the California Governor's Office of Planning and Research (OPR) have jointly prepared the February 2014 guidance document NEPA and CEQA: Integrating Federal and State Environmental Reviews (CEQA/NEPA Handbook). The handbook provides practitioners with an overview of NEPA and CEQA as well as suggestions for developing a single environmental review process that can meet the requirements of both statutes.

Table 1 summarizes the requirements for the analysis of alternatives under each type of environmental document under both CEQA and NEPA.

Table 1 – Alternatives Required In Each Type of Environmental Document

Document Type	**Alternatives Required**
CEQA	
Categorical Exemption	None
Initial Study	None
Environmental Impact Report	Reasonable range of alternatives, including those achieve would attain most of the basic project objectives while avoiding

	or reducing the environmental effects of the project. No-build must be considered. Comparative analysis. Analysis at same level of detail as proposed project not required.
NEPA	
Categorical Exclusion	None
Environmental Assessment	One build alternative is allowable, but for a complex or controversial project, more than one alternative is advised. No-Action alternative must be considered.
Environmental Impact Statement	All reasonable alternatives including No-Action Alternative. Each alternative must be considered and discussed at an equal level of detail.

Alternatives in Joint CEQA/NEPA Documents

The typical rule when preparing a joint CEQA/NEPA document is that when there is a difference between the requirements of the two laws, the Lead Agencies should prepare the document using the more stringent requirements (see *CEQA/NEPA Handbook* at 2, 20, 48). Because NEPA requires a more detailed alternatives analysis, joint EIR/EIS documents should be developed in a manner which satisfies NEPA requirements (40 C.F.R. Section 1502.14(b)).

Areas of Controversy Regarding Alternatives

Legal standards concerning alternatives analysis is one of the more settled areas of CEQA law. The two key issues in most CEQA decisions considering the adequacy of an EIR's analysis of alternatives are whether the EIR included a "reasonable range" of alternatives, including for example an alternative project site, and whether the level of detail of the alternatives analysis is sufficient. There is not "bright-line" rule for either of these issues, and the results tend to be fact-driven. It is critically important to not short-change the alternatives analysis in the EIR, however, either in terms of the number of alternative considered or the depth of analysis. The ultimate determination whether an alternative is actually feasible should be made by the decision-making body as part of its findings rather than in the EIR itself, which should present the information regarding alternatives in a clear and impartial way.

Alternatives in the CEQA Statute

Alternatives are described in many, sections of CEQA (PRC Sections 21000 *et. seq.*), including, but not limited to the following:

- § 21001(g) - Requires governmental agencies to consider alternatives to proposed actions affecting the environment.

- § 21002 - Public agencies should not approve projects, as proposed, if there are feasible alternatives or mitigation measures available that would substantially lessen the significant environmental impacts. Further states that projects that have significant impacts on the environment may be approved if alternatives are found to be infeasible.

- § 21002.1(a) - The purpose of an EIR is to identify the significant effects on the environment of a project, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided

- § 21002.1(e) - EIRs shall focus on the project's potentially significant effects on the environment.

- § 21003.1(a) - Public comments on environmental documents should be made as soon as possible to assist the Lead Agency in identifying potential significant effects of a project, alternatives, and mitigation measures which would substantially reduce the effects.

- § 21061 - The purpose of an EIR is to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project.

- § 21080.1(b) - The Lead Agency shall, upon the request of a potential applicant, provide for consultation prior to the filing of the application regarding the range of actions, potential alternatives, mitigation measures, and any potential and significant effects on the environment of the project.

- § 21080.5(d)(2)(A) - Requires that an activity not be approved or adopted pursuant to a certified regulatory program if there are feasible alternatives or mitigation measures that would substantially lessen environmental effects.

- § 21080.5(d)(3) - Requires environmental documents prepared pursuant to a certified regulatory program to include a description of alternatives to the proposed activity.

- § 21081 – In making findings regarding an EIR where more or more significant environmental impacts were identified, the Lead Agency may

include information as to why alternatives to the project are infeasible.

- § 21081.5 - In making findings regarding an EIR, including where alternatives are determined to be feasible, the Lead Agency must base its conclusions on substantial evidence in the record.

- § 21083.8.1 - Pertains to EIRs for military base reuse plans, including subsections regarding the analysis of alternatives.

- § 21091(d)(1) – The Lead Agency shall respond to comments received on a CEQA document if those comments are received during the public review period.

- § 21094 - Pertains to tiered EIRs and initial studies, including the analysis of alternatives in these documents.

- § 21100(b)(4) - Requires that EIRs contain an analysis of alternatives to the proposed project.

- § 21104(a) - Requires State Lead Agencies to provide for early consultation while preparing an EIR to, among other things, identify alternatives to the proposed project.

- § 21153 - Requires local Lead Agencies to consult with responsible and trustee agencies prior to completing and EIR to, among other things, identify alternatives to the proposed project.

- § 21154 - When local agencies prepare an EIR for a project required pursuant to an order from a state agency, the alternatives to be analyzed in the EIR shall not include those that are in conflict with the order.

Alternatives in the CEQA Guidelines

Alternatives are described in many, sections of the CEQA Guidelines, including, but not limited to the following:

- § 15002(a)(3) - Provides that one of the basic purposes of CEQA is the prevention or avoidance of avoidable significant damage to the environment by requiring changes in projects through the use of feasible alternatives or mitigation measures.

- § 15002(f) - Defines the EIR as the document by which a governmental agency analyzes the effects of a proposed project and identifies alternatives to the proposed project.

- § 15002(h)(4) - Identifies the selection of an alternative as a means of protecting the environment.

- § 15004(b) - Prohibits the Lead Agency from taking actions that would, among other things, limit the choice of alternatives, prior to completing CEQA compliance.

- § 15021 - Prohibits a Lead Agency from approving a project when a feasible alternative or mitigation measures exist that would lessen significant environmental effects.

- § 15041(c) – For projects that include housing development, a Lead or Responsible Agency shall not mitigate for significant environmental effects by reducing the number of units, unless no feasible alternatives exists that would provide comparable reductions in effects.

- § 15060.5 – The Lead Agency shall consult with the project sponsor prior to the filing of a formal application to, among other things, identify potential alternatives.

- § 15065(c)(2) - When making findings regarding an EIR, where significant environmental effects remain after the adoption of mitigation measures, the Lead Agency must make detailed findings, based on substantial evidence, regarding the feasibility of alternatives that would avoid or substantially lessen the effects.

- § 15082(b)(1)(A) - In preparing responses to a Notice of Preparation for an EIR, Responsible and Trustee Agencies and OPR shall provide the Lead Agency with information, including reasonable alternatives that should be analyzed in the EIR.

- § 15083(a) - Suggests that scoping prior to preparation of an EIR can assist Lead Agencies in identifying alternatives.

- § 15088.5(a) - Defines the presence of new information that may require recirculation of an EIR prior to certification, to include the identification of a new feasible alternative.

- § 15091(a)(3) - In making findings regarding an EIR where one or more significant environmental impacts were identified, the Lead Agency may

include information as to why alternatives to the project are infeasible.

- § 15091(c) - Where it shares jurisdiction with another agency for an alternative, the Lead Agency shall provide the specific reasons for rejecting mitigation measures or alternatives in their findings.

- § 15096(d) - Comments of Responsible Agencies on EIRs should focus their comments on, among other things, alternatives that the EIRs should include.

- § 15096(g) - Responsible Agencies shall not approve a project if they find that a feasible alternative is available that would avoid or substantially lessen a significant environmental effect.

- § 15124(b) - Defines the relationship between alternatives and the project objectives.

- § 15126.6 - Defines the general requirements of CEQA with regard to the analysis of alternatives.

- §15126.6(f)(2) - Alternatives may not be rejected merely because they are beyond an agency's authority, would require new legislation, or would be too expensive.

- § 15145 - If the Lead Agency determines that an impact is too speculative, it should indicate this and need not analyze that impact further.

- § 15151 - In evaluating the adequacy of an EIR, the courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure.

- § 15162(a)(3)(C) - Subsequent CEQA documentation may be required if, after an EIR has been certified or an ND adopted for a project, alternatives previously found to be infeasible, are subsequently found to be feasible.

- § 15163(a)(1) – The Lead Agency or Responsible Agency may choose to prepare a supplemental EIR if any of the conditions described in Section 15162 would require the preparation of a subsequent EIR.

- § 15207 – The Lead Agency need not respond to late comments (including suggested alternatives), but may do so.

- § 15364 - Defines the term "feasible" within CEQA.

- § 15384 - Defines the term "substantial evidence" within CEQA.

Important Cases

The following are important published cases involving issues related to alternatives:

***Los Angeles Conservancy v. City of West Hollywood* (2017) 18 Cal.App.5th 1031:** Court held that EIR's analysis of the conservation alternative was detailed enough to permit informed decision making and public participation. Court found that City was not required to prepare a "conceptual design" for the alternative. Finally, Court stated that "[a]n agency's finding of infeasibility . . . is 'entitled to great deference' and 'presumed correct'" in determining whether Lead Agency's findings that an alternative is infeasible is supported by substantial evidence.

***Cleveland National Forest Foundation v. San Diego Association of Governments* (2017) 17 Cal.App.5th 413:** EIR that included analysis of project alternatives focused primarily on congestion relief was inadequate because it failed to analyze an alternative that could significantly reduce total vehicle miles.

***Washoe Meadows Community v. Department of Parks & Recreation* (2017) 17 Cal.App.5th 277:** Court found that the presentation of five very different alternative projects in the EIR without a stable project description was an obstacle to informed public participation, noting that a broad range of possible projects presents the public with a moving target and requires a commenter to offer input on a wide range of alternatives.

***Pesticide Action Network America v. Department of Pesticide Regulation* (2017) 15 Cal.App.5th 478:** Court held that Department "glaringly" failed to address any feasible alternative to registering proposed new uses for two pesticides as required by PRC Section 21001(g).

***Banning Ranch Conservancy v. City of Newport Beach* (2017) 2 Cal.5th 918:** EIR did not describe a range of reasonable alternatives where it failed to include analysis of the Coastal Act's environmentally sensitive habitat area (ESHA) requirements, including consideration of which project areas might qualify as ESHA or potential impacts on ESHAs for a project in the coastal zone.

***Bay Area Citizens v. Association of Bay Area Governments* (2016) 248 Cal.App.4th 966:** Court held that the "No Project" alternative appropriately captured the continuation of existing regional policy. Court found that because the plaintiff's proposed alternative double-counted statewide emissions mandates, it was not feasible in light of the emission reduction requirements of SB 375.

***North Coast Rivers Alliance v. Kawamura* (2015) 243 Cal.App.4th 647:** EIR failed to analyze a control program as an alternative to eradication of light brown apple moth. "Last-minute" adoption of a control program instead of eradication did not cure errors in alternatives analysis, which did not include analysis of the control program based on stated project objective to eradicate light brown apple moth.

***Town of Atherton v. California High-Speed Rail Authority* (2014) 228 Cal.App.4th 314:** Authority properly rejected alternatives proposed during public review process because substantial evidence showed proposed alternatives were substantially similar to alternatives considered in program EIR.

***California Clean Energy Committee v. City of Woodland* (2014) 225 Cal.App.4th 173**: City's findings that an alternative was environmentally inferior to proposed project were not supported by analysis in EIR, which rejected the alternative based on economic feasibility.

***Habitat and Watershed Caretakers v. City of Santa Cruz* (2013) 213 Cal.App.4th 1277**: EIR failed to discuss any feasible alternative, such as a "limited-water alternative," which would "partially meet the project's objectives," and EIR lacked analysis supporting agencies' conclusion that the alternative would not lessen or substantially avoid the significant impacts from the project.

***South County Citizens for Smart Growth v. County of Nevada* (2013) 221 Cal.App.4th 316**: When EIR includes a reasonable range of alternatives, but Lead Agency's staff suggests an additional alternative after release of the final EIR and Lead Agency chooses not to recirculate the EIR with the staff alternative, the agency is not required to make an express finding that the staff alternative is infeasible before it can approve the revised project.

***Mount Shasta Bioregional Ecology Center v. County of Siskiyou* (2012) 210 Cal.App.4th 184:** Court upheld EIR's analysis of alternatives, where infeasible alternatives were dismissed during scoping phase, finding challengers of EIR failed to identify any potentially feasible alternative that could satisfy the project objectives, and finding the EIR considered a "reasonable range" of alternatives given the circumstances presented, despite the fact that the only alternative considered in depth in the Draft EIR was the "No Project" alternative.

***Watsonville Pilots Association v. City of Watsonville* (2010) 183 Cal.App.4th 1059**: EIR for update of City's General Plan should have considered a "reduced development alternative." City's argument that it was not required to consider a "reduced development alternative" because such an alternative did not meet each of the 12 project objectives is contrary to requirement in CEQA Guidelines Section 15126.6(b) that a feasible alternative be considered even if it "would impede to some degree the attainment of project objectives." Further, City's

argument that the "No Project" alternative was in essence a "reduced development alternative" was rejected since the "No Project" alternative achieved none of the basic project objectives, and the fundamental role of the alternatives analysis is to identify alternatives that achieve most of the project objectives while also reducing the project's significant environmental effects.

***Jones v. Regents of the University of California* (2010) 183 Cal.App.4th 818**: EIR for long-range plan for the Lawrence Berkeley National Laboratory included a reasonable range of alternatives, including a "partial off-site alternative," and did not need to consider a "full off-site alternative" where such alternative was properly rejected because it failed to achieve a fundamental project objective.

***California Native Plant Society v. City of Santa Cruz* (2009) 177 Cal.App.4th 947:** EIR's alternatives analysis satisfied CEQA's informational mandates and City's decisions concerning which alternatives to analyze were supported by evidence in the administrative record. The alternatives selected need not satisfy every key objective of the project, and ranking the relative importance of the various objectives of the project is a policy decision entrusted to the city council. When assessing feasibility in connection with the alternatives analysis in the EIR, the question is whether the alternative is potentially feasible. When deciding on project approval, the question is whether the alternatives are actually feasible. Further, CEQA does not require an EIR to explore offsite project alternatives every case. The requirement that an EIR describe alternatives to the proposed project applies only to the project as a whole, not to the various facets of the projects, such as grading and access road.

Finally, the court held that City's rejection of Environmentally Superior alternatives as infeasible based on policy considerations – here, the City's interest in promoting transportation alternatives as well as access to its open space for persons with disabilities - was permissible under PRC Section 21081(a)(3).

***In re: Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* (2008) 43 Cal.4th 1143**: Finding Program EIS/R discussed a reasonable range of alternatives to expansion of water storage facilities by dam construction. Failure to include a reduced exports alternative was not an abuse of discretion because CALFED properly applied the rule of reason when it decided to consider in the PEIS/R only alternatives that had the potential to both achieve ecosystem restoration goals and meet current and projected water export demands, and that would provide balanced progress in all four of the program areas.

***Association of Irritated Residents v. County of Madera* (2003) 107 Cal.App.4th 1383**: Agency properly rejected reduced-herd size alternative as

infeasible where substantial evidence demonstrated alternative was economically infeasible and would not achieve the basic objective of the project.

***San Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656**: Appellants contention that EIR needed to include analysis of economic feasibility of alternatives was found to be without merit because it is the public agency, not the EIR, that bears responsibility for making "findings" as to whether "[s]pecific economic, legal, social, technological, or other considerations . . . make infeasible the mitigation measures or alternatives identified in the [EIR]," or whether there are "specific overriding economic, legal, social, technological, or other benefits of the project" that "outweigh the significant effects on the environment."

***Friends of the Old Trees v. Department of Forestry & Fire Protection* (1997) 52 Cal.App.4th 1383**: Defining alternative for the purposes of CEQA as “a description of another activity of project that responds to the major environmental issues identified during the planning process.” Finding that Lead Agency’s review of timber harvest plan (THP) pursuant to certified regulatory program is required to include analysis of alternatives, and inclusion of mitigation could not substitute for discussing project alternatives.

***Laurel Heights Improvement Association v. Regents of the University of California* (1993) 6 Cal.4th 1112**: Upholding Final EIR conclusion that potential cumulative impacts from toxic air emissions were too “speculative” for evaluation. Final EIR’s response to comment expanding on discussion of the possible environmental consequences of an alternative did not trigger recirculation because substantial evidence supported Lead Agency’s decision that there was no new adverse environmental effect or new feasible alternative that was not implemented by the project proponent.

***Sequoyah Hills Homeowners Association. v. City of Oakland* (1993) 23 Cal.App.4th 704**: EIR that did not examine additional “decreased density alternatives” satisfied the information goal of CEQA because the analysis of the additional alternatives would not have eliminated the significant visual impacts from the project. Further, City did not violate CEQA in concluding that a decreased density alternative would be legally infeasible because it would be prohibited by Government Code Section 65589.5(j), which prohibits a local agency from requiring as a condition of approval that the project be developed at a lower density unless the project would have a specific, adverse impact upon the public health or safety that cannot be mitigated without lowering the density.

***Save Our Residential Environment v. City of West Hollywood* (1992) 9 Cal.App.4th 1745**: Finding the extent to which alternatives must be considered in an EIR is governed by a rule of reason, the ultimate objective being whether a discussion of alternatives fosters informed decision-making and informed public

participation. Because EIR stated that no other site was available for proposed senior citizen housing development, and gave reasons for this conclusion, Court held EIR was adequate. The purpose of CEQA was not to generate paperwork, and EIR is not required to discuss infeasible alternatives.

***Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553**: Finding EIR discussed a legally acceptable range of alternatives, that only reasonable alternatives need be examined in EIR, and that the administrative record substantially supported the conclusion that none of the additional sites represented a feasible project alternative or merited extended discussion in EIR. Although the alternatives were not barred from consideration simply because they were submitted by the citizens' group after the expiration of the comment period for EIR, the court held that the timing issue did justify the board's decision to address the alternative sites by means of administrative findings, rather than by commissioning yet another supplemental EIR.

The court held that the board properly relied on a local coastal program for analysis and conclusions in determining the feasibility of additional sites, finding no abuse of discretion in Lead Agency's finding of certain alternatives to be infeasible, based upon inconsistent land-use designations. Lead Agency could properly consider the fact that an alternative site was outside of that Lead Agency's jurisdiction and whether or not a site was owned by the project proponent, in making an assessment of feasibility.

***Citizens of Goleta Valley v. Board of Supervisors* (1988) 197 Cal.App.3d 1167**: Court held that the record failed to provide substantial evidence to support a finding that a scaled-down project alternative was economically infeasible. The fact that an alternative may be more expensive or less profitable is not sufficient to show that the alternative is financially infeasible. What is required is evidence that the additional costs or lost profitability are sufficiently severe as to render it impractical to proceed with the project.

***Laurel Heights Improvement Association v. Regents of the University of California* (1988) 47 Cal.3d 376**: Under CEQA an EIR must include a meaningful discussion of both project alternatives and mitigation measures. The range of alternatives needing to be analyzed is subject to a rule of reason. Equal level of detail not required in the analysis of alternatives, but is not prohibited. No purpose can be served by requiring EIR to engage in sheer speculation as to future environmental consequences.

Finding discussion of alternatives inadequate, where it identified three types of alternatives (no project anywhere, alternative sites at the university's existing campus, and alternative sites off-campus) but provided only one and one-half pages of textual analysis. The discussion of project alternatives must contain analysis sufficient to allow informed decision-making; conclusory comments in

support of environmental conclusions are generally insufficient. Lead Agency's responsibility to discuss alternatives was not dependent upon a showing by opponents of the relocation that feasible alternatives existed.

***City of Del Mar v. City of San Diego* (1982) 133 Cal.App.3d 401**: Court held that City properly rejected project alternatives as infeasible, explaining that the Lead Agency may reasonably rely on various "economic, environmental, social, and technological" factors in evaluating the feasibility of project alternatives. "Feasibility" under CEQA encompasses "desirability" to the extent that desirability is based on a reasonable balancing of such factors.

***Foundation for San Francisco's Architectural Heritage v. City and County of San Francisco* (1980) 106 Cal.App.3d 893**: Court held that Lead Agency made adequate findings that project alternatives were infeasible given their increased construction costs under PRC Section 21081.

***Residents Ad Hoc Stadium Committee v. Board of Trustees* (1979) 89 Cal.App.3d 274**: Discussion of alternatives need not be exhaustive, and is subject to a construction of reasonableness. It requires the production of information sufficient to permit a reasonable choice of alternatives so far as environmental effects are concerned. Alternatives discussion should support Lead Agency's "hard look" at environmental consequences in recognition of the factors described in CEQA.

There is no need for an extended discussion of speculative alternatives. Lead Agency need not devote itself to an extended discussion of the environmental impact of alternatives remote from reality such as those which are of speculative feasibility or could only be implemented after significant changes in governmental policy or legislation.

***County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185**: EIR that lacks a genuine "No Project" alternative or alternatives tied to a reasonably conceived project fails to comply with CEQA's demand for meaningful alternatives.

Related CEQA Portal Topics

- Project Purpose and Objectives (In process)
- Project Description
- Findings (To come)

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Re: Vichy Springs Resort's Comments on Initial Study and Proposed Negative Declaration for Final Closure Plan for the Ukiah Landfill

Dear Mr. Eriksen and Mr. Theile:

This law firm represents Vichy Springs Resort, which is a property and business located at 2605 Vichy Springs Road immediately adjacent to the proposed location of the City of Ukiah's ("City") Final Closure/Post-Closure Maintenance Plan for the Ukiah Landfill ('Final Landfill Closure Plan"). The purpose of this letter is to provide comments on the Initial Study and proposed Negative Declaration prepared by the City in connection with the requirements of the California Environmental Quality Act ("CEQA").

This letter follows up on the previous January 2015 letter submitted by this law firm on behalf of Vichy Springs Resort to the City in conjunction with the landfill closure plan that was then under development. A copy of this January 2015 letter with its original attachments is attached as **Exhibit A**. In this January 2015 letter to the City, Vichy Springs Resort noted the aspects of the landfill closure plan with the potential to have significant adverse environmental impacts, and suggested ways to formulate the Final Landfill Closure Plan to reduce these impacts to less than significant levels. Vichy Springs Resort raised these considerations early in the planning process

with the aim that appropriate environmental mitigation would be incorporated into the Final Landfill Closure Plan such that preparation of an environmental impact report ("EIR") would not be required.

As set forth below, most of the environmental concerns and recommendation presented in Vichy Springs Resort's earlier January 2015 letter were unfortunately disregarded by the City in its preparation of the Final Landfill Closure Plan and associated CEQA Initial Study. Due to the failure to address these environmental concerns in these documents, there is not presently a proper basis for adoption of a Negative Declaration to satisfy CEQA's requirements in connection with the approval and implementation of the Final Landfill Closure Plan.

Moreover, as explained below, the City may not be the appropriate CEQA lead agency for this project given that the discretionary approval of the project rests with the Mendocino County Environmental Health Department which (along with the North Coast Regional Water Quality Control Board) has ordered the City to prepare and implement a Final Landfill Closure Plan. The City is therefore not making a discretionary decision to prepare and implement a landfill closure plan; it is complying with a legal obligation to do so.

The underlying objective of Vichy Springs Resort is neither to halt or delay the implementation of closure of the Ukiah landfill nor to require that an EIR be prepared in conjunction with the approval of the landfill closure plan. Rather, Vichy Springs Resort's underlying objective is to ensure that closure of the Ukiah landfill proceeds in a manner that does not result in significant adverse environmental impacts. If the Final Landfill Closure Plan had addressed the environmental concerns raised by Vichy Springs Resort back in January 2015 then the preparation of an EIR would not now be required. It follows then that, going forward, the necessity of preparing an EIR in in this instance can still be avoided if additional changes are made to the Final Landfill Closure Plan to reduce the environmental impacts discussed herein to a less than significant level.

I. The City May Not Be the Proper CEQA Lead Agency for the Final Landfill Closure Plan

CEQA's environmental impact assessment obligations apply only to "discretionary" projects. CEQA Guideline 15357, Section 21065(c) of California Public Resource Code. An agency that has a mandatory non-discretionary legal duty to undertake or carry out a particular project is, by definition, not exercising discretion.

For any given discretionary project, the agency responsible for preparing the documentation (whether it be an EIR or a Negative Declaration) to comply with CEQA is referred to as the "lead agency." CEQA Guideline 15367 defines a "lead agency" as the "public agency which has the principal responsibility for carrying out or approving a project."

Read together, the above CEQA provisions suggest that when one public agency is exercising its discretion to propose a new project that it would carry out, and another public agency has

responsibility for discretionary approval of a voluntary project proposed by another public agency, then the CEQA lead agency could either be the public agency carrying out the project or the public agency that approves the project. This, however, is not the situation involved with the closure plan for the Ukiah Landfill.

In the case of the Ukiah landfill, the Mendocino County Environmental Health Department and the North Coast Regional Water Quality Control Board have both *ordered* the City to prepare and implement a Final Landfill Closure Plan to avoid further violation of the California Health and Safety Code. As such, although the Mendocino County Environmental Health Department will exercise its discretion in its review and approval of the Final Landfill Closure Plan, the City is not exercising discretion in its decision to proceed with the preparation and implementation of a Final Landfill Closure Plan. The City has non-discretionary legal obligation to do so.

Due to the fact its decision to prepare and implement the Final Landfill Closure Plan is non-discretionary, the City should not serve as the CEQA lead agency for this project. Rather, for this project the CEQA lead agency should be the public agency that is exercising discretion in its review and approval of the Final Landfill Closure Plan – the Mendocino County Environmental Health Department.

II. Adoption of a Negative Declaration Is Improper Because There Is Not Substantial Evidence to Support the Initial Study's Finding Regarding the Absence of Potential Significant Adverse Environmental Effects

In determining whether CEQA requires preparation of an EIR instead of allowing adoption of a Negative Declaration, the critical inquiry is whether the proposed project has been designed and formulated to reduce the potential for adverse environmental impacts to below a level of significance. If there remains a fair argument that the proposed project may have potential significant environmental effects, CEQA requires preparation of an EIR instead of a Negative Declaration. Section 21080(a), 21080(d) and 21100(a) of the California Public Resources Code; *Friends of B Street v. City of Hayward*, 106 Cal.3d 988 (1980). Moreover, CEQA requires that all significant determinations and findings in Initial Studies (which are used to decide whether an EIR or Negative Declaration will be adopted) must themselves be supported by substantial evidence.

A. The Initial Study's Description of the Environmental Setting of the Project Is Inaccurate Due to Its Failure to Describe Vichy Springs Resort's Use on Lands Immediately Adjacent to the Project Site

CEQA Guideline 15125 is titled "Environmental Setting" and provides that CEQA environmental documents such as Initial Studies and EIRs "must include a description of the environment in the vicinity of the project as it exists before the commencement of the project." The official discussion accompanying CEQA Guideline 15125 explains: "Because the concept of significant effects on the environment focuses on changes in the environment, this section requires [CEQA documents] to describe the environmental setting of the project so that the changes can be seen in context." California court decisions have held that the failure to provide

an adequate and accurate description of the environmental setting taints the remainder of the CEQA significance and mitigation analysis due to the absence of proper baseline conditions upon which the environmental impacts of the project and the sufficiency of the proposed mitigation measures can be evaluated. *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus*, 27 Cal.App.4th 713 (1994). As noted below, the description of the environmental setting provided in the Initial Study for the Final Landfill Closure Project is inadequate and inaccurate.

Pages 3-4 of the Initial Study section titled "Environmental Setting" states: "Land adjacent to the landfill property is zoned primarily as rangeland and is used for grazing. Dwellings within 1,000 feet of the landfill property include a group of structures owned by the Vichy Spring Investment Group that are located within 500 feet of the landfill's south property line…" Similarly, the section of the Initial Study on "aesthetics" (which addresses scenic effects) states that "the landfill property is surrounded by rural agricultural and undeveloped lands." The Vichy Springs Resort parcel is rangeland but has a "resort overlay" zoning, and has been in continuous operation since 1854.

This description of the environmental setting of the landfill site fails to take account of the Vichy Springs Resort located immediately adjacent to the project site, which is a historic resort with extensive grounds where day and overnight visitors come to enjoy the healthful spring-fed baths, clear air, beautiful scenery and bucolic quiet of the location. The statement in the Initial Study that there are a "group of structures owned by the Vichy Springs Investment Group" within 500 feet of the property line" provides no information whatsoever as to the particular uses of this property, or how these particular uses might be impacted by adverse noise, dust, hydrologic and scenic impacts associated with the proposed Final Landfill Closure Plan. Furthermore, when the uses associated with the adjacent Vichy Springs Resort are taken into account, the Initial Study's statement that the landfill project site is "surrounded by rural agricultural and undeveloped lands" is plainly inaccurate, and misleadingly suggests the landfill closure activities will take place in a remote, undeveloped, uninhabited area rather than right next door to an active, well-established resort whose 50,000 visitors per year come for the clean air, quiet, natural hot mineral spring water and beautiful views.

It should also be noted that the Initial Study inaccurately states that the Vichy Springs Resort property is owned by the Vichy Springs Investment Group. In 1990, the Vichy Springs Investment Group was dissolved and title to the Vichy Springs Resort property was conveyed to Gilbert and Marjorie Ashoff (who remain the owners).

As explained further below, the failure of the Initial Study to take account of the adjacent uses by Vichy Springs Resort in its description of the environmental setting for the Final Landfill Closure Plan tainted the remainder of the Initial Study's analysis of potential noise, dust, hydrologic and scenic impacts.

In addition to the omission of any discussion of the adjoining Vichy Springs Resort, there are also certain other inaccuracies in the environmental setting sections of the Initial Study for the

Final Landfill Closure Plan that should be noted. The Initial Study refers to the "Gun Club Parcel" and alleges that this parcel was purchased by the City to create a buffer zone between the Ukiah Landfill and future development. The Initial Study did not disclose that the use of the Gun Club Parcel as a shooting range by a private club (that leases the property from the City) is now a non-conforming use under the County Code, and that expansion of the private club's facilities (including but not limited to unpermitted construction and/or renovation of new/old buildings and new shooting ranges) in recent years may be inconsistent with this non-conforming use status. The Initial Study also refers to the use of certain portions of the Ukiah landfill property as a shooting range for City of Ukiah police department personnel. The Initial Study did not disclose that utilization of the landfill property for this purpose is also a non-conforming use, and that the use permit for these shooting range activities expired years ago when the City police department discontinued its shooting activities on the site. As a result of the expiration of the use permit, the recent resumption of shooting range activities on the landfill property may also be unlawful.

B. There Is Not Substantial Evidence to Support the Initial Study's Finding Regarding the Potential Impact of Construction-Related Fugitive Dust on the Neighboring Vichy Springs Resort

The air quality section of the Initial Study acknowledges that the Mendocino County Air Quality Management District ("MCAQMD") is "currently defined as 'non-attainment' for the PM10 (particulate matter) standard" and that a primary source of particulate matter is "fugitive dust." The air quality section of the Initial Study also concedes: "It is noted that surface disturbances from the proposed project may create dust that would require mitigation and control." The air quality section further states (somewhat confusingly): "Thresholds [of significance for CEQA purposes] for fugitive dust are set at 54 and 82 pounds per day for indirect emissions. No emission thresholds are established for construction related fugitive dust emission which are set at levels that are controllable with the implementation of best management practices." This section is hard to follow, but it suggests the following: the area where the project is located is already out of attainment for particular matter, that a primary source of particular matter is fugitive dust, that the construction phase of the project may create dust, that the CEQA threshold of significance for fugitive dust is 54 and 82 pounds per day for indirect emissions, and that there may not be ways to bring project dust levels down below these thresholds of significance though best management practices.

The Initial Study includes the following mitigation measures to address fugitive dust: MM 4.3-5 ("All land clearing, grading or earth moving activities shall be suspended as necessary, based on site conditions, to prevent excessive windblown dust when winds are expected to exceed 20 mph"); and MM 4.3-6 ("All inactive portions of the construction site shall be covered, seeded, or watered until a suitable cover is established"). Winds in this area generally do not approach 20 miles per hour except during winter storms, when construction activities would likely be suspended.

From a CEQA compliance standpoint, there are several shortcomings to the Initial Study's analysis and mitigation of fugitive dust impacts, and its conclusory finding that the project will not have the potential for significant air quality impacts.

First, CEQA requires that an Initial Study analyze the potential for significant "cumulative" environmental impacts as well the potential for significant "project-specific" impacts. Section 21083(b) of the California Public Resources Code, CEQA Guideline 15065(c). CEQA Guideline 15065(c) provides that impacts are cumulatively significant when the following conditions exist: "The project has possible effects which are individually limited but cumulatively considerable. As used in the subsection, 'cumulatively considerable' means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of current projects and the effects of probable future projects." The Initial Study confirms that the area where the landfill closure project is located is already "non-attainment" for particulate matter, indicating already degraded local air quality conditions. Yet, the Initial Study does not contain any cumulative impact analysis to evaluate whether the incremental fugitive dust generated by landfill closure activities are considerable when considered in the context of past, present and probable future activities that have, are and/or will contribute additional particulate matter to air in the vicinity of the project.

Second, the Initial Study states the applicable CEQA threshold of significance for fugitive dust is "54 and 82 pounds per day." Is the applicable CEQA fugitive dust threshold for the Ukiah landfill closure project 54 pounds per day? 82 pounds per day? Somewhere in between 54 and 82 pounds per day? The Initial Study provides no clarification, so readers are not told what threshold is being looked to for purposes of making a CEQA significance determination.

Third, although the Initial Study reveals that 3,500 cubic yards of soil will be imported during the construction phase of the landfill closure project, the Initial Study does not provide a quantified estimate of the amount (in terms of pounds) of fugitive dust that will be generated daily during the six-month construction phase of the project. Without this quantified estimate, it cannot be determined whether the project's fugitive dust violates the "54 and 82 pounds" daily threshold for fugitive dust.

Fourth, MM 4.3-5 and MM 4.3-6 mitigation measures are worded in a way that suggests they may be of limited effect. For example, there are no criteria in these mitigation measures for determining what is meant by "as necessary, based on site conditions." As another example, the obligation to cover or water areas only applies to "inactive portions" but there are no criteria for determining which if any portion of the landfill area will be considered "inactive" during the construction phase of work. Presumably, during the construction phase of the project, the entire landfill might be deemed "active," rendering this mitigation measure entirely inapplicable to the project. Furthermore, to the extent that these mitigation measures are intended to reduce otherwise significant fugitive dust impacts to less than significant impacts, there is no analysis or data to support the finding that these mitigation measures will achieve this result (and in fact other parts of this section suggest that such best management practices will not bring dust levels below significance levels). CEQA mitigation measures that are vague or undefined have been

held inadequate. *San Franciscans for Reasonable Growth v. City & County of San Francisco*, 151 Cal.App.3d 61 (1984); *Kings County Farm Bureau v. City of Hanford*, 221 Cal.App.3d 692 (1990). As noted in §14.7 the CEB treatise Practice Under the California Environmental Quality Act, "[A]gencies should be cautious about relying on vague, incomplete or untested mitigation measures" because a court may find the CEQA document "inadequate if suggested mitigation measures are so undefined that it is impossible to evaluate their effectiveness."

Fifth, CEQA Guideline 15126 states: "The discussion of mitigation measures shall distinguish between measures which are proposed by the project proponents to be included in the project and other measures that are not included but could be reasonably expected to reduce adverse impacts if required as conditions of approving the project." The Initial Study does not indicate or discuss whether MM 4.3-5 and MM 4.3-6 are included in the actual Final Landfill Closure Plan.

Finally, given the proximity of the landfill project site to the Vichy Springs Resort, there is no analysis in the Initial Study of the levels of fugitive dust that would affect employees and visitors at the resort, in particular visitors using the outdoor baths and extensive landscaped grounds. As explained above, the absence of this analysis is due in part to the underlying failure of the Initial Study to identify the Vichy Springs Resort in its description of the environmental setting for the project.

C. There Is Not Substantial Evidence to Support the Initial Study's Finding Regarding the Potential Impact of Construction-Related Noise on the Neighboring Vichy Springs Resort

The Initial Study chapter on noise begins with a table, which asks whether the project would result in a "substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project,"

The Initial Study chapter on noise states (in terms of threshold criteria) that the proposed project would result in significant adverse noise impacts if: there is an increase of three decibels (dB) which creates an area of noise/land use incompatibility; the proposed project generates noise that would contribute to noise levels that exceed the State noise/land use compatibility guidelines which allow for exterior noise levels up to 70 dB; the proposed project generates noise that exceeds the thresholds prescribed in Appendix C of the Mendocino County Municipal Code (Title 20). The Initial Study chapter on noise further states that, pursuant to Appendix C of the County Municipal Code, the stationary noise standards for light and heavy industrial use are 70 and 75 dB and "these levels are not to be exceeded for more than 30 minutes in any hours throughout an entire day."

The Initial Study chapter on noise states: "Noise generation from the proposed project would result from construction activities including on-road trucking and from temporary operations such as grading and excavation and work related to placement and construction of the final cover."

In its analysis of whether the project would result in a "substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project" the Initial Study chapter on noise states: "The proposed project will include the use of various types and sizes of construction equipment…stationary equipment such as pile drivers, jackhammers, pavement breakers, blasting operations, etc. produce variable and sporadic noise levels and often produce impact-type noises…For impact equipment, the noise is produced by the impact of a mass on a surface, typically repeating over time…Mobile equipment such as bulldozers, excavators, scrapers, graders, etc. may operate in a cyclic fashion in which a period of full power is followed by a period of reduced power."

The Initial Study chapter on noise states (again somewhat confusingly): "The noise levels for the types of equipment expected to be used for the proposed project ranges from 60-90 decibels. These noise levels exceed the levels as set forth in the Mendocino General Plan; however due to the proximity of the project site in a rural area, with greater than 500 feet of separation to residential properties, construction noise levels that exceed 70 dB could result in potential impacts to residences and wildlife. However, maintaining separation from residences and noise-sensitive biotic habitat, plus implementation of the standard measures identified at the end of this section, will maintain construction equipment noise impacts at less than significant levels."

The Initial Study includes the following mitigation measures to address construction-related noise impacts: MM 4.12-1 ("Construction activities shall comply with Mendocino County conditions with respect to hours of lesser noise sensitivity") and MM 4.12-2 ("Noise generating activities at the construction site or in areas adjacent to the construction site associated with the project in any way should be restricted to the hours of 7:00 am to 6:00 pm, Monday through Friday. No construction activities should occur on weekends or holidays").

From a CEQA compliance standpoint, there are several shortcomings to the Initial Study's analysis and mitigation of construction-related noise impacts, and its conclusory finding that the project will not have the potential for significant construction-related noise impacts.

First, the Initial Study concedes that the equipment used during the construction phase of the landfill closure project will exceed the applicable 70 dB limit in the Mendocino County Municipal Code. However, beyond this concession, the Initial Study does not include quantitative analysis of which particular equipment used during the project will exceed the 70 dB limit, which should serve as threshold for determining whether the noise generated constitutes a significant adverse environmental impact. Without information as to which equipment exceeds this threshold there is not substantial evidence upon which to find that such exceedances have been mitigated/reduced to less than significant levels.

Second, the Initial Study notes provisions of the Mendocino County Municipal Code that prohibit industrial noise levels about 75 dB for more than 30 minutes a day. The Initial Study, however, does not then provide any quantitative information as to how many minutes/hours a day there will be exceedances of this 75 dB level, which should serve as a threshold for determining whether the noise generated constitutes a significant adverse environmental impact.

Without information as to how many minutes/hours a day there will be exceedances of this 75 dB level, there is not substantial evidence upon which to find that the periods of such exceedances have been mitigated/reduced to less than significant levels.

Third, give the proximity of the landfill project site to the Vichy Springs Resort, there is no analysis in the Initial Study of the construction-related noise impacts that would affect employees and visitors at the resort. More specifically, there are overnight guests at Vichy Springs Resort who come to vacation and frequently sleep in as late at 9:00/9:30 am (yet the Initial Study indicates construction activities will begin on weekdays at 7:00 am). Beyond interfering with the morning sleep of visitors to Vichy Springs Resort, there is also no analysis of how daytime construction noise will adversely affect the experience of resort visitors using the outdoor baths or enjoying the resort's extensive landscaped grounds. As explained above, the absence of this analysis of noise impacts is due in part to the underlying failure of the Initial Study to identify the Vichy Springs Resort in its description of the environmental setting for the project. In particular, in its section on noise impacts, the Initial Study refers to "the proximity of the project site in a rural area with greater than 500 feet of separation to residential properties" – a description that inexplicably ignores the presence of the Vichy Springs Resort and the resort's overnight visitors and day visitors that come for the quiet. These considerations are why, in its previous January 2015 letter to the City (see **Exhibit A**), Vichy Springs Resort had recommended a 9:00 am weekday start time for construction and a prohibition on construction activities in the May through September peak season for Vichy Springs Resort.

Fourth, the Initial Study concedes that the proposed project would use "pile drivers, jackhammers, pavement breakers, blasting operations, etc. produce variable and sporadic noise levels and often produce impact-type noises…For impact equipment, the noise is produced by the impact of a mass on a surface, typically repeating over time…Mobile equipment such as bulldozers, excavators, scrapers, graders, etc. may operate in a cyclic fashion in which a period of full power is followed by a period of reduced power." There is no analysis of these sporadic, repetitive, cyclic noises on neighboring properties in general, and on the visitors to the Vichy Springs Resort in particular.

Fifth, in addition to the operational noises related to construction equipment identified in the Initial Study, there is also noise associated with the reverse beepers on trucks and vehicles that will operate onsite. These are the loud beepers that go off whenever a construction truck or vehicle moves in reverse. In its January 2015 letter, Vichy Springs Resort had recommended that these reverse beepers be turned off/disabled to reduce noise impacts for resort visitors.

Sixth, as noted above, CEQA Guideline 15126 states: "The discussion of mitigation measures shall distinguish between measures which are proposed by the project proponents to be included in the project and other measures that are not included but could be reasonably expected to reduce adverse impacts if required as conditions of approving the project." The Initial Study does not indicate or discuss whether MM 4.12-1 and MM 4.12-2 are included in the actual Final Landfill Closure Plan.

Finally, to the extent that mitigation measures MM 4.12-1 and MM 4.12-2 are intended to reduce otherwise significant construction-related noise impacts to less than significant levels, there is no analysis, data or other substantial evidence to support the finding that these mitigation measures will achieve this result.

D. Due to the Lack of Any Analysis of the Impact of Project Groundwater Wells on the Pressure and Temperature of Hydrologically Connected Springs Essential to the Vichy Springs Resort, There Is Not Substantial Evidence to Support the Initial Study's Finding Regarding the Potential for Significant Adverse Hydrological Impacts

In the previous January 2015 letter submitted to the City on CEQA issues related to the closure plans for the Ukiah Landfill (see **Exhibit A**), we explained that in March 1993, as part of efforts to monitor the effect of the landfill on groundwater located beneath the site, the City installed and began operation of a series of groundwater wells located close the property line with Vichy Springs Resort. The wells installed and operated by the City in the 1993 resulted in a sudden and severe decrease in the pressure and temperature of the springs utilized by the Vichy Springs Resort. This decrease in the pressure and temperature of the spring water that serves Vichy Springs Resort had a devastating impact on the resort's business. According to Gilbert Ashoff, owner of the Vichy Springs Resort: "Under the direction of Damon Brown, testing wells were drilled that immediately impacted the springs. Right after the landfill wells went in, there was a 20 degree Fahrenheit drop in mineral water temperature and we lost more than half of the mineral water flow due to reduced pressure. It took more than a year for these temperature and flow conditions to recover, and during that year the resort lost one-third of its business because visitors come here for warm mineral waters, not cold mineral waters. The resort's long-term reputation was also damaged for many years as a result of this situation."

As explained in the attached letter by Alisto Engineering's Al Sevilla, included as **Exhibit B**, the presence and operation of these wells as part of the Final Landfill Closure Plan without adequate study of subsurface conditions continues to pose a serious and substantial potential ongoing threat to the pressure and temperature of the spring waters upon which the Vichy Springs Resort relies. This threat relates to what is called an "adiabatic reaction" that occurs when a pressurized underground fault (such as the one where the Vichy Springs mineral waters are located) is connected to a non-pressurized underground fault (such as the one created by the landfill wells installed by the City). In his letter attached as **Exhibit B**, Mr. Sevilla recommends that before proceeding with the landfill closure plan there should be a thorough investigation of the potential for the operation of the project wells to cause an adiabatic reaction in the pressurized mineral waters that serve Vichy Springs Resort.

In its previous January 2015 letter, Vichy Springs Resort called upon the City (and other agencies reviewing and approving the Ukiah landfill closure plan) to undertake a thorough analysis of the hydrologic connections between the groundwater under the landfill and the adjacent spring waters, and to determine the extent to which the continued operation of groundwater wells may impact the pressure and temperature of the spring waters on the Vichy

Springs Resort's property. The January 2015 letter also asked the landfill closure plan to include appropriate mitigation measures to address the potential impact identified in this analysis.

As detailed below, the spring water-related concerns and requests presented by Vichy Springs Resort in its January 2015 letter were disregarded altogether in the Final Landfill Closure Plan and Initial Study prepared by the City.

There is a section in the Initial Study (on pages 50-59) on "Hydrology and Water Quality." At the beginning of this section, there is table which lists 16 different potential hydrological impacts resulting from the landfill closure project (along with the City's determination of whether these potential effects of these 16 listed impacts were found to be less than significant). Importantly, the Initial Study's list of 16 potential hydrological impacts did not include any relating to potential project impacts on adjacent spring waters, impacts on the water pressure in such spring waters, or the impacts on the water temperature in such spring waters. As a result of these omissions, the "Hydrology and Water Quality" section of the Initial Study contains no analysis of these potential spring water impacts, no determinations of whether there is the potential for significant adverse impacts on spring water, and no mitigation measures to address potential impacts on spring waters.

As reflected in the attached letter by Al Sevilla of Alisto Engineering (see **Exhibit B**), and in the information presented in Vichy Springs Resort's January 2015 letter (see **Exhibit A**), the administrative record before the City presents a fair argument supported by expert opinion of the potential of the project's groundwater wells to have significant adverse impacts on the spring waters upon which Vichy Springs Resort relies. Under these circumstances, reliance on an Initial Study (and the related adoption of a Negative Declaration) for the Final Landfill Closure Plan that failed to identify, assess and properly mitigate these spring-related hydrologic impacts would violate CEQA.

E. There Is Not Substantial Evidence to Support the Initial Study's Findings Regarding the Potential for Significant Adverse Scenic Impacts of the Proposed Cover for the Landfill

In its previous January 2015 letter to the City on CEQA issues, Vichy Springs Resort included an attachment with a map showing those areas of the City's landfill property that are visible from the grounds of the Vichy Springs Resort (see **Exhibit A**). This attachment/map was provided to demonstrate that the property on which the landfill is located is visible from the Vichy Springs Resort. In its January 2015 letter, to address concerns about adverse scenic impacts, Vichy Springs Resort called for the articulation of objective revegetation benchmarks as part of a revegetation plan and setting aside adequate long-term funding to ensure post-construction revegetation occurs.

To provide a clearer sense of the current baseline scenic conditions of the landfill area, Vichy Springs Resort has attached an early April 2016 color photograph of the landfill area (see **Exhibit C**) which shows the natural grasses and green landscape that have developed on top of the landfill since its stopped operating 15 years ago. Parts of the landfill area depicted the

photograph attached as **Exhibit C** are visible from homes on Fawnwood Drive in Deerwood Park and Ridgeview Drive in El Dorado Estates.

The aesthetics section of the Initial Study states: "The project site property consists of a 283.5 acre rural parcel of land of which approximately 40 acres of the property is occupied by the landfill unit. The Ukiah Landfill began refuse disposal operations in 1955 and ceased operations in 2001. As discussed herein **the landfill property is surrounded by rural agriculture and undeveloped lands**…The project site property has been significantly altered by past landfilling activities and is not considered to be a scenic or aesthetic resources in its altered conditions. The proposed project includes the closure of the landfill that consists of the placement of final cover material…The landfill surface will consist of a **geosynthetic final cover layer**…Project implementation will not result in any potentially significant visual impacts. Therefore, no mitigation measures are required" (bold emphasis added).

From a CEQA compliance standpoint, there are several shortcomings to the Initial Study's analysis of scenic impacts, and its finding that the project will not have the potential for significant adverse scenic impacts.

First, in terms of scenic resources and impacts, the Initial Study's study description of the environmental setting (baseline conditions) for the project is inaccurate. The Initial Study's claim that "the landfill property is surrounded by rural agriculture and undeveloped lands" ignores the presence of the Vichy Springs Resort located adjacent to the landfill site as well as the views of the landfill site from several nearby residences and roads. The Initial Study makes no mention that visitors at the Vichy Springs Resort, the people who live in these nearby residences, and the neighborhood people who travel on the nearby public roads (in particular the public road that goes right through the landfill property) all have views of the area where the landfill closure project will take place.

Second, again in regards to the environmental setting (baseline conditions) against which scenic impacts are evaluated, the Initial Study has not provided adequate or accurate information about existing views. The Initial Study states that the "project site has been significantly altered by past landfilling activities" but does not actually provide any information about the current scenic conditions of the landfill property. More specifically, the Initial Study does not acknowledge that, since the landfill ceased operations in 2001, the area on top of the landfill has been naturally revegetated with grasses that have allowed the landfill site to increasingly blend in with its natural surroundings. The natural grass vegetation that has developed in the project area over the past 15 years is depicted in the photograph attached as **Exhibit C** to this letter. As part of the Final Landfill Closure Plan, the natural grasses that have returned to the landfill area since 2001 will be torn out and replaced with a "geosynthetic" cover – more commonly known as "astroturf." The result will be a 40-acre patch of geosynthetic astroturf in the middle of a natural grass landscape. The Initial Study section on aesthetics provides no information about the visual aspects of the proposed astroturf landfill cover to enable a determination to be made as to whether the astroturf cover results in a potentially significant adverse scenic impact vis-à-vis the existing natural grass conditions on the project site. For example, the natural grass of the

surrounding hillsides will be brown in the summer/early fall while the 40-acre synthetic astroturf landfill cover patch in this hillside landscape will be bright green during the summer/early fall.

Third, the Initial Study section on aesthetics confirms that the Policy RM-128 of the Resources Management Element of the County's General Plan provides for protection of the County's "natural landscapes." As noted above, the proposed Final Landfill Closure Plan calls for the removal of natural grasses on the landfill site that would be replaced with a geosynthetic astroturf cover. These changes are inconsistent with the protection of natural landscapes required under the County's General Plan.

For the reasons noted above, from the information in the administrative record, there is a fair argument that the proposed cover in the Final Landfill Closure Plan has the potential for significant adverse scenic impacts. Such potential adverse scenic impacts could be mitigated through the preparation and implementation of the revegetation plans focused on the restoration of natural grasses rather than the installation of a synthetic cover. The cost of developing and implementing a natural grass revegetation plan for the landfill cover may not be as inexpensive as simply putting on a synthetic astroturf cover, but this revegetation option is the type of feasible alternative and mitigation that must be considered under CEQA when there is the potential for such significant adverse scenic impacts.

III. Conclusion

For the reasons set forth in this letter, as well as other information in the administrative record, the Initial Study is legally inadequate and there is a fair argument that the proposed Final Landfill Closure Plan has the potential for significant adverse air quality, noise, hydrologic and scenic impacts. The adoption of a Negative Declaration based on the Initial Study would therefore be unlawful under CEQA. Vichy Springs Resort therefore requests either that the plan is modified so that the potential significant adverse environmental effects identified above are reduced to a less than significant level, or in the alternative, that an EIR is prepared prior to approval of the Final Landfill Closure Plan.

Yours,



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Attorney for VICHY SPRINGS RESORT

Exhibits: A – January 15, 2015 Letter from Vichy Springs Resort's Legal Counsel to City on CEQA Landfill Closure Issues (with original attachments)
B – April 6, 2016 Letter from Al Sevilla of Alisto Engineering
C – April 2016 Baseline Photographs of Ukiah Landfill Area

Cc: Trey Strickland, Mendocino County Environmental Health Department
Terry Cia, North Coast Regional Water Quality Control Board
Sage Sangiacomo, City Manager for City of Ukiah
David J. Rapport (Rapport and Marston), City Attorney for City of Ukiah
Gilbert Ashoff, Vichy Springs Resort

Exhibit A

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January 15, 2015

Via Electronic and First Class Mail

Jane Chambers, City Manager
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Tim Eriksen, Director and City Engineer
City of Ukiah Department of Public Works
300 Seminary Avenue
Ukiah, CA 94382

David J. Rapport, City Attorney
Rapport and Marston
405 W. Perkins Street
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Ukiah, CA 95482

Re: Ukiah Solid Waste Disposal Site, SWIS No. 23-AA-0019 – CEQA Review of Proposed Closure Plan

Dear Ms. Chambers, Mr. Eriksen, and Mr. Rapport:

This law firm represents Vichy Springs Resort ("Vichy Springs") located at 2605 Vichy Springs Road in the County of Mendocino. This letter concerns the development and implementation of a Closure Plan for the City of Ukiah's ("City") Ukiah Solid Waste Disposal Site ("Ukiah Landfill") located at 3100 Vichy Springs Road, which is adjacent to Vichy Springs. This letter supplements the letter sent to the City by Gilbert Ashoff (the owner of Vichy Springs) on October 22, 2014 (see Attachment 1).

Given its border with the Ukiah Landfill, Vichy Springs will be acutely and directly impacted by activities and permanent features on the Ukiah Landfill site. Vichy Springs is encouraged that, 14 years after the Ukiah Landfill stopped accepting garbage and solid waste deliveries, the City appears finally to be moving ahead with the completion and implementation of a Closure Plan. Vichy Springs intends to work closely and collaboratively with the City (and with the other agencies involved in reviewing and approving the Closure Plan) to ensure that the

Closure Plan is adequate and appropriately addresses several issues affecting Vichy Springs. Addressing these issues early on will help ensure that implementation of the Closure Plan can proceed expeditiously.

By this letter, Vichy Springs requests that the City's review of the Ukiah Landfill Closure Plan pursuant to the California Environmental Quality Act ("CEQA") properly mitigate the adverse traffic, spring water, noise, dust, and scenic impacts on the neighboring Vichy Springs property. As discussed below, if appropriate mitigation of such impacts is properly incorporated into the Closure Plan, this should enable the City to comply with CEQA's environmental impact assessment requirements via adoption of a Negative Declaration, rather than through preparation of an environmental impact report ("EIR"). Proceeding via a Negative Declaration, in turn, would enable the City to put its resources into the actual implementation of the Closure Plan, rather than into the preparation of an EIR.

II. CEQA Review of the Proposed Ukiah Landfill Closure Plan

In September 2014, the North Coast Regional Water Quality Control Board ("Regional Water Board") issued an order to the City requiring the preparation and implementation of a Closure Plan for the Ukiah Landfill (Attachment 2). The Mendocino County Environmental Health Division also issued a notice requiring the City to finalize and implement a Closure Plan for the Ukiah Landfill. In its September 2014 order to the City, the Regional Water Board clarified that CEQA review would be required for all project components associated with the approval of the Closure Plan. Some additional background information is useful to appreciate the Regional Water Board's finding regarding the need for CEQA review in connection with the Ukiah Landfill closure.

The City has been working on its plans for the closure of the Ukiah Landfill since the late 1990s. On July 20, 2000, before the City had finalized or obtained approval of a closure plan for the Ukiah Landfill, the City issued a Notice of Determination for the "Ukiah Landfill Final Closure and Post-closure Maintenance Plan" (Attachment 3), finding that the project would not have a significant effect on the environment and adopting a Negative Declaration. For three reasons, the July 2000 Negative Declaration does not satisfy the City's current CEQA obligations in connection with the Closure Plan now being developed.

First, under CEQA, the time period in which to challenge an adopted Negative Declaration does not begin to run until the underlying project (that is the subject of the Negative Declaration) has first been approved. This is made clear in California Public Resources Code sections 21167 and 21152 and CEQA Guideline section 15112, which all provide that the limitations period to challenge an adopted Negative Declaration is contingent on the actual approval of the project in question. Pursuant to these CEQA provisions, a challenge to a Negative Declaration for a project that had not been approved would not be ripe (would be premature). In the case of the Ukiah Landfill, as evidenced by the September 2014 Regional Water Board order and the 2014 Mendocino County Environmental Health Division order, to date the City's Closure Plan has never been finalized or approved. As such, the limitations

period to challenge the July 2000 Negative Declaration (before the Closure Plan was finalized and approved) has not yet even begun to run.

Second, quite apart from the fact that the City's Closure Plan for the Ukiah Landfill has never been finalized or approved, the scope of the Closure Plan being considered back in 2000 is considerably different and more limited than the scope of the Closure Plan the Regional Water Board called for in its September 2014 order to the City, particularly in regard to the rigor and scope of CEQA analysis required for projects with water resource impacts. Additionally, obligations under CEQA have changed since 2000. Pursuant to section 21166 of the California Public Resources Code and CEQA Guideline section 15162, when there are significant changes to a proposed project for which previous CEQA environmental review has taken place, CEQA requires that "supplemental" environmental review take place (through either a supplemental Negative Declaration or a supplemental EIR that assesses the impacts associated with these project changes).

Finally, in adopting the prior negative declaration, the City did not provide notice to Vichy Springs or an opportunity to comment as required by law. *See* Cal. Pub. Res. Code § 21092, CEQA Guidelines § 15072. Because Vichy Springs' property is contiguous with that of the landfill, the City should have directly notified Vichy Springs of its adoption of a negative declaration. Cal. Pub. Res. Code § 21092(b)(3)(C). This notice was not provided prior to adoption of the negative declaration.

Going forward, in terms of whether CEQA requires preparation of an EIR instead of allowing adoption of a Negative Declaration, the critical inquiry is whether the proposed project has been designed and formulated to reduce all adverse environmental impacts to below a level of significance. If there remains a fair argument that there is substantial evidence that the proposed project may have significant environmental impacts, then CEQA requires the preparation of an EIR instead of a Negative Declaration. Cal. Pub. Res. Code §§ 21080(a), 21080(d), 21100(a); *Friends of B Street v. City of Hayward*, 106 Cal.App.3d 988 (1980). For the City to lawfully meet its CEQA obligation by adopting a Negative Declaration for its proposed Ukiah Landfill Closure Plan, the City will therefore need to design and formulate the Closure Plan so that there is not a fair argument that there is substantial evidence that the plan could have significant environmental effects. The points below will help the City to prepare a Closure Plan that would allow for the adoption of a Negative Declaration.

II. Ukiah Landfill Closure Plan Impacts of Concern to Vichy Springs

Vichy Springs is a natural warm mineral springs resort located in the County of Mendocino. It has operated uninterrupted since 1854. The first accommodations buildings were constructed in 1852 and are the oldest standing structures in Mendocino County. The pool at Vichy Springs is the oldest pool in California north of San Francisco. It is designated by Mendocino County as a cultural and historical resource and by California as a historical landmark. Vichy Springs offers the only naturally warm and carbonated "Vichy" mineral baths in North America.

The entrance to the Ukiah Landfill adjoins Vichy Springs. Its entrance is approximately 200 feet from Vichy Springs, and the farthest point of Ukiah Landfill is approximately a half-mile from Vichy Springs. We attach a series of maps (Attachments 4 – 7) to show the relative locations of Vichy Springs and the Ukiah Landfill and to serve as a point of reference for the concerns discussed below.

A. Spring Water Impacts on Vichy Springs

As the name "Vichy Springs Resort" suggests, the reputation of the resort is tied to its steady supply of high quality natural warm and carbonated mineral spring water. The opportunity to bathe in this water is one of the primary reasons people come to stay at the resort. Reductions in the supply, quality, or temperature of this "Vichy" water, therefore, have a direct impact on the resort's operations and economic viability.

On March 15, 1993, as part of its effort to monitor the effects of the Landfill on groundwater beneath the site, the City installed a series of monitoring wells, on property later acquired by the City, that were close to the property line with Vichy Springs, against the wishes of Vichy Springs. The installation of the monitoring wells caused the pressure of the springs at Vichy Springs to drop from 65 gallons per minute to 30 gallons per minute. The pressure remained at 30 gallons per minute for two months before gradually climbing back to 65. The monitoring wells also caused the temperature of the spring water to drop from 90° to 72° Fahrenheit. Over two months it slowly recovered to 80°, taking a year to fully recover to 90°. There is a fragile pressure zone where the Vichy Springs water originates that the monitoring wells damaged. The locations of the monitoring wells and fragile mineral springs are shown in Attachment 4. The drop in pressure and temperature adversely affected the business of Vichy Springs, which, as noted above, relies on consistent, warm spring water for its guests. It took approximately one year for the pressure and temperature of the springs to return to normal levels.

The experience in the early 1990s confirms the connection between groundwater on the Ukiah Landfill property and the springs on the Vichy Springs' property. Given this phenomenon, the operation of any groundwater monitoring or treatment wells as part of the Ukiah Landfill Closure Plan has the potential to interfere with the supply and temperature of the spring water on Vichy Springs' site. Any contamination that leaks from the Ukiah Landfill into groundwater beneath it, and any drilling that creates pathways for these contaminants, also has the potential to contaminate the spring water on the Vichy Springs property.

In light of these circumstances, Vichy Springs requests that the City (and other agencies reviewing the Ukiah Landfill Closure Plan) undertake comprehensive and thorough analysis of the hydrologic connections between the groundwater under the landfill and the adjacent spring waters. Vichy Springs further requests comprehensive and thorough analysis of the extent to which the installation and operation of groundwater wells and the remedy for the landfill itself (e.g., lining/encasement) may impact the supply, temperature, and quality of spring waters on the adjacent Vichy Springs property. The final Ukiah Landfill Closure Plan should then include appropriate mitigation measures to address potential impacts identified in this analysis.

B. Noise Impacts on Vichy Springs

Vichy Springs' guests expect quiet, rest, and relaxation when visiting the resort. Given that peaceful tranquility is an essential reason for why guests visit, Vichy Springs is a particularly noise-sensitive area. We anticipate that implementation of the landfill closure will require the use of heavy equipment, the noise of which could disturb guests of Vichy Springs and adversely affect their experience while visiting. Guest sleeping areas are shown on the map in Attachment 5.

To address these concerns, Vichy Springs requests that City (and other agencies reviewing the Ukiah Landfill Closure Plan) undertake comprehensive and thorough technical analysis of the noise impacts of closure plan implementation on guests and visitors to the adjacent Vichy Springs, with particular attention to the effects of construction equipment on Vichy Springs guests that are using the mineral baths and swimming pool, hiking or walking the 700-acre reserve land, or staying overnight. This analysis should include detailed information about the noise levels and noise types associated with landfill closure activities, the proximity of the sources of these noises to the baths and sleeping quarters at Vichy Springs, and an assessment of how these noises/noise levels are likely to impact persons using the baths or sleeping overnight (from 9 pm to 9 am). The final Ukiah Landfill Closure Plan should then include appropriate mitigation measure to address potential impacts identified in this analysis. These appropriate mitigation measures may include the following: (1) prohibiting the use of heavy-equipment back-up beepers; (2) restricting the idling of trucks and other heavy-equipment; (3) scheduling work outside of the Vichy Springs' peak season which is from May through September; (4) limiting closure plan activities that will be audible at Vichy Springs, including delivery and pick-up by heavy trucks, to weekdays between 9:00 am and 5:00 pm and prohibit such work on weekends.

C. Dust Impacts on Vichy Springs

The use of heavy equipment and other construction activities (e.g., soil excavation and stockpiling) may disturb dirt and dust, which could then travel to and affect air quality at Vichy Springs. The airborne dust and dirt could adversely impact the experience of visitors to the resort (especially swimming pool and mineral bath usage) and could also contaminate the mineral springs. The landfill and the dump borrow area are both areas of concern for dust and are indicated on the map in Attachment 6.

To address these concerns, Vichy Springs requests that the City (and other agencies reviewing the Ukiah Landfill Closure Plan) undertake comprehensive and thorough analysis of the dust (airborne particulate matter) impacts of closure plan implementation on guests and visitors to the adjacent Vichy Springs, with particular attention to the effects on mineral pool quality, persons using the swimming pools and baths, and guests hiking on the 700-acre reserve. The final Ukiah Landfill Closure Plan should then include appropriate mitigation measures to address potential impacts identified in this analysis. These appropriate mitigation measures may include: (1) limiting or prohibiting excavation and other dust-inducing activities in areas in close

proximity to the property line with Vichy Springs; and (2) the use of water and tarps to prevent dust on the Ukiah Landfill site from drifting onto the Vichy Springs property.

D. Scenic and Visual Impacts on Vichy Springs

Vichy Springs resort is known for its bucolic grounds, scenery, and surrounding vistas. If the proposed landfill plan results in an adjacent property of barren and unvegetated land, this may result in an eyesore for guests and visitors to the resort (as well as for the larger surrounding community). CEQA requires assessment of project impacts on viewsheds. *Quail Botanical Gardens Foundation v. City of Encintas*, 29 Cal.App.4th 1597, 1604-05 (Cal. Ct. App. 1994). The viewshed is indicated on the map in Attachment 7 with a long arrow and extends to the southeast property line.

To address these concerns, Vichy Springs requests that the City (and other agencies reviewing the Ukiah Landfill Closure Plan) undertake comprehensive and thorough analysis of the scenic and visual impacts of closure plan implementation on guests and visitors to the adjacent Vichy Springs, with particular attention to the extent to which existing vegetated areas (with trees, grasses, plants, bushes, flowers) will be adversely impacted and the extent to which the closure plans includes detailed plans to revegetate disturbed areas. A starting point for this analysis should be a detailed inventory and description of current baseline scenic conditions and views onto the landfill property from Vichy Springs and other nearby locations. The final Ukiah Landfill Closure Plan should then include appropriate mitigation measure to address potential impacts identified in this analysis. These appropriate mitigation measures may include: (1) limiting or prohibiting disturbance of existing vegetated areas of the landfill site visible from Vichy Springs; (2) articulating objective revegetation benchmarks as part of a revegetation plan; and (3) setting aside of adequate long-term funding to ensure post-construction revegetation occurs.

III. Conclusion

We look forward to working with the City to ensure that the Landfill Closure Plan complies with CEQA and avoids impacts to Vichy Springs and its guests. Pursuant to CEQA Guideline section 15063, it is Vichy Springs' expectation that the City's decision about whether to proceed with a Negative Declaration or an EIR in this instance will be based on the information and analysis set forth in an Initial Study. As the California Court of Appeal clarified in *Citizens Association for Sensible Development of Bishop Area v. County of Inyo*, an Initial Study must "disclose the data or evidence upon which the persons conducting the study relied. Mere conclusions simply provide no vehicle for judicial review." 171 Cal.App.3d 151, 171 (Cal. Ct. App. 1985). In the unfortunate event that the environmental impacts noted in this letter are not mitigated to a level that is less than significant, Vichy Springs will insist upon compliance with CEQA's obligation to prepare an EIR prior to project approval.

By this letter, and as required by Section 21092 of the California Public Resources Code and CEQA Guidelines Section 15072, Vichy Springs requests that it be notified in writing of the release of any scoping documents or drafts associated with any Initial Study, Negative

Declaration, or EIR pertaining to the Ukiah Landfill Closure Plan. Vichy Springs also requests that a copy of this letter and its attachments be placed in the administrative record of the City and all other agencies (including the Regional Water Board and the Mendocino County Environmental Health Division) involved in preparing, reviewing, or approving the Ukiah Landfill Closure Plan. Please feel free to contact us if you would like to discuss these issues further.

Respectfully submitted,



Paul S. Kibel
Nicholas Niiro
WATER AND POWER LAW GROUP PC
2140 Shattuck Ave., Ste. 801
Berkeley, CA 94708
(510) 296-5588
pskibel@waterpowerlaw.com
nniiro@waterpowerlaw.com

Attorneys for VICHY SPRINGS RESORT

Attachments:
1. Letter from Vichy Springs to City of Ukiah (October 22, 2014)
2. Letter from North Coast Regional Water Quality Control Board to City of Ukiah (September 2, 2014)
3. Notice of Determination for Ukiah Landfill Closure Plan (July 20, 2000)
4. Map of Spring Water Impacts Vichy Springs
5. Map of Noise Impacts on Vichy Springs
6. Map of Dust Impacts on Vichy Springs
7. Map of Scenic and Visual Impacts on Vichy Springs

Cc:

Douglas Crane, Mayor of Ukiah
Ukiah City Council
Andy Marino, California Department of Resources Recycling and Recovery (CalRecycle)
Trey Strickland, Mendocino County Environmental Health
Terry Cia, Regional Water Quality Control Board

Attachment 1

Vichy Springs
Resort
2605 Vichy Springs Road, Ukiah, CA 95482
707-462-9515 * 707-462-9516 (fax)
www.vichysprings.com

October 22, 2012

Ms. Jane Chambers
City Manager
City of Ukiah
300 Seminary Street
Ukiah, CA 95482

REF: Dump CEQA

Dear Ms. Chambers and To Whom It May Concern:

It has come to our attention the City of Ukiah has a planned project on the adjacent Dump property next to the historic Vichy Springs Resort. I bring this to your attention as this resort is in a quiet neighborhood except for the unregulated and obnoxious gun club also located on city property.

This letter is to request formal notification under CEQA of the project planned for the "Dump" property.

We are aware of the recorded notice of determination done in 2000 where Vichy Springs Resort was not given notice nor were any other neighbors. We are also aware the project has substantially changed and will impact our resort operations that are 24 hours per day. Our guests sleep until 9am regularly as they are on vacation.

Our request is that the CEQA document that will be prepared for the changed new project (the dump closed in 2001 thirteen years ago) regarding applicable soil cover movement, gas plan and well drilling and final closure include protections for our unique Mineral Springs, the guests of our resort and the peaceful operation of our resort.

Our concerns include but not limited to:
No construction before 9am or after 5pm.
No back-up beepers.
Dust control at all times. i.e., zero dust.
No visible change to the view shed of the historic resort i.e., trees, ground or vegetation.
Emergency contact telephone number should an issue arise. If subsequent action does not occur please provide the contact and phone number of that person's supervisor.

Traffic on Vichy Springs road be limited to 8:30 am to 5:30 pm and no heavy trucks or equipment delivery or pickup other than after 9am or before 5pm.

Can you also please provide us with a copy of the CEQA document that led to the notice of determination.

Sincerely,

Gilbert Ashoff
Proprietor

CC:
Trey Strickland
County Local Enforcement Agency
860 N Bush Street
Ukiah, CA 95482

Terry Cia
State Water Board
5550 Skyland Blvd Ste A
Santa Rosa, CA 95403

Andy Marino
Cal Recycle
1001 I Street
Sacramento, CA 95814

Legal Counsel
Water Power and Law Group
2140 Shattuck Ave Ste 801
Berkeley, CA 94704
Attn: Richard Roos-Collins

Passalacqua, Mazzoni, Gladden, Lopez and Maraiglia
1201 Vine Street #200
Healdsburg, CA 95448
Attn: Lourdes Lopez

Attachment 2

California Water Boards

Edmund G. Brown Jr.
Governor

Matthew Rodriquez
Secretary for
Environmental Protection

North Coast Regional Water Quality Control Board

September 2, 2014

Tim Eriksen
Director of Public Works
300 Seminary Avenue
Ukiah, CA 95482-5400

Dear Mr. Eriksen:

Subject: Final Closure Plans for the Ukiah Solid Waste Disposal Site

File: Ukiah, City of, Solid Waste Disposal Site, Mendocino County
WDID No. 1B75043OMEN

This letter is a follow-up to our July 24, 2014 conference call to discuss the status of final Closure Plans for the City of Ukiah Solid Waste Disposal site located at the end of Vichy Springs Road in Ukiah. This letter also confirms our support for the request made by California Department of Resources Recycling and Recovery (Cal-Recycle) and Mendocino County Environmental Health, Local Enforcement Agency staff that you amend the Joint Technical Document (JTD) with all relevant changes and resubmit the revised JTD for the proposed landfill closure as an updated stand-alone project. The JTD amendments are necessary for us to move toward permitting this project for construction in 2015. We look forward to working closely with the City of Ukiah on the proposed closure project for the Ukiah Solid Waste Disposal Site.

Regional Water Board staff have reviewed the City of Ukiah's Closure Plans several times, along with various documents relevant to amending a Report of Waste Discharge (ROWD). With the submittal of the following items discussed during our conference call, Regional Water Board staff expect to be able to find the project plans sufficiently complete to begin our process of drafting tentative Waste Discharge Requirements (WDRs):

1) An updated construction schedule for the 2015 season.
2) All proposed changes and updates to the landfill gas collection system design, operations plans and cost estimates.
3) Updated financial assurance package with adequate coverages.

4) Updated CEQA review for all project components submitted within the JTD and ROWD.

We understand that the City of Ukiah is working on the above-mentioned items and anticipates submitting the required updates within the coming month. We look forward to receiving your updates and to working closely with you on updating the WDRs for closure of this landfill.

Please call me at (707) 576- 2668 if I can assist or if you should have any questions or concerns.

Sincerely,

Terri Cia
Engineering Geologist

140902_TAC_ef_ukiahswds

cc:
Rick Seanor, City of Ukiah, 300 Seminary Avenue, Ukiah, CA 95482-5400
Damon Brown, EBA Wastechnologies, 825 Sonoma Avenue, Santa Rosa, CA 95404
Trey Strickland, Phil Chou, Mendocino County Health Department-LEA,
501 Low Gap Road, Room 1326, Ukiah, CA 95482
Gilbert Ashoff, Vichy Springs Resort, 2605 Vichy Springs Road, Ukiah, CA 95482

cc: via email
California Department of Resources Recycling and Recovery (CalRecyle):
Andy Marino (Andy.Marino@CalRecycle.ca.gov)
Michael Wochnick (Michael.Wochnick@CalRecycle.ca.gov)
Garth Adams (Garth.Adams@CalRecycle.ca.gov)
Richard Castle (Richard.Castle@CalRecycle.ca.gov)

Attachment 3

99-691

NOTICE OF DETERMINATION

TO: ____ Office of Planning and Research
1400 10th Street, RM 121
Sacramento, CA 95814

__X__ Mendocino County Clerk
Courthouse
Ukiah, CA 95482

FROM: City of Ukiah
Civic Center
300 Seminary Ave.
Ukiah, CA 95482

CONFORMED COPY
Copy of Document Recorded
07/20/2000 as 2000-E0074
Mendocino County Clerk-Recorder

DATE RECEIVED FOR FILING _____

Subject: **Filing of Notice of Determination in Compliance with Section 21108 or 21152 of the Public Resources Code**

Ukiah Landfill Final Closure and Postclosure Maintenance Plan
Project Title

200052079	Charles Stump	(707) 463-6219
State Clearinghouse Number	**Lead Agency Contact Person**	**Telephone**

The property is located at 3100 Vichy Springs Road, Ukiah, Mendocino County
Project Location (include county)

The project entails the closure and postclosure maintenance of the Ukiah Class III municipal solid waste landfill. Final closure of the landfill will entail the construction of a final cover over the entire landfill surface. Elements of the closure construction operations will include the following tasks: 1) clearing and stripping of existing vegetation from the landfill surface designated to receive final cover; 2) placing and compacting foundation layer material over the entire landfill surface, followed by a 1-foot of low permeability layer material and 1-foot of vegetative layer material; 3) hydroseeding the vegetative layer with native grasses; 4) reclaiming existing and proposed on-site borrow areas; 5) construction of drainage system components; 6) placing aggregate base rock over portions of existing perimeter roadways; 7) removing existing structures from the site; and 8) installing fencing for site security.

Project Description

This is to advise that the CITY OF UKIAH adopted the Mitigated Negative Declaration on July 19, 2000 and has made the following determinations regarding the above described project:

1. The project will ____ will not __X__ have a significant effect on the environment.
2. __X__ A Mitigated Negative Declaration was prepared for the project pursuant to the provisions of CEQA.
3. Mitigation measures were __X__ were not ____ made a condition of the approval of the project.
4. A statement of Overriding Considerations was ____ was not __X__ adopted for this project.
5. Findings were __X__ were not ____ made pursuant to the provisions of CEQA.

The Mitigated Negative Declaration is available to the General Public and may be examined at the Ukiah Planning Department - City of Ukiah Civic Center, 300 Seminary Avenue, Ukiah, CA.

Charley Stump	July 20, 2000	Planning Director/Environmental Coordinator
Signature	**Date**	**Title**

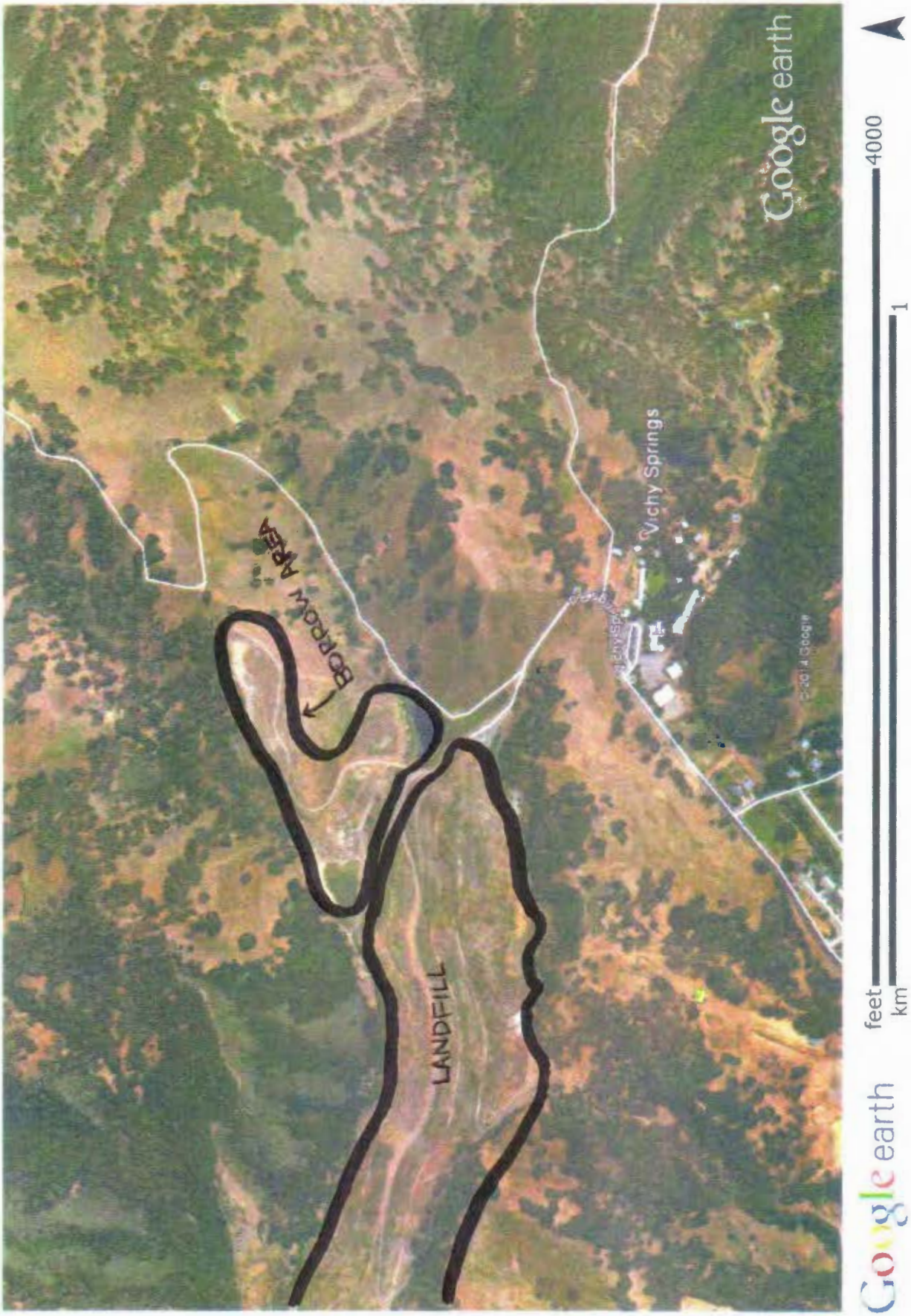
Attachment 4


FRAGILE MINERAL SPRINGS AREA
TEST WELLS
Vichy Springs
Google earth
4000
1
feet
km
Google earth

Attachment 5


Google earth
SLEEPING AREAS
Vichy Springs
4000
feet
1
km
Google earth

Attachment 6


Google earth
Vichy Springs
BORROW AREA
LANDFILL
4000
feet
1
km
Google earth

Attachment 7

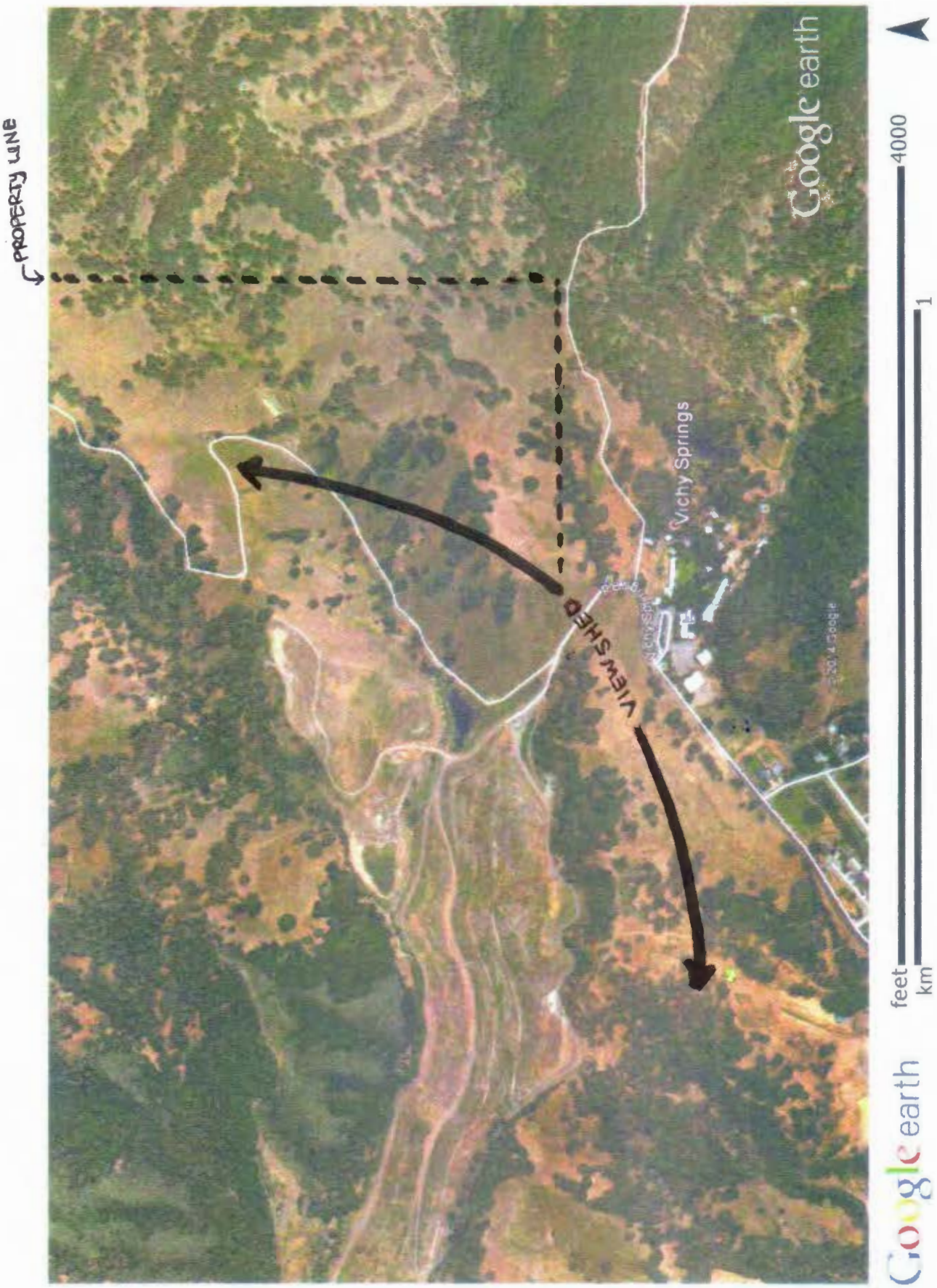

PROPERTY LINE
VIEWSHED
Vichy Springs
Google earth
4000
feet
1
km
Google earth

Exhibit B

ALISTO ENGINEERING GROUP

April 6, 2016

Mr. Gilbert Ashoff
Vichy Springs Resort
2605 Vichy Springs Road
Ukiah, CA 9548

Subject: City of Ukiah Proposed Mitigated Negative Declaration for Landfill Closure and Post Closure Maintenance Plan

Dear Mr. Ashoff:

As requested, I reviewed the Initial Study Proposed Mitigated Negative Declaration for the Proposed Final Closure and Post-Closure Maintenance Plan for the Ukiah Landfill, prepared for the City of Ukiah dated January 2016. My review of the Initial Study focused on the environmental impact analysis of the landfill closure and maintenance plan on geology and soils and hydrology and water quality issues.

Following are issues and concerns regarding the scope of the environmental analysis and findings, which should be addressed before finalizing the mitigated negative declaration and during the implementation and maintenance of the closure and post closure plan:

- There was no discussion as the geology and hydrogeology of the landfill site and surrounding areas, and relationship to the potential source and quality of spring water at the nearby Vichy Spring.
- The environmental analysis on hydrology and water quality did not address impact on groundwater and/or spring water quality and any hydrogeologic connection/relationship between the water bearing zones beneath the landfill and the source of Vichy Spring water.
- The analysis also did not indicate if water quality analysis/study has been performed to compare the quality of groundwater beneath the landfill and the spring water.

Unless the following studies or investigations have already been performed, the City should complete them at the minimum before issuing the final mitigated negative declaration and implementing the closure and post-closure maintenance plan:

- Conduct a detailed geologic study and mapping of the landfill and surrounding areas including Vichy Spring.
- As part of the mitigation measure, conduct a water quality study to establish the “signature” constituents of the Vichy Springs water compared to the groundwater at the landfill and include these constituents in the compliance monitoring program.

- Evaluate both the soil characteristics and water quality during any intrusive activities of the subsurface to ensure no impact or breach into the source formation of Vichy Spring water, if any.

Sincerely,

ALISTO ENGINEERING GROUP



Al Sevilla, P.E.
Principal

Cc:

Paul Stanton Kibel
Water and Power Law Group PC
2140 Shattuck Avenue, Ste. 801
Berkeley, CA 94704-1229

Exhibit C

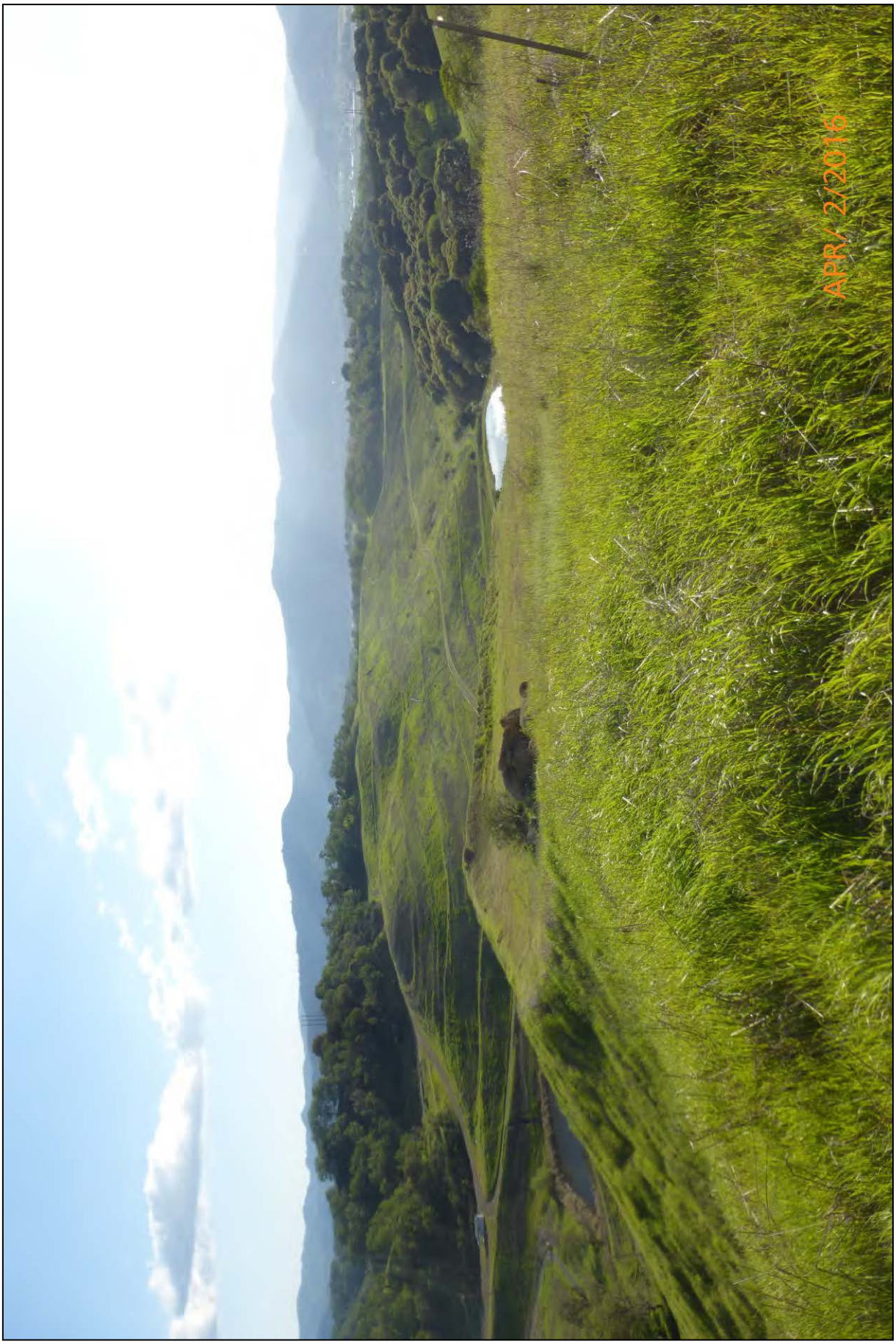

APR/ 2/2016

Exhibit C


JAN/ 4/2020


JAN/ 4/2020


JAN/ 4/2020


JAN/ 4/2020


JAN/ 4/2020


JAN/ 3/2020

Exhibit D


DEC/31/2019


DEC/31/2019

Exhibit E

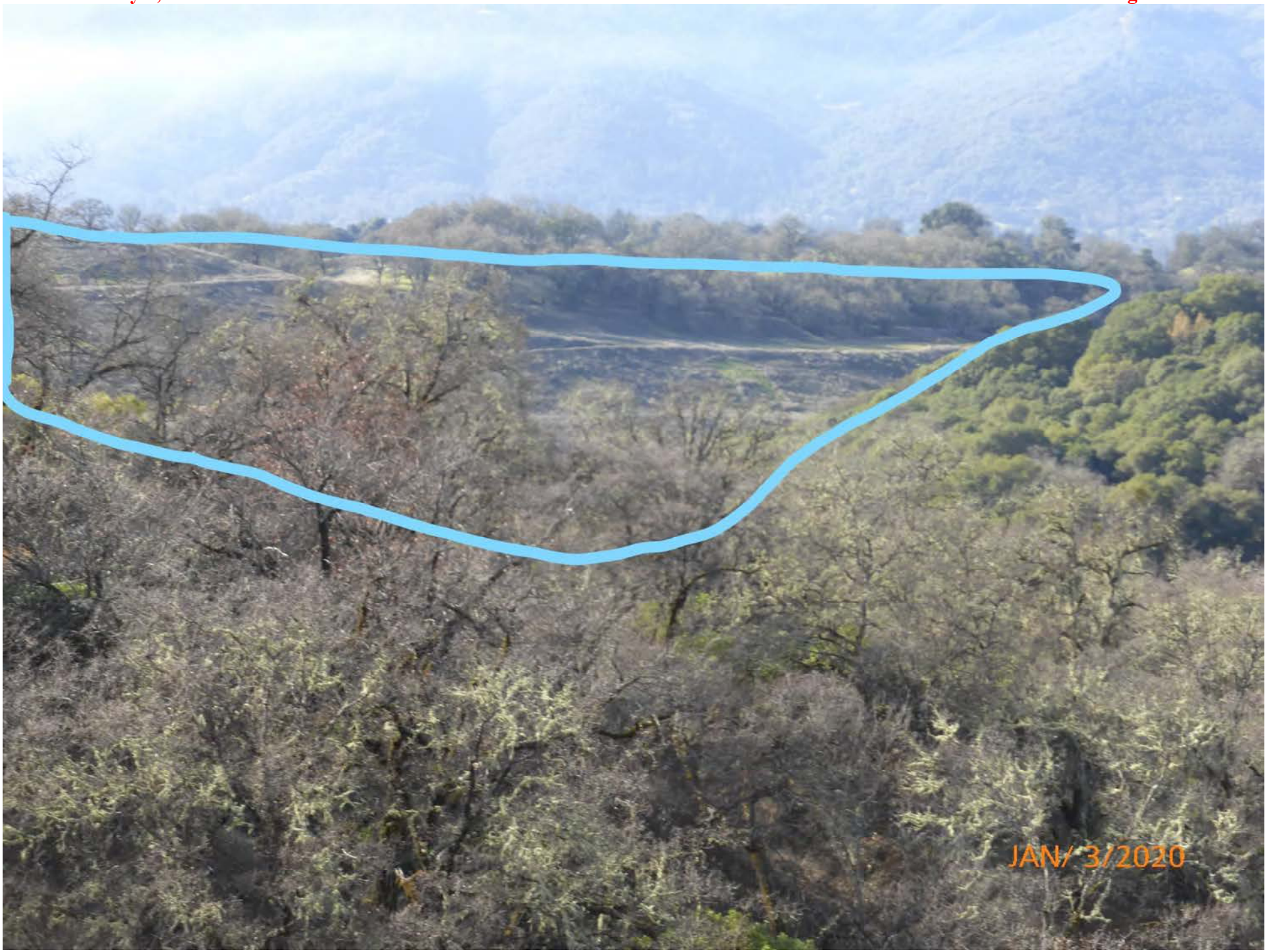

DEC/31/2019


DEC/31/2019

Exhibit F


JAN/ 3/2020


JAN/ 3/2020


JAN/ 3/2020


JAN/ 3/2020

Exhibit G

waste360.com

Clay Remains a Top Choice for Final Landfill Cover

Rachael Zimlich | Aug 11, 2015

18-22 minutes

The waste and recycling industry kicked off the new year with a full plate, and industry experts project 2020 could be a transformative one.

The industry continues to respond to the cyclical impact of China's National Sword and subsequent volatility in recycling markets. Plus, talk of an economic slowdown and the potential for new legislation and regulation in an election year, the impacts of increased merger and acquisition activity and heightened awareness of "forever chemicals" and their potential ramifications for waste management remain top of mind for industry stakeholders this year.

In this two-part series, industry experts discuss emerging trends and their outlook for 2020.

Recycling Markets: Domestic, China and Southeast Asia

From a recycling perspective, 2018 started off unstable due to the implementation of China's import ban. But 2019 wasn't much better.

"When you have something bad, the only thing you can do is try to

predict something more cheerful, so we, along with a lot of other people, said 2019 will be better. And 2019 was worse," says Anne Germain, vice president of technical and regulatory affairs for the National Waste & Recycling Association (NWRA). "Commodity prices did not recover; prices for everything went down, with the exception of plastics."

Germain projects that in 2020, metals prices will stabilize; however, her outlook for cardboard remains bleak.

"Even if China delays an import ban on all fiber, fiber permits are still expected to be reduced. Because of that, we expect commodity prices to remain in the doldrums, and we are hoping that they won't get any worse," she says. "But it's going to be another challenging year from a commodities pricing perspective."



Longtime industry veteran and *Waste360* columnist Chaz Miller also predicts 2020 will be another challenging year for recyclers, with paper markets remaining flat throughout the year. There are, however, some glimmers of hope of rising prices later in the year.

The Pratt Industries mill in Wapakoneta, Ohio, opened in October 2019 and will process 180,000 tons of mixed paper in its first year of operation. That will steadily increase to 360,000 tons in 10 years, says Miller.

“That’s the start of the market for mixed paper, but it’s not enough to buoy markets,” he explains.

Two new paper mills are expected to open at the end of 2020 or in early 2021—the Green Bay Packaging mill in Wisconsin and the Cascades mill in Virginia. Three new Nine Dragons mills have been opaque about when those mills will be fully operational in terms of buying mixed paper, according to Miller, making it difficult to predict what impact they’ll have.

“I think markets will stay relatively flat through 2020. Maybe, at the end of 2020 and early 2021, we’ll start seeing things get better for mixed paper,” Miller projects. “Corrugated will pretty much stay the way it is.”

“I don’t expect China to ban the imports of all recyclables,” he adds. “The paper mills depend too much on it. I am more inclined to think they will ban waste but continue to accept raw materials.”

Plastic markets, however, are a little harder to predict. With a surge in new virgin resin capacity coming online, prices for those resins are likely to drop and depress recycled resin prices, says Miller.

“Many consumer brands announced aggressive goals for the use of recycled plastic,” he explains. “2020 will test their willingness to increase recycled content even if it means paying more for raw materials. I think it’s clearly time for them to step up and start buying now.”





Robin Weiner, president of the Institute of Scrap Recycling Industries (ISRI), anticipates that there will be a continued trend of seeking new global and domestic recycling markets.

“There has been a significant amount of investment in the U.S. in the past year, and I would imagine that we would continue to see that—with investment on both the consumption side and within recycling itself,” explains Weiner. “This will be an expansion for existing facilities as well as greenfield operations. We’re excited about that because the greater market improvements we see, the stronger the business will be. And we will be pushing for any opportunity to strengthen market demand in recycled content and design for recycling.”

ISRI also expects continued challenges for international recycling markets.

“The issue of import restrictions is being discussed in a lot of

different markets, and we are being very proactive in Indonesia, Malaysia and other countries discussing the difference between legitimate scrap trade and waste that has been illegally shipped," says Weiner. "I think one of our biggest challenges going forward is helping importing countries understand the difference. That continues to be a big focus for us."

David Biderman, executive director and CEO for the Solid Waste Association of North America (SWANA), notes that in 2020, the industry will continue to respond to the evolving impact of China's National Sword on local recycling programs.

"The inaccurate media narrative that recycling was in some sort of national 'crisis' appears to have been effectively rebutted, as new domestic capacity coming online and reductions in contamination levels reported throughout the United States had led to a reduction in the pace of local governments suspending curbside collection," explains Biderman. "In addition, EPA [the U.S. Environmental Protection Agency] announced at the America Recycles Day (ARD) Summit in November 2019 that it would be proposing national recycling goals this year, and I expect that, together with implementation of the EPA Recycling Framework released at the ARD Summit, will encourage local governments to continue with their recycling programs."

Bryan Staley, president and CEO of the Environmental Research & Education Foundation (EREF), expects to see more nuanced conversations happening around recycling and sustainable materials management.

"I think some of the issues with the domestic recycling markets and China's National Sword have really put the spotlight on recycling

and asking some hard questions that I don't think have been asked in the past," he says. "I think the industry has the opportunity to lead that conversation."

"I think recycling markets will improve, but I think it will be slow," adds Staley. "In order to strengthen domestic markets and recycling overall, the best feedstock is going to result in the best end materials and end markets. And that doesn't seem to be happening right now."

Economic Outlook, Legislation and Regulation

Another top trend to watch in 2020 is the overall health of the economy. The industry also is watching certain legislative and regulatory activity but doesn't expect too much to pass in the upcoming presidential election year.

"Later this year or in 2021, there could be a sufficient cooldown for the economy that will impact the industry; we don't know yet," explains Staley. "With various geopolitical things happening, you never know how that will affect the economy—good or bad."



Biderman points out that if the U.S. and Canadian economies continue to hum along at the 2 to 2.5 percent growth range, there will be plenty of waste and recyclables to go around. However, 2019 was the 10th consecutive year of economic growth following the 2008-09 Great Recession, and eventually, the tide will turn, he says.

“Solid waste owners, local governments and others interested in the overall health of the industry should keep a close eye on GDP [gross domestic product] numbers, as they will determine whether the United States or Canada will have a record-breaking 11th consecutive year of economic growth, or if a long-predicted economic downtown is at hand in either late 2020 or 2021,” says Biderman.

In terms of legislation for 2020, Jim Riley, chief counsel and senior vice president of government affairs for NWRA, says a couple things immediately come to mind.

NWRA has been lobbying to get tax extenders renewed since they expired at the end of 2017. NWRA also had its eye on a federal infrastructure bill—both for surface transportation and a broadly defined infrastructure measure that would encompass domestic recycling infrastructure capabilities.

In addition, NWRA ended 2019 on a high note. In November, the Federal Motor Carrier Safety Administration (FMCSA) announced it would grant NWRA an hours of service (HOS) exemption exclusively for its members. The exemption eliminates the need for NWRA member companies to use electronic logging devices (ELDs) in their trucks.

"Congress will not be in session very much next year. We already looked at the 2020 calendar and calculated back in terms of how many days they are going to be there," explains Riley. "One of the reasons we do that is because of the rulemaking underway from the U.S. Department of Transportation in terms of hours of service. We already have our [HOS] exemption, which is good for five years. But there are some broader hours of service changes that FMCSA is trying to make. And if a Democrat were to win the White House and had control of both the House and Senate after the 2020 election, they could invoke the Congressional Review Act (CRA). That gives them so many days to go back and basically repeal any kind of new rules implemented by the various agencies."

"That's why it's so important that NWRA got its exemption for member companies," he adds.

Kirk Sander, NWRA's chief of staff and vice president of safety and standards, explains it's hard to say how the CRA play would impact the industry.

"We will just be watching if the change is in the next five years. We don't think it'll change much, but we haven't seen the final rule," he says. "The same thing goes for FMCSA's entry-level driver training. Indications are there will be pushback, but nothing is official until it's in the [Federal] Register."

Typically, not much is accomplished during a presidential election year, but Riley says he wouldn't rule out passage of a highway bill, which would be separate from the bigger, broader infrastructure package. Riley adds that NWRA has had conversations with people on both sides of the aisle to ensure the passage of a surface transportation infrastructure bill.

"Aside from that, we made sure that domestic recycling infrastructure was included in any broader package," he says.

As for recycling, NWRA doesn't anticipate much regulatory activity from the federal government, but Germain projects there will likely be movement put forth at the state level. Congress may also pass either the RECOVER (Realizing the Economic Opportunities and Value of Expanding Recycling) or the RECYCLE (Recycling Enhancements to Collection and Yield through Consumer Learning and Education) Acts, which provide financial support to local government recycling efforts.

Sander says the industry will continue tracking Move Over laws and whether a measure will expand to all vulnerable road workers, including those in waste and recycling.

In addition to the RECOVER and RECYCLE Acts, Miller projects that Congress will pass the Save Our Seas 2.0, which expands the 2018 law.

At the local level, New York City will start the implementation of its controversial commercial waste zone (CWZ) system this year, with a request for proposal (RFP) likely to be issued by June, notes Biderman.

"Although the changes aren't expected to be fully finalized until 2022 at the earliest, the specter of CWZ, also known as 'franchising,' will likely impact the hyper-competitive New York City market, as some carters go out of business and others battle for advantage in this large, important market," he says.

Mergers and Acquisitions

Another key area to watch is the pace of acquisitions, which has

been accelerating over the past few years and has industrywide ramifications. The biggest merger to keep an eye on this year is Waste Management's acquisition of Advanced Disposal (ADS).



"Acquisitions like the Waste Management/Advanced deal have major ripple effects throughout the industry on the OEM [original equipment manufacturer] side and even on the competitor side and for haulers as well," explains Staley. "That has impacts on the trade associations and on EREF as an organization."

In June 2019, ADS' stockholders voted to adopt the merger agreement with Waste Management. The transaction is expected to close by the first quarter of 2020.

"Large national companies, regional players and private equity are all aggressively buying companies, and I expect this will continue in 2020," says Biderman. "The pending acquisition of Advanced

Disposal by Waste Management is expected to result in the divesture of solid waste assets (e.g., disposal facilities and collection) in several markets, which will create additional opportunities for companies to grow. The possibility of a Democrat being elected in November 2020, and a potential subsequent increase in the capital gains or federal income tax rates, may fuel even more deals, at higher multiples, as Election Day nears."

PFAS and Waste Management

Issues surrounding per- and polyfluoroalkyl substances (PFAS)—known as "forever chemicals"—really began to gain public attention in 2019 with movies like "Dark Waters" and the Netflix documentary, "The Devil We Know." EREF, which has released an RFP targeting PFAS research, predicts PFAS will be in the crosshairs of the industry for the foreseeable future.

EREF is working on funding for three new contracts to study PFAS in landfill leachate. EREF's goal is to get a better understanding of PFAS and their impacts on the industry in order to answer looming questions.

"There are still a lot of questions that need to be answered," stresses Staley. "I've had conversations with folks who suggest that the answers are in on PFAS, and I disagree with that. There's still a lot of scientific research that is necessary to understand the actual health implications on low-level exposures that we are seeing in our everyday lives."





Although the House of Representatives passed a bill that included language designating PFAS compounds as hazardous substances under Superfund and directing EPA to set a maximum contaminant level for PFAS under the Safe Drinking Water Act, the language was dropped from the National Defense Authorization Act due to opposition in the Senate.

"SWANA expects this bill to re-emerge this month in the House, but it will likely have difficulty getting traction in the Republican-controlled Senate," explains Biderman. "Also, EPA is expected to finalize a regulatory determination for certain PFAS compounds this year, and states are aggressively moving forward to fill the void created by federal inaction. Several northeastern and midwestern states have issued or are proposing PFAS standards for drinking water. SWANA is closely monitoring PFAS issues and is developing new resources for members to help them address rising concerns over PFAS in leachate."

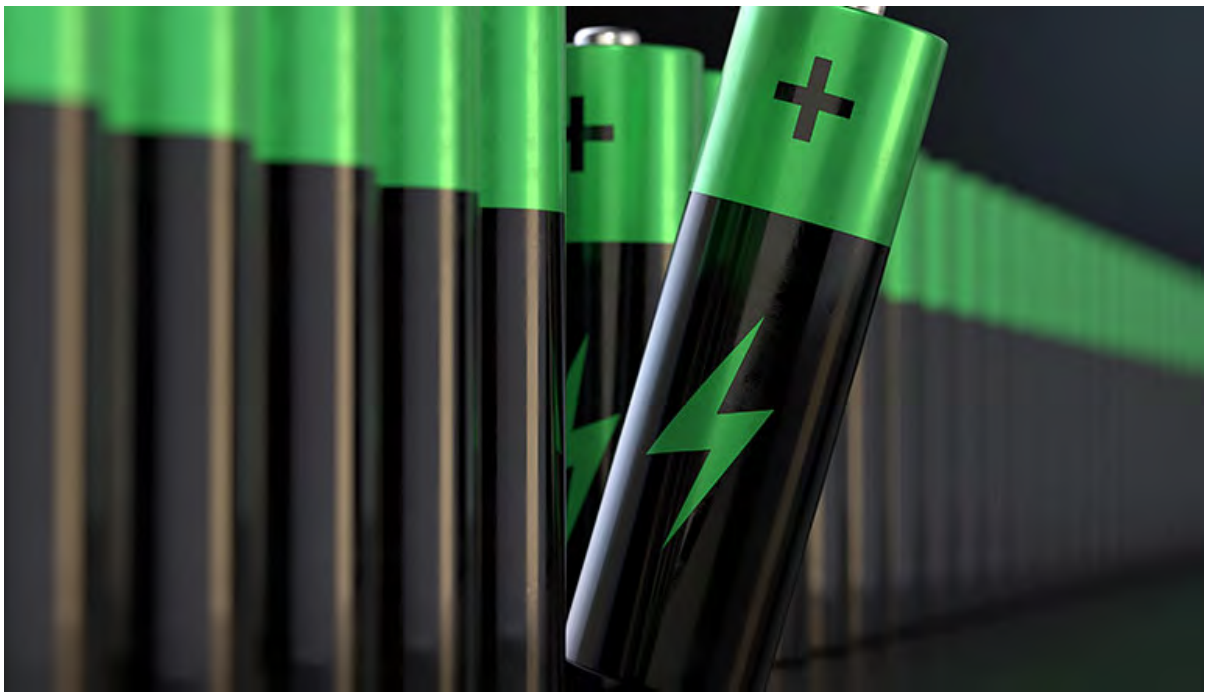
Safety & Technology

At the end of 2019, the U.S. Department of Labor's Bureau of Labor Statistics released its 2018 National Census of Fatal Occupational Injuries, which revealed an increase in waste collection fatalities.

As safety remains top of mind for industry associations, NWRA is working on an RFP for a 10-year review of safety data on the industry and figuring out where the gaps are, explains Sander. “We are going to announce that winner early in 2020 and our selection on that. So, starting that process and hopefully getting preliminary data in 2020 is exciting for me,” he says.

In addition, Biderman says he hopes the joint SWANA-NWRA Alliance with the U.S. Occupational Safety & Health Administration will help reduce the frequency of fatalities, accidents and injuries in the sector.

At the end of 2019, NWRA also released its best practices guide for materials recovery facilities and temp workers. Sander adds that lithium-ion battery safety will also be a continuing safety trend.



ISRI also projects that the dual issue of lithium-ion batteries and fires will continue to be a huge issue for ISRI moving forward and for all in the stream—whether it’s residential, commercial or industrial. Weiner points out that the waste stream will now include larger ELD batteries and those from electric vehicles, as well as

smaller lithium-ion batteries.

“Both are causing safety and fire risks,” she says. “We are being very proactive to try and address the issue from both a policy perspective and operational perspective.”

EREF is also looking to mandate some work in 2020 to drill down fatality statistics.

When it comes to technology, Arnold Bowers, business solutions director at ENGIE Impact, formerly ENGIE Insight, anticipates that bigger, bolder technology solutions will eventually relieve the pressure of municipalities and communities having to enforce plastics bans and legislation. He points to renewed investment in chemical recycling as an efficient way for bottlers to recapture plastic.

Bowers also points out that the proliferation of Internet of Things (IoT) has been a longstanding expansion in the industry. Prior to his work at ENGIE Impact, Bowers worked with an IoT company that builds and supports smart bins.



“There are all these new kinds of monitoring technologies growing,

and we are piloting these technologies today to figure out if there is a one size fits all or if there will be different technologies for these sorts of things," says Bowers.

Technologies include cameras revealing material in a bin, which can help combat contamination. Others are more sonar based and provide more feedback of how full a bin is.

"All this data is closed loop, and it's from the point of generation, whether it be a bin, at a park, on a college campus or industrial setting, where that bin is being monitored and that data is being sent back to a system that someone is watching," says Bowers. "Then, resources can be deployed more on-demand rather than the old, historical routing and collection loops. Using the IoT and monitoring technology allows us to conserve our resources as we go out and move materials."

Bowers also broached the idea of building an "Uber for waste" concept, where trucks are deployed only when bins are full.

"Maybe in the future of waste that could be possible, but the model that collection is built on today is not really prepared for that Uber-type situation," he says. "But I think we're prepared for that IoT data to feed back into our collection and help us address and adjust where we can focus our attention. The expansion of all our technology and focus today, in my view, will impact the waste business tremendously over the next decade."

Part two of this series will highlight the industry's goals for 2020.

Exhibit H

4.26.3 Parks and Recreation (CEQA)

4.26.3.1 Introduction

The parks and recreation analysis focuses on the potential for the Master Plan alternatives to create or exacerbate deficiencies in public parks and recreation areas through increased demand for facilities, acquisition, construction activities, or alteration of existing facilities. Conclusions regarding the significance of impacts provided in this section are strictly for the purposes of CEQA. Technical Report 16*, Public Services Technical Reports,* contains detailed information on baseline conditions and regulations related to parks and recreation. Section 4.8, *Department of Transportation Act, Section 4(f)* addresses potential impacts on public park and recreational facilities as required by Section 4(f) of the U.S. Department of Transportation Act, which includes an assessment of acquisition, noise, access, and other indirect effects. Impacts on bikeways are analyzed in Section 4.2, *Land Use* and in Section 4.14, *Coastal Zone Management and Coastal Barriers*. Direct and indirect growth in the vicinity of LAX and elsewhere in the region associated with the Master Plan would also result in increased demand for parks and recreational facilities. Potential indirect influences on park demand, such as those associated with new employee households that could be generated off of the airport, are addressed in Section 4.5, *Induced Socio-Economic Impacts (Growth Inducement)*, and in subsection 4.26.3.7, *Cumulative Impacts*.

4.26.3.2 General Approach and Methodology

To assess the potential direct effects of the proposed Master Plan alternatives associated with physical changes in the environment and increases in demand for public park and recreational facilities, 1996 baseline conditions were compared with conditions expected with implementation of the No Action/No Project Alternative and four build alternatives. Characterization of the environmental baseline included a discussion of parkland dedication/fee ordinances, descriptions of park and recreational facilities at and adjacent to LAX, and a summary of the sufficiency of existing parklands in meeting user demands. Information was obtained from park and recreation agencies within the study area.

The parks and recreation study area has been defined to incorporate areas immediately surrounding the LAX property potentially affected by direct impacts (e.g., acquisition) or increased demand for facility use associated with implementation of the proposed Master Plan build alternatives. The study area includes the LAX property, the southern portion of the community of Westchester, the area between the western airport boundary and the Pacific Ocean, the area adjacent to the southern boundary of the airport, and the area to the east of the airport that includes parks adjacent to the proposed LAX Expressway. The public park and recreational facilities within the study area are shown in **Figure F4.26.3-1**, Public Parks and Recreation Facilities Within Study Area. Parks and recreation areas outside of this study area potentially affected by noise are identified and addressed in Section 4.8, *Department of Transportation Act, Section 4(f)*. The primary public park and recreation providers within the parks and recreation study area are the County of Los Angeles and the cities of Los Angeles, El Segundo, and Inglewood. Direct and indirect growth in the vicinity of LAX and elsewhere in the region associated with the Master Plan would also result in increased demand for parks and recreation. Potential impacts are addressed in Section 4.5, *Induced Socio-Economic Impacts (Growth Inducement)*, and subsection 4.26.3.7, *Cumulative Impacts.*

Impacts on public parks and recreation areas were determined by evaluating whether the Master Plan build alternatives would create or exacerbate deficiencies in public park and recreational facilities through increased demand, or whether construction activities, acquisition, or alteration of a facility would significantly compromise its use or create the need for new public parks and recreational facilities. Assessment of demand for public park or recreational facilities is based on increases in employees, airport users, or changes in population resulting directly from project development, and whether such demand would conflict with standards established in applicable plans and ordinances.

4.26.3.3 Affected Environment/Environmental Baseline

The Quimby Act, a section of the California Subdivision Map Act adopted by the California State Legislature, empowers local governments to require a property owner or developer to dedicate land for public park or recreational use or to pay a parkland fee. Communities with parkland dedication or "Quimby" ordinances have the ability, through fees or land dedications, to keep pace with increases in demand for public park and recreational facilities generated from residential development. Identifying

jurisdictions that have such ordinances in place is directly relevant to assessing the effects of the Master Plan on such jurisdictions.

Within the study area, the County of Los Angeles and the City of Los Angeles currently have developer fees in place for parkland development or improvement.

Parks and recreation areas within the study area range in size from less than two acres to over 200 acres. Facilities and services range from landscaped passive recreation areas to parks with ball fields, tennis courts, gymnasiums, and swimming pools. Jurisdictions may augment their parks and recreational facilities available to the general public by shared-use arrangements with local school districts and private entities. **Table F4.26.3-1**, Public Parks and Recreation Areas Within Study Area, lists the parks and recreation areas and their jurisdictions and sizes within the parks and recreation study area.

Table F4.26.3-1

Public Parks and Recreation Areas Within Study Area

Name	Jurisdiction	Size (acres)
Ashwood Park	City of Inglewood	1.3
Carl E. Nielson Youth Park	City of Los Angeles	7.0
Isidore B. Dockweiler State Beach	State of California	288
Imperial Strip	City of El Segundo	7.4
South Bay Bicycle Trail	County of Los Angeles	N/A[1]
Vista del Mar Park	City of Los Angeles	1.8
Westchester Golf Course	City of Los Angeles	69.0
Westchester Park Recreation Center	City of Los Angeles	22.0
Total		**396.5**

[1] South Bay Bicycle Trail is contained within Dockweiler State Beach.

Source: PCR Services Corporation, 2000.

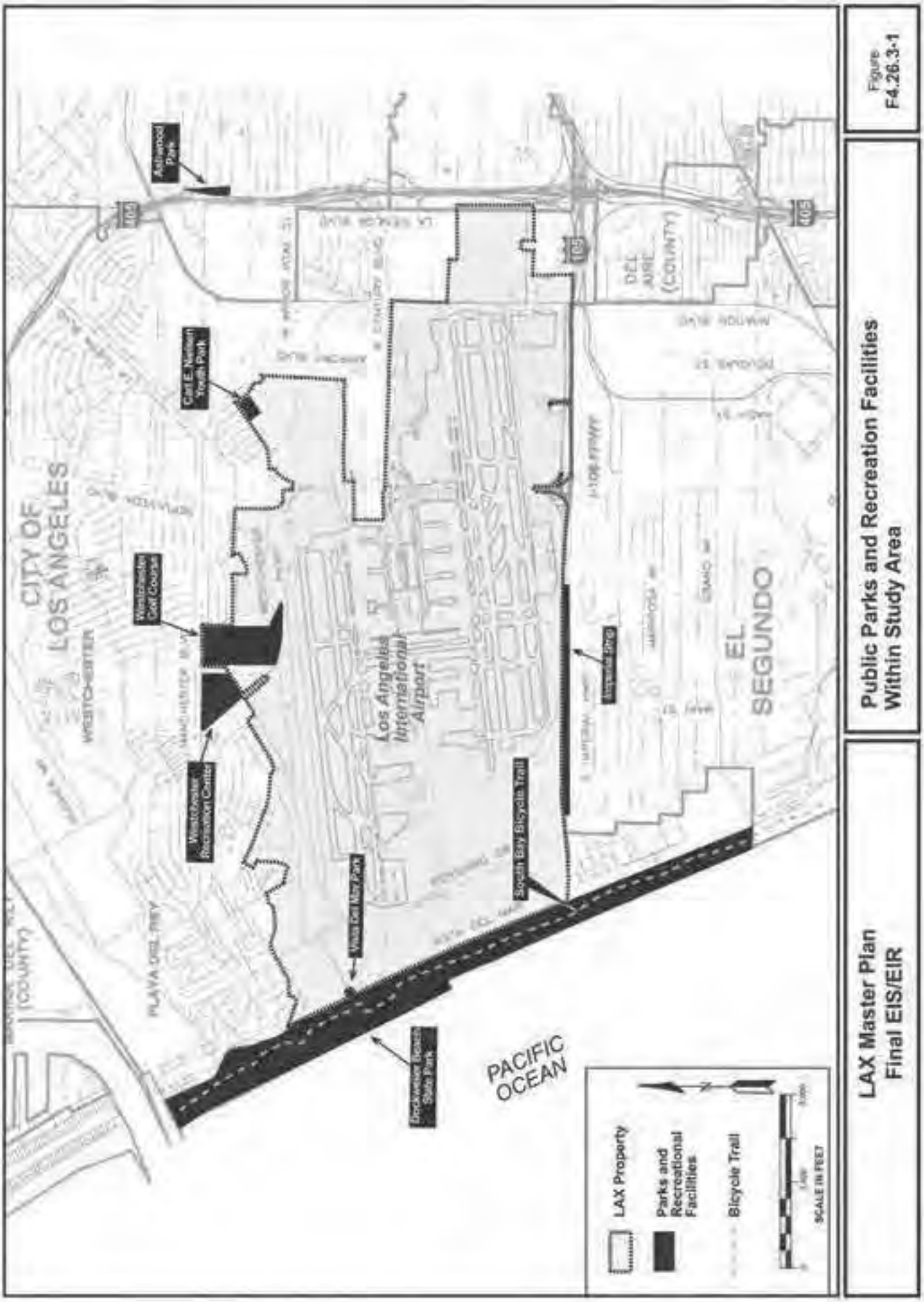
Parks and recreation plans, regulations, and facilities for each jurisdiction located within the study area are described below.

State of California

Isidore B. Dockweiler State Beach (Dockweiler State Beach) is the only state park or recreational facility within the study area. Located directly west of LAX, Dockweiler State Beach is maintained by the Los Angeles County Department of Beaches and Harbors. Dockweiler State Beach is 4.05 miles long and approximately 550 feet wide over much of its length, encompassing 288 acres. The main beach entrance is located at the western end of Imperial Highway. Multiple pedestrian entries and restrooms, parking lots, and concession stands are spread out along its length to accommodate beach visitors along the oceanfront. There are also showers, playground and volleyball facilities, and fire pits on the beach. The six parking lots provide a total of 1,523 parking spaces. Dockweiler State Beach had an attendance of 2,993,330 in 1997.

County of Los Angeles

The County of Los Angeles maintains a bicycle trail that traverses Dockweiler State Beach. The South Bay Bicycle Trail runs along Santa Monica Bay from Torrance County Beach to Will Rogers State Beach, with benches and bicycle racks along its path. It is maintained by the Los Angeles County Department of Public Works, with the exception of a short section between Culver Boulevard and the Marina del Rey entrance channel, which is under the control of the Los Angeles County Department of Beaches and Harbors. In unincorporated areas of Los Angeles County, developer fees for parkland improvement or development are required for residential developments of more than one unit; no fees are imposed for commercial or industrial projects.


Ashwood Park
Carl E. Nelson Youth Park
Westchester Golf Course
Westchester Recreation Center
Vista Del Mar Park
Dockweiler Beach State Park
Alicante Strip
South Bay Bicycle Trail
CITY OF LOS ANGELES
WESTCHESTER
PLAYA DEL REY
Los Angeles International Airport
EL SEGUNDO
DEL AIRE (COUNTY)
PACIFIC OCEAN
LAX Property
Parks and Recreational Facilities
Bicycle Trail
SCALE IN FEET
LAX Master Plan
Final EIS/EIR
Public Parks and Recreation Facilities Within Study Area
Figure F4.26.3-1

City of Los Angeles

The City of Los Angeles Zoning Code (Section 17.12) requires that a percentage (0.9 to 32 percent) of the gross area of a residential subdivision be dedicated for park and recreational uses, or a fee may be paid in lieu of park dedication. Parkland dedication or payment of fees is not required for non-residential development in the city.

The City of Los Angeles Community Plan Standards[988] call for a minimum of two acres of neighborhood park and two acres of community park per 1,000 population. According to the City's Public Recreation Plan,[989] neighborhood recreation sites serve residents of all ages within a radius of approximately one-half mile. The optimum site would be 5 to 10 acres and provide space and facilities for outdoor and indoor recreational activities. Community recreation sites would be 15 to 20 acres and serve residents of all ages with a broad interest range in several surrounding neighborhoods within a two-mile radius.

Based on these adopted standards, the City of Los Angeles is deficient in parkland: no area of the city is adequately served by recreation and park facilities.[990] The city has an overall deficiency of 11,404 acres of neighborhood and community parkland.[991]

In the City of Los Angeles, on and adjacent to LAX property, there are four parks, totaling approximately 100 acres, including the 69-acre Westchester Golf Course. Two of these parks, Westchester Park Recreation Center and Vista del Mar Park, are located immediately adjacent to the LAX property. The Westchester Park Recreation Center is a 22-acre park with many facilities, including tennis, basketball, and volleyball courts, baseball fields, children's play and picnic areas, a swimming pool, and a community building. Vista del Mar Park is a 1.8-acre passive, landscaped park with picnic tables and a tot lot located east of Vista del Mar Boulevard, next to the El Segundo Blue Butterfly Habitat Restoration Area. The Westchester Golf Course and Carl E. Nielson Youth Park are located on LAX property. The Westchester Golf Course, a public facility leased by LAWA, is within the proposed Westchester Southside project area. Carl E. Nielsen Youth Park, a private facility leased by LAWA, is on the northeast corner of the LAX property. The park occupies approximately seven acres, and includes a soccer field and two baseball diamonds that are used for organized youth sports.

Within the Westchester/Playa del Rey communities, the parkland acreage in combination with the Westchester Golf Course currently provides approximately 2.3 acres of parkland per 1,000 population. Based on the city's adopted standards, this is a deficit of approximately 1.7 acres per 1,000 population or approximately 82 acres.

City of El Segundo

The City of El Segundo's park and recreation inventory totals approximately 213 acres, including private recreational facilities. City public park and recreational facilities total 91 acres, including ten public parks, three school sites, a utility transmission corridor, a golf driving range, a recreational facility, and a beach area.

El Segundo's General Plan Open Space and Recreation Element sets forth a standard parkland ratio of 5 acres per 1,000 population. The City of El Segundo, with a ratio of 5.7 acres per 1,000 population, is currently meeting its adopted standard.[992] Although the City of El Segundo does not have developer fees for parkland improvement or development, the city has adopted standards for new non-residential development to provide recreational facilities for the daytime employee population.[993]

The only City of El Segundo park within the parks and recreation study area is Imperial Strip, a 7.35-acre passive open space corridor consisting of cultivated lawn, trees, and benches, which serve to buffer the city from LAX. This open space corridor is on the southern boundary of LAX between Imperial Highway, Imperial Avenue, Hillcrest Street, and Center Street. This area is frequently used by the public to observe

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988 Part of the City of Los Angeles Public Recreation Plan, a portion of the Service Systems Element of the Los Angeles General Plan, January 1979, p. IV-4.

989 City of Los Angeles, Public Recreation Plan Background/Implementation Report, January 1979, p. IV-3.

990 City of Los Angeles, Los Angeles Citywide General Plan Framework Draft EIR, January 19, 1995.

991 City of Los Angeles, Los Angeles Citywide General Plan Framework Draft EIR, January 19, 1995.

992 Fauk, Jim, Director, Recreation and Parks Department, City of El Segundo, Letter, January 23, 1998.

993 Fauk, Jim, Director, Recreation and Parks Department, City of El Segundo, Letter, January 23, 1998.

aircraft activities at LAX and take in long-range views of Santa Monica Bay and areas of the Los Angeles basin.

City of Inglewood

The City of Inglewood has ten parks with a total of 86.6 acres. Ashwood Park, a 1.3-acre park located between I-405 and Ash Avenue, is the only City of Inglewood park or recreation area within the study area. Ashwood Park contains a wading pool, basketball court, volleyball court, tennis court, and picnic area. The Inglewood standard for parks is one acre per 1,000 residents.[994] The current ratio is 0.8 acres of parkland per 1,000 residents, a deficit of 0.2 acres per 1,000 residents.[995] There is no developer fee program for city park development.

4.26.3.4 Thresholds of Significance

4.26.3.4.1 CEQA Thresholds of Significance

A significant impact on parks and recreation areas would occur if the direct and indirect changes in the environment that may be caused by the particular build alternative would potentially result in one or more of these conditions:

- Directly generate a substantial increase in the population of the project area that creates or exacerbates deficiencies in parkland as determined by the applicable ordinances and/or adopted standards.
- Directly results in the need for new parks or recreational facilities due to degradation or acquisition of parkland or substantially alters existing parks or recreational facilities so that it would decrease the use of the park or recreational facility.

These thresholds are utilized because they address the concerns for parks and recreation areas potentially directly affected by the proposed Master Plan build alternatives. The first threshold is a modification of a threshold in the *Draft L.A. CEQA Thresholds Guide,* which states that the "demand for recreation and park services anticipated at the time of project buildout" be "compared to the expected level of service available."[996] In the following analysis, demand is based on whether the public park or recreational facilities would serve the surrounding population as determined through adopted ordinances and standards. Assessment of demand for recreational facilities is based on increases in employees, airport users or changes in population resulting directly from project development. The second threshold was derived from Appendix G of the State CEQA Guidelines, which states that a project would have a significant impact on parks if it results in the "need for new or physically altered" facilities and/or results in "substantial physical deterioration of the facility." Physical deterioration in this analysis includes acquisition, decreased access, or a change in the use of a park or recreational facility.

4.26.3.4.2 Federal Standards

The FAA *Airport Environmental Handbook* does not require that this environmental topic be addressed; therefore, no federal standards apply to the following analysis. Environmental effects on parks and other resources associated with acquisition, noise, access, and other indirect effects are, however, addressed pursuant to federal standards in Section 4.8, *Department of Transportation Act, Section 4(f).*

994 Parcells, Lori, Planning Manager, City of Inglewood, Letter, January 20, 1998.

995 City of Inglewood, Community Development and Housing Department, Open Space Element, Inglewood General Plan, December 1995.

996 City of Los Angeles, Draft L.A. CEQA Thresholds Guide, Section J.4. Recreation and Parks, J.4-3, May 14, 1998.

4.26.3.5 Master Plan Commitments

No Master Plan commitments for parks and recreation are proposed. However, the following Master Plan commitments from other environmental disciplines are relevant to this analysis.

- **LU-3. Comply with City of Los Angeles Transportation Element Bicycle Plan (Alternatives A, B, and C).**
- **LU-5. Comply with City of Los Angeles Transportation Element Bicycle Plan (Alternative D).**
- **ST-18. Construction Traffic Management Plan (Alternatives A, B, C, and D).**

The above commitments are provided in their entirety in Chapter 5, *Environmental Action Plan.*

4.26.3.6 Environmental Consequences

4.26.3.6.1 No Action/No Project Alternative

Project Development

The No Action/No Project Alternative (described in Chapter 3, *Alternatives*) contains various features that are especially pertinent to the analysis of parks and recreation impacts. Some of these features are increases in passenger activity and property acquisition. The No Action/No Project Alternative would not result in any physical alteration to Carl E. Nielson Youth Park.

Service Effects

Although projected increases in passengers may increase demand for public park and recreation areas due to possible daytime or lunchtime use by visitors to the airport, any increase is expected to be small. Furthermore, there would be a reduction in demand from employment with a projected decline in on-airport employees under the No Action/No Project Alternative. Moreover, there would be reduced local demand on parks associated with the ongoing voluntary relocation of 4,987 residents under LAWA's existing Aircraft Noise Mitigation Program (ANMP) (see Section 4.4.2, *Relocation of Residences or Businesses)*. There are no public parks within the LAWA ANMP acquisition areas.

LAX Northside Project

Approximately 4.5 million square feet (MSF) of commercial and research/development uses would be constructed on 358-acres under the LAX Northside project. Although no residential uses are proposed, the *LAX North Side Development Project Final EIR* indicated that the project would increase the use of public parks and recreational facilities in the Westchester/Playa del Rey area due to daytime or lunchtime employee use. Consistent with the conclusions in the *LAX North Side Development Project Final EIR*, incidental increases in daytime employee demand for public parks and recreational facilities would be minimal and demand would be offset by the construction of a 2.3-mile bikeway.[997]

Continental City

At buildout, approximately 3.1 MSF of the Continental City site would be developed with office and retail uses. No residential uses and no associated park and recreation demand would result from the development of the Continental City site under the No Action/No Project Alternative. Furthermore, the Continental City project includes a proposal for a 1.9-acre park, referred to as the Central Green,[998] in the center of the proposed building towers to serve employees and visitors. The *Continental City EIR* did not include an analysis of parks and recreational facilities as the *Continental City Initial Study* determined that impacts would not be significant.

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997 City of Los Angeles, Department of Airports, Final Environmental Impact Report LAX North Side Development Project, p. IV-102, April 1993.

998 City of Los Angeles, Draft Environmental Impact Report EIR No. 407-82 SUB Continental City, p. III-29, August 1984.

Construction

Construction of the LAX Northside project may temporarily impair access to Westchester Park Recreation Center (via Lincoln Boulevard). However, alternate routes or detours would be provided if access is impaired as part of the standard planning and environmental review processes.

4.26.3.6.2 Alternative A - Added Runway North

Project Development

Alternative A (described in Chapter 3, *Alternatives*) contains various features that are especially pertinent to the analysis of parks and recreation impacts. Some of these features are increases in employees, construction, and property acquisition.

Although airport activity and the number of passengers and employees in the study area would increase between 1996 and 2015, no residential development or acquisition of park or recreational facilities is proposed. Both the Westchester Golf Course and Carl E. Nielson Youth Park would be expanded. The implementation of Alternative A would involve acquisition and the relocation of 84 residential units and relocation of 172 residents. Various transportation improvements both on and off the airport property would be implemented with Alternative A, some of which would be adjacent to parks and recreational facilities.

Service Effects

Without any residential development proposed, increases in on-airport employment and passengers, compared to baseline conditions, would increase demand for parks and recreational facilities due to daytime or lunchtime use. However, this increase is not expected to be substantial. Demand for park or recreational facility use from passengers is not considered significant as most visitors to the airport are focused on arriving or departing directly from the immediate area. While there would be an estimated increase in on-airport employment of 11,824 individuals compared to baseline conditions, it is doubtful, based on field observation,[999] that a meaningful number of these new employees would frequent off-airport parks at lunchtime such that demand would place constraints on these facilities. Due to time limitations, it is expected that such use would not likely involve active sports or require recreational facilities. As a result, impacts on parks and recreational facilities due to increases in on-airport employment would be less than significant.

Accepting that there would be some increased demand for park and recreational facilities, such increases would be more than offset by proposed increases in park and recreational facilities and the reduced local demand associated with residential acquisition. By 2015, Carl E. Nielson Youth Park would be expanded by 5 acres to approximately 12 acres. The expanded park would continue to be used for organized youth sports or other active recreational activities. Additional proposals for new park and recreational facilities are described below under Westchester Southside Project.

The reduced demand for local public park and recreational facilities would correspond to the land acquisition proposed under Alternative A, which would involve the relocation of 84 residential units with an estimated population of 172. As previously stated for the No Action/No Project Alternative, local demand would also be reduced with the relocation of 4,987 residents, independent from the Master Plan, under LAWA's existing acquisition program.

Imperial Highway would be improved by 2005; however, Imperial Strip would not be altered with implementation of any of the alternatives. Furthermore, there would be no changes or access constraints posed to the Westchester Park Recreation Center, Vista del Mar Park, Dockweiler State Beach, or the South Bay Bicycle Trail. Effects on parks and recreational facilities associated with the LAX Expressway and State Route 1 improvements under Alternative A are described in Appendix K, *Supplemental Environmental Evaluation for LAX Expressway and State Route 1 Improvements*.

As further described in Section 4.8, *Department of Transportation Act, Section 4(f)*, within the Section 4(f) study area, park use would not be significantly impacted by noise. As further described in Section 4.14, *Coastal Zone Management and Coastal Barriers*, under Alternatives A, B, and C, bicycle access to

[999] Field observation of park use in the LAX vicinity was conducted by PCR Services Corporation on September 5, 2000, between 12:00 and 2:00 p.m.

Dockweiler State Beach via Imperial Highway and Westchester Parkway would be temporarily impaired with development of the ring road. However, implementation of Master Plan Commitment LU-3, Comply with City of Los Angeles Transportation Element Bicycle Plan (Alternatives A, B, and C), would ensure that new bicycle lanes would be provided along Imperial Highway and incorporation of a bike path into the Westchester Southside development would maintain and improve access between Sepulveda Boulevard and Dockweiler State Beach along the north side of LAX.

Westchester Southside Project

By 2015, the Westchester Southside project would be built out with 2.62 MSF of office, hotel, retail, restaurant, and business park uses. Westchester Southside does not include residential development and, therefore, would have only limited increased demand for parks and recreational facilities from daytime or lunchtime employee use. Development of Westchester Southside includes expansion of the existing Westchester Golf Course by approximately 6 acres and would include 3 new holes. Within the remaining 91 acres of proposed open space, pedestrian and bike paths are proposed along greenbelts and there is potential for development of a public park and/or other recreational facilities. These proposed park improvements would increase the capacity of park and recreational facilities and more than offset the limited increase in demand expected from daytime employee and visitor use. As a result, impacts from Westchester Southside on parks and recreation are considered to be less than significant.

In conclusion, although Alternative A would increase park and recreational facility use with new employees and visitors to the area, this demand is not considered to be substantial and is not expected to have an adverse effect on park and recreational facilities. Furthermore, increases in demand would be more than offset through new and expanded park and recreational facilities proposed for Carl E. Nielson Youth Park, the Westchester Golf Course, and other areas within Westchester Southside. As a result, potential impacts to park recreational facilities would be less than significant. Potential impacts associated with Alternative A are consistent with those of the No Action/No Project Alternative; although Alternative A would, in comparison, provide more park amenities through the expansion of Carl E. Nielson Youth Park and the Westchester Golf Course.

Construction

Construction activities would occur throughout the airport vicinity on an ongoing basis through 2015. Construction of transportation facilities and other improvements in proximity to park and recreational facilities are not expected to restrict access to area parks and recreation areas. A possible exception would be construction associated with the expansion of Carl E. Nielson Youth Park; although, it is expected that LAWA would time the construction of these improvements so they would minimally interfere with youth sports. As described in Section 4.1, *Noise*, construction noise impacts would occur at Imperial Strip, just south of Imperial Highway in the City of El Segundo. However, Imperial Strip serves as a buffer between the airport and the City of El Segundo and much of its use is for viewing aircraft. Furthermore, construction noise at Imperial Strip would be temporary. Therefore, construction noise impacts at Imperial Strip relative to park use are considered less than significant. Construction of the Westchester Southside Development may temporarily impair access to Westchester Park Recreation Center (via Lincoln Boulevard). However, implementation of Master Plan Commitment ST-18, Construction Traffic Management Plan (Alternatives A, B, C, and D) would ensure that alternate routes or detours would be provided if access is impaired. Furthermore, as the focus of construction would be largely on airport property and within immediately adjacent acquisition areas, there would be no significant impacts on Vista del Mar Park, Dockweiler State Beach, or the South Bay Bicycle Trail. (See Section 4.20, *Construction Impacts*, for additional information.)

4.26.3.6.3 Alternative B - Added Runway South

Project Development

With implementation of Alternative B, Master Plan features influencing demand for parks and recreational facilities would be similar to Alternative A, with no acquisition of parkland, relocation of the same 84 residential units, and equivalent expansion of recreational facilities.

Service Effects

Increases in on-airport employment and proposals for 11 acres of new and expanded park facilities (i.e., Carl E. Nielson Youth Park and Westchester Golf Course) would be equivalent to those described for Alternative A, relative to the baseline conditions. Consistent with conclusions for Alternative A, impacts on park and recreational facilities would be considered less than significant, with incidental increases in demand from employees and visitors more than offset by new and expanded recreational facilities. Alternative B would provide greater park and recreational amenities than the No Action/No Project Alternative.

As further described in Section 4.8, *Department of Transportation Act, Section 4(f)*, within the Section 4(f) study area, no parks would be significantly impacted by noise. Impacts on bikeways, as further discussed in Section 4.14, *Coastal Zone Management and Coastal Barriers*, would be avoided through implementation of Master Plan Commitment LU-3 and incorporation of a bike path into the Westchester Southside development.

Westchester Southside Project

The Westchester Southside development proposal's effects on parks and recreational facilities would be equivalent to those described for Alternative A. Consistent with conclusions for Alternative A, proposed park improvements would increase the capacity of park and recreational facilities and more than offset the limited increase in demand expected from daytime employee and visitor use. As a result, impacts from Westchester Southside on parks and recreation are considered to be less than significant.

Construction

Impacts to parks and recreation areas resulting from construction activities would be similar to Alternative A. Therefore, as described for Alternative A, impacts due to construction are considered less than significant.

4.26.3.6.4 Alternative C - No Additional Runway

With implementation of Alternative C, Master Plan features influencing demand for parks and recreational facilities would be similar to Alternatives A and B with the primary difference focusing on changes in on-airport employees, and acquisition activities, and the provision of park and recreational amenities would be equivalent.

Project Development

Other than the difference in on-airport employment, there are no other components under Alternative C that would change previously identified effects on park and recreational facilities. The proposals for new and expanded park facilities in this alternative are the same as described above under Alternative A.

Service Effects

There would be an increase of 6,421 on-airport employees compared to baseline conditions and the same 172 residents would be relocated under Alternative C. This net increase in demand (compared to baseline conditions) would not alter the conclusions reached under Alternatives A and B regarding impacts on park and recreational facilities.

As previously stated, the increase in demand on park and recreational facilities associated with employees and visitors is not expected to be substantial, and with the proposed new and expanded facilities, impacts would be less than significant.

Compared to the No Action/No Project Alternative, Alternative C would have more beneficial effects with greater provision of recreational amenities.

As further described in Section 4.8, *Department of Transportation Act, Section 4(f)*, within the Section 4(f) study area, park use would not be significantly impacted by noise. Impacts on bikeways, as further discussed in Section 4.14, *Coastal Zone Management and Coastal Barriers*, would be avoided through implementation of Master Plan Commitment LU-3 and incorporation of a bike path into the Westchester Southside development.

Westchester Southside Project

The Westchester Southside development proposal's effects on parks and recreational facilities would be equivalent to those described for Alternatives A and B. Consistent with conclusions for Alternatives A and B, proposed park improvements would increase the capacity of park and recreational facilities and more than offset the limited increase in demand expected from daytime employee and visitor use. As a result, impacts from Westchester Southside on parks and recreation areas are considered to be less than significant.

Construction

Impacts to parks and recreation areas resulting from construction activities would be similar to Alternatives A and B. Therefore, as described for Alternatives A and B, impacts due to construction are considered less than significant.

4.26.3.6.5 Alternative D - Enhanced Safety and Security Plan

Project Development

A complete description of the facilities associated with Alternative D is provided in Chapter 3, *Alternatives*. The features of Alternative D that are relevant to the analysis of parks and recreation are summarized herein. Under Alternative D, no residential development or acquisition of park or recreational facilities is proposed. The Westchester Golf Course would be expanded by 6 acres, with the addition of 3 holes. Alternative D does not propose acquisition or relocation of residences.[1000] Under Alternative D, no changes to Carl E. Nielson Youth Park would occur.

Service Effects

Although no residential development is proposed, increases in passenger activity may increase demand for parks and recreation. However, demand from passengers is not considered substantial as most visitors to the airport are focused on arriving or departing directly from the immediate area. In addition, this increase is expected to be offset by a decrease of 9,261 on-airport employees that would occur under Alternative D.[1001] Furthermore, expansion of the Westchester Golf Course and provision of a bikeway and other recreational amenities within LAX Northside would offset the potential demand for parks and recreation that could occur from passengers. Local demand would also be reduced with the relocation of 4,987 residents, independent from the Master Plan, under LAWA's existing acquisition program. As a result, impacts on parks and recreational facilities due to changes in passenger activity would be less than significant.

Access to public parks or recreation areas within the study area would not be impaired with implementation of Alternative D. As described in Section 4.14, *Coastal Zone Management and Coastal Barriers*, Alternative D would not inhibit bicycle access to Dockweiler State Beach. Furthermore, implementation of Master Plan Commitment LU-5, Comply with City of Los Angeles Transportation Element Bicycle Plan (Alternative D), as further described in Section 4.2, *Land Use* (subsection 4.2.5), would support incorporation of bicycle paths and lanes as part of the Master Plan circulation system.

As further described in Section 4.8, *Department of Transportation Act, Section 4(f)*, within the Section 4(f) study area, park use would not be significantly impacted by noise.

1000 Although no residential acquisition is proposed under Alternative D, if surface transportation mitigation measure MM-ST-13, Create A New Interchange at I-405 and Lennox Boulevard (Alternative D), recommending a new interchange at I-405 and Lennox Boulevard is carried forward, it is possible that 9 to 12 homes may need to be acquired. Also, if ANMP land acquisition for Manchester Square cannot be completed by the time the Master Plan is approved, the City of Los Angeles will use the most appropriate and practical measures available (e.g., voluntary acquisition, leasing, and/or public condemnation) to ensure that the designated areas are vacated consistent with the Construction Sequencing Plan. These measures would be available to pursue any needed acquisition that cannot be obtained through negotiations. This would be the case for the majority of the build alternatives (i.e., Alternatives B, C, and D), the only exception being Alternative A where no new development within Manchester Square is proposed.

1001 The decline in employment in spite of increasing aviation activity reflects productivity increases (i.e., producing more economic output per worker within manufacturing industries related to LAX that would outpace increases in employment).

LAX Northside Project

Similar to the No Action/No Project Alternative, approximately 4.5 MSF of commercial and research/development uses would be constructed on 340-acres under the LAX Northside project. Although no residential uses are proposed, the *LAX North Side Development Project Final EIR* indicated that the project would increase the use of public parks and recreational facilities in the Westchester/Playa del Rey area due to daytime or lunchtime employee use. Consistent with the conclusions in the *LAX North Side Development Project Final EIR*, incidental increases in daytime employee demand for public parks and recreational facilities would be minimal and demand would be offset by the construction of a 2.3-mile bikeway.[1002] Demand would also be offset by a 6 acre expansion of the Westchester Golf Course. As a result, impacts on parks and recreational facilities from development of LAX Northside would be less than significant.

Construction

The extent and duration of construction would be reduced under Alternative D when compared to the other build alternatives. Construction of transportation facilities and other improvements in proximity to park and recreational facilities are not expected to restrict access to area parks and recreation areas.

As shown in Figure F4.1-10, Potential Construction Noise Impacts - Alternative D, in Section 4.1, *Noise* (subsection 4.1.6.4.3), construction noise impacts would occur at a small portion of Imperial Strip, just south of Imperial Highway in the City of El Segundo. However, Imperial Strip serves as a buffer between the airport and the City of El Segundo and much of its use is for viewing aircraft, rather than quiet activities. Furthermore, construction noise at Imperial Strip would be temporary and additive to a currently noisy environment. Therefore, construction noise impacts at Imperial Strip relative to park use are considered less than significant.

Construction of the LAX Northside project may temporarily impair access to Westchester Park Recreation Center (via Lincoln Boulevard). However, Master Plan Commitment ST-18, Construction Traffic Management Plan (Alternatives A, B, C, and D), would provide alternate routes or detours if access is impaired. Therefore, potential impacts to the Westchester Park Recreation Center would be less than significant.

As the focus of construction would be largely on airport property and within immediately adjacent acquisition areas, there would be no significant impacts on Vista del Mar Park, Dockweiler State Beach, or the South Bay Bicycle Trail (see Section 4.20, *Construction Impacts* (subsection 4.20.6.3), for additional information).

4.26.3.7 Cumulative Impacts

When considering cumulative impacts to parks and recreation associated with the No Action/No Project Alternative and Alternatives A, B, C, or D, in combination with other past, present, and probable future projects, as discussed under subsection 4.26.3.3, *Affected Environment/Environmental Baseline*, there are deficiencies in parkland relative to community goals in the Cities of Los Angeles and Inglewood and a surplus of parkland in the City of El Segundo. Under baseline conditions, there are 76 acres of parkland on LAX property between the 69-acre Westchester Golf Course and the 7-acre Carl E. Nielson Youth Park. Beyond the parks and recreation study area, the City of Los Angeles has an overall deficit of parkland, and the supply of parkland varies from surplus to deficit conditions in other jurisdictions in the region.

4.26.3.7.1 No Action/No Project Alternative

Under the No Action/No Project Alternative, there would be a reduction in direct employment generated by LAX due to increases in worker productivity with advances in technology among affected industries. As a result, employment-related demand for parkland would decrease. While passenger activity would increase, associated use of local parks and recreation areas by visitors to LAX is expected to be small. The acquisition of properties and relocation of 4,987 residents from the Manchester Square and Belford areas would substantially reduce local neighborhood demand for parkland. This demand would shift to

[1002] City of Los Angeles, Department of Airports, Final Environmental Impact Report LAX North Side Development Project, IV-102, April 1993.

other jurisdictions, which may or may not be faced with parkland deficiencies. Considering the above and the No Action/No Project Alternative's provision of a 2.3-mile bike path within the LAX Northside project and a 1.9-acre park within the Continental City site, the No Action/No Project Alternative's impacts on parkland would be offset or minimal, and would not contribute considerably to cumulative effects associated with other local and regional projects.

4.26.3.7.2 Alternatives A, B, and C

As previously discussed under subsection 4.26.3.3, *Affected Environment/Environmental Baseline*, increases in demand for parkland associated with new employees and visitors at LAX would be small, and would be more than offset through new and expanded park and recreational facilities proposed for Carl E. Nielson Youth Park, the Westchester Golf Course, and areas within the Westchester Southside development.

Although direct impacts on parkland would be less than significant under Alternatives A, B, and C, increases in employment generated by these alternatives would indirectly result in new households that could increase demand for parkland in the region. Depending on the alternative, LAX-related increases in population associated with increases in direct employment could range from 38,017 to 86,806 within the five-county region. This population increase, which represents less than 1 to approximately 2 percent of forecasted population growth for the region from 1996 to 2015, would generate demand for 114 to 258 acres of parkland. Within a ten-mile radius of LAX, population growth associated with new employment at LAX would represent approximately 3 to 5 percent of forecasted growth, generating demand for 21 to 40 acres of parkland. The potential impacts associated with these increases are difficult to predict, although it is clear that a large portion of this demand would be offset in areas where parkland dedication fee ordinances are in place, including the County and City of Los Angeles and numerous other jurisdictions. Within a ten-mile radius of LAX, only two out of 16 jurisdictions, the cities of Compton and Hawthorne, representing less than 5 percent of the area, do not have parkland dedication fee ordinances and are also deficient in parkland. Furthermore, the small increase in growth that might occur within these jurisdictions would only translate to demand for parkland where provisions for parkland are not included with new housing or through environmental review requirements.

In the more immediate LAX vicinity it is expected that independent project effects on parkland would be limited. For instance, the Playa Vista project, one of the few large areas available in the vicinity for residential development, is subject to parkland dedication or fees to offset project demand, and would not contribute to localized cumulative effects. The built-out nature of the surrounding communities is such that new residential development opportunities would be limited to small infill projects.

As Alternative A, B, or C's contribution to demand for parkland would be indirect, very small, and almost entirely covered by parkland dedication fees or special taxes, and the demand from related projects would be similarly offset through development fees, cumulative impacts on parkland are considered less than significant.

4.26.3.7.3 Alternative D - Enhanced Safety and Security Plan

Similar to the No Action/No Project Alternative, employment-related demand for parkland would decrease due to a reduction in direct employment generated by LAX. While passenger activity would increase, use of local park and recreation areas by visitors to LAX is expected to be small and would be offset by proposed recreational facility improvements. The acquisition of residential properties and relocation of 4,987 residents from the Manchester Square and Belford areas would also substantially reduce local demand for parkland. Therefore, the potential impacts of Alternative D on parks and recreation would be fully offset and less than significant, and would not contribute to cumulative effects associated with other local or regional projects.

4.26.3.8 Mitigation Measures

Alternatives A, B, C, and D would not have a significant impact on parks and recreation, therefore, no mitigation is required.

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Comment Letter D

Vichy Springs
Resort

2605 Vichy Springs Road, Ukiah, CA 95482
707-462-9515 * 707-462-9516 (fax)
www.vichysprings.com

January 9, 2020

Mr. Jared Thiel
Public Works
Ukiah, CA 95482

Dear Jared,

Please find my observations, critiques and requests attached relative to the DEIR for the closure of the Ukiah Landfill.

It turns out Al Sevilla, Alisto Engineering, was unable to open and review the DEIR with the addresses given although we did utilize some of his comments.

He will be available again in a few weeks and thereafter. We feel the DEIR is defective and should be modified and recirculated with the adjustments, omissions and factual corrections it may yield a good result.

Thank you,

Gilbert Ashoff
President
Vichy Springs Resort, Inc

January 9, 2020

Page 10 E5.2 3rd Paragraph

Land adjacent to land fill property is zoned primarily as range land and is used for grazing.

a) This is not true
b) Only land north is used for grazing majority is not. Resort is zoned commercial Resort (overlay zoning) property west is zoned residential.
c) Resort building this is true, but the dump can be seen from many locations on the Resort property.

D-1

Page 14 E5.2 2nd paragraph

The Concerns were not expressed by non-existent (1990) Vichy Springs Investment Group. Concerns are from 166-year-old Vichy Springs Resort. The resort adjoins the dump property (not 500 feet from the southern property line).

D-2

Page 15 E5.6

"Alternatives considered but eliminated. Compacted clay and/or geo synthetic clay liners with natural vegetation." This is the standard for closure why not studied so City Council is informed?

D-3

Page 16 E5.7 Table E5.1

Impact 3.1 – 1

Many neighbors either look directly at the dump from their house or see it several times per day when they drive by. Residents, tourists who use Vichy Springs Road will see the dump. It will be bright and very ugly in late spring, summer and fall.

D-4

Page 19 E5.7 Table E5.1

Impact 3.1 – 3

Of course, this ugly cover will impact a historical resource the Resort. View shed from trails and guests walking or driving on Vichy springs Road will experience the blight.

D-5

Page 21 E5.7 Table E5.1

Impact 3.7 – 2

This project has already damaged substantially the fragile pressurized springs at Vichy. Continued drilling may further impact the pressure zone from which they originate. Study is needed by pressure zone experts. **D-6**

Table E5.1

Impact 3.8 – 1

There is zero noise at Vichy Springs at night. 7 am start will severely impact sleeping conditions. At 8 am added to the unpermitted unregulated Gun Club will be a dramatic increase. All day it will impact walkers and hikers at the Resort. **D-7**

Page 23 E5.8

No valid alternatives including the standard clay cover were included in this DEIR therefore this section is simply false. **D-8**

Page 39 2.3.2

The proposal is for gradient no steeper than 2:1 which means the dump is less than 2:1 in most of its area. Further the synthetic cover "will essentially eliminate the discharge of sediment" which is a natural occurrence. No place is it mentioned the effect of a forty-acre impermeable barrier on stream flows already under cutting the downstream areas especially west of Redemeyer Road to the Russian River. **D-9**

How will this be mitigated? It would not happen with a natural cover allowing water to penetrate.

Page 46 2.3.3 Third Paragraph

Hours are simply incompatible with a quiet Resort a few 100 feet away – when an environment is quiet any noise carries and is noticeable. **D-10**

We have proposed previously a 9am start and no back up beepers (this has applications and OSHA allows it).

Saturdays are the Resort's busiest day. Request no Saturdays.

Page 51 Chapter Three 3.0.3

Project area is not within and around the City of Oxnard! **D-11**

Seems this is not an original DEIR (see future references)

Page 53 3.0.6

The referred to “reasonable range of alternatives” is not included in this DEIR **D-12**

Page 54 3.1.1

Visual quality and visual sensitivity.

It seems neither of these were addressed not mitigated in this DEIR **D-13**

Page 57 3.1.2.2

Existing visual proposed project site. This again purposely misrepresents adjacent property as zoned rangeland and used for grazing. Property south, east and west of the dump is not used for grazing land. **D-14**

Page 62 3.1.4.3 Impacts and mitigation measures

The 2’ x 3’ sign is slightly smaller than the 40 acres that will be seen from Vichy Springs Road and the hiking property at Vichy Springs. Completely a misrepresentation. Needs to reflect what 40 acres looks like from 1,000 feet. **D-15**

Page 65

The “Green Blob” photo is self-explanatory. It is gross, unappealing and not acceptable next to a 165-year-old State Landmark. **D-16**

Page 66 3.1 Aesthetics

D-17

False statements as follows:

a) The landfill is visible from the landfill gate. One looks directly at it.
b) Vichy Springs Resort from its property sees the same as a) above sees it from a great percentage of their property.
c) The author did not hike all around the property or he would have seen the dump easily from many vantage points.
d) His comment “no visual sighting” is simply untrue. Photos will be presented by our legal counsel demonstrating 4-5 areas of over 100 where the dump can be seen in all its glory.
e) 40 acres are easily seen from 1,000 feet away, another untruth.

Page 72 Photo

The boundary line is misrepresented it is approximately where the 50' plus elevation barrier is. See fence line located which means the gate and dump are visible from the Vichy Springs property. **D-18**

Page 73 Photo

The arrow points at the visible dump. Please correct this error/misrepresentation. **D-19**

Page 84 3.2.2.5

Once again, the land use west, south and east is misrepresented to soften impacts. It is not used for grazing but for a private resort, a private gun range and residential. **D-20**

Page 102 3.3.2.3 Wildlife Movement

No mention of the huge quality of wild boar weighing up to 400 pounds or large elk at 650 pounds that graze and root (boar) the area and what that will do to plastic astroturf cover vs. clay. **D-21**

133 3.4.2 Key Concepts

Historic resource one again this cracker jack box DEIR refers to "Ventura County Historical Landmarks, or City of Oxnard points of interest." Really? May want to use another or a freshly created DEIR. Please correct this **D-22**

Page 136 3.4 Cultural . . . .

Vichy Springs did not begin in 1888 but in 1852-1854 as Day's Soda Springs. William Doolan renamed it Doolan's Ukiah Vichy Springs after selling the lands of Cayetano Juarez to the squatters on Juarez's Ukiah Valley Mexican Land Grant in about 1866. He acquired Vichy from Juarez. Day was a squatter. **D-23**

Page 139 3.4.3.6 Project Site Setting

The author correctly elicits Vichy Springs is a California State Landmark on page 136. Then, in the second paragraph, misrepresents "just outside the project area Vichy Springs resort established in 1857 (remember he said 1888 on page 136) is listed on the National Register of Historic Places (National Park Service 1985) <u>It is not</u> true. He then blanket states "the proposed project is not located in Vichy Springs Resort property (true) and would not involve any activities that would affect this historical place and/or **D-24**

buildings. He ignores all our comments especially the delicate pressure zone of the only springs of their type in North or South America. Really? Needs study, analysis and mitigation measures.

Page 140 3.4.4.2

"CEQA requires that lead agencies determine weather their projects may cause a substantial adverse change to a historical resource." **D-25**

Where is this shown, studied? Please study, indicate impacts and show mitigations.

Page 144 3.4.5.2 Approach to Analysis

Two places in paragraph 2 the author mentions .25-mile radius then 1/8-mile radius and again the 1857 date (1854) and the National Register – (not true). What does this actually prove? Please expand show study, results and any mitigations. **D-26**

Page 187 3.7 Hydrology

2nd paragraph last sentence this describes the main vent of water called Vichy Springs. The pressure zone extends 1/3 mile east to the base of the Mayacamas Mountains and west to the subdivision all along the Sulphur Creek. Free CO2 is seen all along this line. **D-27**

Page 189 3.7 Hydrology

Top of the page it mentions volatile organic compounds (vocs) found in 90-8 and 92.4. It states, "generally consistent with historical conditions and do not appear related to the landfill." Based on what? These are not normally found in shallow ground water. Please provide a study or documentation to back up this blanket statement and mitigations. **D-28**

Pages 189-190 Same for Tables 3.7.2

Please provide background study for these assumptions and any mitigations to prevent this from spreading to neighboring lands and water sources. **D-29**

Pages 190-191

This is addressed in our legal counsel's report. Is this just a magical coincidence drilling in the pressure zone of Vichy springs and its results? This needs to be studied by on expert who understands pressure zones not simply hydrology as that is not the issue. **D-30**

Pages 199 3.7

The mitigated negative declaration does not apply to a plastic cover. It applies to a clay cover. Please readdress this issue. D-31

Page 205 3.7.3

This project already illegally (with no Fish and Game permit) moved the steam channel and flow, from its natural channel, north to create a larger base for garbage. This needs to be studied and approved by Fish and Game, meaning what long term affects has the improper realigning of the stream had on the environment. What affects has dumping garbage in a streambed had and is having on the environment. D-32

Page 222 3.8.4.3 Noise

Sleeping guests will not appreciate 7am trucking and construction noise. An easy mitigation would be a 9am start and no back up beepers. This is a big deal. For the historical use of Vichy Springs. D-33

Page 223 3.8 Noise

The noise at 7am (City's ordinance, the DEIR report is in the county at a quiet location) is simply incompatible and is an impact that requires mitigation. Please study, show impacts and mitigation measures to zero out the problem that will be existing. D-34

Page 227 Chapter 4 Alternatives

Please see our legal council's report on the lack of alternatives. D-35

Page 257 2.9.1

This states gas well probes will extend 250 feet below surface. This may cause, once again, upset of Vichy Springs' pressure zone and needs study and mitigation measures. D-36

Page 706 Section 01800 Health and Safety

There is nothing in his section that addresses the lack of safety for workers behind the hugely increased unpermitted use of the City owned privately operated Gun Club. D-37

Old-time workers at the Dump will attest to the then, from a club with a fraction of today's use, bullets and ricochets flying around as they worked directly in the line of firing from the Gun Club. This needs to be studied and mitigated.

Note this northerly trajectory of bullets affects all activities including residences and ranchland north and east of the Gun Range. Vichy Springs can provide names of people who have experienced this past and present.

Nowhere could be found safety and mitigation measures should the well drilling affect the spring waters at Vichy Springs. The springs should be monitored and drilling immediately stopped should pressure be encountered (pressure sensitive instruments should be used when drilling) and remediation immediately implemented. Drilling close to springs like Vichy is prohibited in enlightened parts of Europe. D-38

This is extremely important and is a formal request.

Pages 1014 & 1015 Post closure Cost

This should be done with clay cover for comparison and evaluation by public – This is a major defect in the DEIR. D-39

Page 1039 2.2

Tis is a huge misrepresentation. It makes the gun range, which is adjacent (not 2000 feet away) to the "Waste Management" and is south not northeast. Once again land surrounding is <u>not</u> primarily used for grazing but resort, gun range and residential homes. There are also homes on the only area north and northeast of dump used for grazing. D-40

Please correct all of these inferences and stop misrepresenting them.

Page 1056 (20) section d

This is simply false. It is in an urban area with 100's of homes and a resort within 1,000 to 4,000 feet with sewer, water, gas and electricity, hardly rural. D-41

Please correct, address, impacts and mitigations with the correction in all of the following pages and other locations.

Page 1111 (75) section c second paragraph

Stream bed alteration agreement should include a clearance for the illegal diverting of tributary and burying the original stream bed with garbage. This is imperative as the new permit should not be issued without the previous alteration being studied, certified and accepted as having no impact on the environment. D-42

Page 1113 5.0 conclusions 5.1 c

This is simply is not true. It will have adverse impact on human beings. The transfer from bucolic grasslands to ugly plastic is huge. D-43

Please address impacts, alternatives and mitigations.

Page 1114 c Less than significant impact

D-44

The first sentence is a statistical impossibility.

Please see comments and requests herein and those of our legal counsel. There are significant impacts address them please.

Page 1281 1.1

See previously mentioned concerns related to the second sentence. This creek was moved illegally now is the time to address it. D-45

Page 1344 site characteristics Gen. Desc.

2nd paragraph again repeats misinformation Vichy Springs Investment Group (does not now exist (since 1990). First mention of home(s) 900 feet west of landfill. This was not included in impacts before and it is addressed in our legal counsel's report with photos, as are homes (several) in El Dorado Estates that look directly at the dump. D-46

Pages 1411, 1413, 1414 Mendocino County, CA ……Part of Trinity County, CA

D-47

Again, the cracker jack box DEIR appears. May want to correct this.

Thank you,

Gilbert Ashoff
President
Vichy Springs Resort, Inc

Chapter 3 Responses to Comments

This chapter evaluates and provides responses to the comments received on the 2019 Public Draft EIR (DEIR) during the 45-day public review period (November 13 through December 31, 2019 and then extended through January 9, 2020). The City also received verbal comments from Vichy Springs resort at the Public Hearing which was held on December 18, 2019 as well as four written comment letters. In comparing the notes from that meeting and the written comments provided by Vichy Springs Resort, it appears that all of the substantive elements of their verbal comments are covered by their written comment letters. The City has reviewed and considered all of the comments received and provides a response to each of those comments as provided for below.

COMMENT LETTER A – CALRECYCLE

Response to Comment A-1. Thank you for your letter and the information regarding that a closure permit should be issued when the Final EIR is certified to enable the Lead Environmental Agency (LEA) to enforce the Final Closure Post Closure Maintenance Plan.

Response to Comment A-2. The City acknowledges that the Mendocino County Department of Environmental Health is the Local Enforcement Agency (LEA) and is responsible for providing regulatory oversight of solid waste handling activities, including inspections. The City looks forward to working with the Mendocino County Department of Health on this Project.

Response to Comment A-3. The City understands that CalRecycle may have further comments on the Proposed Project. Please feel free to continue to contact Jarod Thiele at 707-463-6755 or by e-mail at jthiele@cityofukiah.com.

Response to Comment A-4. As required by the California Environmental Quality Act (CEQA), the City will provide CalRecycle and all other commenting agencies with a minimum of 10-days advance notification of the time, date, and location of the adoption of the Proposed Project by the City Council, along with an electronic copy of the Final EIR, which includes responses to comments received.

COMMENT LETTER B – NORTH COAST REGIONAL WATER QUALITY CONTROL BOARD

Response to Comment B-1. The comment is correct in that the City is proposing to use an engineered alternative design cap rather than a prescriptive compacted clay layer cover for the closure of the Ukiah landfill pursuant to the provisions Order No. R1-002-0061 and Title 27 of the California Code of Regulations (T27 CCR), §20080(b). The City agrees that the No Project Alternative is not a viable regulatory alternative that can legally be implemented as the Ukiah Landfill is required to be closed in accordance with T27 CCR. Please be advised that the City has revised Chapter 4 – Alternatives in the DEIR to expand on the evaluation of the clay layer/natural cover alternative. Specifically, the City has moved the clay layer/natural cover alternative from Section 4.4 - Alternatives Considered and Eliminated to Section 4.3 - Alternatives Carried Forward. Please see Chapter 4 – Revision to the DEIR (of this Final EIR) for changes to the DEIR.

The City's selection of the Proposed Project - including the use of engineered alternative design cap cover and the ClosureTurf® product as the artificial synthetic turf cover was evaluated by EBA Engineering in a Joint Technical Document ("JTD") Addendum No. 2, submitted to the Local Enforcement Agency ("LEA") on August 14, 2015 (See Appendix B to this Final EIR) as environmentally and functionally superior to the prescriptive compacted clay liner (CCL) cover. EBA proposed ClosureTurf® after evaluating other alternatives, including the prescriptive clay cover and other traditional geomembranes

and geosynthetic clay liners (GCLs), as well as a rock-armored surface in lieu of a vegetative soil cover to address the susceptibility of soil creep and veneer failures on the steep slopes.

Findings from the aforementioned research concluded that a GCL final cover system represented a suitable alternative. Based on this finding, the City proceeded with the submittal of an engineered alternative analysis (EAA) on March 11, 2003 to the North Coast Regional Water Quality Control Board (RWQCB), California Integrated Waste Management Board (now CalRecycle), and the Mendocino County Environmental Health Department (LEA). The EAA was prepared in accordance with Title 27 of the California Code of Regulations (27CCR), §20080(b) and included comparisons of pertinent properties related to physical, mechanical, and hydraulic conductivity characteristics, construction/installation, and other miscellaneous performance features, as well as an economic analysis. Conclusions from the EAA demonstrated that the proposed GCL alternative met or exceeded the performance criteria addressed by the prescriptive standard and would result in a reduced economic commitment of tax payers' dollars on the order of $461,000. This same EAA was included in the January 2008 Joint Technical Document (JTD) requested by the RWQCB.

In 2015, the final cover design was reviewed once again to consider the potential application of the ClosureTurf® product. Whereas the GCL final cover system was demonstrated to be an appropriate upgrade to the prescriptive standard, the stability characteristics of the system only marginally exceeded the minimum design standards. Further research by EBA of the ClosureTurf® final cover system revealed that the use of this product would provide significantly higher stability characteristics than the GCL and other geosynthetic products. It would also offer a number of other advantages as compared to the GCL and the prescriptive CCL standard. These advantages include the following:

Performance

- ClosureTurf® exhibits substantially lower infiltration rates as compared to the prescriptive CCL standard and offers more efficient removal of moisture above the low-hydraulic conductivity layer (LHCL) component, thereby reducing the amount of potential infiltration into the waste management unit (WMU).
- The engineered turf component eliminates the potential for soil creep and veneer failures resulting from saturation of the vegetative soil cover that is a required component of the prescriptive Subtitle D final cover and other traditional geosynthetic cover systems. This potential is exacerbated by the very steep slopes that exist at the Ukiah Landfill.
- The drainage aspects of the ClosureTurf® are designed to allow rainfall to penetrate rapidly through the sand infill layer and into the structured drain liner below which has a very high transmissivity for subsequent conveyance of the water off of the liner system. The sand infill has been demonstrated to handle over six inches per hour of rainfall intensity without erosion when applied on three horizontals to one vertical (3H:1V) slopes. Such rainfall energy conditions on a traditional vegetative soil cover would likely result in significant erosional damage.
- The drainage aspects of the ClosureTurf® promote very "clean" and low turbidity stormwater run-off, which represents a beneficial feature since the collected run-off is subsequently discharged to the ephemeral creek that borders the northern boundary of the WMU. Achieving comparable stormwater run-off quality from a traditional vegetative soil cover would be difficult. It should be noted that the unnamed creek is a tributary to the Russian River which is listed as impaired for excessive sediment pursuant to 303d of the Federal Clean Water Act.
- ClosureTurf® is designed to provide weathering resistance and geomembrane protection when exposed to extreme heat and ultra-violet (UV) exposure. Based on results of independent, real-world weathering tests and data from existing projects, ClosureTurf® can provide decades of

reliable performance beyond the standard 30-year postclosure maintenance period.

- ClosureTurf® has been tested for wind uplift resistance and demonstrated no uplift when exposed to 120 miles per hour wind. As such, the ClosureTurf® can withstand most wind conditions that could realistically be encountered at the site.

Installation

- ClosureTurf® deployment is very straightforward, both from a placement and seaming standpoint. Furthermore, heavy equipment requirements for ClosureTurf® deployment are limited primarily to a rubber-tire forklift or equivalent. Conversely, CCL construction is very labor intensive with substantial reliance on heavy equipment (i.e., scrapers, dozers, compactors, etc.).
- Less construction quality assurance (CQA) is required for ClosureTurf® due to the consistency of the materials and manufacturing process. CQA testing for a CCL, in turn, is more extensive and occurs at a higher frequency to verify the consistency of borrow source materials and the contractor's ability to achieve moisture content, compaction, and hydraulic conductivity during construction.
- Installation of a sealed, double-ring infiltrometer (SDRI) is required to test the field permeability of CCLs, which is costly and time consuming. Such a provision is not required for ClosureTurf®.
- In comparison to other geosynthetic liner systems, ClosureTurf® is slightly more labor intensive due to the placement of the sand infill layer. However, this increased labor is more than offset by the elimination of the vegetative soil layer. Similar to the CCL construction, construction of a vegetative soil layer is also very labor intensive with substantial reliance on heavy equipment. In addition, in the case of the GCL final cover system that was previously proposed for the landfill, the gas relief layer material and labor requirements are significantly greater as compared to the ClosureTurf®. Thus, the ClosureTurf® final cover system installation represents the least intensive approach from an installation standpoint.

Maintenance

- ClosureTurf® offers a significant maintenance advantage over a prescriptive Subtitle D final cover and any other traditional geosynthetic cover systems that require a vegetative soil cover. In essence, vegetative soil covers often require regular maintenance related to the repair of erosional damage, installation of erosion control measures (i.e., silt fences, hay bales, wattles, etc.), slope repairs, and revegetation. Erosion from the vegetative soil cover also causes siltation of drainage ditches and culverts that require subsequent repair. Such provisions are not required with the ClosureTurf® product, thereby providing a significant cost savings over the course of the postclosure maintenance period.

Based on the aforementioned considerations, the City proceeded with the submittal of a second EEA to demonstrate equivalency to the prescriptive standard and to meet the criteria specified in 27CCR, §20080(b). As required in 27CCR, an economic analysis was included that compared the closure construction costs for ClosureTurf® versus the GCL final cover system. Note that this cost comparison focused on the GCL scenario since it was previously demonstrated as part of the March 2003 EEA that the GCL was more economical than the prescriptive standard. The results of the comparison revealed that the construction cost for ClosureTurf® was approximately $420,000 less than the GCL final cover system. In addition, the 30-year postclosure maintenance costs associated with ClosureTurf® were estimated to be approximately $277,000 less than any final cover system that requires an erosion-resistant layer comprised of a vegetative soil cover. Thus, the overall cost savings resulting from replacing the previously proposed

GCL final cover system with ClosureTurf® is approximately $697,000. This EEA was included as part of a *Final Closure Submittal Package* issued to the RWQCB, CalRecycle, and LEA on August 14, 2015.

After the aforementioned submittal, two additional versions of the FCPMP were prepared in March and May, 2016 at the request of CalRecycle. The content of these versions was similar to the information contained in the August 2015 submittal, with modifications pertaining to formatting issues and incorporating miscellaneous comments issued by the various regulatory agencies. However, following submittal of the May 2016 FCPMP and prior to regulatory approval of the design, a prolonged period of negotiations occurred that focused on the thickness of the foundation layer (1-foot versus 2 feet) and geomembrane liner (50 mil versus 60 mil). In a meeting with the RWQCB on October 11, 2018, an agreement was reached on both issues (2 feet foundation layer and 50 mil geomembrane liner), as well as a provision to address a possible replacement scenario as part of financial assurance.

After the final negotiations and agreements reached during the October 11, 2018 meeting with RWQCB staff, the City was directed by CalRecycle, LEA, and RWQCB to proceed with updating the FCPMP for the ClosureTurf® final cover system design by April 30, 2019. The City met this deadline. That directive confirms that each agency was satisfied with the previous EEA demonstrations and the corresponding conclusions that the ClosureTurf® final cover system as proposed is adequately protective of the environment.

As demonstrated above, EBA has evaluated potential alternatives multiple times over the course of this project under the regulatory framework of 27CCR and the various regulatory agencies. The scope of the analyses performed complied with 27CCR, §20080(b) which requires that the proposed engineered alternative be consistent with the performance goal addressed by the prescriptive standard and afford equivalent protection against water quality impairment, while also demonstrating that the construction of the prescriptive standard is unreasonably and unnecessarily burdensome and will cost substantially more than the proposed alternative. While these analyses have been performed and subsequently approved by the regulatory agencies, including the RWQCB and are part of the administrative record and now contained as part of the Final EIR.

In its evaluation, EBA found that the low hydraulic conductivity layer (LHCL) geomembrane component of the ClosureTurf® system is fully protected from ultra-violet (UV) degradation and other environmental stresses by the engineered turf and specified infill. Watershed*Geo* (ClosureTurf® manufacturer) has completed extensive testing that shows the protective turf cover with sand infill will last longer than 100 years. This testing has been conducted at third-party laboratories and the results have been audited by other third parties. (See Appendix B.) As such, the design-life of the engineered turf layer ensures that the LHCL geomembrane component will remain covered for that period.

The City also shares concerns about catastrophic wildfires and its potential to adversely impact the landfill cover. As such and as standard City practice, the City has addressed the maintenance and replacement costs and values in the Final Closure and Postclosure Maintenance Plan (FCPMP) and will take out adequate insurance policy(s) to cover the costs for replacement in the event of a catastrophic event such as a wildfire.

Response to Comment B-2. The comment is correct in that in 2018, the City had proposed to develop portions of the same parcel APN No. 178-130-01 as a public park known as the Vichy Hills Trail Project. However, according to the City Public Works Director, the City has dropped/abandoned that Proposed Project due to environmental and public safety concerns that could result from allowing public access. As a result, the Proposed Vichy Hills Trail Project is cancelled/abandoned and the City property will remain closed to public access. That project is no longer a probable future project that requires further consideration in this EIR.

Response to Comment B-3. The City looks forward to continue to work with the Regional Board to address the permitting requirements and mitigation measures for work in the jurisdictional water requiring 401 Certification.

Response to Comment B-4. The City acknowledges that disturbed soils on the Proposed Project will exceed 1 acre in area and thus will require to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Construction General Permit Order No. 2009-0009-DWQ (As amended by 2010-0014-DWQ and 2012-0006-DWQ). In addition, the City acknowledges that the Construction General Permit also requires the development of a Storm Water Pollution Prevention Plan (SWPPP) by a certified SWPPP Developer which must be implemented, monitored, and maintained. The City looks forward to working closely with the various departments within the Regional Board on this Project.

COMMENT LETTER C – WATER AND POWER LAW GROUP/VICHY SPRINGS RESORT

Response to Comment C-1. Thank you for your comment letter and similar oral comments at the December 17, 2019 Public Hearing in Ukiah, California on the DEIR.

Response to Comment C-2. Comments noted. The City appreciates Vichy Springs Resort's assertion that its comments on the DEIR are not about stopping the Landfill Closure Plan, but instead are more about ensuring that the Landfill Closure Plan is done correctly. Specifically, the City intends to close the Ukiah Landfill in an environmentally responsible and safe manner so that the Proposed Project will not cause any significant environmental and/or physical impacts to the Vichy Springs Resort including its guests, hikers, and recreational users.

Response to Comment C-3. The City acknowledges that Vichy Springs has previously provided written comments on the 2016 IS/MND and the 2017 Notice of Preparation to prepare an EIR (i.e. "Scoping Document") that discussed the scope of the issues to be addressed and excluded in the EIR that would be prepared for the Landfill Closure Project. The City responds to these comments in its responses to Comments C-3a to C-3c, below.

Response to Comment C-3a. The City disagrees that the Proposed Project's artificial synthetic cover would have an adverse visual impact. Figure 2-2 in the DEIR provides two recent examples of artificial synthetic turf covers being successfully used for landfill closures and which look very natural and blends well into the surrounding natural environment. The City's proposed artificial synthetic turf cover would look very similar and would be designed to fit into the surrounding environment. The City agrees that the artificial synthetic turf cover will not change color with the change of seasons. However, there are many instances throughout Northern California where there are green grass/vegetation features contrasted by or along-side brown hills in the late summer early fall timeframe. This phenomenon occurs naturally around water features such as rivers, lakes, streams, creeks, marshes, wetlands, etc. as well as manmade features through irrigation practices. These instances create contrast in the landscape and are not considered to have a significant adverse aesthetic impact(s). Further, the proposed artificial synthetic turf cover is designed to look like natural grass and the technology has improved so that it is almost impossible to tell the difference unless you are standing on the artificial synthetic turf. As an example, see the picture below of an artificial baseball field where the entire infield (including home plate area and base paths) is made out of artificial turf. The outfield is natural grass and the pitcher's mound is dirt/clay. This picture was taken from on the field near the backstop, where the outfield grass is approximately 110-feet away. From that distance, it is virtually impossible to tell the difference between the artificial turf and the outfield grass. Certainly, at any partial views from of over 500-feet away, it would be difficult or impossible to tell the difference between artificial synthetic turf and real/natural grass. As a result, the City proposed the olive-green color option as the olive-green color would blend into the natural surrounding environment the best. Also, as described in Section 2-Project Description, a sand layer will be put on top of the turf to serve as a ballast and help hold

the turf down. This sand ballast will be a soft tan/brown color and will help dampen any harsh olive-green color contrast concerns and will help to make the artificial synthetic turf look even more natural. Please refer to Chapter 4 of this Final EIR for additional documentation and photos describing how and why the Proposed Project would not have a significant visual impact on the Vichy Springs Resort. In short, it is the City's determination that the Proposed Project's artificial synthetic turf would not have an adverse aesthetic impact on any viewshed. Further, the fact that the City has not received ay other comments from other potential sensitive receptors, further supports that the proposed Project would not have any significant adverse aesthetic impacts.



Example of Artificial Turf Infield and Natural Grass Outfield
McBean Baseball Field, Lincoln, CA

Response to Comment C-3b. The City acknowledges that Vichy Springs Resort has explained numerous times that there are extensive hiking trails on the Vichy Springs property where guests come to enjoy the quiet and tranquility of the area. However, as disclosed in the DEIR and discussed more fully in Response to Comment C-6e below, the proposed construction activities would not provide a significant source of noise that would exceed the Mendocino County noise ordinance and would not ruin the "quiet and tranquility" for Vichy Springs Resort guests staying overnight and/or using the hiking trails.

Once constructed, the Proposed Project would not have any activities that would make any noise that could be heard by Vichy Springs Resort's guests and hiking trail users, except for the basic ongoing maintenance and inspection activities that currently exists and which are well within the Mendocino County noise ordinance restrictions. As a result, the Proposed Project would not have any adverse noise effects on Vichy Springs Resort, its guests, and/or hiking trail users. Therefore, no mitigation measures are necessary. Further, the City would certainly not condone or advise its contractors to remove their back-up beepers. Please see response to Comment C-6i.

Response to Comment C-3c. The City agrees that for many years Vichy Springs Resort has raised concerns that the City's existing groundwater monitoring wells impact Vichy Spring Resort's spring water. Please see response to Comment C-7 that addresses this concern.

Response to Comment C-4. The City respectfully disagrees that the DEIR did not consider the Compacted Clay and/or GeoSynthetic Clay Covers with Natural Vegetation Closure Alternative. The DEIR did in fact "consider" and "evaluate" numerous alternatives, including the clay layer/natural cover alternative. Under CEQA, alternatives can be "eliminated from further consideration" based on rationale provided for elimination of the alternative. This in and of itself is an "evaluation". Further, CEQA, unlike NEPA, does not require that alternative discussions be presented in/at the same level of detail as the assessment of the Proposed Project.

As disclosed in Section 4.3 of the DEIR, the clay layer/natural cover alternative was eliminated due to a variety of technical and environmental concerns including, site suitability, increased costs from both a construction and maintenance perspective, and increased environmental impacts to air quality, biological resources, water quality, noise, and traffic, among others. Even though the clay layer/natural cover alternative was eliminated, it has been adequately "considered" and "evaluated". Also, please refer to Appendix B of this Final EIR for specifics and history of how the City has further considered the clay layer/natural cover alternative through the years.

Nevertheless, in an attempt to help resolve this issue, the City has revised Chapter 4 – Alternatives to move the clay layer/natural cover alternative to be included in the DEIR as an alternative carried forward instead of being eliminated. Specifically, the City has moved the clay layer/natural cover alternative as a Section 4.4 - Alternatives Considered and Eliminated and moved it to Section 4.3 - Alternatives Carried Forward. Please see Chapter 4 – Revision to the DEIR (of this Final EIR). Specifically, the City has expanded on its evaluation of the clay layer/natural cover alternative in the DEIR. However, the conclusion is the same in that the clay layer/natural cover alternative would have increased environmental impacts to air quality, biological resources, water quality, noise, and traffic, among others than the Proposed Project.

Response to Comment C-5. See responses to C-5a to C-5j below.

Response to Comment C-5a. The City respectfully disagrees with the comment that the DEIR has several flaws and defects in Section 3.1 – Aesthetics/Visual Resources as it relates to the artificial synthetic cover. Please see responses to C-5b through C-5j below.

Response to Comment C-5b. The comment is correct in that the City did in fact choose the "olive-green" color as the best color option to blend into the natural surrounding environment. It was selected to blend into the olive-green grass in the winter or wet-season and look like an irrigated field in the summer dry months. This is not a flawed concept because it is very common to find irrigated fields, pastures, agricultural crops, golf courses, and landscape designs using grass adjacent to the natural brown/tan hillsides throughout Northern California in the summer or dry months. This is common place throughout Northern California and specifically in the Ukiah area and therefore does not present an uncommon contrast. For example, the DEIR provided a comparison of the Proposed Project's proposed olive-green color scheme blends in with other local irrigated areas such as the Ukiah Valley Golf Course and the local surrounding areas. Please see Chapter 4 of this Final EIR for additional photos and analysis of the aesthetic features of the Proposed Project. Further, Vichy Springs Resort itself has a relatively large grass area that is kept green all year long, due in part, because it provides it guests with a natural, aesthetically appealing, contrast to the natural brown/tan landscape surrounding the resort. Color contrasts in natural green and brown/tan contrasts are prevalent throughout northern California and is not considered to be a significant environmental impact. The City has used the CEQA guidelines in the DEIR for establishing the environmental standards for evaluating whether a change to the physical environment is significant and adverse. The City's DEIR (and as revised through this Final EIR) concluded that the color contrast in the dry season would not be a significant environmental impact and/or would impact a designated view by Mendocino County. Please see comments C-3 and C-3a above as well as C-5c through C-5j below.

The City has only received comments from Vichy Springs Resort expressing these concerns. The comment also does not provide any evidence such as pictures or testimony from technical experts that it would be a significant environmental impact and or that a view to the Ukiah Landfill is considered by Mendocino County as a scenic resource of significance.

Response to Comment C-5c. Please see response to comment C-5b above. The proposed olive-green artificial turf cover will look like real or natural grass. Please see and revisit Figure 2-2 as real-life examples of it being used on existing landfills and how well they look like real or natural grass. The proposed olive-green artificial turf cover will appear to be an area of irrigated land. Please see Chapter 4 of this Final EIR for additional photos and analysis of the aesthetic features of the Proposed Project.

Response to Comment C-5d. Please see response to comment C-5a and C-5b above. The overall comment correctly points out that the existing vegetation on the surface of the landfill and on the surrounding land represents the baseline or existing environmental condition. The City agrees that the EIR must evaluate the impact of the Proposed Project on existing conditions. As such, the DEIR acknowledged that the Proposed Project cover will change the existing condition from the natural vegetation to an artificial synthetic turf cover and provided several examples in the DEIR of how that would look in comparison to the existing conditions.

As discussed above, the proposed artificial/synthetic turf cover is designed to and will blend into the surrounding area as an irrigated grass field, which is very common throughout Northern California and the surrounding Ukiah region. The Aesthetic Chapter 3.1 includes Figure 3.1-1 (page 3.1-6) of the DEIR that shows a 2018 view of the landfill (the existing condition on the day of the aerial photo). The baseline condition changes from season to season, but the landfill will always stand out from the surrounding area, because the landfill is the largest continuous area in this viewshed with no trees. The existing landfill already is distinct from the existing natural landscape as it is a landfill with waste underneath the existing vegetation and there are no trees on top of the landfill. As a result, the 40-acre area of the closed landfill will always be in contrast to the surrounding natural environment (with sparse or dense stands of trees) – even with a clay/natural cover. The DEIR provides several examples of how the Proposed Project would compare and contrast with the existing conditions. Specifically, the DEIR shows recent examples of where artificial synthetic turf is being successfully used. For instance, and as provided in Figure 2-2 of the DEIR, artificial/synthetic turf covers have been and are being successfully used for landfill covers and provide a very natural, aesthetically appealing, looking cover. The City maintains that the Proposed Project's proposed artificial/synthetic turf cover would look very similar to the two artificial/synthetic covered landfills examples provided in the DEIR (see Figure 2-2).

Please see Chapter 4 of this Final EIR for additional photos and analysis of the aesthetic features of the Proposed Project. As explained in response to comments C-3, C-.3a, and C-5b above as well as in Section 3.1 of the DEIR and as revised in this Final EIR, the City has determined that the change is not environmentally significant and provides substantial evidence that it does not at other landfills and would not adversely affect Vichy Springs Resort. Further, the comments from Vichy Springs Resort contain the only opinion and/or evidence received by the City during the several public comment periods over the years that the color contrast between the Proposed Project and surrounding land during the dry season should be considered environmentally significant. Further, the comment does not provide any evidence other than Vichy Springs Resort's opinion to support this claim.

Response to Comment C-5e. Please see response to Comment C-5d regarding baseline conditions and response to Comment C-5b regarding evaluation of the future visual landscape to the surrounding areas.

Response to Comment C-5f. As discussed in the DEIR, the primary purpose of the 1,000-foot example is to provide some context to the reader as to what can reasonably be seen by the naked eye from within and up to 1,000-feet away. Further, the demonstration shows how, even without obstruction, objects are harder

and harder to see or notice as one moves farther and farther away. Views of the proposed artificial turf cover from over 500-feet away would look like a natural olive-green grass or irrigated field off in the distance that is aesthetically appealing against a brown/tan natural hillside environment. The City maintains that the Proposed artificial synthetic turf will not result in significant adverse visual impacts based on the applicable CEQA standards and thresholds of significance as well as the environmental setting.

Response to Comment C-5g. Thank you for the photographs attached as Exhibits C-F to your comments. However, these photos do not change the determination that the impact to viewshed is not environmentally significant. Also, the DEIR does in fact consider potential views from houses in the El Dorado Estates and Deerwood Park. These are referred to as Key Observation Points (KOPs) F and G in Table 3.1-1 in the DEIR, and which are almost 2,000-feet away. The author of that section did not have access to the balconies of private individual homes with the partial views of the landfill area. The author did not find any public vantage point where the landfill area could be readily seen. However, it should be pointed out that these residents all received notification of this DEIR and none have expressed concerns with the Proposed Project, including concerns with the color contrast of an olive-green artificial/synthetic turf cover with the natural surroundings and environment. As a result, the City has received only one opinion that the Proposed Project would have an adverse viewshed impact from distant private property from over 2,000-feet away and no evidence that viewsheds from public property to which the public has access would be adversely affected.

Response to Comment C-5h. Please refer to responses to comment C-4 above.

Response to Comment C-5i. The City agrees that the prescriptive natural cover has been the standard for numerous years. However, as pointed out in the DEIR, there is growing concerns and evidence that the prescriptive natural cover does not perform as well on steep slopes like the slopes at the Ukiah Landfill and an engineered alternative is the preferred alternative in this situation. The engineered alternative cover meets Title 27 requirements, and is conditionally approved by all of the necessary regulatory agencies, including Cal Recycle. Please see Response to Comment C-2 above and Appendices B and C of examples where artificial synthetic turf covers are being successfully used over the prescriptive clay natural cover.

The advantages of an artificial synthetic turf landfill cover system over traditional clay cover layer/natural vegetation cover system include the following:

- **Long Life.** Durable, high-strength system components ensure a long-life (100-year design life) of protection against operational and natural forces while maintaining a natural looking appearance with less maintenance than will likely be required for the prescriptive clay cover or a different artificial cover.
- **Soil Cover Savings**. Eliminates the need for high maintenance vegetative soil covers and increases weather resistance. Since final cover soils are challenging to locate and expensive to place in the final stages of the landfill's lifespan, the resulting savings can be significant.
- **Environmentally Friendly.** The system is better for landfills in sensitive areas like the Ukiah Landfill where soil erosion and sedimentation are a major concern due to steep canyon slopes. Soil loss is non-existent during operations and post-closure. Eliminates the need for borrow sources, and siltation ponds can be converted to simple stormwater retention ponds. As a direct result, associated environmental construction impacts are much easier to manage.
- **Slope Stability.** While a prescriptive clay cover in pristine condition is the most stable landfill cover, it is possible that over time, the clay cover will desiccate and become less stable. Moreover, with the landfill's steep slopes, failures over time are likely. When those failures occur, less material will be required to repair the damage to the ClosureTurf® cover and the repair will require less heavy equipment with less cost and less risk of damage caused by the equipment. Soil stability

problems either rain/storm events, through earthquake, and/or gas pressure buildup is reduced.

- **Weather Resistant**. The components of an artificial synthetic cover system work in conjunction to seal the waste mass from the destructive forces of high rainfall intensities and hurricane force winds.
- **Reduced Wildlife Impacts**. By reducing organic matter and food sources, fewer animals, including birds, are attracted to the site. This is important at landfills located in coastal areas or near airports. Because the components of an artificial synthetic cover system do not pass on the animals' smell/taste test, they do not usually bother with it or return to it.
- **Eliminates Cap Infiltration**. Since surface water is not restricted by the hydraulic conductivity of a vegetative cover drainage system, and can no longer infiltrate into the waste, leachate production is cut off at the source. (See Appendix B.)
- **Enhanced Visual Inspection**. Because the synthetic materials are not covered with thick soil profiles, they are easily inspected for damage, which, if identified, may be easily and inexpensively repaired. Also, significant additional damage to clay layer caps can be done by earthwork equipment during repair and soil placement maintenance activities. By replacing the soil layer with an artificial synthetic cover system, this risk is eliminated.
- **Easier Reclamation**. Landfill materials are readily accessible in the event of landfill reclamation for future piggyback areas or future waste lifts due to waste settlement or vertical expansion. The composite nature of an artificial synthetic cover system allows owners access to the waste without having to remove the existing cover soils of a typical and traditional final cover system. (See Appendices B and C.)

Response to Comment C-5j. Thank you for the 2015 article from Waste 360 magazine. As discussed above, capital cost is and was not the only issue in the selection of the Proposed Project and is not really a factor in the environmental review. Slope stability issues are the primary concern. With that said, the Proposed Project would help the City save significant amounts of money in capital cost as well as with the long-term and ongoing maintenance and operations costs, by significantly reducing the need to repair failing slopes, avoiding potential water quality issues, inundation of the refuse zone with rain/stormwater, and potential water quality fines from regulatory agencies. In its assessment of the advantages of the Proposed Project's ClosureTurf® cover system over the prescriptive clay cover, the City relies on the analysis conducted by EBA in (Appendix B) as well as the facts and environmental analysis in the DEIR and as revised in this final EIR.

Response to Comment C-6. The DEIR demonstrates that the Proposed Project would not have any adverse noise impacts on the recreational uses at Vichy Springs Resort, including to the users of the hiking trails. As a result, there was/is no need to include an analysis of alternative scheduling construction activities. For instance, the City would not be permitted to construct the Proposed Project in the winter or wet season as any grading would be susceptible to water quality and soil erosion restrictions as well as allowing unpredictable rain or stormwater entering into the waste management unit (garbage) of the landfill. This and other reasons are further explained in response to comments C-6a through C-6k below.

Response to Comment C-6a: As noted on Page 3.8-6 of the DEIR, the Proposed Project would limit construction truck traffic to the hours of 7 a.m. to 7 p.m. As noted on Page 3.8-7 of the DEIR, the use of construction equipment for the Proposed Project would also be restricted to the hours of 7 a.m. to 7 p.m. As noted on Page 3.8-7 of the DEIR, since the Proposed Project would comply with the construction hours within both the City of Ukiah and the Mendocino County Noise Ordinance (7 a.m. to 7 p.m.) the Proposed Project would not exceed any noise thresholds or result in any significant effects relating to construction noise. The cabins and hiking trails of the Resort are much farther than 1,200-feet from the closest part of

the Proposed Project's construction activities. At this distance, greater than the length of three football fields, the cabins and hiking trails are not really in close proximity to construction activities. Table 3.8-3 of the DEIR shows that the noise levels with an intervening ridge would be approximately 39 to 48 dB, L_{max} at 1,000-feet. Because of the low background levels in the project vicinity, these noise levels might be audible, but they would not interfere with off-site normal conversations or be a substantial increase over other ambient noise from daily activities – specifically at the Vichy Springs Resort. Since construction activities would comply with the acceptable hours for construction in the City of Ukiah and the Mendocino County Noise Ordinance (7 a.m. to 7 p.m.) and would not exceed the normally accepted compatibility standards for Vichy Springs Resort (65 dB, Ldn), or be a substantial increase above ambient levels, the Proposed Project would not result in any significant effects relating to construction noise.

Response to Comment C-6b: See Response to Comment C-6a. The DEIR found no significant noise impacts, thus there was no need to include an analysis of alternative scheduling construction activities. Construction activities would be restricted to limited hours during the day (daytime hours) – See Response to Comment C-6a.

Response to Comment C-6c: The Appendix G Checklist Questions for Recreation of the *CEQA Guidelines* are the following:

"a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?"

The Recreation section is intended to analyze a project's increase in use of existing recreational facilities and a project's direct or indirect construction of recreational facilities that could potentially have an adverse physical effect to the environment. The Recreation section is not the appropriate EIR section to discuss potential noise or visual impacts. Therefore, because the Proposed Project would result in no impacts related to the Appendix G Checklist Questions for Recreation of the *CEQA Guidelines*, recreation was excluded from further analysis in the EIR. Furthermore, it should be noted that the Proposed Project would not stop any recreational activities from taking place, such as hiking at the Resort. Generating construction noise from far away would not stop anyone from hiking and hikers may hardly notice the distant noise.

Response to Comment C-6d: Section 3.8, the noise analysis of the DEIR, focused on the "cabins" of the Resort because they are the closest sensitive receptor to proposed construction activities. It is common practice in CEQA analyses to analyze the closest sensitive receptors to a given project. If a noise analysis determines that a project would have less than significant noise impacts on the closest receptor, a noise analyst can rule out the possibility of potentially significant impacts at sensitive receptors farther away from the project. Noise levels attenuate (lessen) as distance from a noise source increases (this is explained on page 3.8-1 of the DEIR).

Response to Comment C-6e: Section 3.8, the noise analysis of the DEIR, analyzed if project construction activities would cause an exceedance of the Land Use Compatibility Standards in the Mendocino County General Plan for the closest sensitive receptor (the northernmost cabin of the Resort). The Land Use Compatibility Standards are exterior noise standards, which assume that if a project complies with the exterior noise standard then interior noise levels will be appropriate for the given land use. As noted on page 3.8-5 of the DEIR, "For residential uses this would be 60 dB, Ldn and for Transient Lodging – Motels, Hotels this would be 65 dB."

Table 3.8-3 of the DEIR displays typical construction equipment of the Proposed Project and associated estimated maximum noise level at the closest construction activities (600 feet) and the distance that the majority of construction activities would occur from (1,000 feet). Note, that the majority of construction

would occur much greater than 1,000 feet from the northernmost cabin of the Resort and approximately half of the landfill area to be covered is greater than 2,000 feet from the northernmost cabin of the Resort. The estimated maximum construction noise levels in Table 3.8-3 of the DEIR along with the noise conclusions on page 3.8-7 indicate that construction activities "would not exceed the normally accepted compatibility standards for Vichy Springs Resort (65 dB, Ldn), or be a substantial increase above ambient levels."

As shown in Table 3.8-3, the estimated maximum construction noise levels would also be below the Residential (Low density single family, duplex, mobile homes) standard of 60 dB, Ldn if one wanted to consider the Resort a "residential land use" since residential land uses have outdoor areas that are enjoyed by residents and often have outdoor recreational resources within a residential neighborhood. The Land Use Compatibility Standards in the Mendocino County General Plan do not contain noise standards for hiking trails, but they do contain noise standards for playground/neighborhood parks (70 dB, Ldn) and golf courses/riding stables/water recreation/cemeteries (75 dB, Ldn), which construction activities would comply with.

The hiking trails of the Resort are much farther than 1,000 feet from the project construction activities. Onsite noise measurements displayed in Table 3.8-2 of the DEIR indicate that existing noise levels in areas far away from major roads (Site 1 and 2), such as trails, are approximately 42-52 dB Leq. As indicated in Table 3.8-3 and on page 3.8-7, estimated maximum construction noise levels would be approximately 39 to 48 dB, Lmax. This supports the DEIR's noise conclusions on page 3.8-7 that construction activities would not cause a substantial noise increase above ambient levels and that the Proposed Project would not result in any significant effects relating to construction noise. As noted in Table 3.8-1 of the DEIR, normal speech at three feet is 60 to 70 dB. Hikers would be able to walk and talk normally with the predicted construction noise levels at 1,000 feet.

Response to Comment C-6f: The Appendix G checklist questions of the *CEQA Guidelines* were updated in 2019 during preparation of the DEIR. The question "would the project result in "a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?" was removed from the Appendix G checklist and the appropriate Appendix G question to consider when analyzing temporary noise impacts such as construction activities is now "Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?". The updated Appendix G checklist questions of the *CEQA Guidelines* are clearly defined as significance thresholds for use in the noise analysis on page 3.8-5 of the DEIR.

Response to Comment C-6g: See Responses to Comments C-6d, C-6e and C-6f. With the adaptation of the 2019 CEQA Guidelines[1] these two noise impact inquiries are linked and not evaluated separately.

Response to Comment C-6h: The comment states that an example approach to noise impact analysis for the Proposed Project is the recreation section of a Master Plan EIS/EIR prepared in 2004 for the Los Angeles International Airport (LAX). The project analyzed in the example 2004 Master Plan EIS/EIR is for a multiphase project spanning greater than 10 years at the busiest airport in California, which proposed to increase capacity at LAX and included the construction and operation of new runways, parking garages/lots, access roads, buildings, terminals, etc. The example Master Plan EIS/EIR analyzed impacts to recreation facilities adjacent to or within the airport property. Furthermore, the example 2004 Master Plan EIS/EIR only considered noise impacts to existing recreational areas near LAX because the project was subject to Department of Transportation Act, Section 4(f), which is required for projects that receive funding from or require the approval by an agency of the United States Department of Transportation. Section 4(f) requires

[1] California Code of Regulations, Title 14, Division 6, Chapter 3, Appendix G.
http://resources.ca.gov/ceqa/docs/2018_CEQA_FINAL_TEXT_122818.pdf

analysis of noise, visual intrusions, or other indirect effects that substantially impair the value of a publicly owned park or recreation area, in terms of its environmental, recreational, ecological, or historical significance. The Master Plan EIS/EIR also used the outdated Appendix G checklist questions of the *CEQA Guidelines* were for determining significant impacts. Airports are very loud and are a permanent noise source. The Ukiah Landfill Closure project was analyzed using the Appendix G checklist questions of the *CEQA Guidelines* that were updated in 2019. Proposed Project construction activities would occur for approximately six months and would not cause a substantial noise increase above ambient levels. It is not appropriate to use the recreation section of a Master Plan EIS/EIR prepared in 2004 for LAX as a guide to prepare a noise analysis of a project-level EIR prepared in 2019 for a landfill closure project of short duration. See Responses to Comments C-6c, C-6d, C-6e and C-6f.

Response to Comment C-6i: See Responses to Comments C-6a and C-6b. Also see Response to Comment C-6h, it is not appropriate to use the recreation section of a Master Plan EIS/EIR prepared in 2004 for LAX as a guide to prepare a noise analysis of a project-level EIR prepared in 2019 for a landfill closure project of short duration. The Master Plan EIS/EIR prepared in 2004 for LAX did not include a mitigation measure restricting use of backup beepers and did not include a mitigation measure restricting construction activities to either the morning or afternoon. The Master Plan EIS/EIR prepared in 2004 for LAX contained four construction mitigation measures[2] and only for construction activities within 600-feet of sensitive receptors:

1. A noise control plan to use noise control devices such as mufflers, barriers and enclosures;
2. Staging construction as far from noise-sensitive uses as feasible;
3. Replacing noisy equipment with quieter equipment when technically feasible; and
4. Limiting the noisiest construction activities to 7 a.m. to 9 p.m. on weekdays and to 6.am. to 8 p.m. on Saturday.

Replacing backup beepers would introduce unnecessary risks to construction workers. Backup beepers/alarms at other solid waste sites have been measured anywhere from 71 to 88 dB, Lmax at a distance of 50-feet from the rear of the construction vehicle[3], which is close to the range of estimated maximum noise levels from typical construction equipment at 50-feet shown in Table 3.8-3 of the DEIR. Backup beepers at 1,000-feet would be close to the range of estimated maximum noise levels from typical construction equipment at 1,000-feet indicated in Table 3.8-3 and on page 3.8-7 (39 to 48 dB, Lmax). Backup beepers would be audible at this distance, but they would be limited to 7 a.m. to 7 p.m. Hikers would be able to walk and talk normally with the predicted construction noise levels at 1,000 feet (see Response to Comment C-6e).

Response to Comment C-6j: The hypothetical road project in Yosemite National Park dreamed up in this comment is an apples to oranges comparison to construction activities of the Ukiah Landfill Closure. A road construction project within a national park is very different from a landfill closure project over 1,000 feet away from hiking trails. A road construction project has potential operational noise implications after the road construction would be completed, while the Proposed Project would generate no new operational noise once construction is complete. See Responses to Comments C-6a, C-6b, C-6d, C-6e and C-6f.

Response to Comment C-6k: See Responses to Comments C-6a, C-6b, C-6c, C-6d, C-6e, C-6h, C-6i and C-6f.

Response to Comment C-7. The analysis of groundwater resource impacts in the DEIR (*Hydrology and Water Quality, Section 3.7*) were informed by the hydrogeologic analysis presented in a report prepared by

[2] Los Angeles International Airport, LAX Master Plan Alternative D Mitigation Monitoring and Reporting Program, https://www.lawa.org/en/lawa-our-lax/studies-and-reports/mitigation-monitoring-reporting-program

[3] Behrens and Associates, Inc., Lopez Canyon Equipment Acoustical Analysis, October 29, 2010. https://www.lacitysan.org/cs/groups/public/documents/document/y250/mda4/~edisp/cnt008843.pdf

EBA Waste Technologies (EBA) in 1994 (EBA, 1994) and the declaration under penalty of perjury by Damon Brown of EBA Engineering filed in Ashoff and Vichy Springs Resort v. City of Ukiah, Mendocino County Case No. 70873 (Brown Declaration"). EBA evaluated data regarding the potential for groundwater impacts to Vichy Springs from groundwater monitoring activity on the Ukiah Landfill (landfill) property. The 1994 EBA report was requested by the California Regional Water Quality Control Board – North Coast Region (RWQCB) in its letter dated August 1, 1994 (RWQCB, 1994). In that letter, the RWQCB acknowledged that work to investigate groundwater contamination at the landfill had been delayed by concerns expressed by Mr. Gilbert Ashoff, owner of the Vichy Springs Resort. Mr. Ashoff was concerned that monitoring wells placed at the landfill were damaging the geothermal well supplying spring water to his resort. The RWQCB stated that it wanted these concerns resolved so that a groundwater contamination investigation could continue (RWQCB, 1994). Mr. Ashoff claimed that drilling monitoring wells on the landfill property was reducing flow and temperature at the geothermal springs. Specifically, Mr. Ashoff blamed an immediate temperature decline of 12 degrees and a 30 percent reduction in geothermal spring flow on the installation of landfill monitoring well 92-4 and 90-8. In its report, EBA reviewed the site geology, investigated potential for heat loss and flow reduction, discussed natural carbon dioxide pressure releases, analyzed groundwater chemical data and reported on results of groundwater isotope testing. EBA concluded from its evaluation that there was no evidence to support the claim that installation of monitoring wells on the landfill property was lowering the temperature or reducing the flow in the Vichy geothermal spring. EBA's conclusion was based on compelling technical evidence that the water-bearing zone feeding the Vichy geothermal spring and the water encountered in the landfill wells were from distinct, separate sources and that monitoring wells could not account for the observed heat loss in the springs. As stated in the DEIR, the State Water Resources Control Board (SWRCB) reviewed the 1994 EBA report, as well as other reports and letters regarding this issue, and concluded that they did not see "convincing evidence to support the conclusion that the drilling of this monitoring well [monitoring well 92-4] could have impacted the temperature and flow rate of the hot spring."

The comment suggests that the DEIR's conclusion that the Proposed Project would not impact the Vichy geothermal spring was based solely on the differences in chemical constituents in the two groundwater-bearing zones and did not address the "redirection of Carbon Dioxide (CO2)" that allegedly "led to the pressure drop and flow decrease". On the contrary, the impact analysis in the EIR considered all lines of evidence supporting the overall conclusions that the monitoring wells did not impact the Vichy geothermal spring, including the unsupported claim that the alleged temperature and flow reduction in the geothermal spring resulted from a drop in formation pressure and release of carbon dioxide after drilling a monitoring well. EBA addressed this hypothesis in its 1994 report and dismissed it because no site-specific data was presented to support the conclusion or the recommendation that no further drilling be permitted in the Vichy Springs area. Furthermore, no significant changes in pressure (other than barometric variations) were observed by EBA during drilling or following installation of monitoring well 92-4 (EBA, 1994).

The comment discusses the hypothesis presented by Al Sevilla of Allisto Engineering that addressed how the landfill groundwater wells affected natural carbon dioxide gas pressure in the Vichy geothermal spring. The issue of whether the monitoring well at the landfill tapped into the subsurface gases that drive Vichy Springs was discussed in the Brown Declaration. Please see Appendix D of this Final EIR. In his court declaration, Mr. Brown stated that while tectonic overpressure zones in the Coast Ranges, such as the geothermal fields near Geyserville, are well documented, he believed that Mr. Sevilla's hypothesis that the monitoring wells are responsible for the release of gases that migrated from the springs to the wells through faults and fractures is "clearly flawed and not worth serious consideration." Mr. Brown's conclusion was based on: 1) A review of published maps that do not show faults or fracture sets through the Vichy Springs and landfill area; 2) Past review of high and low altitude aerial photographs that indicate no photo-lineaments in the Continental Basin Deposits that could be a migration pathway for gases; 3) Observations during geologic field mapping that noted no faults, fractures, or joint sets; 4) Material extracted during well

drilling that did not indicate the presence of Franciscan bedrock or any confining layer capable of trapping the gases; 5) Field evidence of a pressure release if, in fact, a pressure confining layer had been penetrated; and 6) EBA's experience with methane gas migration that reflect the Continental Basin Deposits underlying the landfill are not capable of holding gas under pressure.

The DEIR's compelling substantial evidence that monitoring well drilling did not impact the geothermal spring at Vichy Springs Resort is the distinct difference between the water-bearing zone feeding the geothermal source and the water encountered in the wells. This conclusion is based on the review of EBA's investigations, the results of the SWRCB technical review of this issue, Mr. Brown's expert witness testimony, and EBA's analysis and dismissal of the hypothesis that well drilling at the landfill released gas and lowered the temperature and pressures in the Vichy geothermal spring.

The Proposed Project would include drilling and installation of shallow gas monitoring wells, which would be placed within the waste layers beneath the landfill cover. These gas wells would not extend into the groundwater bearing zones of the Continental Basin Deposits. Therefore, because no additional groundwater wells are proposed, it would not be warranted to perform a new hydrogeologic analysis, conduct groundwater isotope testing, or perform carbon dioxide pressure testing. As stated in the DEIR, Impact 3.7-2, based on the evidence, it is reasonable to conclude that the grading, cover installation, and the post-closure maintenance condition proposed under the Project would not influence or adversely impact spring temperature or discharge rate at the Vichy Springs Resort.

Response to Comment C-8. Please see above responses. Please see Chapter 4 of this Final EIR for additional photos and documentation that the Proposed Project would not have a significant aesthetic impact on Vichy Springs Resort, including its guests and hiking trail users. The noise concerns are addressed with responses to comments C-6a thru C-6k. Response to Comment C-7 evaluates comments regarding potential impacts of project groundwater wells on the springs at Vichy Springs Resort. The City asserts that the Proposed Project is the environmentally superior alternative and has selected the Proposed Project as the alternative to move forward with. Finally, the prescriptive cover Alternative has been carried through for a more detailed analysis as a Project Alternative (see Chapter 4 of this Final EIR).

None of the new information in responses to Comments to Letter C identified substantial adverse environmental effects (CEQA Guidelines 15088.5). Therefore, significant new information has not been added in a way that deprives the public of meaningful opportunity to comment upon a substantial adverse environmental effect. There are no significant unavoidable environmental impacts identified in the Final EIR. Therefore, recirculation of the DEIR is not necessary.

COMMENT LETTER D – VICHY SPRINGS RESORT

Response to Comment D-1. Thank you for your comment letter. Please see Chapter 4 – Revision to the Draft EIR for specific and minor changes to the DEIR. Further, the City agrees that the baseline or existing condition is that Vichy Springs Resort is and has been located adjacent to the Ukiah Landfill and an active private gun range – the Ukiah Rifle and Pistol Club for numerous years.

Response to Comment D-2. Comment Noted. Please see Chapter 4 – Revision to the Draft EIR for specific and minor changes to the DEIR. Further, the City agrees that the City and Vichy Springs Resort's property lines adjoin. However, and to the point, Vichy Springs Resort's property line is more than 500-feet away from the actual landfill area where the Proposed Project will be performed. The landfill area is located on the City's 283.5-acre property, which provides a buffer area between the property line and the actual 40-acre landfill area. Further, the closest building at Vichy Springs Resort is approximately 1,200-feet away and its partial view is obscured by trees, elevation, and sheer distance.

Response to Comment D-3. Please see Chapter 4 – Revision to the Draft EIR for specific and minor changes to the DEIR. This alternative is now further evaluated as requested.

Response to Comment D-4. Please see previous responses to Comments C-5a-5j and additional pictures in in Chapter 4 of this Final EIR. The City disagrees with the assertion that the Proposed Project would be bright and very ugly in late spring, summer, and fall. The proposed olive-green artificial turf cover is designed to look like and will look like real or natural grass, which is very common even in the late summer or dry months when the surrounding landscape is brown or tan.

Response to Comment D-5. Please see Responses to Comments D-4 and C-3a above. The City disagrees that the Proposed Project would have any significant negative environmental impacts on or to Vichy Springs Resort, its guests, and hiking trail users. First, the Proposed Project would not change the historical significance of the Vichy Springs Resort. The Vichy Springs Resort has been in operation during the time period when the Ukiah Landfill was an active landfill and did not change the historical significance. Closing the landfill in accordance with Title 27 of the CCR will also not affect the Vichy Spring Resort's historical significance. Second, the hiking trails are not located on Vichy Springs Road and not Vichy Springs Resort's property. Vichy Springs Road is a public road that dead ends at the landfill gate, which is over 200 to 300-feet from the actual landfill and only provides a small obscured view of the actual 40-acre landfill area. This is not where Vichy Springs Resort's guest pay money to hike or use any Vichy Springs resort's amenities. Third, the Vichy Springs Resort's main hiking trails are well over 2,000-feet away and any partial and/or obscured views from that distance would not be readily noticeable to its guests and hiking trail users.

Response to Comment D-6. Please see Responses to Comments C-7 above. Further and to the point, the Proposed Project does not propose any new groundwater monitoring wells and does not propose to change any operations of the existing groundwater monitoring wells. The new wells included in the Proposed Project would only extend into the waste management unit/refuse portion of the landfill. As a result, the Proposed Project would not impact any pressure zones as Vichy Springs Resort has unsuccessfully alleged over the years. No additional study is needed by pressure zone experts.

Response to Comment D-7. Please see Noise Responses to Comments C-6a, C-6b, C-6c, C-6d, C-6e, C-6f, C-6g, C-6h, C-6i, C-6j, and C-6k.

Response to Comment D-8. Please see Chapter 4 – Revision to the Draft EIR for specific and minor changes to the DEIR.

Response to Comment D-9. Please see Response to Comment B-1 for a discussion as to how and why the Proposed Project was selected over the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative and how it out performs the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative. The primary purpose is to provide an impermeable layer (even with clay) to prevent rain or stormwater penetrating into the waste management unit (i.e. garbage) of the landfill and mixing with the waste. The comment is correct that the Proposed Project will essentially eliminate the discharge of sediment. The comment misunderstands that this is considered to be a beneficial impact and not an adverse impact to downstream surface water quality. The analysis in the DEIR and Appendix B finds the water diverted from penetrating the landfill by the Proposed Project cover will be cleaner with less potential to pollute surface water(s) than the prescriptive clay cover.

Response to Comment D-10. However, see Responses to Comments D-4 and C-6a, C-6b, C-6c, C-6d, C-6e, C-6f, C-6g, C-6h, C-6i, C-6j, and C-6k above. The DEIR analysis shows that the Proposed Project would not have any significant noise impacts on Vichy Springs Resort, its guests, and hiking trail users.

Response to Comment D-11. Please see Chapter 4 – Revision to the Draft EIR for specific and minor changes to the DEIR.

Response to Comment D-12. Please see Chapter 4 – Revision to the Draft EIR for specific and minor changes to the DEIR.

Response to Comment D-13. Please see Chapter 3.1 of the DEIR (Aesthetic/Visual Resources).

Response to Comment D-14. Please see Chapter 4 – Revision to the Draft EIR for specific and minor changes to the DEIR.

Response to Comments D-15 and D-16. Please see responses to visual comments C-5a-j.

Response to Comments D-17. The City agrees that there are partial, distant, and obscured views of the Ukiah Landfill from Vichy Springs Resort property. However, the landfill gate is on public land and Vichy Springs Road and is not on Vichy Springs Resort's property. The additional information provided by your attorney in Comment Letter C does not change the determination that the Proposed Project would not have any significant effect on a viewshed. Please see responses to comment C-5a-j. Vichy Springs Resort's property line is more than 500-feet away from the actual landfill that is located on the City's 283.5-acre property, which provides a buffer area between the actual 40-acre landfill area and the property line. Further, the closest building at Vichy Springs Resort is approximately 1,200-feet away from the actual 40-acre landfill site and its view is obscured by trees, elevation, and sheer distance. The hiking trails are much further away and any partial views from that distance would not be readily noticeable or considered to be an eyesore to the guests and hiking trail users over the existing condition, even in the dry season. These partial views are not considered to be significant and any views to the Ukiah Landfill is not considered to be a scenic viewshed by Mendocino County. Please see Chapter 4 – Revision to the Draft EIR for specific changes to Section 3.1 - Aesthetics/Visual Resources in the DEIR.

Response to Comments D-18 and D-19. Please see Response to Comment D-17 above.

Response to Comment D-20. Please see Chapter 4 – Revision to the Draft EIR for specific and minor changes to the DEIR.

Response to Comment D-21. The City is unaware of such specific sized animals grazing the area. However, the artificial synthetic turf cover is made of durable material that is designed to last over 100-years in the harsh natural environment and would be less likely to attract animals such as pigs and elk over a natural cover as there would be no actual vegetation for them to eat or root under for food. By not having or significantly reducing the organic matter and food sources, fewer animals, including birds, are attracted to the site. Also, because the components of an artificial synthetic cover system do not pass on the animals' smell/taste test, they do not usually bother with it or return to it. Further, if a section of turf is compromised by animals or for any other reason, it is much easier to identify and any repairs are much easier and do not require heavy equipment to come in to do the repairs, which can create additional damages to a prescriptive clay cover layer system[4].

Response to Comment D-22. Please see Chapter 4 – Revision to the Draft EIR for specific and minor changes to the DEIR.

Response to Comment D-23. The source indicated that Vichy Springs started as a "Resort" in 1888. The EIR does not further respond to the historical statements in the comment, since they do not have a direct or material effect the DEIR's environmental analysis or findings.

Response to Comment D-24. Please See Responses to Comments C-7 and D-23 above.

Response to Comment D-25. Please see Impact Statement 3.4-1 on page 3.4-14 and Responses to Comments C-7 and D-23 above.

Response to Comment D-26. This is a standard approach/requirement to search beyond the main area to include a buffer area around the Proposed Project location.

[4] Personal Communication with David Cieply, Vice President Waste Operations, WatershedGeo

Response to Comment D-27. Not sure of the point that is being made and does not affect the environmental analysis of or in the DEIR.

Response to Comment D-28. Please refer to references provided.

Response to Comment D-29. Please refer to references provided.

Response to Comment D-30. Please see response in Comment C-7 above.

Response to Comment D-31. The "plastic cover" or artificial synthetic turf cover has no bearing on the hydrology discussion at hand.

Response to Comment D-32. That was done decades ago. This is the current baseline condition(s) and the Proposed Project would not involve the alteration of a stream or river course (DEIR, page 3.7-26). The Proposed Project is intended to properly close the landfill to prevent any future impacts to downstream water resources.

Response to Comment D-33. Please see response C-6a, and C-6b regarding scheduling of construction, and C-6i regarding noise from back up beepers.

Response to Comment D-34. Please see response C-6a and C-6b.

Response to Comment D-35. Please see Responses to comments to Letter C above and Chapter 4 of this Final EIR for specific revisions.

Response to Comment D-36. Please see Response to comment C-7 above. The new wells included in the Proposed Project would only extend into the waste management unit/refuse portion of the landfill. No new groundwater monitoring wells are proposed as part of the Proposed Project.

Response to Comment D-37. Comment noted. While the comment does not provide any evidence to substantiate its claims regarding gun club activity and the project site, the contractor is legally required to maintain the safety of the worksite and the City will be required to cooperate with the contractor to maintain the safety of the worksite.

Response to Comment D-38. Please see Response to comment C-7 above. The new wells included in the Proposed Project would only extend into the waste management unit/refuse portion of the landfill. No new groundwater monitoring wells are proposed as part of the Proposed Project.

Response to Comment D-39. See response to Comment B-1. As indicated in that response (and copied directly below, the Proposed Project's ClosureTurf® cover system offers significant maintenance advantages over the prescriptive cover.

Maintenance

- ClosureTurf® offers a significant maintenance advantage over a prescriptive Subtitle D final cover and any other traditional geosynthetic cover systems that require a vegetative soil cover. In essence, vegetative soil covers often require regular maintenance related to the repair of erosional damage, installation of erosion control measures (i.e., silt fences, hay bales, wattles, etc.), slope repairs, and revegetation. Erosion from the vegetative soil cover also causes siltation of drainage ditches and culverts that require subsequent repair. Such provisions are not required with the ClosureTurf® product, thereby providing a significant cost savings over the course of the postclosure maintenance period and fewer environmental effects.

Response to Comment D-40. Please see changes in Chapter 4 of this Final EIR. Please consider them all corrected.

Response to Comment D-41. Please see changes in Chapter 4 of this Final EIR. Please consider them all corrected.

Response to Comment D-42. Please see response to Comment D-32.

Response to Comment D-43. Please see visual responses C-5a –j.

Response to Comment D-44. This comment refers to part of the 2016 IS/MND which was provided as background information and is not the 2019 DEIR analysis.

Response to Comment D-45. That was done years/decades ago. This is the current baseline condition(s) and the Proposed Project would not involve the alteration of a stream or river course (DEIR, page 3.7-26). The Proposed Project is intended to properly close the landfill to prevent any future impacts to downstream water resources.

Response to Comments D-46. Comment noted. The comment regards part of the 2016 IS/MND and not the 2019 DEIR.

Response to Comments D-47. This table came from the Natural Resources Conservation Service as the reference material indicates. It is was provided as background information and is not part of the main 2019 DEIR.

Chapter 4 Revisions to the Draft EIR

This chapter shows revisions to the November 2019 Public Draft EIR (DEIR), subsequent to the document's publication and public review. The revisions are primarily from comments received. Other minor edits that do not substantially change the importance of or conclusions made in the DEIR have not been reflected in this document. The revisions are presented in the order in which they appear in the DEIR and are identified by section and page number in respective chapters. These revisions are shown as excerpts from the Public DEIR, with strikethrough (~~strikethrough~~) text in indicate deletions and underlined (underlined) text to indicate additions. If whole sections are deleted and replaced, only the replacement text will be shown to avoid confusion and redundancy. It is assumed all subsequent page, figure, and table numberings are changed accordingly. The following revisions are shown below.

Executive Summary

On Page ES-1, the last paragraph is hereby changed as follows:

~~Land adjacent to the Ukiah Landfill property is zoned primarily as rangeland and is used for grazing.~~ Dwellings around the Ukiah Landfill property include a group of structures owned by the Vichy Springs Resort that are located within 500-feet of the City's south property line, but are well over 1,250 feet from the actual Ukiah Landfill area that is also separated visually by an elevation barrier/ridge. A rural residential development is located approximately one-quarter mile west of the Ukiah Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000-feet southward of the Ukiah Landfill property boundary and is also separated from the Landfill by an intervening ridge.

On Page ES-5, the second paragraph is hereby changed as follows:

In January 2016, EBA prepared an Initial Study/Mitigated Negative Declaration (2016 IS/MND) for the City on a Final CPMP (See Appendix B). Subsequently, the City determined that an EIR should be prepared due in part to concerns expressed by Vichy Springs ~~Investment Group/~~Resort that ~~is located within approximately 500 feet of~~ borders the Ukiah Landfill's southern property line. These concerns included issues regarding aesthetic/visual resources, air quality and geology/hydrology concerns. Subsequently, the City prepared a Notice of Preparation (NOP) of the Draft EIR and published it on February 2, 2017 (SCH #2017022009). Please see Appendix C.

On Page ES-6, Section ES.6 is hereby changed as follows:

As detailed in Chapter 3 – Environmental Analysis, the construction and operation of the Proposed Project would have several potentially significant impacts to the environment. However, with the implementation of the identified and corresponding mitigation measures, all of the potentially significant impacts can be reduced to less-than-significant levels. As a result, the only alternative that needs to be evaluated in this EIR is the CEQA required No Project Alternative. However, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative was also evaluated and would have increased impacts to air quality, biological resources, water quality, and noise impacts, among others. ~~Among others,~~ Other alternatives considered, but eliminated from further consideration include the following:

- ~~Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative~~
- Relocation of the Ukiah Landfill
- Alternative/Synthetic Specialized Tufted Geotextile Landfill Turf Cover Color.

The No Project Alternative and the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative are discussed below.

No Project Alternative

Under the CEQA required No Project Alternative, the City would not close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, none of the components and systems required for closure of the landfill would be implemented. This includes, but is not limited to the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, and landfill slope stability as well as drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, and groundwater/surface water monitoring systems.

The No Project Alternative would result in less significant temporary construction related impacts than the Proposed Project. All of the potentially significant impacts associated with the construction and operation of the Project would not occur under this alternative. However, the No Project Alternative would fail to meet any and/or all of the objectives of the Project. Under the No Project Alternative, the Ukiah Landfill would not be properly closed according to state and local regulations and would be susceptible to slope instability, potential water quality impacts to surface water and groundwater resources due to inadequate cover leading to drainage and erosion issues during inclement weather/stormwater, and the potential for inadequate LFG control and monitoring leading to air quality issues and impacts. Under the No Action Alternative, the City would be potentially susceptible for a variety of water quality and air quality violations and fines.

Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative

The Natural or Clay Layer closure option was a 1974 standard that was officially adopted in 1985 as part of then Subchapter 15 of Title 27 of the California Code of Regulations (27 CCR). However, over the last 35-plus years, the waste industry, along with the regulatory agencies and surrounding communities has recognized that there are serious short-falls with compacted clay layers from both a performance and cost perspective – especially on sites with slope stability issues. The Ukiah Landfill is located on steep, 2:1 plus, slope and the potential for a clay and/or geosynthetic clay layer alternative failure is . significant. Such a failure could degradation of the water quality in the unnamed creek alongside the Ukiah Landfill, which drains into Sulfur Creek and then the Russian River. Further, forensic analyses of a number of natural landfill cover slope failures over the last 20-plus years has shown that both Compacted Clay and Geosynthetic Clay Liners fail due to pore water pressure rise in saturated cover soils building up beneath the clay layers; particularly on steep slopes such as the conditions of the Ukiah Landfill. In short, the heavy clay layers increase the probability of slope failure. Further, CalRecycle has approved numerous alternative landfill covers that are similar to the Proposed Project throughout the State of California and they have proven to be a viable alternative, especially on landfills with steep slopes. See Appendices B and C of this Final EIR.

From an environmental perspective, the compacted clay and/or geo synthetic clay layer alternative would also cause a substantial increase in temporary construction impacts to air quality, biological resources, water quality, and noise as compared to the Proposed Project as it would create the need to excavate and/or import (transport) significant quantities of clay and natural vegetation cover soils to the site and to spread and compact them over the 40-acre Ukiah Landfill. Also, from an operational standpoint, this alternative would result in increased maintenance impacts and costs to maintain and repair slope failures as well as to maintain the natural grass/vegetation to prevent fires and keep rodents from compromising the clay layer structure, which would then contribute to a substantial increase in air quality, biological resources, water quality, noise, and other potential environmental impacts.

The City has proposed the Proposed Project and artificial cover alternative because it has many advantages over the compacted clay and/or geo synthetic clay layer alternative. Te Proposed Project provides: 1) A proven stable cover on steep slopes due to the elimination of low interface strength pore water pressure and gas relief layers, 2) Decreased exposure to construction-related air quality, noise, and traffic impacts and potential long-term water quality impacts to surface and groundwater resources which could lead to significant fines, and 3) significant lower capital and on-going/perpetual maintenance costs. As a result, this compacted clay and/or geo synthetic clay layer alternative has been considered, but is not selected as it does not perform as well as the Proposed Project.

On Page ES-7, Table ES-1 is revised as follows:

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
3.1 Aesthetic/Visual Resources			
Impact 3.1-1: Would the Proposed Project have a substantial adverse effect on a scenic vista?	No Impact	None Required.	No Impact
Impact 3.1-2: Would the Proposed Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.1-3: Would the Proposed Project substantially degrade the existing visual character or quality of the site and its surroundings.	Less-than-Significant Impact	None Required ~~Precautionary Mitigation Measure 3.1-1: Provide Proper Fencing and/or Shielding from Sensitive Receptors.~~	Less-than-Significant Impact ~~No Impact with Mitigation~~
Impact 3.1-4: Would the Proposed Project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	No Impact	None Required	No Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
3.2 Air Quality			
Impact 3.2-1: Would the Proposed Project Conflict with or Obstruct Implementation of the Applicable Air Quality Management Plan?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.2-2: Would Construction of the Proposed Project Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard?	Potential Significant Impact	Mitigation Measure 3.2-1: Fugitive Dust Control Measures	Less-than-Significant Impact
Impact 3.2-3: Would Operation of the Proposed Project Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.2-4: Would Construction and/or Operation of the Proposed Project Expose Sensitive Receptors to Substantial Pollutant Concentrations?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.2-5: Would Construction and/or Operation of the Proposed Project Result in Other Emissions (Such as Those Leading to Odors) Adversely Affecting a Substantial Number of People?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.2-6: Would Construction of the Proposed Project Result in Other Emissions (Such as Naturally Occurring Asbestos) Adversely Affecting a Substantial Number of People?	Potential Significant Impact	Mitigation Measure 3.2-6: Develop and Submit NOA Dust Mitigation Plan	Less-than-Significant Impact
3.3 Biological Resources			

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Impact 3.3-1: Would the Proposed Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Potential Significant Impact	Mitigation Measure 3.3-1a: Conduct A Preconstruction Survey for Special Status Wildlife Species. Mitigation Measure 3.3-1b: Conduct Bird Breeding and Nesting Surveys Mitigation Measure 3.3-1c: Conduct a Bat Habitat Assessment of Trees Mitigation Measure 3.3-1d: Environmental Awareness Training Mitigation Measure 3.3-1e: Biological Monitor Mitigation Measure 3.3-1f: Staging Areas and Access Routes	Less-than-Significant Impact
Impact 3.3-2 Would the Proposed Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations adopted by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	~~Potential Significant Impact~~ Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.3-3: Would the Proposed Project have a substantial adverse effect on federally protected waters of the U.S. as defined by Section 404 of the federal Clean Water Act or protected waters of the state as defined by Section 1600 et seq. of the California Fish and Game Code (including, but not limited to, marshes, vernal pools, and coastal wetlands) through direct removal, filling, hydrological interruption, or other means?	Potential Significant Impact	Mitigation Measure 3.3-3a: Protect Jurisdictional Waters and Sensitive Habitat Areas	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Impact 3.3-4: Would the Proposed Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.3-5: Would the Proposed Project conflict with any local policies or ordinances protecting biological resources?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.3-6: Would the Proposed Project conflict with an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	No Impact	None Required	Less-than-Significant Impact
3.4 Cultural, Paleontological, and Tribal Resources			
Impact 3.4-1: Would the Proposed Project cause a substantial adverse change in the significance of an historical resource as defined in State CEQA Guidelines §15064.5?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3-4.2: Would the Proposed Project cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5?	Potential Significant Impact	Mitigation Measure 3.4-2: Halt work if cultural resources are discovered	Less-than-Significant Impact
Impact 3.4-3: Would the proposed Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	Potential Significant Impact	Mitigation Measure 3.4-3: Stop Work if Paleontological Remains are Discovered	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Impact 3.4-4: Would the Proposed Project disturb any human remains, including those interred outside of formal cemeteries?	Potential Significant Impact	Mitigation Measure 3.4-4: Halt Work if Human Remains are Found	Less-than-Significant Impact
Impact 3.4-5: Would implementation of the Proposed Project cause a substantial adverse change in the significance of a tribal cultural resource?	Potential Significant Impact	Mitigation Measure 3.4-5: Halt Work if Tribal Cultural Resources are Discovered	Less-than-Significant Impact
3.5 Geology Soils and Seismicity			
Impact 3.5-1: Would the Proposed Project expose people to injury or structures to damage from potential rupture of a known earthquake fault, strong ground shaking, seismic-related ground failure, or landslides?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.5-2: Would construction grading and long-term closure conditions at the Landfill expose soils to erosion and result in the loss of topsoil?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.5-3: Would the Proposed Project be located on a unit or soils that are potentially unstable, or that could become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.5-4. Would the Proposed Project make a cumulatively considerable contribution to cumulative effects associated with increased seismic risk, landsliding, erosion, topsoil	Less-than-Significant Impact	None Required	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
loss or increased exposure to seismic or other risks?			
3.6 Greenhouse Gases			
Impact 3.6-1: Would Implementation of the Proposed Project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.6-2: Would the Proposed Project conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
3.7 Hydrology and Water Quality			
Impact 3.7-1: Would the Proposed Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.7-2: Would the Proposed Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.7-3: Would the Proposed Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would result in substantial erosion, siltation, polluted runoff or flooding on- or off-site?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.7-4: Would the Proposed Project conflict with or obstruct implementation of	Less-than-Significant Impact	None Required	Less-than-Significant Impact

Table ES-1
Summary of Environmental Impacts and Mitigation Measures

Potential Environmental Impact	Level of Significance Before Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
a water quality control plan or sustainable groundwater management plan?			
3.8 Noise			
Impact 3.8-1: Would the Proposed Project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Proposed Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.8-2: Would the Proposed Project generate excessive groundborne vibration or groundborne noise levels?	Less-than-Significant Impact	None Required	Less-than-Significant Impact
Impact 3.8-3: Would the Proposed Project be located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, and/or expose people residing or working in the project area to excessive noise levels.	No Impact	None Required	No Impact
Growth Inducement Effects			
Project implementation includes the final closure of the Ukiah landfill in accordance with local, regional, state and federal requirements. No residential or other development is proposed that would result in additional population growth. No infrastructure is required to be extended to the site that would induce population growth in the area. Therefore, the Proposed Project or the official and proper closing of	No Impact	None Required	No Impact

Table ES-1 Summary of Environmental Impacts and Mitigation Measures			
Potential Environmental Impact	**Level of Significance Before Mitigation**	**Mitigation Measure(s)**	**Level of Significance After Mitigation**
the Ukiah Landfill will not indirectly or directly remove barriers to population growth and/or encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.			
Cumulative Effects			
As described in Chapter 3 – Environmental Analysis, the construction and operation of the Proposed Project would have less-than-significant effects to the environment with the implementation of the identified mitigation measures. There are no known projects that would be constructed at the same time and within the same vicinity of the Proposed Project that would or could create any additional or cumulative construction related impacts. Once constructed the Proposed Project would not have any significant impacts. As a result, the Proposed Project would not have any direct, indirect, short-term and/or long-term cumulative impacts.	No Impact	None Required	No Impact

On Page ES-14, Section ES.8 is hereby changed as follows:

ES.8 Environmentally Superior Alternative

Section 15126.6(e)(2) of the CEQA Guidelines requires an EIR to identify an environmentally superior alternative. Of the ~~two~~ three alternatives considered ~~in this section~~ (Proposed Project, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative, and the No Project Alternative), the Proposed Project would be the environmentally superior ~~to the No Project~~ Alternative.

The Proposed Project would be environmentally superior to the No Project Alternative. The No Project Alternative would not be a legally acceptable alternative. The No Project Alternative would not meet any of the goals and objectives of the Proposed Project. Under the No Project Alternative, the Ukiah Landfill would not be properly closed according to state and local regulations and would be susceptible to slope instability, potential water quality impacts to surface water and groundwater resources due to inadequate cover leading to drainage and erosion issues during inclement weather/stormwater, and the potential for inadequate LFG control and monitoring leading to air quality issues and impacts. Under the No Action

Alternative, the City would be potentially susceptible for a variety of water quality and air quality violations and fines.

The Proposed Project would be environmentally superior to the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative due to the fact that the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have more slope stability issues that could cause significant water quality issues and concerns of sediment discharging into the ephemeral creek that discharges to the Russian River. This is considered to be a potentially significant and unavoidable impact that cannot be mitigated as it is impossible to predict when and where theses potential slope stability issues will occur. The slope stability issues will also require more maintenance which will cause an increase in noise, and air quality impacts and concerns as compared to the Proposed Project.

As a result, the Proposed Project is considered to be the environmentally superior alternative compared to both the No Action Alternative and the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative.

Chapter 1 Introduction

On Page 1-1, the 3rd paragraph in Section 1.1Project Location and Background is hereby changed as follows:

~~Land adjacent to the Ukiah Landfill property is zoned primarily as rangeland and is used for grazing.~~ Dwellings around the Ukiah Landfill property include a group of structures owned by the Vichy Springs Resort that are located within 500-feet of the City's south property line, but are well over 1,250-feet from the actual Ukiah Landfill area that is also separated visually by an elevation barrier/ridge. A rural residential development is located approximately one-quarter mile west of the Ukiah Landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire development is approximately 1,000-feet southward of the Ukiah Landfill property boundary and is also separated from the Landfill by an intervening ridge.

Chapter 3 Environmental Analysis

On Page 3.0-1, the 1st Sentence in Section 3.0.3 Definition of Project Area and Study Area is hereby changed as follows:

The project area consists of areas within and around the City of ~~Oxnard~~ Ukiah as were previously described in Chapter 2, Project Description, and are further described throughout this section.

Section 3.1 Aesthetics/Visual Resources

On Page 3.1-4, the last paragraph is hereby changed as follows:

~~Land adjacent to the landfill property is zoned primarily as rangeland and is used for grazing.~~ Vichy Springs Resort is a California Registered Historical Location (No. 980) that is located approximately 500~~625~~ feet from the Ukiah Landfill's south property line. A single-family residence located approximately 1,000-feet west of the landfill's western property boundary. A rural residential development is located approximately one-quarter-mile west of the landfill property boundary. A housing development is also located along the south side of Vichy Springs Road and westward of the Vichy Springs Resort. The entire residential

development is approximately 1,000-feet southward of the landfill property boundary and is separated from the Ukiah Landfill by an intervening ridge. It should be noted that the City owns an approximate 97-acre parcel (Assessor's Parcel No. 178-210-01) that adjoins a portion of the Ukiah Landfill's southern property boundary. This property, which is now known as the Ukiah Rifle and Pistol Club, was purchased as a buffer zone to limit future development adjacent to the Landfill. The Gun Club Parcel is a separate parcel and is not considered part of the landfill property or part of this Proposed Project.

On Page 3.1-10, the last paragraph is hereby changed as follows:

The Project Site is located at the end of Vichy Springs Road, which is not identified in the Mendocino County General Plan as a Scenic Vista or Resource. The Ukiah Landfill is, has been, and will always be a landfill site and is not, nor will ever be, considered to be a scenic resource. Further, the Proposed Project would not be visible from the main lodges and primary facilities of Vichy Springs Resort. However, there are some distant partial views of the Ukiah Landfill from some vantage points on Vichy Springs Resort's 700-acres, which include hiking trails for its guests. Figure 3.1-5 provides several photos of these partial views from Vichy Springs Resort property which were taken by Vichy Springs Resort's President and Owner, Mr. Gilbert Ashoff. However, these are partial views from 1) either a distance of more than 2,000-feet or 2) from the edge of the property lines adjacent to the landfill property, which are not the main areas visited by most, if not all, of Vichy Springs Resort guests and hiking trail users. While the proposed project using artificial grass with a 5/8-inch sand cover will remain green in the dry season and contrast with the surrounding landscape which turns brown in the summer and early fall, that color contrast has been determined not to be environmentally significant. Green grass commonly contrasts with surrounding dry areas in Northern California and is not regarded as unattractive. Moreover, the views from these locations are not recognized as designated scenic views or vistas by Mendocino County. Further, the artificial grass cover will blend into the existing environment, in the same way green grass surrounding rivers, lakes or ponds or in irrigated landscapes, such as golf courses, blend with surrounding dry areas. Moreover, at these distances and partial views, the artificial grass is indistinguishable from natural grass and, thus, will not cause an environmentally significant change to the existing landscape. For these reasons, no impacts would occur to a designated scenic vista and Project implementation will not adversely affect existing views from any designated scenic corridors/roads.

Significance: No Impact.

Starting on Page 3.1-11, Impact 3.1-3 is hereby replaced in its entirety as follows:

Impact 3.1-3: Would the Proposed Project substantially degrade the existing visual character or quality of the site and its surroundings.

The Ukiah Landfill began refuse disposal operations in 1955 and ceased operations in 2001. As discussed herein, the Ukiah Landfill is approximately 40-acres and is located on a 283.5-acre-parcel that provides no public access and is surrounded by rural buffer area of land (i.e. approximately 240-acres), which is owned by the City. As indicated above, no development (i.e., facilities, structures or vertical features) are proposed for the Proposed Project, other than the landfill gas flare station, which would not be visible/noticeable from surrounding areas and would not affect the aesthetic character either of the project site or the surrounding area. Furthermore, the Ukiah Landfill is, has been, and will always be a landfill site and is not, nor will it ever be, considered to be a scenic resource. The 40-acre landfill area is and will

always be devoid of trees and will always stick out from the rest of the surrounding area. The area is not considered to be a source of scenic beauty by the County of Mendocino.

As for potential sensitive receptors, there is the Vichy Springs Resort, the Ukiah Rifle and Pistol Club, and the residential housing developments off to the south and west of the landfill. Vichy Springs Resort and some of the residential houses to the west have distant partial views of the landfill. Vichy Springs Resort in particular has expressed concern that an artificial synthetic turf cover would provide a negative view to its guests and hiking trail users. Table 3.1-1 provides a summary of the ability to see the Ukiah Landfill from KOPs within approximately 2,000-feet. As demonstrated in Figure 2-2, and Figure 3.1-2 above as well as Figures 3.1-3 and 3.1-4 below, any partial view of the landfill from over 500-feet would, however, not be able to distinguish artificial synthetic turf from natural grass and thus is not considered to be a key observation point (KOP) with a significant view. As a result, the Proposed Project would not have any significant visual impacts which would significantly affect the views the Vichy Springs Resort (including its guests and hiking trail users), the Ukiah Rifle and Pistol Club, the residential developments to the south and the west, and/or any other potentially sensitive receptor(s).

Table 3.1-1
Key Observation Points (KOPs) with 2,000-feet of the Ukiah Landfill

KOP Location	Elevation	Coordinates	Distance (feet)	Is Ukiah Landfill Visible?	Comments
A	800	39.10.01.60 N 123.09.30.30 W	1,061	No	60-foot +/- Elevation Barrier/Ridge Blocks View
B	815	39.10.04.31 N 123.09.29.02 W	963	Partial	Partial View from Edge of Vichy Springs Resort's Adjacent Property Line, But Not Part of the Active Part of the Resort or Hiking Trails
C	812	39.10.01.79 N 123.09.26.63 W	1,270	No	45-foot +/- Elevation Barrier/Ridge Blocks View
D	873	39.10.04.07 N 123.09.22.03 W	1,459	No	Distance and Trees Obstruct View
E	792	39.10.08.79 N 123.09.32.60 W	1,064	No	60-foot (+/-) Elevation Barrier/Ridge Blocks View
F	791	39.10.32.07 N 123.10.28.27 W	1,390	Partial	Partial Views from Some Private Residential Homes and Roads where Distance and Trees Obscures Views
G	803	39.10.23.33 N 123.10.43.75 W	1,892	Partial	Partial Views from Some Private Residential Homes and Roads where Distance and Trees Obscures Views

Note: Due to distance and map scale issues, KOPs F, G (residential development(s) to the west) and distant partial views from Vichy Springs Resort property from over 2,000-feet away are not practical or useful to put on a map.

Most importantly to Vichy Springs Resort's expressed concerns, the Proposed Project would not be visible from the main lodges and primary facilities of Vichy Springs Resort. However, there are some distant partial views of the Ukiah Landfill from some vantage points on Vichy Springs Resort's 700-acre property, which include hiking trails for its guests. Figure 3.1-5 provides several photos of these partial views from Vichy Springs Resort property which were taken by Vichy Springs Resort's President and Owner, Mr. Gilbert Ashoff. However, these are partial views from 1) either more than 2,000-feet or 2) from the edge of Vichy Springs Resort's property lines adjacent to the landfill property, which are not the main areas visited or used

by most, if not all, of Vichy Springs Resort guests and hiking trail users. The closest viewpoint from any potential sensitive receptor is from approximately 500-feet from the edge of Vichy Springs Resort's property and or the landfill gate as it bumps up to the City's buffer area from the City Landfill. Also, and more importantly, these views are not recognized as designated scenic views or vistas by Mendocino County. Therefore, no significant impacts will occur either to the aesthetic character of a designated ~~the~~ site or to that of the surrounding area and no mitigation measures are required.

Vichy Springs Resort has also expressed concerns that artificial synthetic turf cannot and would not fit into the local landscape or look like natural vegetation. However, as discussed in Chapter 2 – Project Description, the Proposed Project includes the construction of a permanent olive-green artificial/synthetic specialized tufted geotextile turf/grass cover instead of a clay layer with a natural grass cover. Figure 2-2, provides two recent examples of where olive-green artificial/synthetic specialized tufted geotextile turf has been and is being successfully used. Further, Figure 3.1-6 provides a visual comparison of artificial synthetic turf actually used in actual landfill closures and natural grasses, demonstrating that artificial turf can and does look like natural grass, especially at distances of over 500-feet, which is the closest view point from the Vichy Springs Resort Property and/or any other potential sensitive receptor. Figure 3.1-7 provides an up-close view of the existing Ukiah Landfill and a simulated view of it with an olive-green artificial/synthetic specialized tufted geotextile turf cover. Based on this analysis, the Proposed olive-green artificial/synthetic specialized tufted geotextile turf cover would have less-than-significant impacts on the existing visual character or quality of the site and its surroundings.

Vichy Springs Resort has also expressed concerns that an olive-green artificial synthetic turf would not blend into the surrounding environment in the summer or dry months when the hills turn brown. However, this is commonplace throughout northern California, California in general, the American West, and throughout the world where irrigation takes place in arid or semi-arid areas. Figure 3.1-8 provides several examples of arguably beautiful, scenic views, of olive-green colored irrigated grass adjacent to brown grass or hillsides. As a result, no significant visual impacts would occur as a result of having natural looking olive-green grass adjacent to brown hills or surroundings in the dry or summer/late fall months.

As a result, the implementation of the Proposed Project, including the olive-green natural looking artificial synthetic turf would not substantially degrade the existing visual character or quality of the site and its surroundings. Further, the Project site is a landfill and is not considered a designated scenic view by Mendocino County. Any partial, distant, views from Vichy Springs Resort's property or the residents to the west would not be considered significant. Furthermore, the natural looking olive-green artificial synthetic turf/grass would blend into the existing environment and would not have any noticeable or negative views from any vantage point. Also, the sand ballast on top layer of the artificial synthetic turf would help dampen any harsh color contrasts and provides a mix of green and brown colors, which matches the natural surrounding environment – especially at views from more than 500-feet away from the 40 acre site. Any impacts are considered to be less-than-significant and no mitigation is required. The City would, however, be willing to work with Vichy Springs Resort to help choose a color option that works best for them if they still have concerns with the olive-green color option. Figure 3.1-9 provides an example of the three-color pallet's available for the artificial synthetic turf/grass cover.

Significance: Less-than-Significant Impact.



Source: Google Earth 2018

SMB ENVIRONMENTAL

Figure 3.1-3
Key Observation Points from Vichy Springs Resort



View from KOP C at Vichy Springs Resort – March 2019



View from KOP D at Vichy Springs Resort – March 2019

SMB ENVIRONMENTAL

Figure 3.1-4
Views from Vichy Springs Resort Towards Ukiah Landfill







Figure 3.1-5
Partial Distant Views from Vichy Springs Resort's Property



Existing Ukiah Landfill – March 2018



Simulated Post-Constructed Ukiah Landfill

SMB ENVIRONMENTAL

Figure 3.1-7
Visual Simulation of Pre- and Post-Project Ukiah Landfill



Olive-Green Artificial Turf
Berkeley County Landfill
Moncks Corner, South Carolina



Mixed Green/Brown Artificial Turf
Baldwin Landfill
Milledgeville, Georgia



Brown/Tan Artificial Turf
Portola Landfill
Portola, California



Natural Olive-Green Grass



Natural Green/Brown Grass



Natural Brown/Tan Grass

SMB ENVIRONMENTAL

Figure 3.1-6
Visual Comparison of Artificial Synthetic Turf and Natural Grass



Existing Ukiah Landfill – March 2018



Simulated Post-Constructed Ukiah Landfill

SMB ENVIRONMENTAL

Figure 3.1-7
Visual Simulation of Pre- and Post-Project Ukiah Landfill



North Ranch Golf Course
Westlake Village, CA



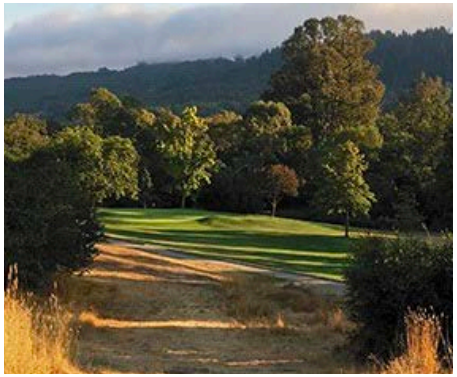
Rosewood Cordevalle
San Martin, CA



La Quinta Resort and Club
La Quinta, CA



Ukiah Valley Golf Course
Ukiah, CA



Bennett Valley Golf Course
Santa Rosa, CA



Lake Ridge Road
Ukiah, CA



East Side Capella Road
Ukiah, CA



Red Meyer road
Ukiah, CA

SMB ENVIRONMENTAL

Figure 3.1-8
Examples of Views of Green Grass/Vegetation Adjacent to Brown Dry Hills



Olive-Green



Blend



Tan

SMB ENVIRONMENTAL

Figure 3.1-9
Artificial Synthetic Turf/Grass Color Options

Section 3.2 Air Quality

On Page 3.2-10, the 2nd paragraph is hereby changed as follows:

~~Land adjacent to the landfill property is zoned primarily as rangeland and is used for grazing.~~ The nearest sensitive receptor is the Vichy Springs Resort and Spa, located approximately 500-~~600~~-feet south of the landfill's entrance. A rural residential development is located approximately one-quarter mile west of the landfill property boundary. A housing development is also located along the south side of Vichy Springs

Road and westward of the Vichy Springs Resort and Spa. The entire development is approximately 1,000-feet southward of the landfill property boundary and is separated from the landfill by an intervening ridge.

Section 3.4 Cultural and Tribal Resources

On page 3.4-2, the 7th bullet is hereby revised as follows:

- Historic Resource. A property, site, or district listed in, or determined to be eligible for listing in, the National Register of Historic Places, California Register of Historical Resources (CRHR), ~~Ventura~~ Mendocino County Historical Landmarks, or City of ~~Oxnard~~ Ukiah Points of Interest.

Specifically, On July 5, 2019, a records search was conducted by staff at the Northwest Information Center (NWIC), Sonoma State University, Rohnert Park, California (NWIC File # 19-0004). The record search included the project Area of Potential Effect (APE) and a 0.25-mile radius outside the project boundaries. The record search included reviewing pertinent NWIC base maps that reference cultural resources records and reports, historic period maps, and literature for Mendocino County including current inventories of the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHP), the California Inventory of Historical Resources, California State Historic Landmarks, and the California Points of Historical Interest. No cultural resources are known within this search radius. Two previous studies have examined the project area in part. In 1975, the Bureau of Land Management prepared a high-level overview of archaeological sites in its Cow Mountain Planning Unit (Keesling and French 1975). A small portion of the project area was also surveyed on foot in 1994 (Roybal 1994). Neither study identified cultural resources in the project area. Just outside of the 0.25-~~1/8~~-mile search radius is Vichy Springs Resort, established in 1854 ~~1857~~. Vichy Springs Resort (P-23-001793) is listed on the National Register of Historic Places (National Park Service 1985). Given this information it appears that the project area is not sensitive for prehistoric or historical cultural resources

Chapter 4 – Alternatives

Pages 4-2 through 4-5 of the DEIR are hereby changed as follows:

4.2 Alternatives ~~Evaluated~~ Carried Forward in this DEIR

As described in **Chapter 1 – Introduction and Chapter 2 – Project Description**, the overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill

slope stability, construction quality assurance, drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, groundwater/surface water monitoring systems, and site security. The Final CPMP for the Ukiah Landfill has been prepared for and conditionally approved by the following agencies:

- California Department of Resources Recycling and Recovery (CalRecycle)
- Mendocino County Department of Public Health
- North Coast Regional Water Quality Control Board
- Mendocino County Air Quality Management District

The Final CPMP has been prepared in accordance with Title 27 of the California Code of Regulations (27 CCR), and Chapters 3 and 4 and the Code of Federal Regulations (CFR) 40, Subpart F. The objectives of the plan are identified below.

- To provide a detailed plan and schedule for closure implementation.
- To provide a plan and schedule for the inspection, maintenance and monitoring procedures to be implemented during the post-closure maintenance period.
- To allow the applicable agencies to monitor closure and post-closure activities to determine that all landfill closure and post-closure maintenance and monitoring requirements are being followed in accordance with the approved plan.
- To provide a basis for the establishment of an accurate detailed cost estimate for closure and post-closure maintenance.

As detailed in Chapter 3 – Environmental Analysis, the Proposed Project would have several potentially significant impacts to the environment. However, with the implementation of the identified and corresponding mitigation measures, all of the potentially significant impacts can be avoided or reduced to less-than-significant levels. Therefore, and as consistent with CEQA regulations, in the selection of alternatives, there is really no need to identify or further evaluate alternatives because no ~~unavoidable~~ significant and unavoidable impacts have been identified with the Proposed Project. However, due to the fact that Vichy Springs Resort has argued for a compacted clay layer/natural cover alternative be further evaluated, the Final EIR includes the further evaluation of a compacted clay layer/natural cover alternative as provided in Section 4.2.2 below and removed from Section 4.3 – Alternatives Considered and Eliminated. ~~Also, as explained in more detail in 4.3 Alternatives Considered and Eliminated, only the Proposed Project is determined to be potentially feasible. An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative (CEQA, 15126.6 (f)(3)). As a result, for this Proposed Project, the only alternative that needs to be evaluated in this Draft EIR is the CEQA required No Project Alternative (Mount Shasta Bioregional Ecology Center v. County of Siskiyou, 2012). CEQA does not require the analysis of the other considered alternatives that are not potentially feasible.~~ The No Project Alternative and the Compacted Clay Layer/Natural Cover Alternative are discussed below. In addition, below we have also provided a discussion of the other alternatives that were considered and eliminated - along with the rationale.

4.2.1 No Project Alternative

CEQA Guidelines §15126.6(e) provides that a No Project Alternative shall also be evaluated along with its impact. According to the CEQA Guidelines, the No Project Alternative shall discuss the existing conditions at the time the Notice of Preparation was published, as well as what would be reasonably expected to occur in the foreseeable future if the Project were not approved, based on current plans and consistent with available infrastructure and community services.

Under the No Project Alternative, the City would not close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, none of the new components and systems required for closure of the landfill would be implemented. This includes, but is not limited to the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, and landfill slope stability as well as drainage and erosion control systems, landfill gas (LFG) control and monitoring systems, and groundwater/surface water monitoring systems. The on-going maintenance of the landfill, would probably continue in a manner similar to existing maintenance of the landfill, since it ceased receiving waste.

The No Project Alternative would result in less significant temporary construction related impacts than the Proposed Project. All of the potentially significant impacts associated with the construction and operation of the Project would not occur under this alternative. However, the No Project Alternative would fail to meet any and/or all of the objectives of the Project. Under the No Project Alternative, the Ukiah Landfill would not be properly closed according to state and local regulations and would be susceptible to slope instability, potential water quality impacts to surface water and groundwater resources due to inadequate cover leading to drainage and erosion issues during inclement weather/stormwater, and the potential for inadequate LFG control and monitoring leading to air quality issues and impacts. Under the No Project Alternative, the City would be potentially susceptible for a variety of water quality and air quality violations and fines.

4.2.2 Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative

The Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative was a 1974 standard that was officially adopted in 1985 as part of then Subchapter 15 of Title 27 of the California Code of Regulations (27 CCR). This alternative would require a 2-foot thick clay foundation layer over the entire landfill area and then another 2-foot thick soil and vegetation layer on top of the clay, thus requiring approximately 2.5 million cubic yards of material to properly cover the approximately 40- acre landfill area. Once constructed the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would soon return to the existing condition as currently exists with the landfill covered with natural vegetation. The construction duration would be extended by another 2-months. Detailed below is an evaluation of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would perform as compared to the Proposed Project in each of the environmental resource areas. As consistent with CEQA requirements, alternatives do not need to be evaluated to the same level of detail as the Proposed Project, but are rather evaluated to compare and contrast to the Proposed Project and/or the No Action Alternative.

4.2.2.1 Aesthetics/Visual Resources

Construction of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have generally the same, but slightly increased temporary construction related aesthetic/visual impacts as compared to the Proposed Project because the excavation of the additional clay foundation layer would increase the visual footprint of the construction area and would also increase the time that the area is exposed. However, similar to the Proposed Project, there are few, if any, sensitive receptors that would actually see or notice the construction activities. And as the construction activities would be temporary, any temporary or partial views of the construction activities of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would be similar, but slightly increased and considered to be less-than-significant.

Once constructed, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would return to the Landfill's existing condition and would have less-than-significant to no significant aesthetic/visual impacts. Any partial views of the landfill would be of the landfill, which is a 40-acre area that would remain a landfill with a natural vegetation cover and devoid of any trees.

Of particular concern to the Vichy Springs Resort is the comparison of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative with the Proposed Project's artificial synthetic turf cover. The DEIR and the Final EIR provide compelling evidence and proof that any partial views would be from a distance of over 500- and up to 2,500-feet away cannot distinguish between an olive-green artificial/synthetic turf cover and natural grass. Please refer to the real-life examples of where artificial/synthetic turf covers have been successfully used and which are displayed in Figure 2-2 of the DEIR, Appendix B of this Final EIR, and the figures in the revised Section 3.1 – Aesthetics/Visual Resources above. Of particular concern to the Vichy Springs Resort, is the notion that an olive-green color would not blend into the landscape when the season changes and where the surrounding hills would be brown and any partial views they have would be green. As provided in the revised aesthetics/visual resources section, there are numerous examples of beautiful views of green/irrigated grass adjacent next to brown/dry hills. This type of view is common in northern California and the semi-arid west. Further, from over 500-feet it is virtually impossible to tell the difference between artificial/synthetic turf and natural grass. As a result, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative, once constructed would have less-than-significant to no significant aesthetic/visual impacts and would look very similar to the Proposed Project.

4.2.2.2 Air Quality

Construction of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have generally the same, but slightly increased temporary construction related air quality impacts as the Proposed Project as the excavation of the additional clay foundation layer would increase the construction emissions including criteria pollutants such as ROG, NOx, PM_{10} and $PM_{2.5}$. However, these emissions can be reduced to less-than-significant levels with the incorporation of Mitigation Measure 3.2-1: Fugitive Dust Control Measures and Mitigation Measure 3.2-6: Develop and Submit Naturally Occurring Asbestos (NOA) Dust Mitigation Plan as discussed in Section 3.2 of the DEIR.

Once constructed, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would produce slightly more emissions as compared to the Proposed project, due to increased

maintenance activities associated with ongoing and potential future slope stability issues using natural cover which would require more machinery and manpower than the Proposed Project.

4.2.2.3 Biological Resources

Construction of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have generally the same, but increased temporary construction related biological resources impacts as compared to the Proposed Project as the excavation of the additional clay foundation layer would increase the construction impacts. Specifically, the excavation of the clay borrow material (assuming that it can all be located on-site) would result in the expansion of the construction footprint with additional impacts to riparian and wetlands resources resulting in additional impacts to biological resources. However, with the implementation of the following mitigation measures for the Proposed Project, construction impacts can be reduced to less-than-significant levels. (i.e. Mitigation Measure 3.3-1a: Conduct A Preconstruction Survey for Special Status Wildlife Species, Mitigation Measure 3.3-1b: Conduct Bird Breeding and Nesting Surveys, Mitigation Measure 3.3-1c: Conduct a Bat Habitat Assessment of Trees, Mitigation Measure 3.3-1d: Environmental Awareness Training, Mitigation Measure 3.3-1e: Biological Monitor, Mitigation Measure 3.3-1f: Staging Areas and Access Routes, and Mitigation Measure 3.3-3a: Protect Jurisdictional Waters and Sensitive Habitat Areas).

Once constructed, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have increased water quality impacts as compared to the Proposed Project as placing a heavy clay layer on steep side slopes has a tendency to fail more often than artificial/synthetic turf covers. Such failures would most often occur during rain or storm events, resulting in uncontrollable erosion and sedimentation that would make its way to the local creek(s) which drains into the Russian River, which is an impaired water body. This is considered to be a potentially significant and unavoidable impact. Under such conditions, the City would be subject to water quality fines that can be as much as $25,000 per day. Due to the fact that these events cannot be predicted as to when or where they will occur, there are no technically viable mitigation measures to reduce these potentially significant and unavoidable impacts.

4.2.2.4 Cultural and Tribal Resources

Construction of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have generally the same, but increased, potential to affect cultural and/or tribal resources as compared to the Proposed Project as the excavation of the additional clay foundation layer would increase the construction footprint and thus would have more potential to inadvertently discover cultural and/or tribal resources. However, with the implementation of the Proposed Project's Mitigation Measure 3.4-2: Halt Work if Cultural Resources are Discovered, Mitigation Measure 3.4-3: Stop Work if Paleontological Remains are Discovered, Mitigation Measure 3.4-4: Halt Work if Human Remains are Found, and Mitigation Measure 3.4-5: Halt Work if Tribal Cultural Resources are Discovered any impacts would be reduced to less-than-significant levels.

Once constructed, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would not have any impacts to cultural and tribal resources.

4.2.2.5 Geology, Soils, and Seismicity

The Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have increased slope stability and soil erosion impacts as compared to the Proposed Project. Specifically, a natural cover alternative would increase the discharge of sediment from the waste management unit over a artificial synthetic turf cover alternative. In addition, the natural cover system would have increased slope stability issues and concerns as the landfill has very steep, 2:1, slopes and would be subject to increased slope failure, sluffing, exposing refuse, leachate seeps, loss of top soil, and soil erosion/sediment transport of material to the creek, which drains to the Russian River. This would be considered to be a *significant and unavoidable impact.* Due to the fact that these events cannot be predicted as to when or where they will occur, there are no technically viable mitigation measures to reduce these potentially significant and unavoidable impacts.

4.2.2.6 Greenhouse Gases

Construction of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have increased greenhouse gas emissions as compared to the Proposed Project due to the increase in excavation activities to find clay and increased vehicle/equipment usage to transport and spread and compact the clay layer over the 40-acre landfill site area. However, this increase is considered to be less-than-significant.

Once constructed, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have slightly increased greenhouse gas emissions as compared to the Proposed Project as a natural cover alternative would require increased operations and maintenance activities to ensure slope stability and repair any slope failures as they occur. However, this increase is considered to be less-than-significant.

4.2.2.7 Hydrology and Water Quality

As discussed above in the Biological resources section, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have increased water quality impacts as compared to the Proposed Project as placing a heavy clay layer on steep side slopes has a tendency to fail more often than artificial/synthetic turf covers. Such failures would most often occur during rain or storm events, resulting in uncontrollable erosion and sedimentation that would make its way to the local creek(s) which drains into the Russian River, which is an impaired water body. Under such conditions, the City would be subject to water quality fines that can be as much as $25,000 per day. This is considered to be a potentially *significant and unavoidable impact.* Due to the fact that these events cannot be predicted as to when or where they will occur, there are no technically viable mitigation measures to reduce these potentially significant and unavoidable impacts.

4.2.2.8 Noise

Construction of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have increased noise as the excavation and compaction of the clay layer would generate more noise and ground vibration as compared to the Proposed Project. Also, the construction time would be extended by 2-months, thus increasing the duration of the construction activities and noise. However, the nearest sensitive receptor structure is approximately 600-feet away from the nearest proposed construction activity at the landfill. The potential vibration levels caused by the equipment at the landfill would be much less than the threshold of perceptibility. As a result, potential vibration effects associated with construction

truck traffic or the use of construction equipment at the landfill would not result in any potentially significant groundborne vibration impacts to structures or people. Therefore, vibration impacts would be a less than significant and no mitigation measures are required.

Once constructed, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would have slightly increased noise as a natural cover alternative would require increased operations and maintenance activities as compared to the Proposed Project to ensure slope stability and repair any slope failures as they occur. However, this increase is considered to be less-than-significant.

4.3 Alternatives Considered and Eliminated

Summarized below are the alternatives that were considered and eliminated from further consideration – along with the rationale for elimination.

~~**Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative.** The Natural or Clay Layer closure option was a 1974 standard that was officially adopted in 1985 as part of then Subchapter 15 of Title 27 of the California Code of Regulations (27 CCR). However, over the last 35-plus years, the waste industry, along with the regulatory agencies and surrounding communities has recognized that there are serious short falls with compacted clay layers from both a performance and cost perspective – especially on sites with slope stability issues. The Ukiah Landfill is located on steep, 2:1 plus, slope and the potential for a clay and/or geosynthetic clay layer alternative failure is unreasonably quite high. Such a failure would result in significant water quality issues to the unnamed creek alongside the Ukiah Landfill, which drains into Sulfur Creek and then the Russian River. Further, forensic analyses of a number of natural landfill cover slope failures over the last 20-plus years has shown that both Compacted Clay and Geosynthetic Clay Liners fail due to pore water pressure rise in saturated cover soils building up beneath the clay layers; particularly on steep slopes such as the conditions of the Ukiah Landfill. In short, the heavy clay layers assist in the probability in slope instability. Further, CalRecycle has approved numerous alternative landfill covers that are similar to the Proposed Project throughout the State of California and they have proven to be a viable alternative, especially on landfills with steep slopes.~~

~~From an environmental perspective, this compacted clay and/or geo synthetic clay layer alternative would also cause a substantial increase in temporary construction impacts to air quality, noise, and traffic issues over the Proposed Project as it would require the need to excavate and/or import (transport) significant quantities of clay sources and natural vegetation cover soils of to the site and spread them over the 40-acre Ukiah Landfill. Also, from an operational standpoint, this alternative would result in increased maintenance impacts and costs to maintain the natural grass/vegetation to prevent fires and keep rodents from compromising the clay layer structure, which would then contribute to a substantial increase in traffic, air quality, noise, and other potential environmental impacts.~~

~~The City has proposed the Proposed Project and artificial cover alternative because it has many beneficial advantages over the compacted clay and/or geo synthetic clay layer alternative as the Proposed Project provides: 1) A proven stable cover on steep slopes due to the elimination of low interface strength pore water pressure and gas relief layers, 2) Decreased exposure to construction related air quality, noise, and traffic impacts and potential long term water quality impacts to surface and groundwater resources which could lead to significant fines, and 3) significant lower capital and on-going/perpetual maintenance costs. As a result, this compacted clay and/or geo synthetic clay layer alternative has been considered, but is~~

~~eliminated from further consideration as it does not perform as well as the Proposed Project. This alternative is not considered feasible because it is not capable of being accomplished in a successful manner within a reasonable period of time, taking into account environmental, economic and technological factors (CEQA Guidelines, Section 15364).~~

Relocation of the Ukiah Landfill. Moving all the waste from one landfill to another is often referred to as a Clean Closure. It is typically only done on small unpermitted landfills or dumping areas. The relocation of the solid waste in the Ukiah Landfill is considered to be a technically unfeasible alternative. In addition to being cost prohibitive, it would require countless truck trips causing significant and unavoidable traffic and noise impacts. In addition, there is no nearby approved or permitted place to relocate the solid waste material. Further, there are countless unknown hazards and hazardous waste risks that could affect the health and safety of the construction workers, Vichy Springs Resort and nearby residents. As a result, this alternative has been eliminated from further consideration. This alternative is not considered feasible because it is not capable of being accomplished in a successful manner within a reasonable period of time, taking into account environmental, economic and technological factors (CEQA Guidelines, Section 15364).

Alternative/Synthetic Specialized Tufted Geotextile Landfill Turf Cover Color. The Proposed Project's alternative/synthetic specialized tufted geotextile turf landfill cover of the Proposed Project was selected to provide a natural shade of color in order to help mimic the existing natural color and blend into the surrounding environment. Artificial or synthetic specialized tufted geotextile covers generally come in three (3) natural colors – olive-green, tan, and a blend of olive-green and tan. For the Proposed Project the olive-green color was selected as the preferred color as it provides arguably the best color option to blend into the natural and surrounding environment. With the required minimum of a 5/8 thick sand infill layer on top, the cover will look like a blend of olive-green and tan. No other <u>non-natural looking</u> colors such as black, blue, red, orange, grey, white or various color pallets of those or other color options are available in alternative/synthetic specialized tufted geotextiles for landfills and would not provide any better ability to blend into the surrounding environment. ~~Further, the 40-acre Ukiah Landfill is not accessible and visible from anywhere on the Vichy Springs Resort Property and/or the general public. The 40-acrte Ukiah Landfill is and will remain inaccessible to the general public and is and will not be visible or from anywhere from a public access point as well as anywhere on the Vichy Springs Resort~~. As a result, this alternative has been duly considered but eliminated from further consideration because it would not avoid any significant environmental (aesthetic) impacts.

4.4 Environmentally Superior Alternative

Section 15126.6(e)(2) of the CEQA Guidelines requires an EIR to identify an environmentally superior alternative. Of the ~~two~~ <u>three</u> alternatives considered in this section (Proposed Project<u>,</u> ~~and~~ the No Project Alternative, <u>and the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative</u>), the Proposed Project would be the environmentally superior to <u>both</u> the No Project Alternative <u>and the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative</u>. <u>The advantages of an artificial synthetic turf landfill cover system over traditional clay cover layer/natural vegetation cover system, include the following:</u>

- **Long Life.** The durable, high-strength system components ensure a long-life (100-year design life) of protection against operational and natural forces while maintaining an excellent natural looking appearance with greatly reduced maintenance.
- **Soil Cover Savings**. Eliminates the need for high maintenance vegetative soil covers and increases weather resistance. Since final cover soils are challenging to locate and expensive to place in the final stages of the landfill's lifespan, the resulting savings can be significant.
- **Environmentally Friendly.** The system is better for landfills in sensitive areas like the Ukiah Landfill where soil erosion and sedimentation are a major concern due to steep canyon slopes. Soil loss is non-existent during operations and post-closure. Eliminates the need for borrow sources, and siltation ponds can be converted to simple stormwater retention ponds. As a direct result, associated environmental construction impacts are much easier to manage.
- **Increased Slope Stability**. Soil stability problems either rain/storm events, through earthquake, and/or gas pressure buildup is reduced.
- **Weather Resistant**. The components of an artificial synthetic cover system work in conjunction to seal the waste mass from the destructive forces of high rainfall intensities and hurricane force winds.
- **Reduced Wildlife Impacts**. By reducing organic matter and food sources, fewer animals, including birds, are attracted to the site. This is important at landfills located in coastal areas or near airports. Because the components of an artificial synthetic cover system do not pass on the animals' smell/taste test, they do not usually bother with it or return to it.
- **Eliminates Cap Infiltration**. Since surface water is not restricted by the hydraulic conductivity of a vegetative cover drainage system, and can no longer infiltrate into the waste, leachate production is cut off at the source.
- **Enhanced Visual Inspection**. Because the synthetic materials are not covered with thick soil profiles, they are easily inspected for damage; which, if identified, may be easily and inexpensively repaired. Also, significant additional damage to clay layer caps can be done by earthwork equipment during repair and soil placement maintenance activities. By replacing the soil layer with an artificial synthetic cover system, this is no longer an issue.
- **Easier Reclamation**. Landfill materials are readily accessible in the event of landfill reclamation for future piggyback areas or future waste lifts due to waste settlement or vertical expansion. The composite nature of an artificial synthetic cover system allows owners access to the waste without having to remove the existing cover soils of a typical and traditional final cover system.

Further, the comparison and rationale for each alternative including the Proposed Project is discussed below.

4.4.1 No Project Alternative

The No Project Alternative would not meet any of the goals and objectives of the Proposed Project. Under the No Project Alternative, the Ukiah Landfill would not be properly closed according to state and local regulations and would be susceptible to slope instability, potential water quality impacts to surface water and groundwater resources due to inadequate cover leading to drainage and erosion issues during inclement weather/stormwater, and the potential for inadequate LFG control and monitoring leading to air quality issues and impacts. Under the No Action Alternative, the City would be potentially susceptible for a variety

of water quality and air quality violations and fines. As a result, the Proposed Project is considered to be the environmentally superior alternative.

4.4.2 Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative[1]

The Natural or Clay Layer closure option was a 1974 standard that was officially adopted in 1985 as part of then Subchapter 15 of Title 27 of the California Code of Regulations (27 CCR). However, over the last 35-plus years, the waste industry, along with the regulatory agencies and surrounding communities, has recognized that there are serious short-falls with compacted clay layers from both a performance and cost perspective – especially on sites with slope stability issues. The Ukiah Landfill is located on steep, 2:1 plus, slope and the potential for a clay and/or geosynthetic clay layer alternative failure is unreasonably quite high. Such a failure would result in significant water quality issues to the unnamed creek alongside the Ukiah Landfill, which drains into Sulfur Creek and then the Russian River. Further, forensic analyses of a number of natural landfill cover slope failures over the last 20-plus years has shown that both Compacted Clay and Geosynthetic Clay Liners fail due to pore water pressure rise in saturated cover soils building up beneath the clay layers; particularly on steep slopes such as the conditions of the Ukiah Landfill. In short, the heavy clay layers assist in the probability in slope instability. Further, CalRecycle has approved numerous alternative landfill covers that are similar to the Proposed Project throughout the State of California and they have proven to be a viable alternative, especially on landfills with steep slopes.

From an environmental perspective, the compacted clay and/or geo synthetic clay layer alternative would also cause a substantial increase in temporary construction impacts to air quality, biological resources, water quality, and noise, issues over the Proposed Project as it would require the need to excavate and/or import (transport) significant quantities of clay sources and natural vegetation cover soils to the site and spread them over the 40-acre Ukiah Landfill. Also, from an operational standpoint, this alternative would result in increased maintenance impacts and costs to maintain and repair slope failures as well as to maintain the natural grass/vegetation to prevent fires and keep rodents from compromising the clay layer structure, which would then contribute to a substantial increase in traffic, air quality, noise, and other potential environmental impacts.

4.4.3 Proposed Project Alternative

As shown in Table 4-1, the City has proposed the Proposed Project and artificial cover alternative because it has many advantages over the Compacted Clay and/or Geo Synthetic Clay Layer with Natural Vegetation Closure Alternative and the No Project Alternative as the Proposed Project provides: 1) A proven stable cover on steep slopes due to the elimination of low interface strength pore water pressure and gas relief layers, 2) Decreased exposure to construction-related air quality, noise, and traffic impacts and potential significant and unavoidable long-term water quality impacts to surface and groundwater resources which could lead to significant fines, and 3) significant lower capital and on-going/perpetual maintenance costs. As a result, the compacted clay and/or geo synthetic clay layer alternative has been considered, but is not

[3] Information of history and rationale for the selection of the Proposed Project and artificial synthetic turf cover was provided by the City's engineering consultant, Mike Delmanowski, C.E.G., C.Hg. Senior Hydrogeologist of EBA Engineering located at 825 Sonoma Avenue Santa Rosa, CA 95404. See Appendices B and C of this Final EIR as well as appendices in the DEIR

selected as it does not perform as well as the Proposed Project. The No Project Alternative is not a legally implementable alternative. As a result, the Proposed Project remains the City's selected alternative.

Table 4-1
Comparison of Alternatives

	Proposed Project	**Compacted Clay/Natural Cover Alternative**	**No Project Alternative**	**Comments**
Meets Project Objectives?	Yes	No/Partial	No	The No Project Alternative would not be a legally implementable alternative. The CCL/Natural Cover Alternative would have less slope stability than the proposed project and would require increased future maintenance than over the Proposed Project.
3.1 Aesthetic/Visual Resources				
Impact 3.1-1: Would the Proposed Project have a substantial adverse effect on a scenic vista?	LSI	Equal	N/A	The Proposed Project is located on an existing dump and is not considered to be a scenic view area by the County of Mendocino.
Impact 3.1-2: Would the Proposed Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.	LSI	Equal	N/A	The Proposed Project is located on an existing dump and is not considered to be a scenic view area by the County of Mendocino.
Impact 3.1-3: Would the Proposed Project substantially degrade the existing visual character or quality of the site and its surroundings.	LSI	Equal	N/A	The Proposed Project is located on an existing dump and is not considered to be a scenic view area by the County of Mendocino.
Impact 3.1-4: Would the Proposed Project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	LSI	Equal	N/A	The Proposed Project is located on an existing dump and is not considered to be a scenic view area by the County of Mendocino.
3.2 Air Quality				
Impact 3.2-1: Would the Proposed Project Conflict with or Obstruct Implementation of the Applicable Air Quality Management Plan?	LSI	Equal	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not conflict with or obstruct implementation of the Applicable Air Quality Management Plan.
Impact 3.2-2: Would Construction of the Proposed Project Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or	LSM	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard. However, the CCL/Natural Cover Alternative would have slightly increased emissions due to

Table 4-1
Comparison of Alternatives

	Proposed Project	Compacted Clay/Natural Cover Alternative	No Project Alternative	Comments
State Ambient Air Quality Standard?				increased construction and maintenance activities.
Impact 3.2-3: Would Operation of the Proposed Project Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard. However, the CCL/Natural Cover Alternative would have slightly increased emissions due to increased construction and maintenance activities.
Impact 3.2-4: Would Construction and/or Operation of the Proposed Project Expose Sensitive Receptors to Substantial Pollutant Concentrations?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not expose sensitive receptors to substantial pollutant concentrations. However, the CCL/Natural Cover Alternative would have slightly increased emissions due to increased construction and maintenance activities.
Impact 3.2-5: Would Construction and/or Operation of the Proposed Project Result in Other Emissions (Such as Those Leading to Odors) Adversely Affecting a Substantial Number of People?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not expose sensitive receptors to substantial pollutant concentrations causing odors. However, the CCL/Natural Cover Alternative would have slightly increased emissions due to increased construction and maintenance activities.
Impact 3.2-6: Would Construction of the Proposed Project Result in Other Emissions (Such as Naturally Occurring Asbestos) Adversely Affecting a Substantial Number of People?	LSM	Equal/PG	N/A	With mitigation, the Proposed Project and/or the CCL/Natural Cover Alternative would not expose sensitive receptors to substantial naturally occurring asbestos. However, the CCL/Natural Cover Alternative would have slightly increased emissions due to increased construction and maintenance activities.
3.3 Biological Resources				
Impact 3.3-1: Would the Proposed Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and	LSM	Equal/PG	N/A	With mitigation, the Proposed Project and/or the CCL/Natural Cover Alternative would not have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. However, the CCL/Natural Cover Alternative would have slightly increased effects due to

Table 4-1
Comparison of Alternatives

	Proposed Project	Compacted Clay/Natural Cover Alternative	No Project Alternative	Comments
Wildlife or U.S. Fish and Wildlife Service?				increased construction and maintenance activities.
Impact 3.3-2 Would the Proposed Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations adopted by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations adopted by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
Impact 3.3-3: Would the Proposed Project have a substantial adverse effect on federally protected waters of the U.S. as defined by Section 404 of the federal Clean Water Act or protected waters of the state as defined by Section 1600 et seq. of the California Fish and Game Code (including, but not limited to, marshes, vernal pools, and coastal wetlands) through direct removal, filling, hydrological interruption, or other means?	LSM	Equal/PG	N/A	With mitigation, the Proposed Project and/or the CCL/Natural Cover Alternative would not have a substantial adverse effect on federally protected waters of the U.S. as defined by Section 404 of the federal Clean Water Act or protected waters of the state as defined by Section 1600 et seq. of the California Fish and Game Code (including, but not limited to, marshes, vernal pools, and coastal wetlands) through direct removal, filling, hydrological interruption, or other means. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
Impact 3.3-4: Would the Proposed Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
Impact 3.3-5: Would the Proposed Project conflict with any local policies or ordinances protecting biological resources?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not conflict with any local policies or ordinances protecting biological resources. However, the CCL/Natural Cover Alternative would have slightly increased

Table 4-1
Comparison of Alternatives

	Proposed Project	Compacted Clay/Natural Cover Alternative	No Project Alternative	Comments
				effects due to increased construction and maintenance activities.
Impact 3.3-6: Would the Proposed Project conflict with an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	NI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not conflict with an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
3.4 Cultural, Paleontological, and Tribal Resources				
Impact 3.4-1: Would the Proposed Project cause a substantial adverse change in the significance of an historical resource as defined in State CEQA Guidelines §15064.5?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not cause a substantial adverse change in the significance of an historical resource as defined in State CEQA Guidelines §15064.5. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
Impact 3-4.2: Would the Proposed Project cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5?	LSM	Equal/PG	N/A	With mitigation, the Proposed Project and/or the CCL/Natural Cover Alternative would not cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
Impact 3.4-3: Would the proposed Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	LSM	Equal/PG	N/A	With mitigation, the Proposed Project and/or the CCL/Natural Cover Alternative would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
Impact 3.4-4: Would the Proposed Project disturb any human remains, including those interred outside of formal cemeteries?	LSM	Equal/PG	N/A	With mitigation, the Proposed Project and/or the CCL/Natural Cover Alternative would not disturb any human remains, including those interred outside of formal cemeteries. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
Impact 3.4-5: Would implementation of the	LSM	Equal/PG	N/A	With mitigation, the Proposed Project and/or the CCL/Natural Cover Alternative would not cause a substantial adverse

Table 4-1
Comparison of Alternatives

	Proposed Project	Compacted Clay/Natural Cover Alternative	No Project Alternative	Comments
Proposed Project cause a substantial adverse change in the significance of a tribal cultural resource?				change in the significance of a tribal cultural resource. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
3.5 Geology Soils and Seismicity				
Impact 3.5-1: Would the Proposed Project expose people to injury or structures to damage from potential rupture of a known earthquake fault, strong ground shaking, seismic-related ground failure, or landslides?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not expose people to injury or structures to damage from potential rupture of a known earthquake fault, strong ground shaking, seismic-related ground failure, or landslides. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
Impact 3.5-2: Would construction grading and long-term closure conditions at the Landfill expose soils to erosion and result in the loss of topsoil?	LSI	PG	N/A	The CCL/Natural Cover Alternative would have greater potential to expose soils to erosion.
Impact 3.5-3: Would the Proposed Project be located on a unit or soils that are potentially unstable, or that could become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	LSI	PG	N/A	The CCL/Natural Cover Alternative would have greater potential to become unstable and potentially resulting in on-site landslides, sluffing, and failure due to the steep slopes.
Impact 3.5-4. Would the Proposed Project make a cumulatively considerable contribution to cumulative effects associated with increased seismic risk, landsliding, erosion, topsoil loss or increased exposure to seismic or other risks?	LSI	PG	N/A	The CCL/Natural Cover Alternative would have greater potential to become unstable and potentially resulting in on-site landslides, sluffing, and failure due to the steep slopes.
3.6 Greenhouse Gases				
Impact 3.6-1: Would Implementation of the Proposed Project	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not generate GHG emissions, either directly or

Table 4-1
Comparison of Alternatives

	Proposed Project	Compacted Clay/Natural Cover Alternative	No Project Alternative	Comments
generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?				indirectly, that may have a significant impact on the environment. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
Impact 3.6-2: Would the Proposed Project conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG. However, the CCL/Natural Cover Alternative would have slightly increased effects due to increased construction and maintenance activities.
3.7 Hydrology and Water Quality				
Impact 3.7-1: Would the Proposed Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	LSI	Equal/PG	N/A	The CCL/Natural Cover Alternative would have greater potential to violate water quality standards or waste discharge requirements due to on-site landslides, sluffing, and slope failures.
Impact 3.7-2: Would the Proposed Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?	LSI	Equal	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin.
Impact 3.7-3: Would the Proposed Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would result in substantial erosion, siltation, polluted runoff or flooding on- or off-site?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would result in substantial erosion, siltation, polluted runoff or flooding on- or off-site. However, the CCL/Natural Cover Alternative would have slightly increased water quality effects due to increased construction and maintenance activities as well as increased susceptibility to slope failures leading to increased erosion and sedimentation.

Table 4-1
Comparison of Alternatives

	Proposed Project	Compacted Clay/Natural Cover Alternative	No Project Alternative	Comments
Impact 3.7-4: Would the Proposed Project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. However, the CCL/Natural Cover Alternative would have slightly increased water quality effects due to increased construction and maintenance activities as well as increased susceptibility to slope failures leading to increased erosion and sedimentation.
3.8 Noise				
Impact 3.8-1: Would the Proposed Project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Proposed Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Proposed Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. However, the CCL/Natural Cover Alternative would have slightly increased noise effects due to increased construction and maintenance activities.
Impact 3.8-2: Would the Proposed Project generate excessive groundborne vibration or groundborne noise levels?	LSI	Equal/PG	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not generate excessive groundborne vibration or groundborne noise levels. However, the CCL/Natural Cover Alternative would have slightly increased noise effects due to increased construction and maintenance activities.
Impact 3.8-3: Would the Proposed Project be located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, and/or expose people residing or working in the project area to excessive noise levels.	LSI	Equal	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not be located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, and/or expose people residing or working in the project area to excessive noise levels.
Growth Inducement Effects				
Would the Proposed Project indirectly or directly remove barriers	LSI	Equal	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not indirectly or directly remove barriers to

Table 4-1 Comparison of Alternatives				
	Proposed Project	**Compacted Clay/Natural Cover Alternative**	**No Project Alternative**	**Comments**
to population growth and/or encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively?				population growth and/or encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.
Cumulative Effects				
Would the Proposed Project create any direct, indirect, short-term and/or long-term cumulative impacts?	LSI	Equal	N/A	The Proposed Project and/or the CCL/Natural Cover Alternative would not create any direct, indirect, short-term and/or long-term cumulative impacts.
NI = No Impact LSI = Less-than-Significant Impact LSM = Less-than-Significant Impact PG = Potentially Greater Impact than the Proposed Project Equal = Equal Impact to the Proposed Project				

As a result, the City has chosen the Proposed Project as the environmentally superior alternative and the alternative of choice for successfully and legally closing the Ukiah Landfill, in accordance with Title 27 and all applicable laws, permits, and/or regulations.

Chapter 5 EIR Preparers

This section presents preparers and reviewers of the Draft and Final EIR.

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- Daniel Shoup, Cultural, Paleontological, and Tribal Resources
- Pete Hudson, Geology, Soils, Seismicity, and Hydrology
- Justin Taplin, Hydrology and Water Quality

Appendix A

Mitigation Monitoring and Reporting Program

MITIGATION MONITORING AND REPORTING PROGRAM

City of Ukiah
Landfill Closure Project
Final Environmental Impact Report

SCH#: 2017022009

Prepared for:
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482-5400

Prepared by:

SMB Environmental, Inc.

April 2020

INTRODUCTION

On November 13, 2019, the City of Ukiah (City) released for public review the Draft Environmental Impact Report (Draft EIR) (State Clearinghouse Number: 2017022009) to provide the public and responsible agencies with information about the potential environmental effects of the City's proposed Landfill Closure Project (Project or Proposed Project). The City is the lead agency under the California Environmental Quality Act (CEQA) and has principal responsibility for approving the Proposed Project.

The overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, landfill gas control and monitoring systems, groundwater/surface water monitoring systems, and site security.

CEQA Guidelines require public agencies to adopt a Mitigation Monitoring and Reporting Program (MMRP) for changes to the project, which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment. A MMRP is required for the Proposed Project because the Draft PEIR identifies potentially significant adverse impacts related to project implementation, and mitigation measures have been identified to reduce those impacts.

On November 13, 2019, to initiate public review of the Draft EIR, the City filed a Notice of Completion (NOC) for the project with the Governor's Office of Planning and Research (State Clearinghouse or SCH) and a Notice of Availability (NOA) with the County of Mendocino and released the Draft EIR for a 45-day public review. The State Clearinghouse identified the project with SCH #2017022009. The 45-day public review period was established between November 13 through December 31, 2019 and was then extended through January 9, 2010, with copies of the Draft PEIR available for review on the City's website at at https://cityofukiah.box.com/UkiahLandfillClosureProject; the City's front desk at 300 Seminary Avenue, Ukiah, CA 95482; and the Main Branch Library, 105 North Main Street, Ukiah, CA 95482.

In March 2020, the City prepared a Final PEIR according to CEQA Guidelines and incorporated all comments received by the State Clearinghouse and the City during the 45-day public review period. As a result, some of the mitigation measures identified in the Public Draft EIR have been revised to reflect those comments. Based on the Final EIR, the Proposed Project would not result in new significant impacts, substantially increase the severity of previously disclosed impacts, or involve any of the other conditions related to changed circumstances or new information that can require recirculation pursuant to Section 15088.5(a) of the State CEQA Guidelines.

PURPOSE OF MITIGATION MONITORING AND REPORTING PROGRAM

This MMRP has been prepared to ensure that all required mitigation measures are implemented and completed in a satisfactory manner before and during project construction and operation. The MMRP may be modified by the City during project implementation, as necessary, in response to changing conditions or other refinements. Table A (included at the end of this document) has been prepared to assist the responsible parties in implementing the mitigation measures. The table identifies individual mitigation measures, monitoring/mitigation timing, responsible person/agency for implementing the measure, monitoring and reporting procedure, and space to confirm implementation of the mitigation measures. The numbering of mitigation measures follows the numbering sequence found in the Public Draft EIR.

ROLES AND RESPONSIBILITIES

Unless otherwise specified herein, the City is responsible for taking all actions necessary to implement the mitigation measures under its jurisdiction according to the specifications provided for each measure and for demonstrating that the action has been successfully completed. The City, at its discretion, may delegate implementation responsibility or portions thereof to a licensed contractor or other designated agent. The City would be responsible for overall administration of the MMRP and for verifying that City staff members and/or the construction contractor has completed the necessary actions for each measure.

The City would designate a project manager to oversee implementation of the MMRP. The City is primarily responsible for implementing the mitigation

measures for the Proposed Project as described in this MMRP. Duties of the project manager include the following:

- Ensure that routine inspections of the construction site are conducted by appropriate City staff; check plans, reports, and other documents required by the MMRP; and conduct report activities.
- Serve as a liaison between the City and the contractor or project applicant regarding mitigation monitoring issues.
- Complete forms and maintain reports and other records and documents generated by the MMRP.
- Coordinate and ensure that corrective actions or enforcement measures are taken, if necessary.

The responsible party for implementation of each item shall identify the staff members responsible for coordinating with the City on the MMRP.

REPORTING

The City's Director of Public Works shall prepare a monitoring report, upon completion of the project, on the compliance of the activity with the required mitigation measures. Information regarding inspections and other requirements shall be compiled and explained in the report. The report shall be designed to simply and clearly identify whether mitigation measures have been adequately implemented. At a minimum, each report shall identify the mitigation measures or conditions to be monitored for implementation, whether compliance with the mitigation measures or conditions has occurred, the procedures used to assess compliance, and whether further action is required.

MITIGATION MONITORING AND REPORTING PLAN TABLE

The categories identified in Table A are described below.

- **Mitigation Measure –** This column provides the text of the mitigation measures identified in the Draft EIR.
- **Timing –** This column identifies the time frame in which the mitigation will take place.
- **Implementation** – This column identifies the party responsible for implementing compliance with the requirements of the mitigation measure
- **Enforcement –** This column identifies the party responsible for enforcing compliance with the requirements of the mitigation measure.
- **Dated Signature for Verification of Compliance –** This column is to be dated and signed by the person (either project manager or his/her designee) responsible for verifying compliance with the requirements of the mitigation measure.

Table A
Mitigation Monitoring and Reporting Plan for the City of Ukiah's Landfill Closure Project
Final Environmental Impact Report

Mitigation Measure	Timing	Implementation[1]	Enforcement[1]	Dated Signature for Verification of Compliance
3.3 AIR QUALITY				
Mitigation Measure 3.2-1: Fugitive Dust Control Measures*:* The following airborne dust control measures shall be required during all construction operations, grading of roads, or the clearing of land (MCAQMD Rule 1-430-Fugitive Dust Emissions): • All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions. • All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 miles per hour. • Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed. • Asphalt, oil, water or suitable chemicals shall be applied on materials stockpiles, and other surfaces that can give rise to airborne dusts. • All earthmoving activities shall cease when sustained winds exceed 15 miles per hour. • The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours. • The operator shall keep a daily log of activities to control fugitive dust.	During construction.	City of Ukiah	City of Ukiah	
Mitigation Measure 3.2-6: Develop and Submit NOA Dust Mitigation Plan. Prior to construction of the Proposed Project (if an exemption is not granted because it is determined that NOA is not found on the project site), the City shall submit a NOA Dust Mitigation Plan to the MCAQMD and comply with NOA requirements of the MCAQMD and Title 17 California Code of Regulations §93105. Specifically, the MCAQMD requires that the following control measures are implemented at the start and maintained throughout the duration of the construction or grading activity (one acre or greater), in accordance with Title 17 California Code of Regulations §93105: • Submittal of an Asbestos Dust Mitigation Plan in accordance with Section 93105(e)(4)	During construction.	City of Ukiah	City of Ukiah	

[1] The City of Oxnard's Director of Public Works is primarily responsible for implementing the mitigation measures for the Proposed Project as described in this MMRP.

Table A
Mitigation Monitoring and Reporting Plan for the City of Ukiah's Landfill Closure Project
Final Environmental Impact Report

Mitigation Measure	Timing	Implementation[1]	Enforcement[1]	Dated Signature for Verification of Compliance
• All Asbestos Dust Mitigation Plan requirements must be implemented and maintained throughout project. • Stabilize disturbed areas after construction. • Report and record all geologic survey and sampling analysis results. • All fill removed from areas containing NOA must be disposed of in accordance with all applicable laws and regulations. • Approved dust suppressants are to be used on all unpaved surfaces annually. • Construction within ¼ mile of a school, hospital, or other sensitive receptors can occur only with a District permit. • Discovery of NOA after start of a project requires stoppage of work, notification to the District and implementation of NOA requirements for the project size prior to restarting of work. • All on-site workers must be notified of the presence or possible presence of NOA per OSHA requirements.				
3.4 BIOLOGICAL RESOURCES				
Mitigation Measure 3.3-1a: Conduct A Preconstruction Survey for Special Status Wildlife Species. A qualified biologist shall conduct a pre-construction survey for state and federal special status wildlife species no more than 10-days prior to construction. A combination of visual and trapping surveys may be performed with authorization from CDFW and/or USFWS. If a wildlife special species such as the western pond turtle, and/or the yellow-legged frog is found near any proposed construction areas, impacts on individuals and their habitat shall be avoided to the extent feasible. If occupied habitat can be avoided, an exclusion zone shall be established around the habitat and temporary suitable/authorized fencing shall be installed around the buffer area with "Sensitive Habitat Area" signs posted and clearly visible on the outside of the fence. If avoidance is not possible and the species is determined to be present in work areas, the biologist with approval and permits from CDFW may capture the wildlife special status species prior to construction activities and relocate them to nearby, suitable habitat a minimum of 300-feet from the work area. Exclusion fencing shall then be installed if feasible to prevent them from reentering the work area. For the duration of work in these areas, the biologist shall conduct regular follow-up visits during and throughout construction activities to monitor effectiveness.	Prior to and/or during construction.	City of Ukiah	City of Ukiah	

Table A
Mitigation Monitoring and Reporting Plan for the City of Ukiah's Landfill Closure Project
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Mitigation Measure	Timing	Implementation[1]	Enforcement[1]	Dated Signature for Verification of Compliance
Mitigation Measure 3.3-1b: Conduct Bird Breeding and Nesting Surveys. For construction activities that occur between February 1 and August 31, preconstruction breeding and nesting bird surveys shall be conducted by a qualified biologist prior to and within 3-days of any initial ground-disturbance activities to prevent birds from nesting between the survey and the start of construction. Typically, nesting birds can build a nest in approximately 4 days. Surveys shall be conducted within all suitable nesting habitat within 250-feet of the activity. All active, non-status passerine nests identified at that time shall be protected by a 75-100-foot radius minimum exclusion zone. Active raptor or special-status species nests shall be protected by a buffer with a minimum radius of 200-feet. CDFW and USFWS recommend that a minimum 500-foot exclusion buffer be established around active special-status species nests. The following considerations apply to this mitigation measure: • Survey results are valid for 7-days from the survey date. Should ground disturbance commence later than 7-days from the survey date, surveys should be repeated. If no breeding birds are encountered, then work may proceed as planned. • Exclusion zone sizes may vary, depending on habitat characteristics and species, and are generally larger for raptors and colonial nesting birds. Each exclusion zone would remain in place until the nest is abandoned or all young have fledged. • The non-breeding season is defined as September 1 to January 31. During this period, breeding is not occurring and surveys are not required. However, if nesting birds are encountered during work activities in the non-breeding season, disturbance activities within a minimum of 50-feet of the nest should be postponed until the nest is abandoned or young birds have fledged.	Prior to and during construction.	City of Ukiah	City of Ukiah California Department of Fish and Wildlife U.S. Fish and Wildlife	
Mitigation Measure 3.3-1c: Conduct a Bat Habitat Assessment of Trees: Removal of trees containing suitable bat roosting habitat comprised of cavities, crevices, and/or exfoliating bark, may cause direct mortality of roosting bats if removed during maternity season (April 15 to August 31) prior to self-sufficient volancy of pups, or in winter during torpor or hibernation (October 16 to February 28). Removal of larger mature trees has the potential of causing direct mortality of solitary tree-roosting species such as western red bat or hoary bat. Minimization Measures identified in Sections 1.3.7, and 1.3.8 will reduce these impacts to less than significant. However, if the construction timing is changed and construction must occur between April 15 and August 31 or October 15 and February 29, a bat habitat assessment will be conducted.	Prior to and during construction.	City of Ukiah	City of Ukiah California Department of Fish and Wildlife U.S. Fish and Wildlife	

Table A Mitigation Monitoring and Reporting Plan for the City of Ukiah's Landfill Closure Project Final Environmental Impact Report				
Mitigation Measure	Timing	Implementation[1]	Enforcement[1]	Dated Signature for Verification of Compliance
For those trees with suitable potential habitat, presume presence of roosting bats, then conduct two-step tree removal during seasonal periods of bat activity, so that bats can safely abandon the tree prior to removal. These dates are: A) between March 1 (or after evening temperatures rise above 45F and 72 hours after rains fall to less than 0.5-inches in 24 hours) and April 15 (maternity season), after which time non-volant pups are present in maternity roosts, and; B) between September 1, after young are self-sufficiently volant, and October 15 (winter hibernation), or before evening temperatures fall below 45F, and 72 hours prior to onset of rains greater than 0.5-inches in 24 hours. A qualified bat biologist experienced with two-step removal procedures is required to instruct and provide initial supervision of tree cutting crews on Day 1 so that they do not accidentally remove potential habitat features, which could result in direct mortality of bats. On Day 2, the day following trimming and removal of non-habitat roost features on habitat trees, the tree is removed. Any new tree cutting crew members added to the crew will require instruction and initial supervision by a qualified bat biologist.				
Mitigation Measure 3.3-1d: Environmental Awareness Training. All construction personnel shall be given environmental awareness training by the Proposed Project's environmental inspector or biological monitor before the start of construction. The training will familiarize all construction personnel with the federally listed species that may occur in the Action Area, their habitats, general provisions and protections afforded by the Endangered Species Act, measures to be implemented to protect these species, and the project boundaries. This training will be provided to any new worker before they are authorized to perform project work. As part of the environmental awareness training, construction personnel will be notified that no dogs or any other pets under control of construction personnel will be allowed in the Project Area, and that no firearms will be permitted in the Project Area, unless carried by authorized security personnel or law enforcement.	Prior to construction.	City of Ukiah	City of Ukiah	

Table A
Mitigation Monitoring and Reporting Plan for the City of Ukiah's Landfill Closure Project
Final Environmental Impact Report

Mitigation Measure	Timing	Implementation[1]	Enforcement[1]	Dated Signature for Verification of Compliance
Mitigation Measure 3.3-1e: Biological Monitor. A CDFW -approved Biological Monitor will be present on site for all construction activities that occur within 100-feet of suitable habitats for state and/or federally listed species that may be present during the Proposed Project. The City will submit the Biological Monitor's qualifications to the CDFW for approval 30-days prior to project construction. The Biological Monitor will ensure that all applicable avoidance and minimization measures are implemented during project construction. Specifically, the Biological Monitor will also ensure that: • All vehicles entering the site are free of debris that may harbor organisms that could be introduced to the site, such as vegetation or mud from other areas. • Turbidity, sedimentation, and the release of materials such as dust or construction runoff are controlled, and that spill control measures are enacted properly. • No state or federally listed species and/or their habitats experience unintended effects. The Biological Monitor will have the authority to stop any work activities that could result in unintended adverse effects to covered species and/or their habitats.	During construction.	City of Ukiah	City of Ukiah	
Mitigation Measure 3.3-1f: Staging Areas and Access Routes. Placement of all staging areas, access roads, and other facilities will avoid and limit disturbance-sensitive habitats (e.g., riparian habitat, suitable habitats) as much as possible. All staging and material storage areas, including the locations where equipment and vehicles are parked overnight, will be placed outside of the flood zone of a watercourse, away from riparian habitat or wetland habitat, and away from any other sensitive habitats. When possible, staging and access areas will be situated in areas that are previously disturbed, such as developed areas, paved areas, parking lots, areas with bare ground or gravel, and areas clear of vegetation.	Prior to and/or during construction.	City of Ukiah	City of Ukiah	
Mitigation Measure 3.3-3a: Protect Jurisdictional Waters and Sensitive Habitat Areas. The City shall implement the following measures to protect jurisdictional waters and sensitive habitats. • Request a verification of the pre-construction delineated boundaries from the Corps. Following verification of the delineation boundaries from the Corps, the City shall develop measures to avoid impacts to jurisdictional wetlands.	Prior to construction.	City of Ukiah	City of Ukiah California Department of Fish and Wildlife U.S. Army Corps of Engineers	

Table A
Mitigation Monitoring and Reporting Plan for the City of Ukiah's Landfill Closure Project
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Mitigation Measure	Timing	Implementation[1]	Enforcement[1]	Dated Signature for Verification of Compliance
• After final design, quantify impacts to wetlands and other waters. Submit to the Corps a permit application for discharge of fill material into waters of her United States, pursuant to Section 404 of the Clean Water Act. • Install and maintain appropriate erosion and sedimentation controls during and following construction. • Obtain a streambed alteration agreement with the California Department of Fish and Wildlife, pursuant to Section 1601 of the Fish and Game Code, before initiating construction within the 100-year floodplain of any stream crossing. • Develop and implement mitigation plans for impacts to wetlands. Replace eliminated wetlands at a 1:1 ratio so there is no net loss of wetlands. Temporarily impacted wetlands should be restored onsite. Stockpile topsoil removed from wetlands and store in upland landscape positions. Following construction disturbance, restore the land surface contours and backfill the top 6- to 12-inches with stockpiled topsoil. • Following Project completion, monitor the site to assess mitigation success. Success criteria should be clearly defined for all measures implemented to mitigate for project impacts to wetlands. Yearly reports should be submitted to the Corps until implementation has been determined to be successful.			U.S. Fish and Wildlife	
3.4 CULTURAL AND TRIBAL RESOURCES				
Mitigation Measure 3.4-2: Halt Work if Cultural Resources are Discovered. In the event that any prehistoric or historic subsurface cultural resources are discovered during ground disturbing activities, all work within 100-feet of the resources shall be halted and after notification, the City shall consult with a qualified archaeologist to assess the significance of the find. If any find is determined to be significant (CEQA Guidelines 15064.5[a][3] or as unique archaeological resources per Section 21083.2 of the California Public Resources Code), representatives of the City and a qualified archaeologist shall meet to determine the appropriate course of action. In considering any suggested mitigation proposed by the consulting archaeologist in order to mitigate impacts to historical resources or unique archaeological resources, the lead agency shall determine whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If avoidance is infeasible, other appropriate measures (e.g., data recovery) shall be instituted. Work may proceed on other parts of the project	During construction.	City of Ukiah	City of Ukiah	

Table A
Mitigation Monitoring and Reporting Plan for the City of Ukiah's Landfill Closure Project
Final Environmental Impact Report

Mitigation Measure	Timing	Implementation[1]	Enforcement[1]	Dated Signature for Verification of Compliance
site while mitigation for historical resources or unique archaeological resources is carried out.				
Mitigation Measure 3.4-3: Stop Work if Paleontological Remains are Discovered. If paleontological resources, such as fossilized bone, teeth, shell, tracks, trails, casts, molds, or impressions are discovered during ground-disturbing activities, work will stop in that area and within 100-feet of the find until a qualified paleontologist can assess the significance of the find and, if necessary, develop appropriate treatment measures in consultation with the City.	During construction.	City of Ukiah	City of Ukiah	
Mitigation Measure 3.4-4: Halt Work if Human Remains are Found. If human remains are encountered during excavation activities conducted for the Proposed Project, all work in the adjacent area shall stop immediately and the Mendocino County Coroner's office shall be notified. If the Coroner determines that the remains are Native American in origin, the Native American Heritage Commission shall be notified and will identify the Most Likely Descendent, who will be consulted for recommendations for treatment of the discovered human remains and any associated burial goods.	During construction.	City of Ukiah	City of Ukiah Mendocino County Coroner's Office Native American Heritage Commission Most Likely Descendent	
Mitigation Measure 3.4-5: Halt Work if Tribal Cultural Resources are Discovered. In the event that any tribal cultural resources are discovered during ground disturbing activities, all work within 100-feet of the resources shall be halted and after notification, the City shall consult with a qualified archaeologist and local tribes to assess the significance of the find. If any find is determined to be significant as a unique tribal cultural resource, the City shall treat the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including to, but not limited to, the following: • Protecting the cultural character and integrity of the resource; • Protecting the traditional use of the resource; and • Protecting the confidentiality of the resource. In considering any suggested mitigation proposed by the consulting archaeologist and/or the appropriate tribe in order to mitigate impacts to any tribal cultural resources find, the City shall determine whether avoidance is feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If avoidance is infeasible, other appropriate measures (e.g., data recovery) shall be instituted and coordinated with the appropriate tribe(s). Work may proceed on other parts of the project site while mitigation	During construction.	City of Ukiah	City of Ukiah Mendocino County Coroner's Office Native American Heritage Commission Most Likely Descendent	

Table A Mitigation Monitoring and Reporting Plan for the City of Ukiah's Landfill Closure Project Final Environmental Impact Report				
Mitigation Measure	Timing	Implementation[1]	Enforcement[1]	Dated Signature for Verification of Compliance
measures for tribal cultural resources or other unique archaeological resources are carried out.				

Appendix B

Engineered Alternative Analysis

EBA ENGINEERING
CIVIL & ENVIRONMENTAL ENGINEERS

March 11, 2003

Ms. Terri Kinney
California Regional Water Quality Control Board
North Coast Region (RWQCB)
5550 Skylane Blvd., Ste. A
Santa Rosa, CA 95403

RE: ENGINEERED ALTERNATIVE ANALYSIS
CITY OF UKIAH LANDFILL, MENDOCINO COUNTY, CALIFORNIA
EBA Project No. 02-907 (Task 5)

Dear Ms. Kinney:

This letter is being submitted by EBA Engineering (EBA) on behalf of the City of Ukiah, Department of Public Works (City) for purposes of presenting an engineered alternative cover for final closure of the City of Ukiah Landfill (Landfill). The proposed engineered alternative presented herein substitutes a geosynthetic clay liner (GCL) in lieu of the prescriptive standard (i.e., compacted clay liner [CCL]) required under Title 27 of the California Code of Regulations (27 CCR). Regulatory consideration of an engineered alternative is allowed under 27 CCR, §20080(b), which stipulates that that an engineered alternative may be considered if construction of the prescriptive standard is unreasonably and unnecessarily burdensome and will cost substantially more than the proposed alternative. Furthermore, the engineered alternative must be consistent with the performance goal addressed by the prescriptive standard and afford equivalent protection against water quality impairment. The following information has been compiled to demonstrate compliance with these criteria and includes data regarding the properties of GCLs, as well as comparisons of performance and site-specific construction costs of the proposed GCL engineered alternative to that of the prescriptive standard.

DESCRIPTION OF PROPOSED ENGINEERED ALTERNATIVE

As outlined above, the engineered alternative cover proposed for the Landfill incorporates a GCL in lieu of the CCL prescriptive standard. The design characteristics of the proposed alternative cover includes the following final cover system components (in ascending order):

- A 24-inch-thick vegetative layer, track-walked to achieve a firm consistency;

825 Sonoma Avenue, Suite C Santa Rosa, California 95404 (707) 544-0784 FAX (707) 544-0866
Also in Southern California

- A geonet composite drainage layer consisting of a high-density polyethylene (HDPE), high capacity drainage net (geonet) heat bonded with a non-woven, needle-punched polyester geotextile filter fabric;

- A reinforced, double non-woven, needle-punched GCL; and

- A 12-inch-thick (minimum) foundation layer moisture conditioned and compacted to 90 percent relative compaction.

The GCL represents the primary component of the alternative cover design that will dictate compliance equivalency with respect to the prescriptive standard. A detailed discussion of the GCL performance characteristics as compared to the CCL prescriptive standard is presented in the following subsection. However, it should be noted that the alternative cover design also incorporates several other characteristics that deviate from the prescriptive standard. These design components and the corresponding rationales are as follows:

- The proposed foundation layer thickness of 12 inches is half of the prescriptive standard thickness of 24 inches. The primary purpose of the foundation layer for the prescriptive standard scenario is to provide a firm surface for compaction of a CCL. However, based on the physical characteristics and installation procedures associated with a GCL, the construction of a 24-inch-thick foundation layer is not necessary or critical in the overall performance of the GCL. Thus, a minimum12-inch-thick foundation layer is considered sufficient to provide protection from differential settlement, given the proposed postclosure land use, and to provide a firm and smooth surface upon which to place the GCL.

- The geonet composite drainage layer is proposed as a mitigation measure against the potential development of excessive pore pressures in the overlying vegetative layer material. This design feature is considered critical due to the steep nature of the final cover slopes (2 horizontal to 1 vertical [2H:1V]). Since the potential development of excessive pore pressures would also apply to a prescriptive standard final cover system, a geonet composite drainage layer would also be required under the CCL scenario. In addition, the presence a geonet composite provides additional protection to the GCL from potential rodent damage and, combined with the selection of shallow rooted plant species for reseeding, protects against tap root damage from deeper rooted plants.

- The proposed vegetative cover thickness of 24 inches is double the prescriptive standard thickness of 12 inches. The bottom 12 inches will serve to provide confining overburden pressure for the GCL material, whereas the upper 12 inches will serve to harbor vegetative growth. In addition, the increase in vegetative cover thickness is intended to further reduce the potential for damage to the GCL by rodents and/or deeper rooted plants. Furthermore, the overburden pressure induced by the 24 inches of vegetative cover material will serve to counteract any landfill gas (LFG) pressures that may develop below the GCL and aid in maintaining the integrity of GCL seam areas.

It should be noted that in the Fall of 2001, Rau and Associates, Inc. (RAI) of Ukiah, California conducted a comprehensive survey of the landfill surface to evaluate the thickness of existing

interim soil cover (RAI, 2001). The survey consisted of a series of shallow borings drilled at a spacing of approximately 50 feet apart on the roads and benches and approximately 100-foot spacing on the slopes. A total of 433 borings were drilled using a hydraulic drill motor (mounted on a backhoe boom) equipped with 4-inch diameter solid-stem augers. A hand-operated post-hole digger was used in areas not accessible by the backhoe-mounted drill. Findings from the survey revealed that the existing interim soil cover thickness is equal to or greater than 12 inches for over 90 percent of the landfill surface. Based on these conditions, the existing interim soil cover will be scarified, moisture conditioned within 3 percent of optimum moisture content and recompacted to 90 percent relative compaction to meet the minimum 12-inch-thick foundation layer requirement. Those areas determined by RAI's survey to have an existing interim cover thickness of less than 12 inches, additional foundation layer material will be placed and subsequently prepared and compacted according to the same specifications described above.

REGULATORY HISTORY

Since 1995, more than 31 GCL landfill final cover closures have been approved by various RWQCBs and constructed in California. Additional GCL caps have been approved by the Department of Toxic Substances Control (DTSC), and the U.S. Environmental Protection Agency (USEPA) for landfills, hazardous waste sites, and remediation sites in California. Overall, GCLs have been used in landfill applications since 1986 (Koerner, 1996).

COMPARISON OF GCL AND CCL PROPERTIES

The following subsections provide a comparison of pertinent properties of the GCL and CCL prescriptive standard as a mechanism to demonstrate equivalency. The various properties compared include physical and mechanical, hydraulic, stability, installation and repair. Also addressed are some miscellaneous issues that have been raised by the RWQCB during previous correspondence regarding the potential application of GCL at the site.

Physical and Mechanical Properties

- GCLs are generally considered superior to CCLs in terms of their ability to resist damage from differential settlement. Laboratory testing of GCLs has demonstrated its ability to withstand relatively high levels of tensile strain (at least 5 percent) without undergoing significant increases in permeability (Koerner and Daniel, 1993). Standard CCLs, in turn, generally cannot tolerate strains approaching 1 percent without cracking (LaGatta et al., 1997).

- GCLs outperform CCLs with respect to desiccation caused by repeated wetting and drying cycles. CCLs are subject to desiccation from above and/or below and crack unless adequately protected from changes in moisture content following construction or as caused by climate changes (Koerner and Daniel, 1992). The GCL's ability to expand upon hydration and "self-heal" reduces detrimental effects to the GCL that may occur during and after installation.

- As a result of the "self-healing" characteristics described above upon rewetting, GCLs also outperform CCLs with respect to freeze-thaw conditions (Koerner and Daniel, 1993; and Daniel, 1996).

- The bearing capacity of GCLs under hydrated conditions is less than that of CCLs, thereby making the GCL more susceptible to physical damage due to heavy loads. However, laboratory testing (Narejo et al., 1996) and field observations (Brown et al., 2001) has demonstrated that such concerns are negated provided that the cover soil thickness is greater than the footprint of any concentrated bearing load on the GCL (i.e., vehicle tires). The 24-inch-thick vegetative layer proposed as part of the final cover design satisfies the concentrated bearing load criteria stated above and should be more than sufficient to provide adequate protection.

  Please note that the construction specifications for the GCL will include protocols designed to protect the GCL from excessive load damage during installation. These protocols will include: 1) deployment of the GCL under unhydrated conditions; 2) placement of vegetative layer material onto the GCL by spreading each full lift thickness in advance of a low ground pressure, wide-tracked bulldozer (Maximum Size: Caterpillar D6 or equivalent); 3) covering of all GCL installed during any given working day with vegetative layer material to protect against overnight hydration due to precipitation, condensation, or other causes; and 4) prohibiting vehicle access onto the GCL until the placement of vegetative layer material is complete. Furthermore, upon completion of the final cover system installation, future vehicle access within the limits of the GCL footprint will be limited to designated access roadways constructed as part of the final closure activities.

- GCLs are more vulnerable to puncturing than CCLs. The primary potential sources of puncturing include manufacturing defects, subgrade protrusions, and penetration by sharp objects through the foundation and/or vegetative layers. However, protection against these sources can be provided through the employment of quality assurance procedures and design controls. As a mechanism to protect against manufacturing defects, a comprehensive manufacturer's quality control (MQC) program will be implemented to monitor the quality and integrity of the GCL material delivered to the site. Prior to installation, the completed foundation layer surface (i.e., GCL subgrade) will be inspected for the identification and subsequent removal of any sharp objects that could puncture the GCL. Finally, in regards to penetration of sharp objects through the foundation and/or vegetative layers, such an incident is considered unlikely following installation based on the thickness of the respective layers.

Hydraulic Properties

- For equivalence to a 12-inch CCL with a hydraulic conductivity of 1×10^{-6} centimeters per second (cm/sec), the required hydraulic conductivity of a GCL is 3.9×10^{-8} cm/sec. Typical hydraulic conductivities for CGLs range from 1 to 5×10^{-9} cm/sec under low compressive stresses with a conservatively high 12-inch hydraulic head of water (Koerner and Daniel, 1993). More recent testing of various GCLs found that hydraulic conductivities range from 2×10^{-10} to 1×10^{-9} cm/sec under a compressive stress of 150 pounds per square foot (psf)

(Daniel, 1996), conservatively less than the anticipated normal load for the proposed engineered alternative for the Ukiah landfill.

- It has been documented that certain chemical interactions between the GCL and the permeating liquid can adversely affect the hydraulic conductivity performance of the GCL (GSE Lining Technology, 2001). Parameters of concern with respect to the permeating liquid include its dielectric constant, salt concentration, pH, and cation exchange capacity. However, these chemical interactions only come into play with highly concentrated liquids such as leachates or brines. Since the permeating liquid for the final cover system corresponds to percolating rainwater, the potential for adverse chemical interactions with the final cover system's GCL component is negligible.

Stability Properties

Interface direct shear tests were conducted to evaluate the interface shear strength between the GCL and underlying site soil subgrade. Sample preparation and testing conditions were selected to simulate field conditions. Interface direct shear tests (ASTM D5321) were conducted at normal compressive stresses of 100 psf, 400 psf, and 800 psf. The GCL samples were tested under conservatively hydrated conditions by allowing the GCL sample to hydrate for 24 hours under no confining load prior to shear testing. A bulk sample of representative site subgrade soil was remolded to 90 percent R.C. at just below optimum moisture content to simulate in-place prepared subgrade. Results of the interface shear testing indicate a peak friction angle of 30.3° and a residual friction angle of 28.8°. Peak and post-peak adhesion was measured at 114.1 psf and 107.5 psf, respectively. A summary of laboratory test results is presented in Appendix A. The following values were used in performing the stability analyses, as described below:

Unit Weight of Soil	110.0 pcf
Cohesion	107 psf
Friction Angle	28.0 degrees

Final cover requirements stipulated in 27 CCR, §21090(a) require that a slope stability analysis be performed for final cover systems equipped with a geosynthetic component. Based on this requirement, the stability of the proposed GCL final cover system was evaluated using an infinite slope stability analysis. This method assumes failure of an infinitely long block and neglects resisting forces at the toe and along the sides of the failure. Hence, this analysis provides a conservative stability evaluation for shallow failures of constant thickness and slope. Analyses were performed for the proposed GCL final cover system using a soil thickness of 2 feet and a maximum slope 26.5 degrees (2H:1V). Findings from the analysis revealed that the lowest factor of safety during trial runs occurred for failures passing through the soil/GCL interface. The corresponding minimum factor of safety for this scenario is 2.28 under unsaturated conditions.

Determination of the yield acceleration for the GCL final cover system was accomplished through performance of a psuedo-static, infinite slope stability analysis. The yield acceleration was determined by iteratively choosing a horizontal acceleration that reduced the factor of safety to unity. The resulting yield acceleration for the proposed GCL final cover system for unsaturated conditions was 0.51 g. Using this value and time histories of horizontal acceleration

at the top of the refuse mass as determined from previous seismic analyses (EBA, 2000b), a deformation analysis was performed to evaluate permanent seismic displacements at the soil/GCL interface during dynamic loading. The analysis was performed using the computer model YSLIP_PM (Matasovic, 1997). Findings from this analysis indicate that permanent seismic displacements at the soil/GCL interface for the proposed GCL final cover system will be less than 2 inches.

In summary, findings from the stability analyses reveal that the proposed GCL final cover system is statically stable and will yield less than 2 inches of permanent displacement under seismic loading conditions. Based on these characteristics, the proposed GCL final cover system is considered feasible from a technical standpoint. Please refer to Appendix A of this report for supporting documentation and data used in the respective analyses.

Installation/Repair Properties

- The installation of a GCL is significantly easier than a CCL. Particularly on steeper slopes such as those at the Ukiah landfill. In general, GCL deployment is very straightforward, both from a placement and seaming standpoint. Furthermore, heavy equipment requirements for GCL deployment are limited primarily to a rubber-tire forklift or equivalent. Conversely, CCL construction is very labor intensive with substantial reliance on heavy equipment (i.e., scrapers, dozers, compactors, etc.).

- Less construction quality assurance (CQA) is required for GCLs due to the consistency of the materials and manufacturing process. CQA testing for a CCL, in turn, is more extensive and occurs at a higher frequency to verify the consistency of borrow source materials and the contractor's ability to achieve moisture content, compaction, and hydraulic conductivity during construction.

- Installation of a sealed, double-ring infiltrometer (SDRI) is required to test the field permeability of CCLs, which is costly and time consuming. Such a provision is not required for a GCL.

- Postclosure repair of a GCL final cover is less involved than the repair of a CCL final cover system. Repair of a GCL is performed by exposing the damaged liner, rolling out new GCL material, and covering the damaged portion of the liner with a GCL patch. Repair of a CCL, in turn, requires the procurement of low-hydraulic conductivity material, mobilization of heavy equipment, moisture conditioning, compaction, and CQA testing to verify placement in accordance with the original specifications.

Miscellaneous Issues

A number of site-specific issues with regards to the potential application of GCL at the site have been previously raised by the RWQCB. These issues include the potential for damage to the GCL by rodent activity and deep penetrating roots, as well as the ability to retrofit the landfill in the future with a LFG collection system if deemed necessary. Evaluations regarding each of these issues are provided below.

- *Rodent Damage:* Based on the thickness of the vegetative cover (24 inches) for the proposed GCL final cover system, the GCL is no more susceptible to burrowing rodent damage than the CCL prescriptive standard. In fact, the GCL final cover system is probably less susceptible since rodents would have to penetrate a full 24 inches of vegetative cover material and the geonet composite drainage layer before reaching the GCL. In the case of the CCL prescriptive standard, a similar burrowing depth would result in complete penetration of the CCL.

  One other aspect that should be noted is that the GCL does not contain any plasticizers. The breakdown of plasticizer products has been documented to serve as a potential food source to rodents in some cases. As a result of its absence in the GCL materials, there is no physical aspect of the GCL component that would attract or promote rodent activity.

- *Root Damage:* The GCL's potential vulnerability to root damage should be effectively negated by the final cover revegetation provisions. As outlined in the Final Closure and Postclosure Maintenance Plan (FCPMP) (EBA, 1999), the vegetative layer will be reseeded with plant species having shallow root systems. Furthermore, the geonet composite drainage layer will also inhibit penetration of the GCL by root systems. Whereas the potential exists for the introduction of different plant species with deeper root systems via wind-blown seed deposition, such conditions have not been observed to date in the soil borrow areas that have undergone comparable reseeding processes. Thus, there is no current evidence to suggest that the site will be susceptible to this concern.

- *Retrofitting of LFG Collection System:* As discussed in the previous subsection, repairs to the GCL final cover system are relatively simple to implement based on the nature of the installation process. As a result, the same conditions apply to penetrating and resealing the GCL for the purpose of installing LFG extraction wells if such provisions are necessary in the future. Installation of an extraction well would require exposing a small portion of the GCL and cutting a hole slightly larger than the diameter of the drill auger or bucket. Following drilling and installation, a polyvinyl chloride (PVC) well bore seal would be placed around the casing and secured, followed by placement of a GCL patch over the PVC well bore seal. Finally, the seams along the edges of the GCL patch would be augmented with powdered bentonite and the area backfilled with vegetative layer material. Appropriate precautions would be implemented to ensure that mobilization of the drill rig to the respective drill sites does not damage the underlying GCL.

ECONOMIC ANALYSIS

As noted at the outset of this report, one of the criteria for an engineered alternative approval corresponds to cost and demonstration that the proposed alternative offers a significant cost savings as compared to the prescriptive standard. Based on this criterion, an economic analysis was performed to compare overall closure costs for the CCL prescriptive standard and the proposed GCL final cover system alternative. The results of the economic analysis are presented below in Table 1. Please refer to Appendix B for a more detailed breakdown and supporting data for the costs presented in Table 1.

TABLE 1
ECONOMIC ANALYSIS OF FINAL CLOSURE COSTS
PRESCRIPTIVE STANDARD vs. ENGINEERED ALTERNATIVE

Item	Prescriptive Standard[1]	Engineered Alternative[2]
Construction Facilities and Controls	$ 45,000	$ 45,000
General Earthwork and Test Pad[3]	$ 60,300	$ 45,300
Foundation Layer	$ 764,731	$ 192,971
Low Hydraulic Conductivity Layer	$ 2,036,904	$ 1,917,623
Vegetative Layer	$ 428,820	$ 857,640
Drainage System	$ 336,070	$ 336,070
Site Security	$ 2,000	$ 2,000
Revegetation	$ 428,020	$ 428,020
Access Roads	$ 16,500	$ 16,500
Sedimentation Basins	$ 36,500	$ 36,500
Borrow Area Reclamation	$ 229,700	$ 205,700
Final Design and Construction Quality Assurance	$ 316,321	$ 233,007
Subtotal	$ 4,700,866	$ 4,316,331
20 Percent Contingency	$ 940,173	$ 863,266
TOTAL	**$ 5,641,039**	**$ 5,179,597**

[1]Design includes the following construction (in ascending order): 24" foundation layer; 12" compacted clay liner; geonet composite drainage layer; and 12" vegetative layer.

[2]Design includes the following construction (in ascending order): 12" foundation layer; geosynthetic clay liner; geonet composite drainage layer; and 24" vegetative layer.

[3]Test pad only pertains to the prescriptive standard scenario.

As presented in Table 1, the proposed engineered alternative offers a significant cost savings as compared to the prescriptive standard. The cost differential between the two final cover systems is approximately $461,000. The items primarily responsible for the difference in cost include: reduction in foundation layer thickness for the GCL scenario ($571,800 cost savings); lower installation costs for the low hydraulic conductivity layer component ($119,300 cost savings); and lower design/CQA costs ($83,300 cost savings). The one cost item for the engineered alternative that exceeds the prescriptive standard by approximately $428,800 is the vegetative layer component due to the need for 24 inches of vegetative layer material as opposed to 12 inches for the prescriptive standard. However, based on the overall reduction in cost of almost 10 percent, the proposed engineered alternative meets the cost savings criteria specified in 27 CCR, §20080(b).

It should be noted that the cost differential calculated in the economic analysis is considered to represent a conservatively low difference because the bid cost of installing a CCL can vary widely. Estimates of the cost to excavate and place a 12-inch thick CCL at the Ukiah landfill were provided by five different earthwork contractors surveyed for this project. Cost estimates ranged from $6 per cubic yard (cy) to $25/cy. The variation in costs illustrates the uncertainty inherent in estimating earthwork on steep slopes. For this analysis, EBA used an median cost of $15/cy. It is probable that the cost for placement of CCL will be significantly higher at the time of construction bidding. In contrast, the variance in cost of GCL procurement and placement has historically been relatively low and stable.

In addition, the potential exists for higher CCL costs due to variability of the clay borrow source. As referenced in the borrow source investigation conducted by EBA in 1999 (EBA, 1999 and EBA, 2000a), the excavation of low hydraulic conductivity materials may be hindered by conglomerate beds occurring at various depths in the borrow source area. Such conditions, if encountered, would result in higher material handling costs, as well as higher CQA inspection and testing costs. Since GCL is a manufactured product, such concerns are not an issue. As a result, actual GCL costs are more predictable and not subject to significant change due to conditions encountered in the field.

REVISIONS TO FINAL CLOSURE AND POSTCLOSURE MAINTENANCE PLAN

Since the proposed engineered alternative represents a significant design change to the current final cover system design presented in the FCPMP, a Revised FCPMP would have to be prepared and submitted for regulatory approval to meet the requirements set forth in 27 CCR, §21890. Preparation of such a document would be contingent upon approval of the engineered alternative by the RWQCB. Specific sections and appendices of the FCPMP requiring revisions would include the following:

- Proposed Final Cover Design and Construction *(Section 2.9.2)*
- Proposed Final Cover Material Specifications *(Section 2.9.3)*
- Slope Stability *(Section 2.10.4 and Appendix C)*
- Construction Quality Assurance (CQA) Plan *(Section 2.16.1 and Appendix F)*
- Closure Construction Schedule *(Section 2.17)*
- Final Cover Inspection and Maintenance Program *(Section 3.9)*
- Closure and Postclosure Maintenance Cost Estimates *(Section 4 and Appendix G)*
- Fund Disbursement Schedule for Closure *(Section 5)*
- Final Closure Plan Drawings *(Section 8 and Sheets 1 through 5)*

As stipulated in 27 CCR, §21890(a), the Revised FCPMP would be submitted to the RWQCB, California Integrated Waste Management Board, and the Mendocino County Environmental Health Department (i.e., Local Enforcement Agency [LEA]) for final approval.

CONCLUSIONS

As demonstrated by the comparative information presented herein, the proposed GCL engineered alternative meets or exceeds the performance criteria addressed by the prescriptive standard. Furthermore, the economic analysis comparing construction costs for the two scenarios clearly shows that the CCL prescriptive standard is unreasonably and unnecessarily burdensome and will exceed the GCL engineered alternative construction cost by a conservative estimate of approximately $461,000. Based on these circumstances, it is EBA's conclusion that the GCL engineered alternative meets the qualifying criteria specified in 27 CCR, §20080(b).

CLOSING

We trust that this submittal includes all the necessary information and data needed for the RWQCB to approve the engineered alternative proposal. If you should have any questions regarding the information contained herein or need additional information, please do not hesitate to contact us.

Sincerely,
EBA ENGINEERING

Mike Delmanowski, C.E.G., C.Hg.
Senior Hydrogeologist

Damon Brown, C.E.G., C.Hg.
President

MD/DB/mc

cc: Ms. Diana Steele, City of Ukiah, Department of Public Works
Mr. Scott Humpert, California Integrated Waste Management Board
Mr. John Morley, Mendocino County Environmental Health Department

REFERENCES

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APPENDIX A

STABILITY ANALYSIS

Consulting Engineers

Laboratory Services Group 750 Corporate Woods Pkwy Vernon Hills, Illinois 60061 Phone: (847) 279-2500 Fax: (847) 279-2510

Determining the Interface Friction of Geosynthetics
By the Direct Shear Method
ASTM D 5321

Determining the Coefficient of Friction of Geosynthetics By the Direct Shear Method ASTM D 5321

Project Name: CETCO, City of Ukiah Landfill
Date Tested: 10/25/2001

STS Project # 29139-B

Test Parameters

Interface Tested:
Top Layer: Silty Clay, little sand, gravel -- brown (CL) Remolded to 109.8 pcf @11.0 %
Bot. Layer: GCL - Bentomat DN, Hydrated for 24 hours under no confining load

Shear Rate: 0.04 in/min

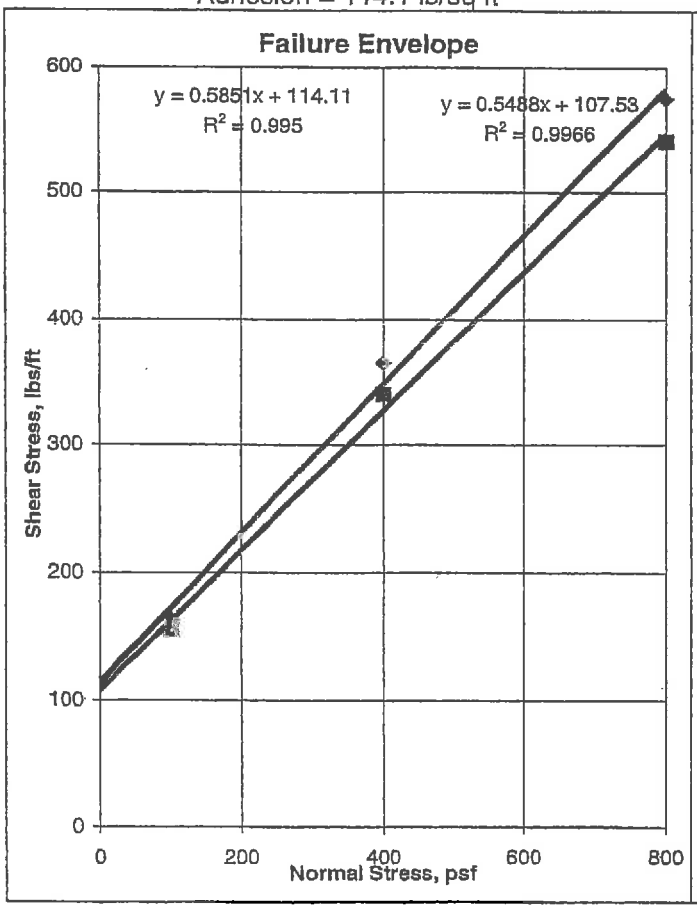
Test Results

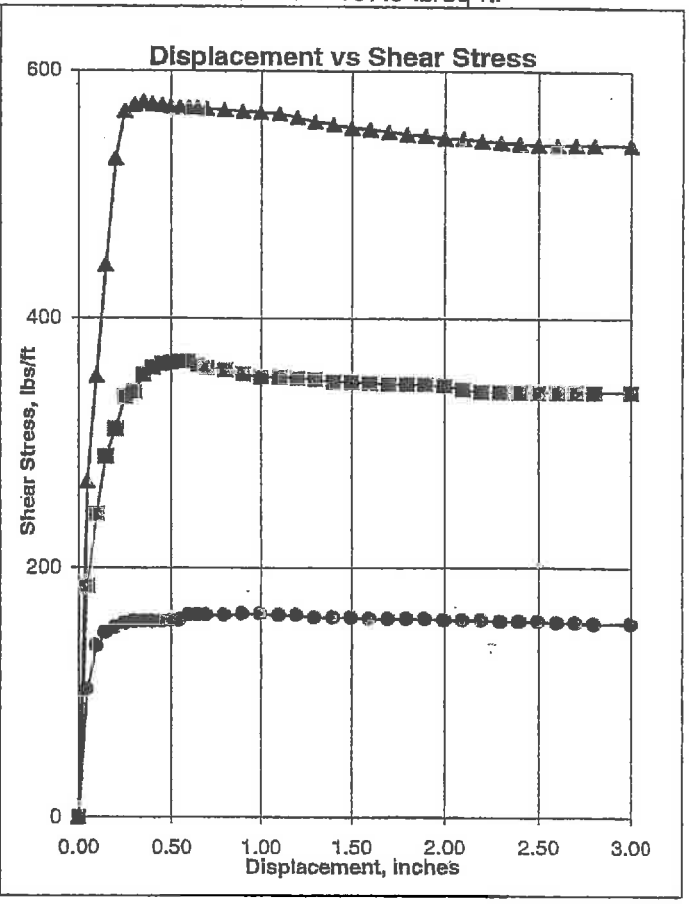
Normal Stress psf	Shear Stress psf	Residual Stress psf
100	163	155
400	365	340
800	575	541

Summary of Results

Peak Friction Angle = 30.3 Degrees
Adhesion = 114.1 lb/sq ft

Residual Friction Angle = 28.8 Degrees
Adhesion = 107.5 lb/sq ft.

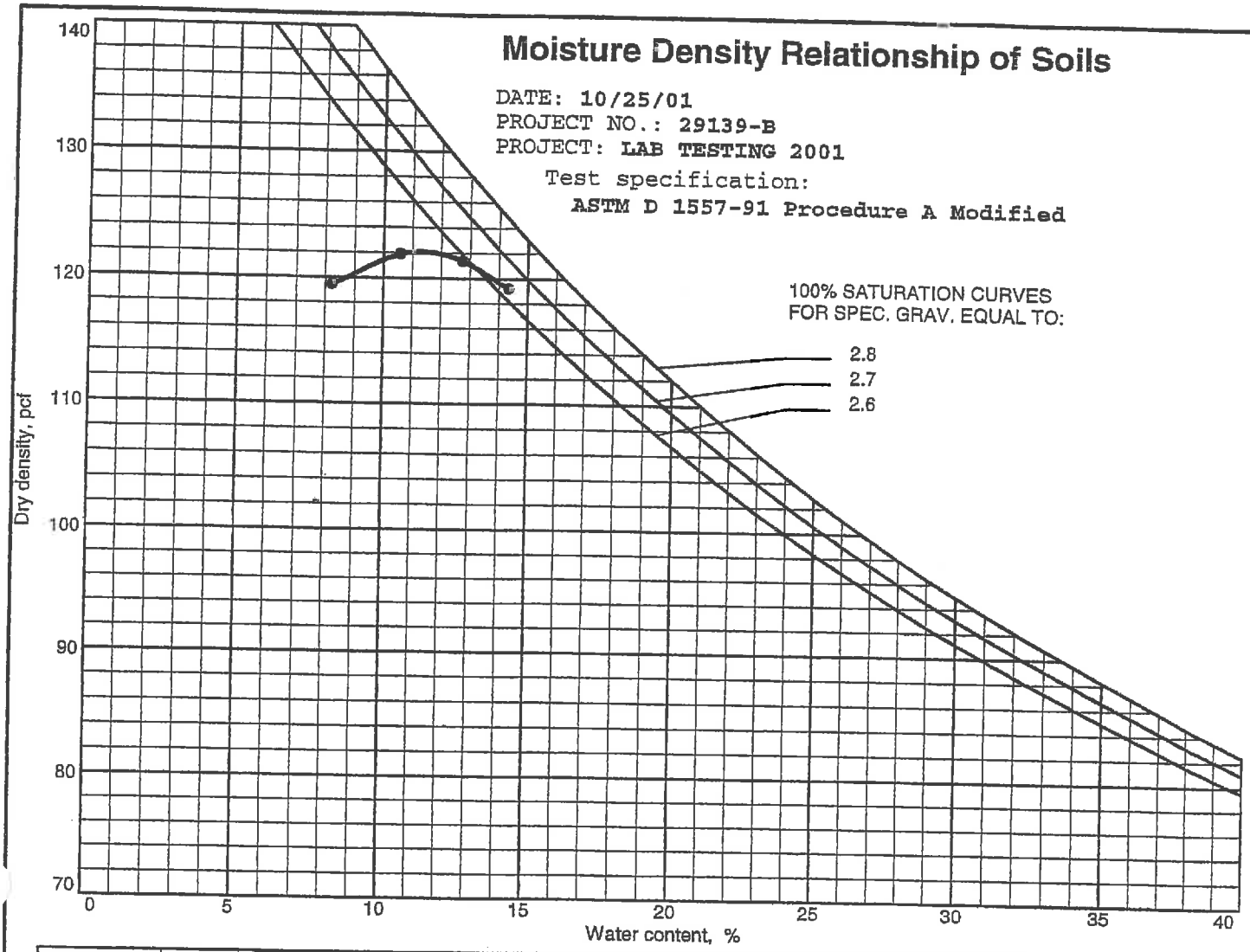




UKIAH.xls

Moisture Density Relationship of Soils

DATE: 10/25/01
PROJECT NO.: 29139-B
PROJECT: LAB TESTING 2001
Test specification:
ASTM D 1557-91 Procedure A Modified



	Sample No.	Elev. or Depth	Material Description	SPECIFIC GRAVITY	LL	PL	% > No.4	% < #200
●	S-3		SILTY CLAY LITTLE F-C SAND LITTLE F GRAVEL - BROWN					

Sample No.	S-3			
Natural water content, percent	3.0			
Optimum water content, percent	11.5			
Max dry density, pcf	122			

Remarks	Project LAB TESTING 2001	Project No. 29139-B
	Location	
	Source	
Plate	STS Consultants Ltd. 750 Corporate Woods Parkway Vernon Hills, IL 60061	

Infinite-Slope Stability Analysis with Parallel Seepage

Ukiah Municipal Solid Waste Disposal Site
GCL cap (revised 2002)

soil depth	z =	2.0	ft		
fraction sat.	m =	0.00		cos ß =	**0.8949**
slope angle	ß =	26.5	°	sin ß =	**0.4462**
				tan ß =	**0.4986**
soil unit. wt.	γ =	110.0	PCF		
cohesion	c' =	107	PSF		
friction angle	ø' =	28.0	°	tan ø =	**0.5317**
seismic coeff.	K_h =				
driving stress	τ =	**87.8**	PSF		
normal stress	σ =	**176.2**	PSF		
pore pressure	u =	**0.0**	PSF		
resisting stress	S =	**200.7**	PSF		

Factor of Safety **FS =** 2.28

Infinite-Slope Stability Analysis with Parallel Seepage

Ukiah Municipal Solid Waste Disposal Site
GCL cap (revised 2002)

soil depth	z =	2.0	ft		
fraction sat.	m =	0.00		cos ß =	**0.8949**
slope angle	ß =	26.5	°	sin ß =	**0.4462**
				tan ß =	**0.4986**
soil unit. wt.	γ =	110.0	PCF		
cohesion	c' =	107	PSF		
friction angle	ø' =	28.0	°	tan ø =	**0.5317**
seismic coeff.	K_h =	0.51			
driving stress	τ =	**177.7**	PSF		
normal stress	σ =	**131.4**	PSF		
pore pressure	u =	**0.0**	PSF		
resisting stress	S =	**176.9**	PSF		

Factor of Safety **FS =** 1.00

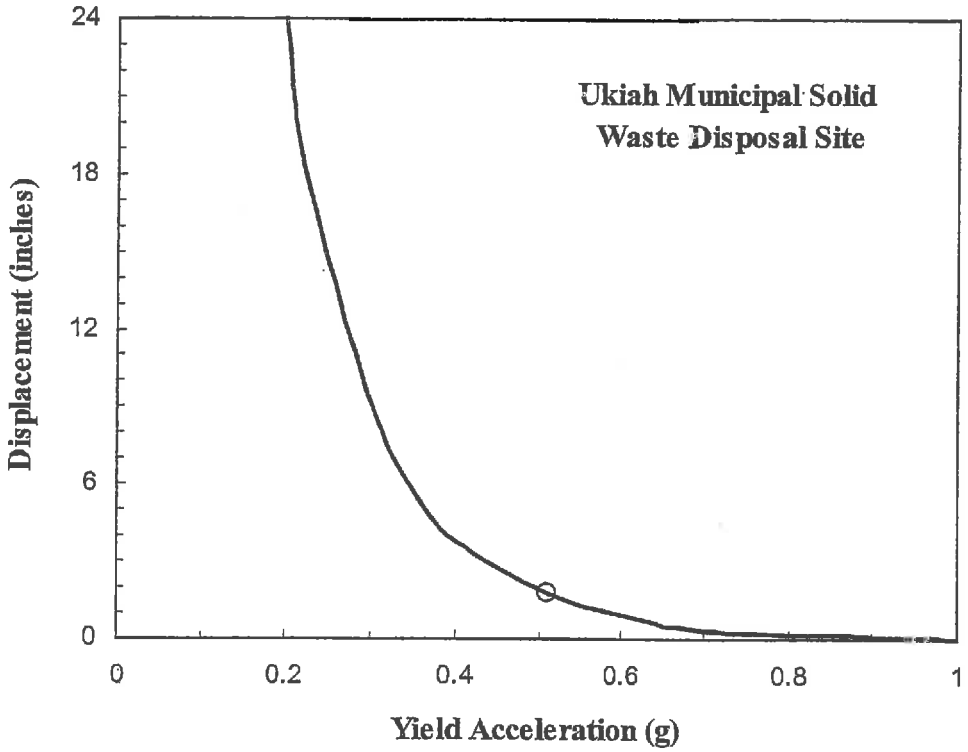


Figure 1. Plot of yield acceleration versus permanent seismic displacement for cover failure (filename COR50C62) and 50-foot waste profile. Open circle represents the yield acceleration calculated from the infinite slope stability analysis and the maximum displacement predicted by YSLIP_PM.

```
          ***********************************************
          **                                           **
          **                YSLIP_PM                   **
          **        (VERSION 2.2, JANUARY 1996)        **
          **                                           **
          **   A COMPUTER PROGRAM FOR SIMULATION OF    **
          **   DYNAMIC BEHAVIOR OF A RIGID BLOCK ON    **
          **   AN INCLINED PLANE AND CALCULATION OF    **
          **   PERMANENT DISPLACEMENTS OF THE BLOCK    **
          **                                           **
          **                   BY                      **
          **                                           **
          **              Liping Yan                   **
          **           Neven Matasovic                 **
          **         Edward Kavazanjian, Jr.           **
          **                                           **
          ***********************************************

          **************REPRINT INPUT DATA**************

CARD  1: FILE CORGCL62.YSL
         UKIAH MUNICIPAL SOLID WASTE DISPOSAL SITE, REVISED 2002
CARD  2: SUBTITLE
         MCE CORRALITOS-LOMA PRIETA Kh=0.62g
CARD  3: KPAR  N     KACC  KCOM   g(ft/s/s)  KOUT   KSLIP  KDIR
         0     1     1     1      32.2       0      0      0
CARD  4: Ky(1), ..., Ky(N)
         0.51
CARD  5: YIELD ACCELERATION DEGRADATION DATA
         Ky is constant.
CARD  6: FILE NAME FOR HORIZONTAL ACC.
         cor50c62.hea
CARD  7: NIDH  KREAD     NP         NLINE      DT       APH
         4     1         1500       1500       0.02     0.0
CARD  8: FILE NAME FOR VERTICAL ACC.
         NO Av
CARD  9: NIDV  KREAD     NP         NLINE      DT       APV       TSHIFT
         NO INPUT
CARD 10: FILE NAME FOR OUTPUT OF SLIDING MOTION
         NO FILE
CARD 11: FILE NAME FOR OUTPUT OF ABSOLUTE MOTION
         NO FILE

MAX. VALUE OF INPUT HORI. ACC. = 1.207951
INPUT HORI. ACC. TIMES A FACTOR = 1.000000 TO GET APH = 1.207951


          ****************RESULTS****************

  RESULTS FOR DOWNSLOPE YIELD ACCELERATION (g) =   .510000

*** RUN 1: THE DIRECTION OF Ah IS AS INPUT ***
                MAX. SLIDING VELOCITY =   .8677 ft/sec
        PERMANENT SLIDING DISPLACEMENT =   .1505 ft

*** RUN 2: THE DIRECTION OF Ah IS REVERSED ***
                MAX. SLIDING VELOCITY =   .2870 ft/sec
        PERMANENT SLIDING DISPLACEMENT =   .0305 ft
```

```
*********************************************
**                                         **
**                YSLIP_PM                 **
**        (VERSION 2.2, JANUARY 1996)      **
**                                         **
**   A COMPUTER PROGRAM FOR SIMULATION OF  **
**   DYNAMIC BEHAVIOR OF A RIGID BLOCK ON  **
**   AN INCLINED PLANE AND CALCULATION OF  **
**   PERMANENT DISPLACEMENTS OF THE BLOCK  **
**                                         **
**                   BY                    **
**                                         **
**               Liping Yan                **
**            Neven Matasovic              **
**         Edward Kavazanjian, Jr.         **
**                                         **
*********************************************

**************REPRINT INPUT DATA**************

CARD  1: FILE PACGCL68.YSL
         UKIAH MUNICIPAL SOLID WASTE DISPOSAL SITE, REVISED 2002
CARD  2: SUBTITLE
         MCE PACOIMA-NORTHRIDGE Kh=0.68g
CARD  3: KPAR  N     KACC  KCOM   g(ft/s/s)  KOUT   KSLIP  KDIR
         0     1     1     1      32.2       0      0      0
CARD  4: Ky(1), ..., Ky(N)
         0.51
CARD  5: YIELD ACCELERATION DEGRADATION DATA
         Ky is constant.
CARD  6: FILE NAME FOR HORIZONTAL ACC.
         pac50c68.hea
CARD  7: NIDH  KREAD     NP         NLINE      DT       APH
         4     1         1500       1500       0.02     0.0
CARD  8: FILE NAME FOR VERTICAL ACC.
         NO Av
CARD  9: NIDV  KREAD     NP         NLINE      DT       APV       TSHIFT
         NO INPUT
CARD 10: FILE NAME FOR OUTPUT OF SLIDING MOTION
         NO FILE
CARD 11: FILE NAME FOR OUTPUT OF ABSOLUTE MOTION
         NO FILE

MAX. VALUE OF INPUT HORI. ACC. = 1.051902
INPUT HORI. ACC. TIMES A FACTOR = 1.000000 TO GET APH = 1.051902


          ******************RESULTS*****************

  RESULTS FOR DOWNSLOPE YIELD ACCELERATION (g) =    .510000

*** RUN 1: THE DIRECTION OF Ah IS AS INPUT ***
                MAX. SLIDING VELOCITY =    .7239 ft/sec
        PERMANENT SLIDING DISPLACEMENT =    .1095 ft

*** RUN 2: THE DIRECTION OF Ah IS REVERSED ***
                MAX. SLIDING VELOCITY =    .4770 ft/sec
        PERMANENT SLIDING DISPLACEMENT =    .0688 ft
```

```
*********************************************
**                                         **
**                YSLIP_PM                 **
**        (VERSION 2.2, JANUARY 1996)      **
**                                         **
**   A COMPUTER PROGRAM FOR SIMULATION OF  **
**   DYNAMIC BEHAVIOR OF A RIGID BLOCK ON  **
**   AN INCLINED PLANE AND CALCULATION OF  **
**   PERMANENT DISPLACEMENTS OF THE BLOCK  **
**                                         **
**                   BY                    **
**                                         **
**              Liping Yan                 **
**            Neven Matasovic              **
**         Edward Kavazanjian, Jr.         **
**                                         **
*********************************************

**********REPRINT INPUT DATA**********

CARD  1: FILE SCZGCL66.YSL
         UKIAH MUNICIPAL SOLID WASTE DISPOSAL SITE, REVISED 2002
CARD  2: SUBTITLE
         MCE SANTA CRUZ-LOMA PRIETA Kh=0.66g
CARD  3: KPAR  N     KACC  KCOM   g(ft/s/s)  KOUT   KSLIP  KDIR
         0     1     1     1      32.2       0      0      0
CARD  4: Ky(1), ..., Ky(N)
         0.51
CARD  5: YIELD ACCELERATION DEGRADATION DATA
         Ky is constant.
CARD  6: FILE NAME FOR HORIZONTAL ACC.
         scz50c66.hea
CARD  7: NIDH  KREAD     NP         NLINE      DT        APH
         4     1         1500       1500       0.02      0.0
CARD  8: FILE NAME FOR VERTICAL ACC.
         NO Av
CARD  9: NIDV  KREAD     NP         NLINE      DT        APV        TSHIFT
         NO INPUT
CARD 10: FILE NAME FOR OUTPUT OF SLIDING MOTION
         NO FILE
CARD 11: FILE NAME FOR OUTPUT OF ABSOLUTE MOTION
         NO FILE

MAX. VALUE OF INPUT HORI. ACC. =  .660000
INPUT HORI. ACC. TIMES A FACTOR = 1.000000 TO GET APH =  .660000


          **********RESULTS**********

  RESULTS FOR DOWNSLOPE YIELD ACCELERATION (g) =   .510000

*** RUN 1: THE DIRECTION OF Ah IS AS INPUT ***
                MAX. SLIDING VELOCITY =   .1341 ft/sec
        PERMANENT SLIDING DISPLACEMENT =   .0048 ft

*** RUN 2: THE DIRECTION OF Ah IS REVERSED ***
                MAX. SLIDING VELOCITY =   .0576 ft/sec
        PERMANENT SLIDING DISPLACEMENT =   .0019 ft
```

APPENDIX B

ECONOMIC ANALYSIS

TABLE B-1
ECONOMIC ANALYSIS OF FINAL CLOSURE COSTS
PRESCRIPTIVE STANDARD vs. ENGINEERED ALTERNATIVE
CITY OF UKIAH LANDFILL

ITEM No.	ITEM	UNIT	UNIT PRICE	PRESCRIPTIVE STANDARD QTY	PRESCRIPTIVE STANDARD TOTAL PRICE	ENGINEERED ALTERNATIVE QTY	ENGINEERED ALTERNATIVE TOTAL PRICE
1.0	**CONSTRUCTION FACILITIES AND CONTROLS**						
1.1	Mobilization	LS	$ 20,000.00	1	$ 20,000	1	$ 20,000
1.2	Demobilization	LS	$ 10,000.00	1	$ 10,000	1	$ 10,000
1.3	Construction Facilities	LS	$ 5,000.00	1	$ 5,000	1	$ 5,000
1.4	Temporary Controls	LS	$ 10,000.00	1	$ 10,000	1	$ 10,000
	SUBTOTAL:				**$45,000**		**$45,000**
2.0	**GENERAL EARTHWORK & TEST PAD**						
2.1	Minor Excavation	CY	$ 2.00	500	$ 1,000	500	$ 1,000
2.2	Clear and Grub	AC	$ 1,000.00	44.3	$ 44,300	44.3	$ 44,300
2.3	Test Pad	LS	$ 15,000.00	1.0	$ 15,000	-	$ -
	SUBTOTAL:				**$60,300**		**$45,300**
2a	**FOUNDATION LAYER**						
2a.1	Foundation Layer (Existing 12")	AC	$ 4,356.00	44.3	$ 192,971	44.3	$ 192,971
2a.2	Foundation Layer (Additional 12")	CY	$ 8.00	71,470	$ 571,760	-	$ -
	SUBTOTAL:				**$764,731**		**$192,971**
3.0	**LOW HYDRAULIC CONDUCTIVITY LAYER**						
3.1	Compacted Clay Liner (CCL)	CY	$ 15.00	71,470	$ 1,072,050	-	$ -
3.2	GCL Subgrade Preparation (Top Deck)	AC	$ 800.00	-	$ -	3.5	$ 2,800
3.3	GCL Subgrade Preparation (Side Slopes)	AC	$ 2,000.00	-	$ -	40.8	$ 81,600
3.5	GCL - Supply and Install	SF	$ 0.45	-	$ -	1,929,708	$ 868,369
3.6	Drainage Layer Geonet Composite - Supply and Install	SF	$ 0.50	1,929,708	$ 964,854	1,929,708	$ 964,854
	SUBTOTAL:				**$2,036,904**		**$1,917,623**
4.0	**VEGETATIVE LAYER**						
4.1	Vegetative Layer (Bottom 12")	CY	$ 6.00	71,470	$ 428,820	71,470	$ 428,820
4.2	Vegetative Layer (Upper 12")	CY	$ 6.00	-	$ -	71,470	$ 428,820
	SUBTOTAL:				**$428,820**		**$857,640**
5.0	**DRAINAGE SYSTEM**						
5.1	Earthen Ditches	LF	$ 5.00	2,000	$ 10,000	2,000	$ 10,000
5.2	Riprap Ditches	LF	$ 20.00	1,800	$ 36,000	1,800	$ 36,000
5.3	24" HDPE Pipe	LF	$ 35.00	1,825	$ 63,875	1,825	$ 63,875
5.4	18" HDPE Pipe	LF	$ 25.00	2,575	$ 64,375	2,575	$ 64,375
5.5	15" HDPE Pipe	LF	$ 23.00	2,040	$ 46,920	2,040	$ 46,920
5.6	12" HDPE Pipe	LF	$ 20.00	3,020	$ 60,400	3,020	$ 60,400
5.7	Drainage Inlets	EA	$ 500.00	97	$ 48,500	97	$ 48,500
5.8	Concreted Rock Outlet	SF	$ 12.00	500	$ 6,000	500	$ 6,000
	SUBTOTAL:				**$336,070**		**$336,070**
6.0	**SITE SECURITY**						
8.1	Signs	LS	$ 2,000.00	1	$ 2,000	1	$ 2,000
	SUBTOTAL:				**$2,000**		**$2,000**
7.0	**REVEGETATION**						
7.1	Hydroseeding	AC	$ 1,400.00	44.3	$ 62,020	44.3	$ 62,020
7.2	Slope Protection	SF	$ 0.20	1,830,000	$ 366,000	1,830,000	$ 366,000
	SUBTOTAL:				**$428,020**		**$428,020**
8.0	**ACCESS ROADS**						
8.1	Aggregate Base Rock	SF	$ 1.10	15,000	$ 16,500	15,000	$ 16,500
	SUBTOTAL:				**$16,500**		**$16,500**
9.0	**SEDIMENTATION BASINS**						
9.1	Regrading	AC	$ 5,000.00	3	$ 12,500	3	$ 12,500
9.2	Outlet Structures	EA	$ 8,000.00	3	$ 24,000	3	$ 24,000
	SUBTOTAL:				**$36,500**		**$36,500**
10.0	**BORROW AREA RECLAMATION**						
10.1	Regrading	AC	$ 5,000.00	20	$ 100,000	17	$ 85,000
10.2	Soil Amendments and Revegetation	AC	$ 3,000.00	20	$ 60,000	17	$ 51,000
10.3	Slope Protection	SF	$ 0.20	348,500	$ 69,700	348,500	$ 69,700
	SUBTOTAL:				**$229,700**		**$205,700**
11.0	**FINAL DESIGN & CQA**						
11.1a	Construction Plans, Specifications & Bid Documents (CCL)	EA	$ 40,000.00	1	$ 40,000	-	$ -
11.1b	Construction Plans, Specifications & Bid Documents (GCL)	EA	$ 55,000.00	-	$ -	1	$ 55,000
11.1c	Redesign for CCL due to Change in Grades	EA	$ 10,000.00	1	$ 10,000	-	$ -
11.1d	Redesign for GCL	EA	$ 5,000.00	-	$ -	1	$ 5,000
11.2	Construction Administration & Supervision	EA	$ 25,000.00	1	$ 25,000	1	$ 25,000
11.3a	Daily Inspections, Recordkeeping & Reporting (CCL) (See Table B-1a)	EA	$ 155,009.67	1	$ 155,010	-	$ -
11.3b	Daily Inspections, Recordkeeping & Reporting (GCL) (See Table B-1a)	EA	$ 137,247.30	-	$ -	1	$ 137,247
11.4a	Sampling & Testing Program (CCL) (See Table B-1a)	EA	$ 86,311.40	1	$ 86,311	-	$ -
11.4b	Sampling & Testing Program (GCL) (See Table B-1a)	EA	$ 10,760.00	-	$ -	1	$ 10,760
	SUBTOTAL:				**$316,321**		**$233,007**
	TOTAL				**$4,700,866**		**$4,316,331**

LS: Lump Sum
CY: Cubic Yard
AC: Acre
SF: Square Feet
LF: Linear Feet

EA: Each
CCL: Compacted Clay Liner
GC L: Geosynthetic Clay Liner
HPDE: High-Density Polyethylene

TABLE B-1a
INSPECTION, TESTING AND REPORTING COSTS
CITY OF UKIAH LANDFILL

ITEM No.	ITEM	UNIT	UNIT PRICE	PRESCRIPTIVE STANDARD QTY	PRESCRIPTIVE STANDARD TOTAL PRICE	ENGINEERED ALTERNATIVE QTY	ENGINEERED ALTERNATIVE TOTAL PRICE
11.3	**DAILY INSPECTION, RECORDKEEPING & REPORTING**						
11.3-1	EBA - Daily Inspections	Day	$ 720.00	65	$ 46,800	21	$ 15,120
11.3-2	EBA - SDRI Installation	Day	$ 720.00	2	$ 1,440	-	$ -
11.3-3	EBA - Travel and Per Diem	Trip	$ 225.00	15	$ 3,375	13	$ 2,925
11.3-4	Contractor - Daily Geotechnical Inspections (FL/CCL)	Day	$ 805.00	80	$ 64,400	48	$ 38,640
11.3-5	Contractor - Daily Geotechnical Inspections (VL)	Day	$ 805.00	17	$ 13,685	34	$ 27,370
11.3-6	Contractor - Daily GCL Inspections	Day	$ 747.50	-	$ -	45	$ 33,638
11.3-7	Contractor - Travel	Trip	$ 15.53	214	$ 3,323	160	$ 2,485
11.3-8	Contractor - Project Management	Hr	$ 86.25	81	$ 6,986	24	$ 2,070
11.3-9	Final Construction Report	EA	$ 15,000.00	1	$ 15,000	1	$ 15,000
	SUBTOTAL:				**$ 155,010**		**$ 137,247**
11.4	**SAMPLING & TESTING PROGRAM**						
11.4-1	ASTM D 5093 (SDRI Installation)	EA	$ 7,600.00	1	$ 7,600	-	$ -
11.4-2	ASTM D 5093 (SDRI Monitoring)	EA	$ 4,894.40	1	$ 4,894	-	$ -
11.4-3	ASTM D 2487	EA	$ 51.75	115	$ 5,951	-	$ -
11.4-4	ASTM D 422	EA	$ 34.50	115	$ 3,968	-	$ -
11.4-5	ASTM D 4318	EA	$ 92.00	114	$ 10,488	-	$ -
11.4-6	ASTM D 1557	EA	$ 126.50	56	$ 7,084	-	$ -
11.4-7	ASTM D 5084	EA	$ 408.25	105	$ 42,866	-	$ -
11.4-8	ASTM D 2488	EA	$ -	-	$ -	-	$ -
11.4-9	ASTM D 1556	EA	$ -	-	$ -	-	$ -
11.4-10	ASTM D 2922	EA	$ -	-	$ -	-	$ -
11.4-11	ASTM D 2216	EA	$ -	-	$ -	-	$ -
11.4-12	ASTM D 5035 (GCDL)	EA	$ 55.00	20	$ 1,100	20	$ 1,100
11.4-13	ASTM D 5199 (GCDL)	EA	$ 18.00	20	$ 360	20	$ 360
11.4-14	ASTM D 1505 (GCDL)	EA	$ 30.00	20	$ 600	20	$ 600
11.4-15	ASTM D 3776 (GCDL)	EA	$ 18.00	20	$ 360	20	$ 360
11.4-16	ASTM D 4632 (GCDL)	EA	$ 52.00	20	$ 1,040	20	$ 1,040
11.4-17	ASTM D 5993 (GCL)	EA	$ 25.00	-	$ -	20	$ 500
11.4-18	ASTM D 5890 (GCL)	EA	$ 90.00	-	$ -	20	$ 1,800
11.4-19	ASTM D 5887 (GCL)	EA	$ 250.00	-	$ -	20	$ 5,000
	SUBTOTAL (Subcontractors):				**$ 86,311**		**$ 10,760**
	TOTAL				**$ 241,321**		**$ 148,007**

Hr: Hour
EA: Each
FL: Foundation Layer
VL: Vegetative Layer

CCL: Complacted Clay Liner
GCL: Geosynthetic Clay Liner
GCDL: Geonet Composite Drainage Layer
SDRI: Sealed Double-Ring Infiltrometer

Note: Items 11.4-8 through 11.4-11 included in cost for daily inspections (Item 11.3-4).

City of Ukiah

August 14, 2015

Mr. Trey Strickland
Mendocino County Environmental Health (County)
860 North Bush Street
Ukiah, CA 95482

RE: FINAL CLOSURE SUBMITTAL PACKAGE AND EXTENSION REQUEST
CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

Dear Mr. Strickland:

This submittal package, identified herein as Joint Technical Document (JTD) Addendum No. 2, has been prepared in response to the County's letter dated June 18, 2015 inquiring about the status of the final closure project for the City of Ukiah Landfill and requesting information from the City of Ukiah (City) to demonstrate that a "good faith effort" is being put forth to complete the project in order to justify the granting of an extension to the previously agreed upon construction start date of August 15, 2015. Included in the County's letter is a request for submittal of miscellaneous documentation that is needed for the County and California Department of Resources Recycling and Recovery (CalRecycle) to approve the final closure project. The following provides a list of the documentation requested and the current status of their development:

- *Complete Final Closure Plan:* Updated closure and postclosure maintenance information is attached herein that incorporates changes from the previously submitted Final Closure and Postclosure Maintenance Plan (FCPMP) included as part of the January 2008 Joint Technical Document (JTD). The updated information provides supporting documentation for a revised final cover system. Also included are the corresponding Construction Drawings, Technical Specifications, Construction Quality Assurance (CQA) Plan, and updated final closure and postclosure maintenance cost estimates.

- *Financial Assurance:* The requested financial assurance documents will be prepared utilizing the enclosed updated final closure and postclosure maintenance cost estimates. The financial assurance documents will be submitted to CalRecycle Financial Assurances Unit by no later than October 9, 2015.

300 Seminary Avenue • Ukiah • CA • 95482-5400
Phone: (707)463-6200 · Fax: (707)463-6204 ·www.cityofukiah.com

- *California Environmental Quality Act (CEQA):* Consistent with the information outlined in the County's letter, provisions are being made to update CEQA that include the development of an updated Initial Study that incorporates changes that have occurred since the previous CEQA determination in 2000, as well as the performance of studies for special status plant/wildlife species, wetland delineation of the creek, and greenhouse gas emissions. In addition, permits are being obtained through the California Regional Water Quality Control Board – North Coast Region (RWQCB)(401 Permit), US Army Corps of Engineers (404 Permit), and California Department of Fish and Wildlife (1602 Permit) to accommodate discharge modifications to the creek. All the field studies for the above work have been completed. The new CEQA determination and acquisition of the various permits will be completed before the end of this calendar year (2015).

- *Waste Discharge Requirements (WDRs):* The information provided herein associated with the updated FCPMP should be sufficient for the RWQCB to develop closure WDRs. Whereas the City has no control over the RWQCB's schedule and priorities, the issuance of closure WDRs by the end of this calendar year (4.5 months) is considered a reasonable time frame for this to occur.

As demonstrated above, progress has been made with respect to implementing the final closure project. Whereas the City will be unable to meet the existing August 15, 2015 closure construction start date, this should not be perceived as a lack of commitment by the City. As the County is aware, a revised final cover system has been identified for the site which represented the primary cause of the noted delays. However, the additional time expended in researching potential alternatives proved to be highly beneficial from a performance (higher stability), maintenance, and cost perspective. Based on the revised closure and postclosure maintenance cost estimates presented in the attached addendum, the cost reductions related to the revised final cover system equate to approximately $696,960, which represents a significant savings of tax payer dollars. In addition, the City has already committed $50,750 towards the CEQA and permitting process, and $186,520 for the design and fabrication of a totally-enclosed vertical ground flare. These provisions clearly demonstrate that the City is committed to moving forward on this project and that a "good faith effort" has been made in this regard.

Based on the circumstances presented herein, the City would like to respectfully request that the closure construction start date be extended to May 1, 2016. This extension will allow sufficient time for regulatory review and approval of this submittal package, the development of closure WDRS, completion of the CEQA and permitting process, the procurement of contractor bids, and awarding of the construction contract.

Thank you for your understanding and consideration of this extension request. If you should have any questions regarding the information contained herein or need additional information, please contact our office accordingly.

Respectfully,
CITY OF UKIAH

Tim Eriksen, P.E.
Director of Public Works / City Engineer

cc: Mr. Andy Marino, California Department of Resources Recycling and Recovery
Mr. Trey Strickland, Mendocino County Health & Human Services Agency
Mr. Robert Scaglione, Mendocino County Air Quality Management District
Ms. Terri Cia, RWQCB, North Coast Region
Mr. Damon Brown, EBA Engineering

Enclosure: Joint Technical Document Addendum No. 2 (August 2015)

August 14, 2015

Mr. Tim Eriksen, P.E.
City of Ukiah, Department of Public Works (City)
300 Seminary Avenue
Ukiah, CA 95482

RE: JOINT TECHNICAL DOCUMENT (JTD) ADDENDUM No. 2
FINAL CLOSURE CONSTRUCTION SUBMITTAL
CITY OF UKIAH LANDFILL, MENDOCINO COUNTY, CALIFORNIA
EBA JOB No. 02-907

Dear Mr. Eriksen:

This addendum has been prepared to respond to a request by the Mendocino County Health & Human Services Agency (Local Enforcement Agency [LEA]) in a letter dated June 18, 2015 to submit a complete Final Closure Plan (FCP) for the City of Ukiah Landfill (Landfill). Modification of the FCP has become necessary based on a proposed revision to the final cover system design. The proposed revision will also require an update to the Final Postclosure Maintenance Plan (FPMP). In this regard, it is important to note that the existing FCP and FPMP are part of the January 2008 Joint Technical Document (JTD, EBA Engineering [EBA], 2008), with various closure and postclosure maintenance details included in Section 5. Based on this circumstance, this addendum has been prepared to update Section 5 of the January 2008 JTD and associated Addendum No. 1 (EBA, 2013) as they pertain to closure and postclosure maintenance.

Please note that this document is also intended to serve as a *Final Closure Construction Submittal* for review and approval by the LEA, California Department of Resources Recycling and Recovery (CalRecycle), California Regional Water Quality Control Board, North Coast Region (RWQCB), and Mendocino County Air Quality Management District (MCAQMD). As such, included herein are a final cover stability analysis, updated final closure and postclosure maintenance cost estimates, updated FPMP, Technical Specifications, Construction Quality Assurance (CQA) Plan, and Construction Drawings. These documents are hereby incorporated into the January 2008 JTD by reference herein.

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EBA appreciates the opportunity to be of service to the City on this project. If you should have any questions regarding the information contained herein, please contact our office at (707) 544-0784.

Sincerely,
EBA ENGINEERING

Mike Delmanowski, C.E.G., C.Hg.
Senior Hydrogeologist

Damon F. Brown, C.E.G., C.Hg.
President

cc: Mr. Andy Marino, California Department of Resources Recycling and Recovery
Mr. Trey Strickland, Mendocino County Health & Human Services Agency
Mr. Robert Scaglione, Mendocino County Air Quality Management District
Ms. Terri Cia, RWQCB, North Coast Region

Enclosures:

Attachment 1 - Updated JTD Section 5 – Closure & Postclosure Maintenance
Attachment 2 - Closure*Turf* ™ Product Literature
Attachment 3 - Final Cover Stability Analysis
Attachment 4 - Updated Closure and Postclosure Maintenance Cost Estimates
Attachment 5 - Updated Final Postclosure Maintenance Plan
Attachment 6 - Technical Specifications – Final Closure Construction
Attachment 7 - Construction Quality Assurance Plan – Final Closure Construction
Attachment 8 - Construction Drawings – Final Closure Construction

REFERENCES

EBA Engineering, January 2008, *Joint Technical Document for City of Ukiah Landfill, Mendocino County, California, Volumes I through III, EBA Job No. 02-907*; Prepared for the City of Ukiah, Department of Public Works by EBA Engineering, Santa Rosa, California.

EBA Engineering, October 2013, *January 2008 Joint Technical Document Addendum, Response to Regulatory Comments, Final Closure and Postclosure Maintenance Plans, City of Ukiah Landfill, Mendocino County, California, EBA Job No. 02-907;* Prepared for the City of Ukiah, Department of Public Works by EBA Engineering, Santa Rosa, California.

ATTACHMENT 1

UPDATED JTD SECTION 5
CLOSURE & POSTCLOSURE MAINTENANCE

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SECTION 5
CLOSURE & POSTCLOSURE MAINTENANCE
(Updated)

This section addresses the general closure and postclosure maintenance requirements for landfills as stipulated in Title 27, California Code of Regulations (27CCR), Division 2, Chapter 3, Subchapter 5. As outlined in 27CCR, §20950, the primary performance goal for closure is to minimize the infiltration of water into the waste, thereby minimizing the production of leachate and landfill gas (LFG). The primary performance goal for postclosure maintenance, in turn, is to assure that the waste management unit (WMU) continues to comply with the aforementioned closure performance goal. In order to meet these objectives, Dischargers who are implementing final closure of a new or existing classified solid WMU must carry out the closure in accordance with a Final Closure and Postclosure Maintenance Plan (FCPMP) which the RWQCB finds meets all applicable requirements. In general, the FCPMP shall provide for continued compliance with the applicable SWRCB-promulgated performance standards for waste containment, precipitation and drainage controls, and monitoring throughout the closure and postclosure maintenance period, which shall extend as long as the wastes pose a threat to water quality.

A FCPMP (EBA Engineering [EBA], 1999) was prepared and submitted for the Landfill in August 1999. This was followed by the submittal of a final cover Engineered Alternative Analysis dated March 11, 2003 (EBA, 2003). Copies of these documents are enclosed as Appendices M and N, respectively, of the January 2008 Joint Technical Document (JTD, EBA, 2008). This updated section has been prepared to address a revision to the final cover system design for the WMU. Details regarding this revision is presented in Subsection 5.1.1 (*Final Cover Requirements*).

In addition to closure of the WMU, the surface impoundment formerly used as a leachate holding pond will be closed in accordance with requirements for surface impoundments as stipulated in 27CCR, §21400. Closure of this surface impoundment was not addressed in the August 1999 FCPMP. Details regarding the proposed closure activities for the surface impoundment are summarized herein under Subsection 5.3 (*Closure Requirements for Surface Impoundments*).

5.1 CLOSURE & POSTCLOSURE MAINTENANCE REQUIREMENTS FOR SOLID WASTE LANDFILLS 27CCR, §21090

5.1.1 Final Cover Requirements *27CCR, §21090(a)-(a)(2)*

The proposed final cover system will consist of a patented geosynthetic product identified as "ClosureTurf™". ClosureTurf™ is a three-component system comprised of a structured geomembrane, a specialized tufted geotextile, and a sand infill layer. The structured geomembrane component serves as the low-hydraulic conductivity layer (LHCL), whereas the specialized tufted geotextile and sand infill layer represent the erosion-resistant layer as defined in 27CCR. Literature for the ClosureTurf™ product is enclosed in Attachment 2 of this Addendum.

Overall, the proposed final cover system design can be summarized as follows (in ascending order):

- Minimum 1-foot thick soil foundation layer.
- 50 mil linear low-density polyethylene (LLDPE) geomembrane liner (Super Gripnet® with Spike Down).
- Specialized tufted geotextile (Engineered Turf).
- Minimum ½-inch thick sand infill layer.

In addition to the above features, the final cover system will also be equipped with a gas relief component. This component will consist of a series of 3.5-foot wide collection strips placed parallel and/or perpendicular to slopes and spaced at maximum 220-foot intervals. The collection strips, which will be constructed of the same Super Gripnet® with Spike Down material described above for the geomembrane liner component, will be connected to the LFG collection system to prevent the build-up of gas pressures beneath the final cover system. Pressure release valves will also be installed at regular intervals between the collection strips as an additional precautionary measure.

Please refer to the Technical Specifications (Attachment 6), Construction Quality Assurance (CQA) Plan (Attachment 7), and Construction Drawings (Attachment 8) of this Addendum for details regarding material and installation specifications for the respective final cover system components described above.

The proposed final cover system presented herein represents an engineered alternative design to the prescriptive standard (i.e., compacted clay liner [CCL]) and therefore requires regulatory approval. In this regard, an engineered alternative analysis is presented in the following subsection that demonstrates its viability as a final cover alternative.

5.1.1.1 Engineered Alternative Analysis

As presented in Subsection 5.1.1 (*Final Cover Requirements*), the proposed engineered alternative presented herein substitutes the patented geosynthetic product ClosureTurf™ in lieu of the LHCL prescriptive standard (i.e., CCL) required under 27CCR. Regulatory consideration of an engineered alternative is allowed under 27CCR, §20080(b), which stipulates that an engineered alternative may be considered if construction of the prescriptive standard is unreasonably and unnecessarily burdensome and will cost substantially more than the proposed alternative. Furthermore, the engineered alternative must be consistent with the performance goal addressed by the prescriptive standard and afford equivalent protection against water quality impairment. The following information has been compiled to demonstrate compliance with these criteria and includes data regarding the properties of the ClosureTurf™, as well as comparisons of performance and costs of the proposed ClosureTurf™ engineered alternative to that of the prescriptive standard and the previously proposed geosynthetic clay liner (GCL) final cover system.

Performance

One of the primary variables for demonstrating equivalency to the prescriptive standard is infiltration through the final cover system. In this regard, infiltration equivalency analyses have been performed on the ClosureTurf™ product versus a prescriptive Subtitle D cover system. The analyses have included the use of two methodologies: 1) the Hydrologic Evaluation of Landfill Performance (HELP) Model; and 2) the Giroud Method (Giroud et al., 1997). Both methods were employed for a generic landfill site in Texas. Findings from these analyses revealed the following:

INFILTRATION EQUIVALENCY ANALYSIS
ClosureTurf™ vs. SUBTITLE D FINAL COVER SYSTEMS

Methodology	***ClosureTurf™ Final Cover System***	***Prescriptive Subtitle D Final Cover System***
HELP Model for Site in Texas – Average Annual Infiltration (Cubic Feet)	8.3	347
Giroud Method with Silty-Sandy Soil below the ClosureTurf™ (Gallons per Day)	1.33	4.51
Giroud Method with Silty-Sandy Soil with Some Clay below the ClosureTurf™ (Gallons per Day)	0.24	4.51

As demonstrated in the above table, the ClosureTurf™ product exhibits substantially lower infiltration rates for the respective scenarios as compared to the prescriptive standard. This can be attributed to the lower hydraulic conductivity characteristics of the LLDPE geomembrane liner as compare to a CCL, as well as the more efficient removal of moisture above the LHCL component, thereby reducing the amount of

potential infiltration into the WMU. Based on these circumstances, the ClosureTurf™ product meets the required performance goal for an engineered alternative by providing equal to or greater protection against potential water quality impairment. Other features afforded by ClosureTurf™ that demonstrate its suitability as an engineered alternative from a performance perspective can be summarized as follows:

- The slope stability characteristics of ClosureTurf™ far exceeds those provided by other geosynthetic products (including GCLs), which is very important based on the steep slopes that exist at the Landfill. The bottom spiked friction surface of the Super Gripnet® provides maximum interface friction and a high factor of safety against sliding at the liner/foundation layer soil interface.

- The Engineered Turf component eliminates the potential for soil creep and veneer failures resulting from saturation of the vegetative soil cover that is a required component of the prescriptive Subtitle D final cover and other traditional geosynthetic cover systems. As noted in the previous bullet item, this potential is exacerbated by the very steep slopes that exist at the Landfill.

- The drainage aspects of the ClosureTurf™ are designed to allow rainfall to penetrate rapidly through the sand infill layer and into the structured drain liner below which has a very high transmissivity for subsequent conveyance of the water off of the liner system. The sand infill has been demonstrated to handle over six inches per hour of rainfall intensity without erosion when applied on three horizontal to one vertical (3H:1V) slopes. Such rainfall energy conditions on a traditional vegetative soil cover would likely result in significant erosional damage.

- The drainage aspects of the ClosureTurf™ as described above promote very "clean" and low turbidity stormwater run-off, which represents a beneficial feature since the collected run-off is subsequently discharged to the ephemeral creek that borders the northern boundary of the WMU. Achieving comparable stormwater run-off quality from a traditional vegetative soil cover would be difficult.

- ClosureTurf™ is designed to provide weathering resistance and geomembrane protection when exposed to extreme heat and ultra-violet (UV) exposure. Based on results of independent, real-world weathering tests and data from existing projects, ClosureTurf™ can provide decades of reliable performance beyond the standard 30-year postclosure maintenance period.

- ClosureTurf™ has been tested for wind uplift resistance and demonstrated no uplift when exposed to 120 miles per hour wind. As such, the ClosureTurf™ can withstand most wind conditions that could realistically be encountered at the site.

As presented in the product literature data enclosed in Attachment 2 of this Addendum, ClosureTurf™ has been approved for use as an engineered alternative by the RWQCB at two sites in California. These sites correspond to the Crazy Horse Landfill and Portola Landfill located Monterey County and Plumas County, respectively. This product has also been successfully employed at a number of landfill sites throughout the United States, including sites in the southeast and east that are subject to much harsher weather conditions than would be experienced at the Landfill.

Installation

The installation and CQA testing of the ClosureTurf™ product at the Landfill would be significantly easier than for a CCL. The following provides a summary to support this position:

- In general, ClosureTurf™ deployment is very straightforward, both from a placement and seaming standpoint. Furthermore, heavy equipment requirements for ClosureTurf™ deployment are limited primarily to a rubber-tire forklift or equivalent. Conversely, CCL construction is very labor intensive with substantial reliance on heavy equipment (i.e., scrapers, dozers, compactors, etc.).

- Less CQA is required for ClosureTurf™ due to the consistency of the materials and manufacturing process. CQA testing for a CCL, in turn, is more extensive and occurs at a higher frequency to verify the consistency of borrow source materials and the contractor's ability to achieve moisture content, compaction, and hydraulic conductivity during construction.

- Installation of a sealed, double-ring infiltrometer (SDRI) is required to test the field permeability of CCLs, which is costly and time consuming. Such a provision is not required for ClosureTurf™.

In comparison to other geosynthetic liner systems, ClosureTurf™ is slightly more labor intensive due to the placement of the sand infill layer. However, this increased labor is more than offset be the elimination of the vegetative soil layer. Similar to the CCL construction, construction of a vegetative soil layer is also very labor intensive with substantial reliance on heavy equipment. In addition, in the case of the GCL final cover system that was previously proposed for the Landfill, the gas relief layer material and labor requirements are significantly greater as compared to the ClosureTurf™. Thus, the ClosureTurf™ final cover system installation represents the least intensive approach from an installation standpoint.

Maintenance

ClosureTurf™ offers a significant maintenance advantage over a prescriptive Subtitle D final cover and any other traditional geosynthetic cover systems that require a vegetative soil cover. In essence, vegetative soil covers often require regular

maintenance related to the repair of erosional damage, installation of erosion control measures (i.e., silt fences, hay bales, wattles, etc.), slope repairs, and revegetation. Erosion from the vegetative soil cover also causes siltation of drainage ditches and culverts that require subsequent repair. Such provisions are not required with the ClosureTurf™ product, thereby providing a significant cost savings over the course of the postclosure maintenance period.

Cost

The cost of the final cover system using ClosureTurf™ was compared to the GCL final cover system as previously proposed in the January 2008 JTD and subsequent October 31, 2013 *Final Closure Construction Submittal Package* (EBA, 2013b). Since the different products influence other aspects of the final cover construction (i.e., foundation layer, gas relief layer, erosion-resistant layer, drainage, access roads, etc.), the cost comparison included these variables in the analysis. Conversely, those final closure construction items not influenced by the final cover system design (i.e., mobilization, leachate control system improvements, LFG collection and control system, etc.) are not included in the analysis. The corresponding estimated construction costs for the two final cover systems are presented in the following table.

CONSTRUCTION COST COMPARISONS
ClosureTurf™ vs. GCL FINAL COVER SYSTEMS

Item	*ClosureTurf™ Final Cover System*	*GCL Final Cover System*
Foundation Layer / Engineered Fill	$594,530	$465,890
Gas Relief Layer	$86,200	$2,290,360
Low-Hydraulic Conductivity Layer (LHCL)(1)	$2,034,620	$1,493,690
Erosion-Resistant Layer(2)	$3,807,850	$1,866,300
Drainage System Components	$552,910	$695,590
Erosion Control	$100,300	$581,930
Access Roads	$172,580	$374,790
EXTENDED TOTAL	***$7,348,990***	***$7,768,550***

GCL: Geosynthetic Clay Liner

(1) The LHCL component for the ClosureTurf final cover system includes the Super Gripnet® with Spike Down, while the GCL final cover system includes the GCL.

(2) The erosion-resistant layer component for the ClosureTurf final cover system includes the Engineered Turf and sand infill layer, while the GCL final cover system includes a geonet composite drainage layer and vegetative soil layer.

As presented in the above table, the cost for the ClosureTurf™ final cover system is approximately $419,560 less than the GCL final cover system. In addition, as noted in the previous subsection, long-term maintenance associated with ClosureTurf™ is substantially less than any final cover system that requires an erosion-resistant layer comprised of a vegetative soil cover. The estimated cost savings from a maintenance perspective over the 30-year postclosure maintenance period equates to approximately $277,400. Thus, the overall cost savings resulting from replacing the previously proposed GCL final cover system with ClosureTurf™ is approximately $696,960.

Conclusions

As demonstrated by the comparative information presented herein, the proposed ClosureTurf™ engineered alternative meets or exceeds the performance criteria addressed by the prescriptive standard. Furthermore, the cost analysis comparing construction costs for the ClosureTurf™ versus the previously proposed GCL final cover system reveals that a significant cost savings can be realized through implementation of the ClosureTurf™ option. Based on these circumstances, it can be concluded that the ClosureTurf™ engineered alternative meets the qualifying criteria specified in 27CCR, §20080(b).

5.1.2 Erosion-Resistant Layer
27CCR, §21090(a)(3)-(a)(3)(A)

The erosion-resistant layer for the proposed final cover system is comprised of the Engineered Turf and sand infill layer. As presented in Subsection 5.1.1.1 (*Engineered Alternative Analysis*), the combination of these components are designed to provide weathering resistance and geomembrane protection when subjected to the most extreme conditions, including rain, wind, heat, and UV exposure. Based on the absence of a traditional erosion-resistant layer constructed of soil, the proposed system is not subject to erosional channeling that can lead to exposure of the geomembrane component. As a result of the aforementioned characteristics, the proposed system meets the performance criteria specified in 27CCR with regard to resisting the foreseeable erosion effects by wind-scour, raindrop impact, and run-off. Please refer to the Technical Specifications (Attachment 6) of this Addendum for further details regarding the material specifications.

5.1.3 Cover Maintenance Plan
27CCR, §21090(a)(4)-(a)(4)(D)

This section requires FPMPs to incorporate a cover-integrity monitoring and maintenance program that includes the following components: periodic leak search; periodic identification of other problem areas; prompt cover repair; and vegetation maintenance. Details regarding periodic leak search procedures is outlined in the following paragraph. The identification of other problem areas and cover repairs, in turn, are addressed under Section 5.1.8 (*General Postclosure Duties*) of this

Addendum. Finally, vegetation maintenance does not apply since the erosion-resistant layer for the proposed final cover system is comprised of Engineered Turf material.

Integrity monitoring of the LHCL (i.e., Super Gripnet® with Spike Down) will be accomplished using LFG as a surrogate for determining potential leaks. In essence, the detection of elevated methane (primary component of LFG) at concentrations in excess of 5 percent by volume on the surface of the waste management unit (WMU) would be indicative of a possible breach in the LHCL. Monitoring will be accomplished using a portable hydrocarbon detector (calibrated to methane) meeting the requirements of Assembly Bill 32 (AB32) for measuring methane emissions from municipal solid waste landfills. The monitoring pattern across the WMU will also coincide with AB32 requirements. It is EBA's opinion that the walking pattern required under AB32 is adequate for providing a reasonable survey of the WMU surface conditions. In addition, under AB32 requirements, the frequency of monitoring ranges from quarterly to annual, thereby providing a robust monitoring program that is suitable for complying with the period leak search regulations.

5.1.4 Discharges of Liquids to Covers (Leachate & Condensate) *27CCR, §21090(a)(5)(A)*

The discharge of leachate, LFG condensate or other waste liquids onto the final cover is not proposed at the Landfill. Instead, these liquids will be processed through the facility's existing leachate collection and pumping system as described in Subsection 2.9 (*Leachate Collection and Removal Systems [LCRS]*) of the January 2008 JTD.

5.1.5 Discharges of Liquids to Covers (Other Liquids) *27CCR, §21090(a)(5)(B)*

The discharge of other liquids onto the final cover is also not proposed at the Landfill. Postclosure land use will be non-irrigated open space. As a result, monitoring of potential liquid through flow to the underlying waste will not be necessary.

Please note that the need for dust control provisions (other than during final closure construction) as outlined in CalRecycle citations 27CCR, §20800 and §21600(b)(8)(D) during the postclosure maintenance period is not anticipated based on the placement of aggregate base rock on all access roads at the time of closure. In regards to final closure construction, the Technical Specifications for construction stipulate that dust control provisions must be such as to protect against excess water application that could result in potential through flow into underlying waste or run-off into surface water drainages.

5.1.6 Stability Analysis
27CCR, §21090(a)(6)

Please refer to the stability analysis enclosed in Attachment 3 of this Addendum for details regarding stability determinations for the proposed final cover system.

5.1.7 Grading Requirements
27CCR, §21090(b)-(b)(3)

Please refer to the Construction Drawings (Attachment 8) in this Addendum for updated grading plans for the WMU, sedimentation ponds, and associated borrow areas.

5.1.8 General Postclosure Duties
27CCR, §21090(c)-(c)(5)

General postclosure duties will be performed in accordance with the Facility's FPMP, which was previously presented in the January 2008 JTD. However, due to a variety of changes that have taken place since its submittal, an updated FPMP has been prepared and is enclosed in Attachment 5 of this Addendum.

One substantive change in the updated FPMP as compared to the FPMP presented in the January 2008 JTD corresponds to the elimination of stormwater monitoring during the 30-year postclosure maintenance period. Since submittal of the January 2008 JTD, a Notice of Termination (NOT) for the existing stormwater permit (WDID Number 123I001656) has been granted approval by the RWQCB on the basis that industrial activity no longer occurs at the site, nor will it occur in the future as the end use of the Landfill during the postclosure maintenance period will be non-irrigated open space. Furthermore, surface water monitoring and inspection will be performed as part of the Landfill's postclosure Monitoring and Reporting Program (M&RP), thereby providing long-term provisions for monitoring surface water quality. Approval of the NOT was issued on July 30, 2015.

5.1.9 Landfill Closure Deadline & Extension
27CCR, §21090(d)

The existing closure construction start date was previously established as August 15, 2015. However, adherence to this start date became unattainable due to delays related to pursuing a more economical final cover alternative. The proposed final cover system presented herein represents the outcome of those efforts. In response to this circumstance, the City has requested an extension from the LEA and CalRecycle to revise the closure construction start date to May 1, 2016. Based on an estimated construction period of eight months, the corresponding completion date for the final closure project is December 2016.

5.1.10 Final Cover Survey(s)
27CCR, §21090(e)-(e)(4)

A topographic map of the completed final cover grades will be produced at a minimum scale of one inch to 100 feet and accompany the Final Documentation Report. In addition, iso-settlement maps will be produced every five (5) years thereafter to calculate any differential settlement. The iso-settlement maps will be prepared with a maximum contour interval of two (2) feet and a scale of one inch equals 60 feet.

5.1.11 Operational Clean Closure
27CCR, §21090(f)-(f)(2)

Not Applicable

5.2 Landfill Emergency Response Plan Review 27CCR, §21132

Please refer to the updated FPMP in Attachment 5 of this Addendum for a copy of the Facility's Emergency Response Plan.

5.3 Closure Requirements for Surface Impoundments 27CCR, §21400

As part of the January 2008 JTD, recommendations were provided for assessing the unlined leachate surface impoundment for potential environmental impacts. Authorization to proceed with the assessment was issued by the RWQCB in their letter dated April 24, 2013. The work was subsequently implemented by EBA on August 6, 2013. The scope of work entailed the advancement of four (4) soil borings within the footprint of the surface impoundment to depths ranging from 11.5 to 16.5 feet below ground surface (BGS) and the collection of four (4) soil samples from each borehole for chemical analysis. All soil samples from each borehole were analyzed for volatile organic compounds (VOCs), arsenic, and barium. In addition, one (1) soil sample from each borehole was analyzed for organochlorine pesticides, polychlorinated biphenyls, organophosphorus pesticides, chlorinated herbicides, and oil and grease.

Findings from the aforementioned investigation were summarized in a technical report dated October 3, 2013 (EBA, 2013a) and submitted to the RWQCB, CalRecycle and LEA. Results from the soil sampling activities did not reveal any evidence of appreciable residual contamination associated with the former leachate surface impoundment operations. Based on these results, it was concluded by EBA that no further assessment or remedial actions were necessary. Furthermore, it was recommended that the leachate surface impoundment be backfilled with "clean" engineered fill and the final ground surface graded to promote positive drainage and prevent ponding. These

provisions are included in the Technical Specifications (Attachment 6) and Construction Drawings (Attachment 8) of this Addendum.

REFERENCES

EBA Wastechnologies, August 1999, *Final Closure and Postclosure Maintenance Plan, Ukiah Municipal Solid Waste Disposal Site, Mendocino County, California, EBA Project No. 99-691;* Prepared for City of Ukiah, Public Works Department by EBA Wastechnologies, Santa Rosa, California.

EBA Engineering, March 11, 2003, *Engineered Alternative Analysis, City of Ukiah Landfill, Mendocino County, CA, EBA Project No. 02-907 (Task 5);* Prepared for City of Ukiah Department of Public Works by EBA Engineering, Santa Rosa, California.

EBA Engineering, January 2008, *Joint Technical Document for City of Ukiah Landfill, Mendocino County, California (Volumes I through III), EBA Project No. 02-907;* Prepared for City of Ukiah Department of Public Works by EBA Engineering, Santa Rosa, California.

EBA Engineering, October 3, 2013a, *Leachate Surface Impoundment Assessment, City of Ukiah Landfill, 3100 Vichy Springs Road, Ukiah, California, EBA Job No. 13-1952 (Task 3);* Prepared for the City of Ukiah, Department of Public Works by EBA Engineering, Santa Rosa, California.

EBA Engineering, October 31, 2013b, *Final Closure Construction Submittal Package, City of Ukiah Landfill, Mendocino County, California, EBA Job No. 02-907;* Prepared for the City of Ukiah, Department of Public Works by EBA Engineering, Santa Rosa, California.

Giroud, J.P., King, T.D., Sanglerat, T.R., Hadj-Hamou, T. and Khire, M.V., *Rate of Liquid Migration Through Defects in a Geomembrane Placed on a Semi-Permeable Medium*; Geosynthetics International 1997, Vol. 4, Nos. 3-4.

ATTACHMENT 2

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Infiltration Equivalency Analysis

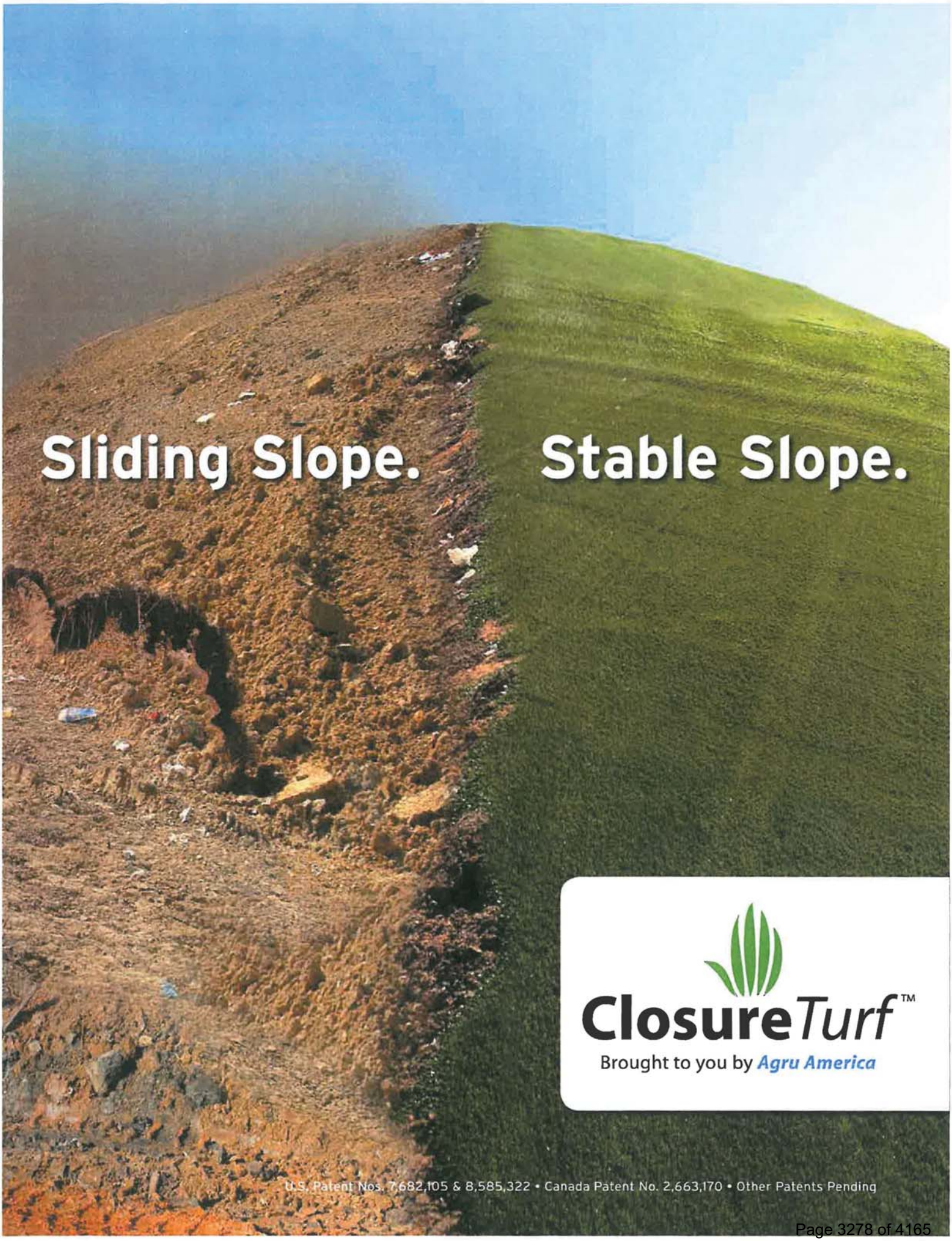
The minimum technical requirements as defined by the EPA for Subtitle D Final Cover Systems are contained in 40 CFR 258.60. This regulation allows for an alternative (performance based) cover system. One of the requirements for determining equivalency is infiltration. Typically, this is evaluated using two methodologies – (i) the Hydrologic Evaluation of Landfill Performance (HELP) Model and (ii) the Giroud Method1. Both of these methods have been used to compare the infiltration performance of the **ClosureTurf®** Final Cover System to the Prescriptive Subtitle D Cover. A comparison of infiltration rates is shown in the Table for both methodologies for a generic site in Texas.

The results demonstrate that the **ClosureTurf®** Final Cover System provides superior protection against infiltration when compared to the Prescriptive Subtitle D Standard landfill final closure systems.

Infiltration Equivalency Analysis	ClosureTurf® Cover System	Prescriptive Subtitle D Cover System
HELP Model for Site in Texas – Average Annual Infiltration (Cubic Feet)	8.3	347
Giroud Method with Silty-Sandy Soil below the ClosureTurf® (Gallons / day)	1.33	4.51
Giroud Method with Silty-Sandy Soil with Some Clay below the ClosureTurf® (Gallons / day)	0.24	4.51

Summary of Results for Infiltration Equivalency Analyses for a Generic Site in Texas

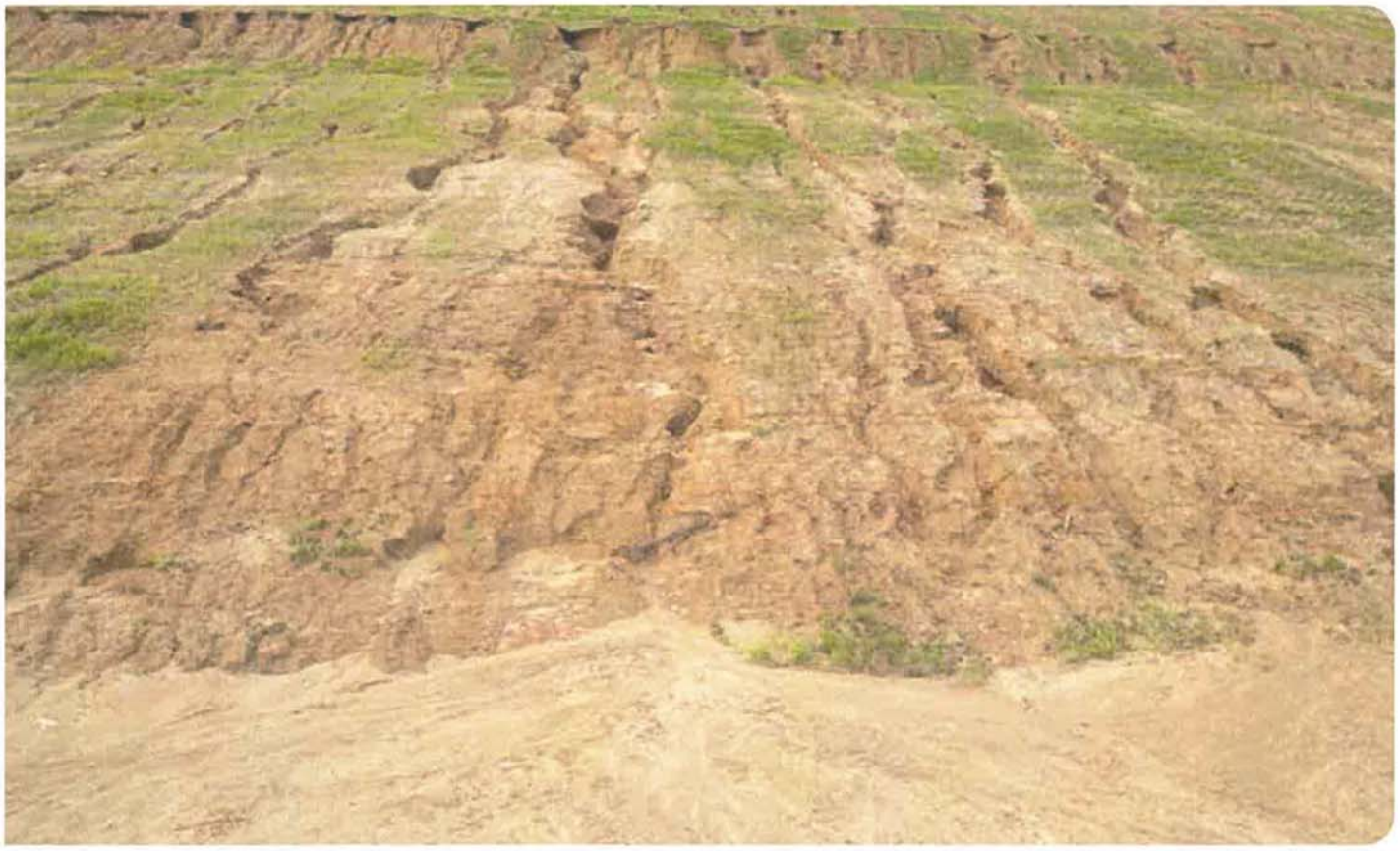
[1] Rate Of Liquid Migration Through Defects In A Geomembrane Placed On A Semi-Permeable Medium, J.P. Giroud, T.D. King, T.R. Sanglerat, T. Hadj-Hamou and M.V. Khire, Geosynthetics International 1997, Vol. 4, Nos. 3-4.


Sliding Slope.
Stable Slope.
ClosureTurf™
Brought to you by Agru America
U.S. Patent Nos. 7,682,105 & 8,585,322 • Canada Patent No. 2,663,170 • Other Patents Pending

Soil slopes don't work, although they keep you working.

Soil erosion continually plagues the ongoing management of landfills, industrial waste sites, CCR storage areas, and other environmental containment applications requiring constant rebuilding of slopes weakened by rain and wind. In addition to ongoing maintenance headaches, traditional systems utilizing soil as their main component are costly to maintain, slow to install, and introduce unwanted slope instabilities.

There is an alternative solution available for these challenging applications which address the lessons learned by the industry since the implementation of Subtitle D. The innovative solution is called ClosureTurf™ which meets and/or exceeds the requirements set forth by the EPA in Subtitle D. A three component system, ClosureTurf is revolutionizing the way engineers, owners, government agencies and many others solve containment challenges. The ClosureTurf system offers exceptional durability and pleasing aesthetics at a lower cost than traditional practices.





ClosureTurf™ makes fast, cost-efficient erosion control so easy—it's virtually install and that's all.

ClosureTurf is a patented three component system comprised of a structured geomembrane, an engineered turf, and a specialized sand infill. The ClosureTurf system provides many advantages over a typical Subtitle D landfill cover such as:

- Reduces construction and long-term maintenance costs
- Improves short term and long term slope stability
- Excellent performance in extreme weather conditions
- Provides for enhanced gas collection (when applicable)
- Improves stormwater quality
- Incremental closures for odor control and leachate reduction (close as you go)

With several square miles of installed product, ClosureTurf has proven to be superior in performance when compared to other cover solutions—not only in the laboratory but also in real life applications where it counts. The system has a proven track record to significantly outperform traditional vegetative closure methods with regard to installation, maintenance and environmental compliance.

ClosureTurf™ delivers superior performance

Performance:

- Prevents common erosion, storm water and siltation problems–even during severe weather events.
- Utilizes the highest interface friction geomembrane available in the market which provides greater stability on steeper grades and reduces the need to rebuild slopes.
- The lifespan of the ClosureTurf system extends well beyond the required 30 year post closure maintenance period. It protects against driving forces, severe weather conditions, heat and wind uplift.



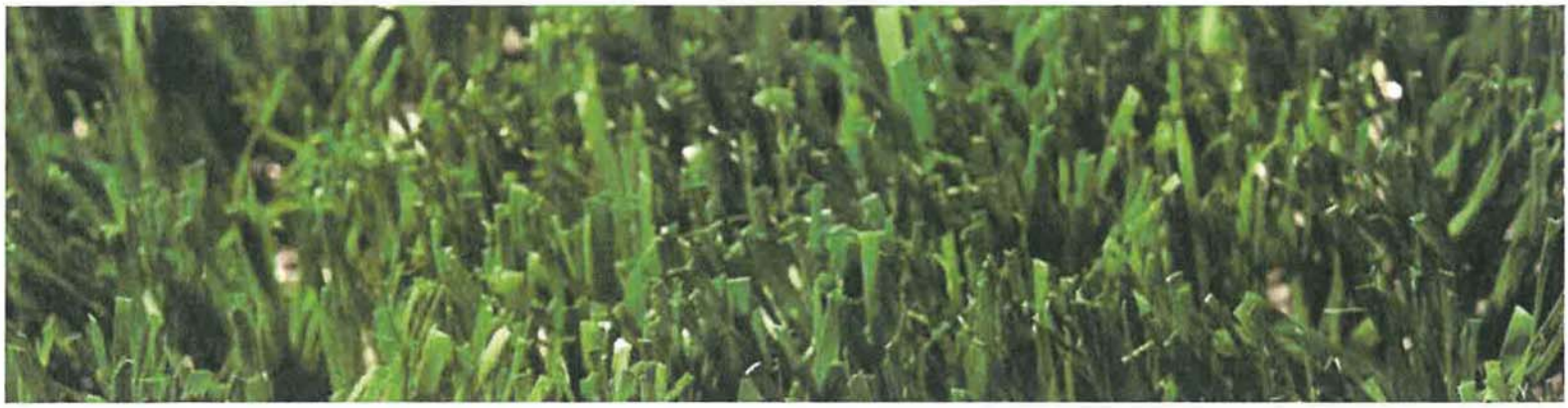
Timber Ridge Landfill

Cost Savings:

- Significantly lowers upfront capital costs.
- Dramatically reduces maintenance costs.
- Reduces the cost associated with the repair of significant failures.



Saufley Landfill



Environmental Benefits:

- Obtain control over gas collection sooner than later ("close as you go").
- Reduces environmental carbon footprint by up to 75% during construction.
- Lowers the production of leachate by allowing incremental closures.
- Durable system construction designed to safely convey internal gas pressures, reduce unwanted releases and avoid slope stability issues.
- The ClosureTurf system requires no irrigation, fertilizing, seeding or mowing.
- Provides filtration resulting in clean storm water runoff.



Crazy Horse Landfill

Other Benefits:

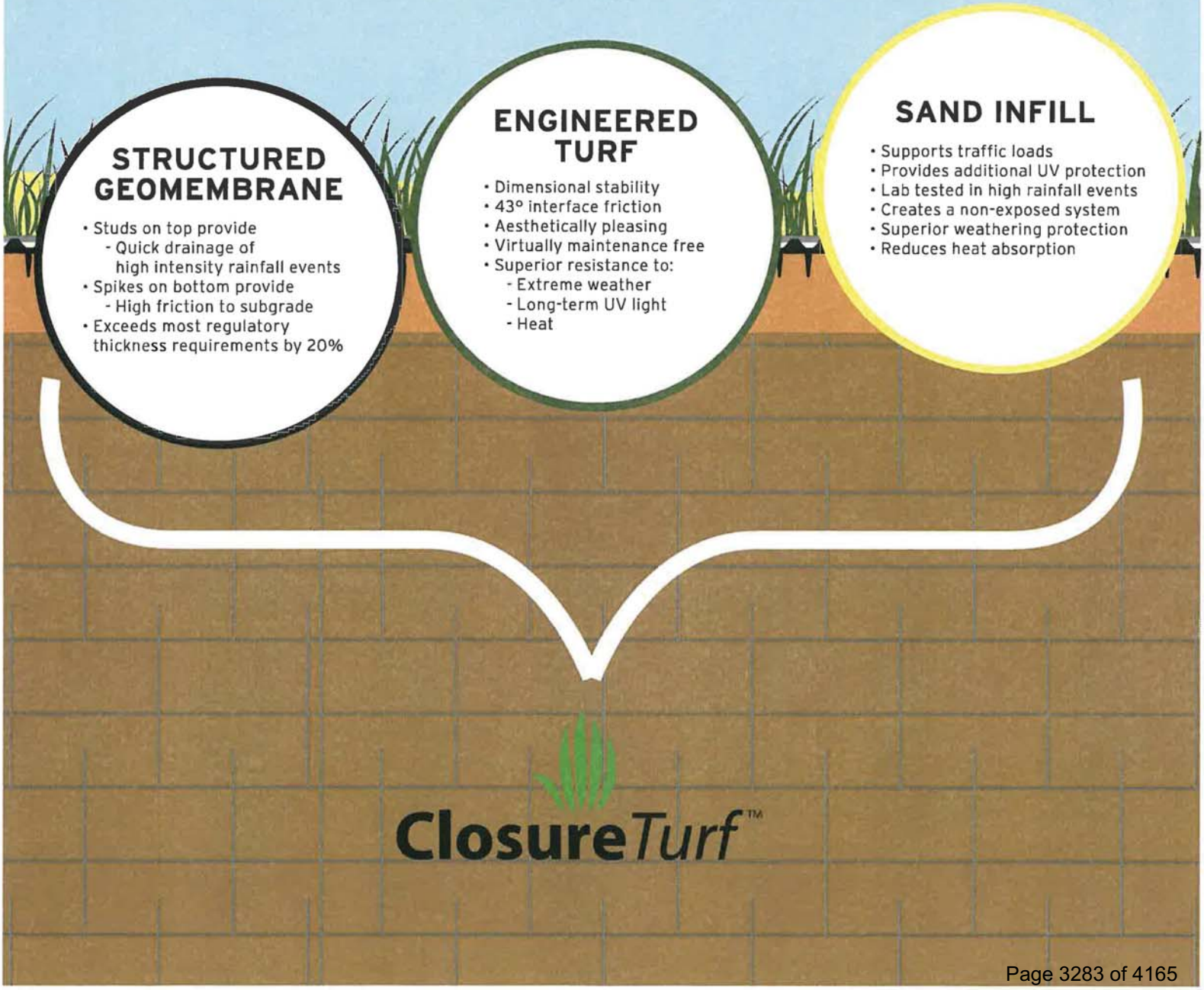
- Reduces overall surface emissions.
- Easily adapted during or after construction for solar field development.
- Rapid, low-impact construction.

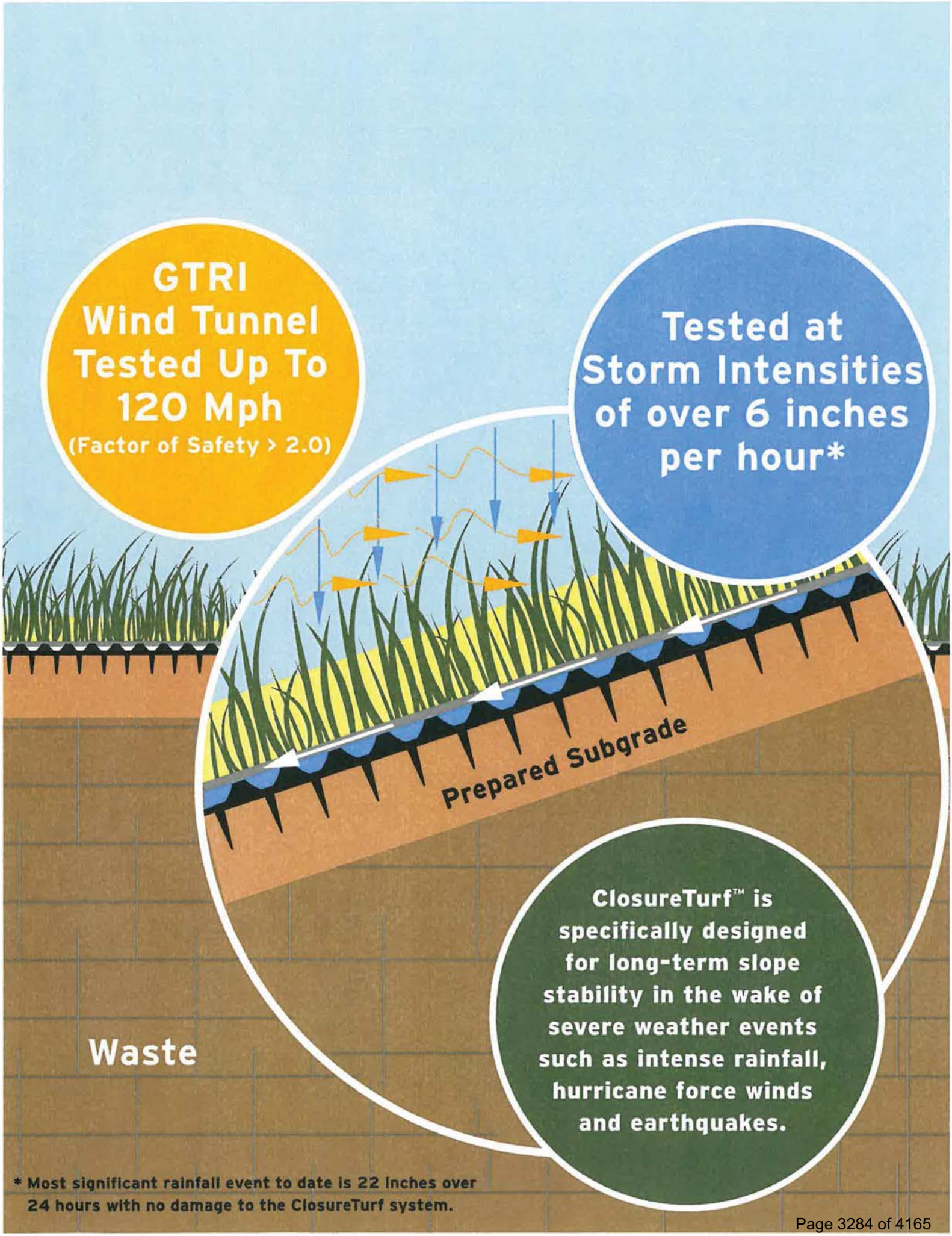


Hartford Landfill

Take a closer look at ClosureTurf™

ClosureTurf™ is a patented, three component system comprised of a structured geomembrane, an engineered turf, and a specialized sand infill. The foundation of the system is an impermeable, highly transmissive structured geomembrane. It provides for the highest interface friction values available in the market. The engineered turf component gives the system its natural look and feel of grass while protecting the geomembrane from extreme weather conditions for the long term. The specialized sand infill component is placed between the blades of the engineered turf and allows the system to be trafficked while also providing additional protection from weathering. When required, ClosureTurf's patented surficial gas system is included with the system to vent landfill gas emissions. ClosureTurf is fast and easy to install for an aesthetically pleasing, cost-effective landfill closure solution.




GTRI
Wind Tunnel
Tested Up To
120 Mph
(Factor of Safety > 2.0)
Tested at
Storm Intensities
of over 6 inches
per hour*
Prepared Subgrade
ClosureTurf™ is
specifically designed
for long-term slope
stability in the wake of
severe weather events
such as intense rainfall,
hurricane force winds
and earthquakes.
Waste
* Most significant rainfall event to date is 22 inches over
24 hours with no damage to the ClosureTurf system.

More engineered solutions...

CLOSURETURF™ SURFICIAL GAS COLLECTION SYSTEM

ClosureTurf's patented surficial gas collection system reduces, and in some cases, eliminates the need for traditional gas wells and piping. It can function as a standalone system or in conjunction with a traditional system. Underneath the ClosureTurf system, gas is generated and rises to the surface where a vacuum created by the differential pressures is vented through the surficial gas collection foot. This method provides an efficient method of gas collection while reducing the amount of condensate that needs to be managed.

The unique design of the ClosureTurf Surficial Gas Collection System resulted in one landfill winning an International Achievement Award for a combined gas collection and closure system and the Solid Waste Association of North America (SWANA) Gold Excellence Award for landfill gas collection in 2012.

VERSACAP™

VersaCap is a low-cost, intermediate landfill cover solution designed to help prevent erosion, infiltration, runoff and gas emissions during the operational phases of the landfill.

Fast and easy to install, VersaCap is a wind-resistant membrane comprised of a synthetic turf and specially-formulated polymer backing that improves the quality of surface water runoff and eliminates downstream siltation by preventing erosion of the cover soils. VersaCap does not require tires or sandbags to keep it in place and can easily be taken up and reused in future areas.

HYDROTURF™

HydroTurf is an economical, environmentally-friendly alternative revetment to rock riprap and piped channels. It is a patented three component system made up of a structured geomembrane, an engineered turf and a specialized pozzolanic infill (HydroBinder™). Created specifically for bench drains, downchutes and perimeter channels on landfill covers, HydroTurf will flex and move with typical differential settlements that occur on landfill covers. It provides superior hydraulic performance capable of handling large velocity and large flows resulting in very high velocities.

Delivering the same advantages as ClosureTurf, HydroTurf offers rapid, low impact installation that's significantly less costly than hard armor and piping, and is projected to last more than 100 years when properly maintained. Best of all, unlike hard armor riprap channels, HydroTurf improves the environment by producing cleaner storm water runoff.

SOLAR

The nature of the ClosureTurf system provides an excellent opportunity for generating environmentally friendly renewable energy through the implementation of solar panel arrays. ClosureTurf's geosynthetic cover enables panels to operate in a clean environment significantly reducing dust and erosion. The engineered turf provides an excellent surface for easy access and eliminates the risk of panel damage from mowing and maintenance required for other types of ground cover.

The exceptionally durable heavy load bearing ClosureTurf platform enables complete accessibility for installation, maintenance and replacement of PV panels.









ClosureTurf's proven technology is working hard for these landfills.

Industrial Ash and Sludge Lagoon, Southeast USA

- Saved 20 acres of land from destruction for borrow.
- Created a 70-acre watershed of clean runoff.
- Unique lightweight construction allowed for closure on soft, weak subgrade.

Crazy Horse Landfill, Salinas, CA

- Eliminated 26,000 truck trips for soil borrow (equivalent to 660,000 miles).
- Combination of soil import elimination and reduced heavy equipment needs reduced the project's carbon footprint by 70%.
- Eliminates dirty storm water run-off by replacing cover soils with a cover system that produces very clear and clean water free of fertilizer and muddy runoff.
- Provided the perfect foundation for solar panel racking system.
- Eliminated slope veneer failures high seismic loads (site is adjacent to San Andreas Fault).

LaSalle Landfill, Jena, LA

- Endured more than 330 inches of rainfall since installation in 2008.
- Survived a tornado when 70 mph winds hit across the front of landfill.
- Sand infill remained in place with no erosion when a levee broke releasing 5 acres of water across the turf.
- Eliminated annual slope rebuilding—a savings of over $300,000 to date.

Timber Ridge Landfill, Richwoods, MO

- Proprietary ClosureTurf system collected 500 SCFM of gas over a ten-acre closure with no vertical wells.
- Winner of the International Achievement Award for combined gas collection and closure system.
- Winner of the Solid Waste Association of North America (SWANA) Gold Excellence Award for landfill gas collection.

Based on these and other successes, ClosureTurf exceeds requirements of EPA Subtitle D and has been approved and installed in many states.

AFFILIATIONS:

Geosynthetic Institute (Partner)

Georgia Tech Research Institute (Partner)

Industrial Fabrics Association International (Member)

Colorado State University–Engineering Research Center (Partner)

CLOSURETURF IS TESTED IN ACCORDANCE WITH:

GTRI-SSWT - Aerodynamic Shear & Uplift
CSU USACE - Hydraulic Shear - Levee Overtop Simulation
ASTM D5261 - Mass per Unit Area
ASTM D4632 - Grab Tensile Properties
ASTM D4595 - Wide-Tensile
ASTM D2256 - Tensile and Elongation
ASTM D4716 - Hydraulic Transmissivity
ASTM D5321 - Interface Shear
ASTM D6460 - Large Scale Channel Hydraulics
ASTM D6241 - CBR Puncture
ASTM D6459 - Infill Stability
ASTM D4884 - Seam Strength
G147(02) & G145/G7 - UV Resistance & Stability
ASTM D7277/7276 Steady State Hydraulic Overtopping
UL94 Modifiers - Flammability



ClosureTurf™

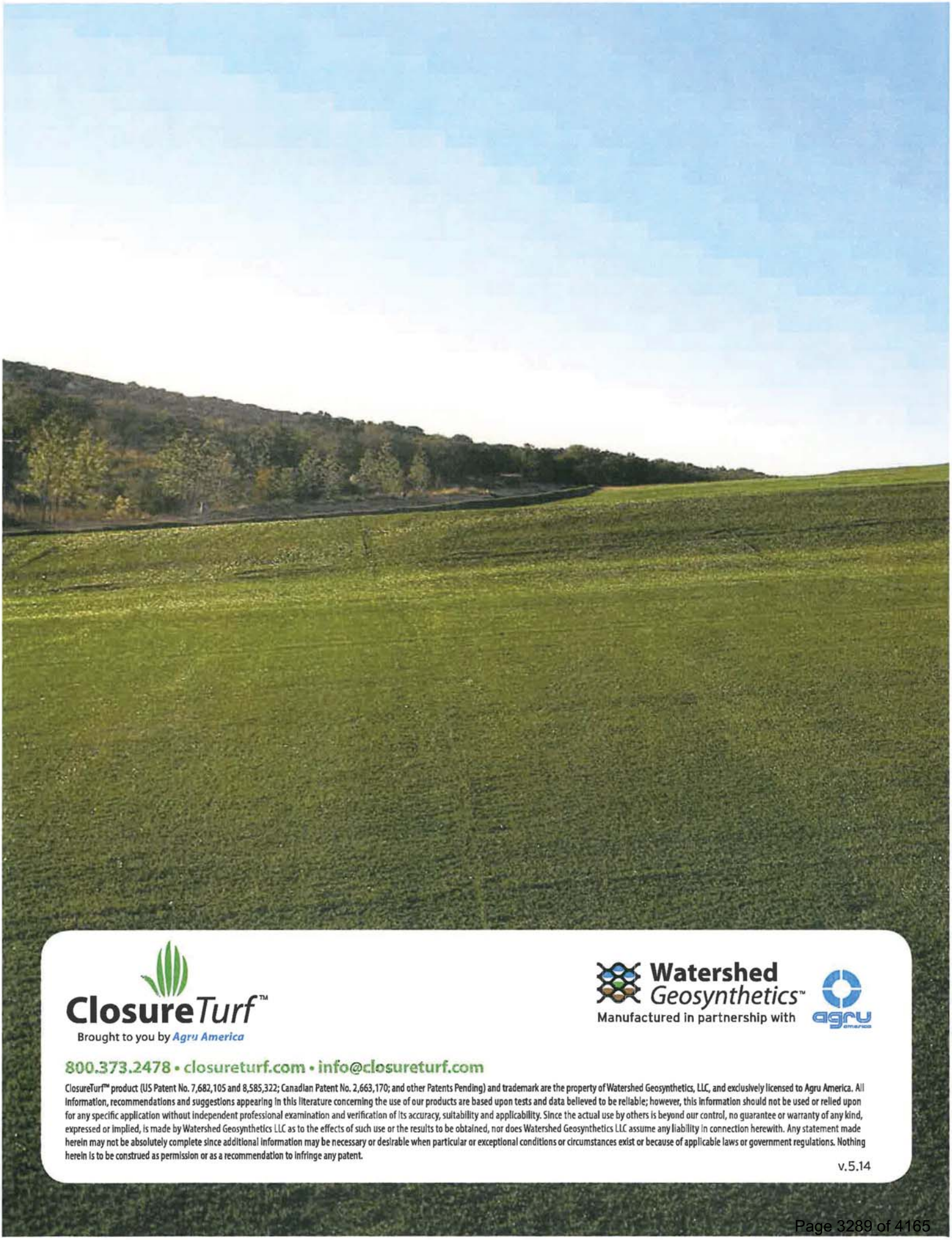
The cost-efficient, compliance-driven, environmentally-friendly landfill solution.

With slope erosion and vegetative maintenance an ongoing battle, and compliance issues ever looming, choose the cover solution designed to eliminate the most common problems associated with landfill management.

ClosureTurf is specifically designed to solve soil erosion, slope instability, gas emissions, and high costs of installation and maintenance. Discover the solution that makes your job a lot easier, keeps you compliant and makes you look good in the process.

For more information on ClosureTurf, visit closureturf.com, email us at info@closureturf.com or call 800-373-2478.

ALL ClosureTurf COMPONENTS ARE PROUDLY MADE IN THE USA.



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Brought to you by Agru America

Watershed Geosynthetics™
Manufactured in partnership with agru america

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ClosureTurf™

Brought to you by Agru America

U.S. Patent Nos. 7,682,105 & 8,585,322 • Canada Patent No. 2,663,170 • Other Patents Pending

Over 13 million square feet and closing...

ClosureTurf PERFORMS IN REAL WORLD SITUATIONS.



ClosureTurf™ ensures fast, cost-efficient and environmentally-friendly erosion control—even in some of the toughest applications.

ClosureTurf™ is a three component system comprised of an impermeable, highly transmissive structured geomembrane, a specialized engineered turf, and sand infill. The structured geomembrane component is the foundation of the system and provides for the highest interface friction values available in the market. The engineered turf component is placed on top of the geomembrane giving the system its natural look and feel of a grass while protecting the geomembrane component from extreme weather conditions for the long term. Finally, the sand infill placed in the engineered turf enables the system to be trafficked, while also providing for additional protection and an additional factor of safety against weathering. A virtually maintenance free technology designed to last, ClosureTurf has proven to be the most sustainable closure option available for the waste industry. See how ClosureTurf performs in some of the most demanding applications.

1

LASALLE-GRANT LANDFILL

QUICK STATS

Location: Jena, LA
Completed: 2009
Owner: Progressive Waste Solutions
Size: 9 acres



PROJECT SCOPE

The soil of the LaSalle-Grant Landfill in central Louisiana was highly erodible, had a high plasticity index, and had a natural pH of 4.0, so its characteristics weren't conducive to side slope maintenance. In fact, every spring the existing vegetative slopes required slope repair, reseeding and liming in order to remain intact. Pressure to find a more stable solution led the operator to implementing Closure Turf's 43 degree interface friction technology, which is more than a 3.0 factor of safety against sliding failure, over 10 acres of the landfill.

2

CRAZY HORSE LANDFILL

QUICK STATS

Location: Salinas, CA
Completed: 2013
Owner: Progressive Waste Solutions
Size: 68 acres



PROJECT SCOPE

Situated adjacent to the San Andreas Fault in California, the Crazy Horse Landfill in Salinas, CA, required a solution that would enable capping without modifying steep slopes of 2.25H:1V. And, since most available borrow soil was expensive and environmentally impacted with agricultural chemicals, the site was especially challenged in producing surface water quality that met the regulations. The 65-acre landfill is also situated in a residential area that demanded a final cover system that was aesthetically-pleasing and not subjected to on-going erosion and maintenance noise.

3

TIMBER RIDGE LANDFILL

QUICK STATS

Location: Richwoods, MO
Completed: 2010
Owner: Progressive Waste Solutions
Size: 10 acres



PROJECT SCOPE

Due to its location in a seismic area, concerns over slope stability that could compromise gas collection and containment was a major concern for this landfill. The lack of quality borrow soil and the high cost of procuring it made a ClosureTurf system an easy choice. Likewise, gas collection using deep wells would drastically increase installation costs and compromise speed of closure. A system that could perform effectively without deep vertical wells was greatly advantageous.

4

HARTFORD LANDFILL

QUICK STATS

Location: Hartford, CT
Completed: 2013
Owner: Connecticut Resources Recovery Authority
Size: 38 acres



PROJECT SCOPE

The vision that the owner had for the Hartford Landfill was one where they would be able support the initiatives to promote renewable energy that were consistent with both the CTDEEP and the City of Hartford, CT. ClosureTurf enabled them to do just that, by providing for the best closure technology available and is capable of incorporating traditional rigid or flexible solar photovoltaic panels.

RESULTS

Operators quickly learned of Closure Turf's ability to provide long-term erosion control as the system controlled rainfall runoff in excess of 4 inches per hour at times during it's first year in action. In fact, the system has endured more than 300 inches of rainfall since 2008. And, three months after phase one of the project was completed, a tornado producing shear winds of 70 mph hit across the front of the landfill without damaging the turf cap. Finally, the LaSalle sand infill remained in place with no erosion when a levee broke, releasing water over 5 acres of the project area.

The Closure Turf system requires no mowing, little maintenance, and has remained in tact even under the most extreme weather conditions. Low maintenance costs can relate to significant savings over the 30 year post closure period. Best of all, soil erosion, water infiltration, leachate reduction and fugitive gas emissions were immediately controlled once the ClosureTurf system was installed.

"We'd been killing ourselves working and reworking our slopes, but after we installed the Closure Turf system we didn't have to do anything to it again. The grass looks great, the sand hasn't moved and there's no erosion."

Delaney Lewis,
District Landfill Manager,
IESI Corp, A Progressive Waste Solution Company

RESULTS

Installation of the ClosureTurf system was successfully achieved with currently developed slopes under earthquake loading, eliminating 11,000 round trip truck loads (equivalent to 660,000 miles) that would have been required for soil borrow. The combination of soil import elimination and reduced heavy equipment needs reduced the project's carbon footprint by 70%.

ClosureTurf eliminated dirty storm water runoff by replacing a traditional vegetated cover with a cover system that produces very clear and clean water free of fertilizer and muddy runoff. In addition, ClosureTurf eliminated slope veneer failures from high seismic loads and reduced yearly maintenance activities for the SVSWA to essentially zero. These would have included rebuilding slopes because of erosion, revegetation, dust control efforts, mowing of weeds and grasses to reduce fire danger, and controlling rodent populations.

"We've been extremely impressed with the stability of our slopes and quality of the water runoff. Plans now include a 2 mega-watt solar array system down the road, which will mean this land will produce renewable energy source that gives back to the environment."

Dave Meza, P.E.
Project Manager
Salinas Valley Solid Waste Authority

RESULTS

ClosureTurf's patented system precluded the need for gas wells or piping. This resulted in a cost savings of $15,000 per acre that would have been required for installing deep gas wells. ClosureTurf's structured membrane reduces oxygen in the system that results in higher quality methane gas to be vented for flaring or alternative energy generation.

Under the ClosureTurf system, the gas rises to the surface due to positive pressure and generates little condensate to be collected and managed. The Timber Ridge system is consistently venting 500 SCFM of gas over a ten-acre closure with no vertical wells. This achievement has resulted in Timber Ridge winning an International Achievement Award for a combined gas collection and closure system and the Solid Waste Association of North America (SWANA) Gold Award for landfill gas collection in 2012.

"Capturing 100% of methane has provided options for carbon credits and given us more fuel to burn for generating energy. As soon as an area is closed, all emissions can be controlled which is great. And, the structured membrane protects against oxygen infiltration, eliminating that as a fire pathway."

Mike Freisen, P.E.
Regional Engineer
IESI Corp, A Progressive Waste Solution Company

RESULTS

ClosureTurf was selected for use by the owner for the following reasons: ClosureTurf's geomembrane component had a proven track record in landfill closure applications, the engineered turf with sand infill was durable and strong protecting the underlying geomembrane from ultraviolet degradation while also enabling the system to be driven across by light rubber tire vehicles without damaging the SGN required for normal solar field operations. As the best long-term solution for Hartford, ClosureTurf also provided for an aesthetically-pleasing environment in a high-profile area.

Other successful installations:

Industrial Sludge and Ash Lagoon
- **Location** Rincon, GA
- **Completed** 2013
- **Owner** GA Pacific
- **Size** 70 acres

Weatherford Landfill
- **Location** Weatherford, TX
- **Completed** 2010
- **Owner** Progressive Waste Solutions
- **Size** 8.5 acres

Berkeley County Landfill
- **Location** Moncks Corner, SC
- **Completed** 2013
- **Owner** Berkeley County
- **Size** 12 acres

Lanchester Landfill
- **Location** Narvon, PA
- **Completed** 2013
- **Owner** Chester County
- **Size** 7 acres

Tangipahoa Parish Solid Waste Facility
- **Location** Independence, LA
- **Completed** 2013
- **Owner** Tangipahoa Parish Government
- **Size** 22 acres

Timberlane Landfill
- **Location** Oakdale, LA
- **Completed** 2011
- **Owner** Progressive Waste Solutions
- **Size** 4 acres

Saufley Landfill
- **Location** Pensacola, FL
- **Completed** 2012
- **Owner** Escambia County
- **Size** 22.5 acres

Sandtown Landfill
- **Location** Sandtown, DE
- **Completed** 2013
- **Owner** Berkeley County
- **Size** 4 acres

Bi-County Landfill
- **Location** Woodlawn, TN
- **Completed** 2013
- **Owner** Montgomery County
- **Size** 5 acres

B&W Pantex Landfill
- **Location** Amarillo, TX
- **Completed** 2013
- **Owner** Department of Energy, EPA Region 6
- **Size** 5 acres

Contact Agru America for information on other successful ClosureTurf™ landfill applications across the U.S.

ClosureTurf delivers superior performance.

ClosureTurf was specifically designed to address and solve erosion, slope integrity, gas emissions, installation and maintenance cost control, EPA regulation compliance, and longevity of structure and appearance. Discover the solution that delivers on its promises. Choose ClosureTurf.

For more information on ClosureTurf, visit closureturf.com, or email us at info@closureturf.com or call 800-373-2478.

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Brought to you by Agru America

Engineering Report

ClosureTurf™ has been extensively tested in the lab and in "real-world" applications for performance and durability.

The goal was to produce a system that performs better than current "Subtitle D" requirements and can resist the many common failure modes of today's closure covers. Traditional approaches to landfill closure have customarily involved the use of a vegetative cover. However, many of these cover systems have failed as a result of excessive erosion, gas pressure buildup, earthquake loads, poor maintenance and inadequate oversight procedures after site closure.

In response to numerous failures of these closure systems and associated rising costs, engineers have looked at new approaches in establishing a more stable and environmentally sound solution. An old solution to address cover failures and the associated environmental impacts is the implementation of exposed geomembranes. However, exposed geomembrane systems are still costly to maintain, are not wind resistant, and do not provide for an aesthetically pleasing solution. For these reasons, many state agencies do not grant final cover status to exposed geomembrane cover systems. After all, the geomembrane is still exposed to the elements for the entire duration of the application. The best approach still involves covering and protecting the underlying geomembrane, however instead of using two feet of soil to do it, it can be done with a specialized tufted geotextile ("engineered turf"), infilled with sand that has been engineered to perform better than the traditional soil cover.

Combining an engineered turf infilled with sand and a highly transmissive structured geomembrane forms a system known as ClosureTurf. The next generation closure system, ClosureTurf has proven to be environmentally protective and more stable than traditional vegetative/soil solutions as a cover system.

The engineered turf technology was originally developed for professional sports venues. Over the last decade the market has expanded greatly and technology has improved dramatically. The latest generation of polyethylene material now provides excellent residual strength and color durability against UV light.

By combining the newest technology of engineered turf with a 50 mil thick geomembrane that has the highest interface friction available in the market, and adding approximately a 0.5 inch of sand for infill, the ClosureTurf system is quickly becoming the preferred choice among the engineering community for covering landfills, mines, industrial waste sites, and CCR storage areas. The product is proven to significantly outperform current closure methods while allowing engineers to deliver a sound solution with net savings to their clients.

The driving performance criteria for the product are stability, transmissivity and durability. These criteria serve to mitigate LFG emissions and liquid infiltration for a duration that extends well beyond the post-closure period. The graphs and charts represent a summary of the performance.

U.S. Patent Nos. 7,682,105 & 8,585,322
Canada Patent No. 2,663,170
Other Patents Pending

Stability

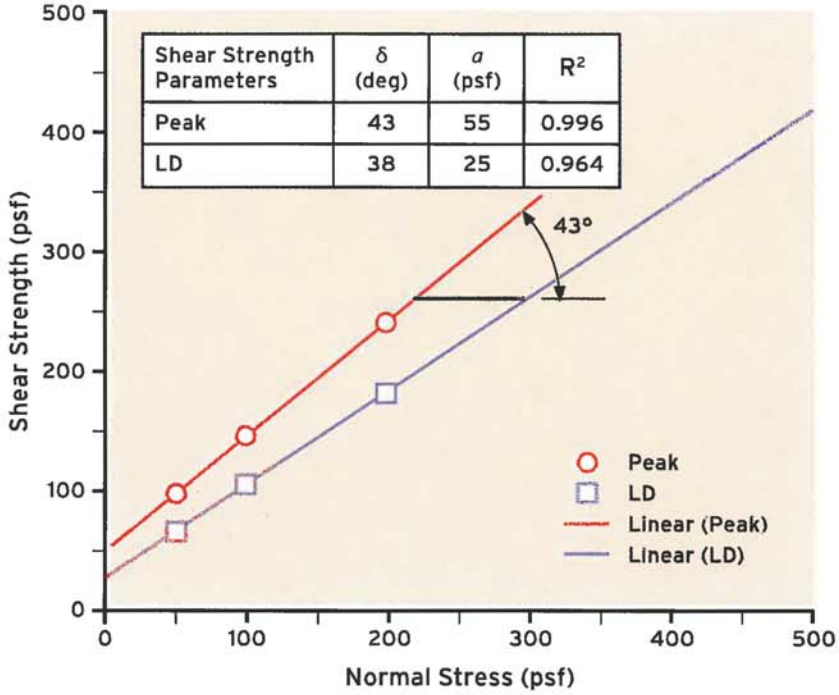
On landfills and mine piles, sliding of the soil cover along steep side slopes is of primary concern, particularly after major storm events. During a rain event, **the rainfall will penetrate quickly through the sand infill and drain directly in the drainage system below avoiding sand erosion and maintaining stability** of the sand infill. **"The infill is also held in place by the unique structure of the engineered turf** that traps the sand to anchor and ballast the engineered turf to the surface it covers. Note that:

- **ClosureTurf™ can be placed on very steep slopes**
- **Tests indicate 43 degrees interface friction value**
- **The slope stability safety factor can be calculated from the chart using the equation:**

  SF= tan φ/tan α

ClosureTurf System Interface Evaluation

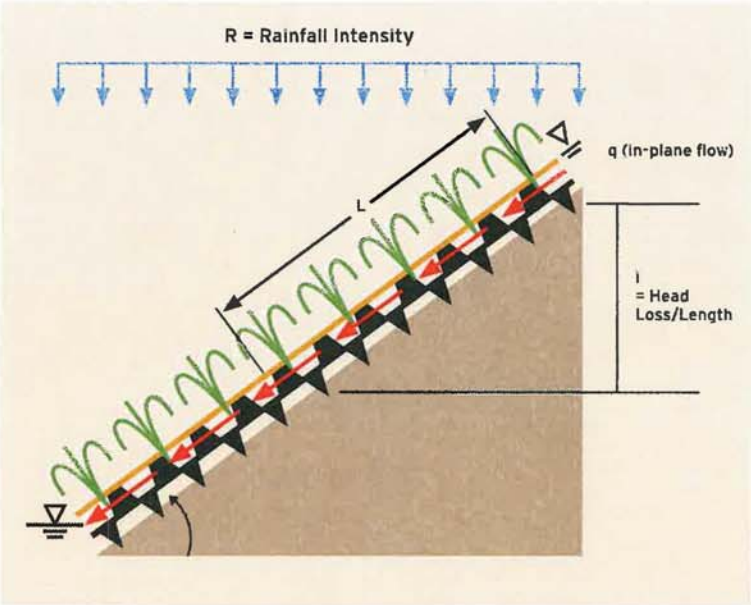
Slope angle	Slope	SF
34	1.5H: 1V	1.4
27	2.0H : 1V	1.9
18	3.0H: 1V	2.8
14	4.0H: 1V	3.7

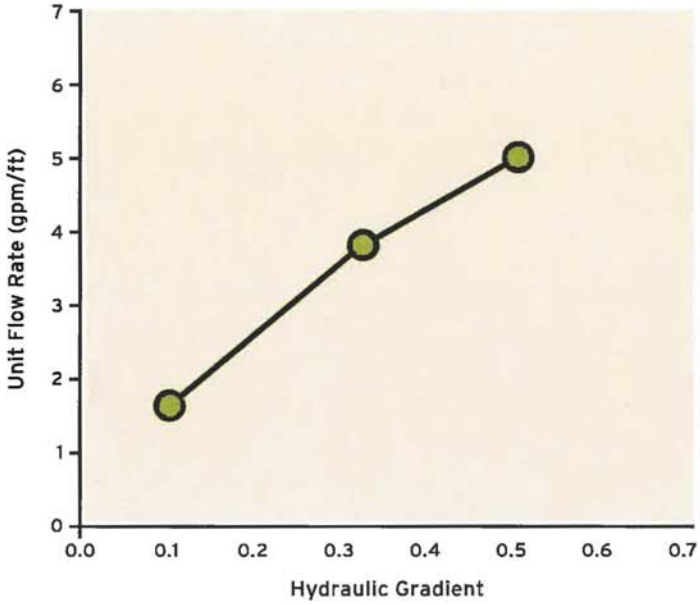


Drainage

ClosureTurf™ sand infill material is **stable on steep slopes under severe weather conditions.** The stability of the sand infill is controlled by the following product characteristics:

- **Percolation/Permeability**
- **Transmissivity**
- **Sand friction**
- **Grass interlocking grid**
- **Sand gradation**



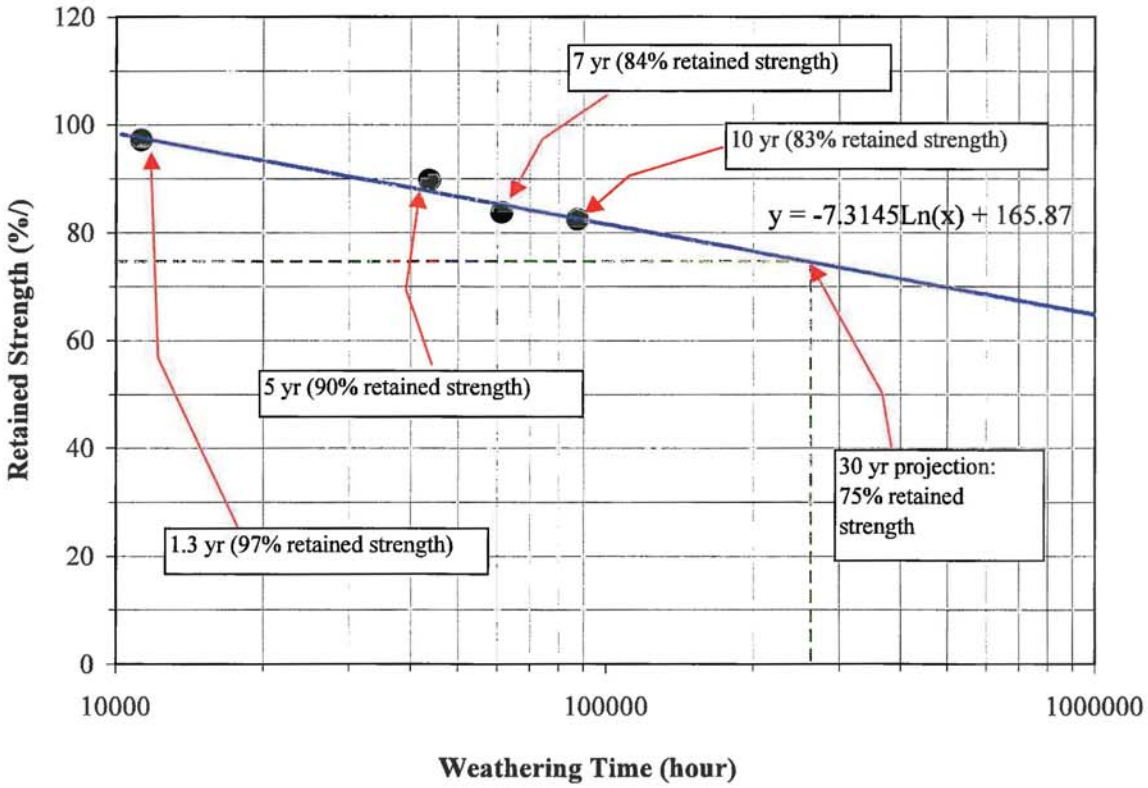


ClosureTurf was designed with the above characteristics in mind. The sand infill can handle **over six inches per hour of rainfall intensity without erosion** when applied on 3H:1V slopes.

Rainfall penetrates quickly through the sand and into the structured drain liner below which has a very high transmissivity. The energy that could cause erosion is on the structured geomembrane and not on the surface of the sand. The transmissivity is presented in the graphic at left.

Weathering

Weathering Resistance For a Long Life



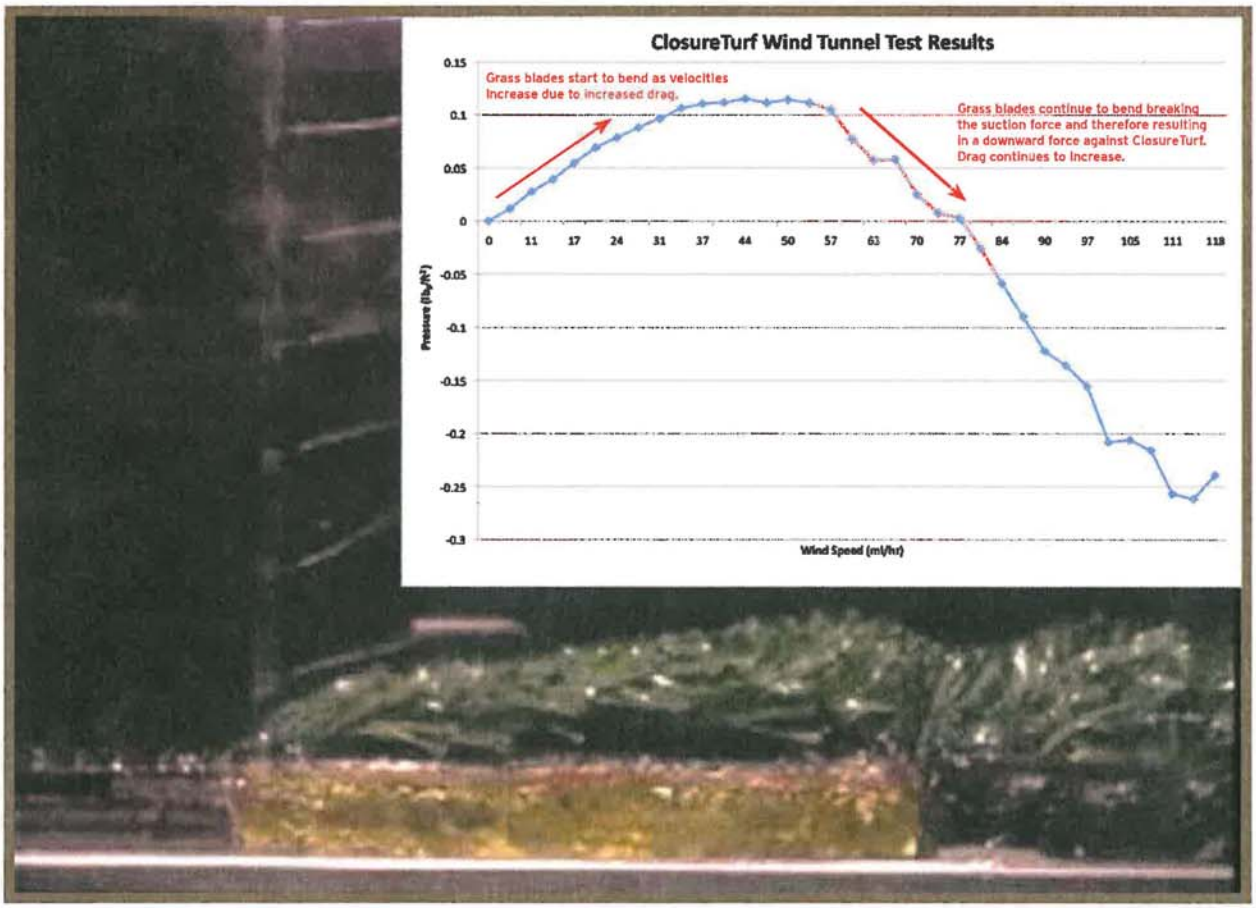
ClosureTurf™ is designed to provide weathering resistance and geomembrane protection when exposed to the **most extreme conditions.** Based on independent, real-world weathering tests performed at Atlas Material Testing Laboratories in New River, AZ. The tensile strength of the engineered turf fibers is projected to have 75% retention after 30 years. This means that with typical traffic loading forces, the material can provide over **four times the strength required after thirty years of extreme heat and UV exposure.** Based on the testing data collected and shown in the graph above, and data from many existing ClosureTurf projects, the system can **provide decades of reliable performance beyond the standard thirty-year post-closure maintenance period.**

Wind Uplift Resistance

Wind Tunnel Testing at GTRI

Since all exposed geomembranes are susceptible to damage from high winds, the technology must withstand these forces. A study was performed on the wind uplift reactions by Georgia Tech Research Institute. To complete their evaluation wind tunnel testing was performed. The ClosureTurf™ product indicated no uplift when exposed to 120 mph winds. This is in contrast with exposed geomembrane systems where extensive anchoring is required even for 30 mph winds.

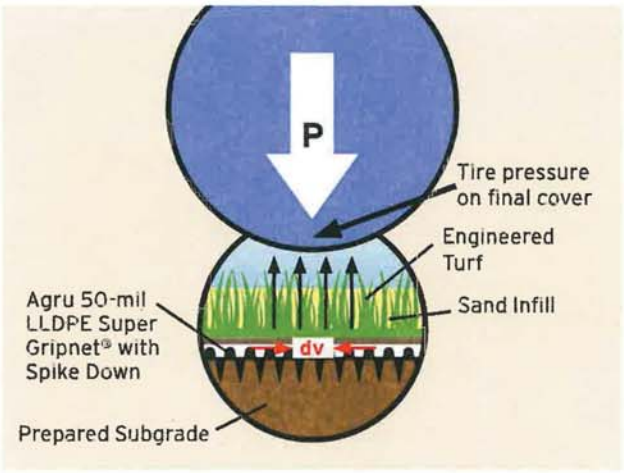
ClosureTurf technology provides features that help mitigate the forces of wind, such as a porous surface to break vacuum and engineered turf blades that will increase the aerodynamic boundary conditions and blades bending and reacting against the wind causing a resistance to the uplift.



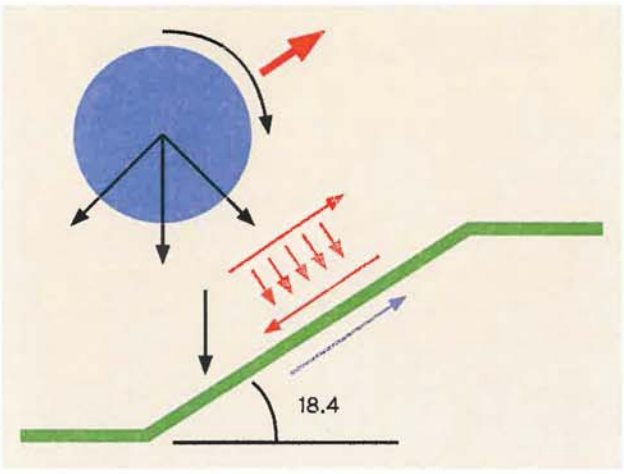
Drivability

Gas system monitoring locations or wells in the landfill will have to be accessed by persons on foot or in vehicles. The typical exposed geomembrane closures, being fully exposed, would likely be damaged during access. Further, the geomembrane can be damaged by birds or other animals. All such damage to the geomembrane would have to be continually repaired and replaced at additional costs after construction. The ClosureTurf™ is thicker, covered with sand infill that not only ballast the system but also allows for access of a 60 psi tire pressure vehicle on 3:1 slopes and up to 90 psi tire pressure in flatter areas without being susceptible to damage.



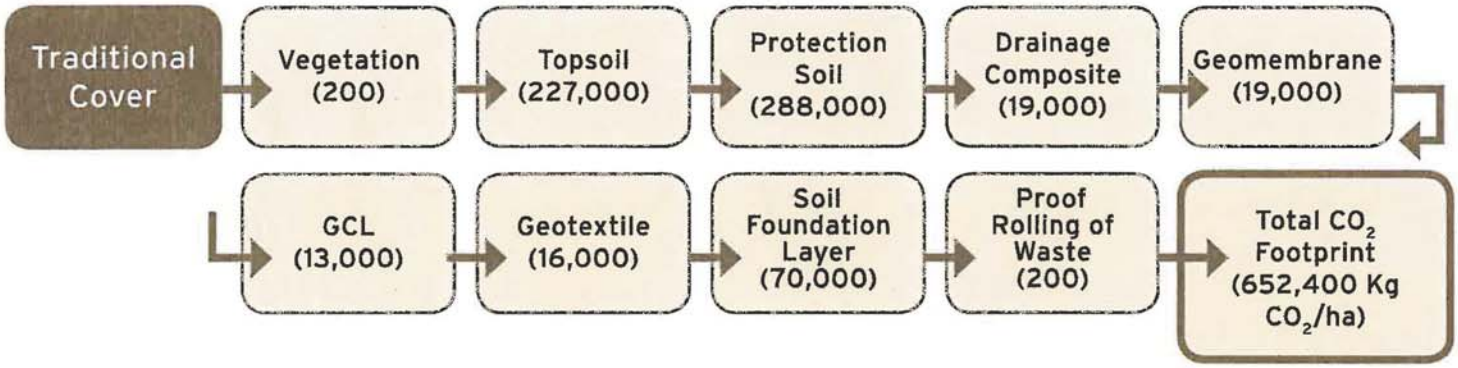


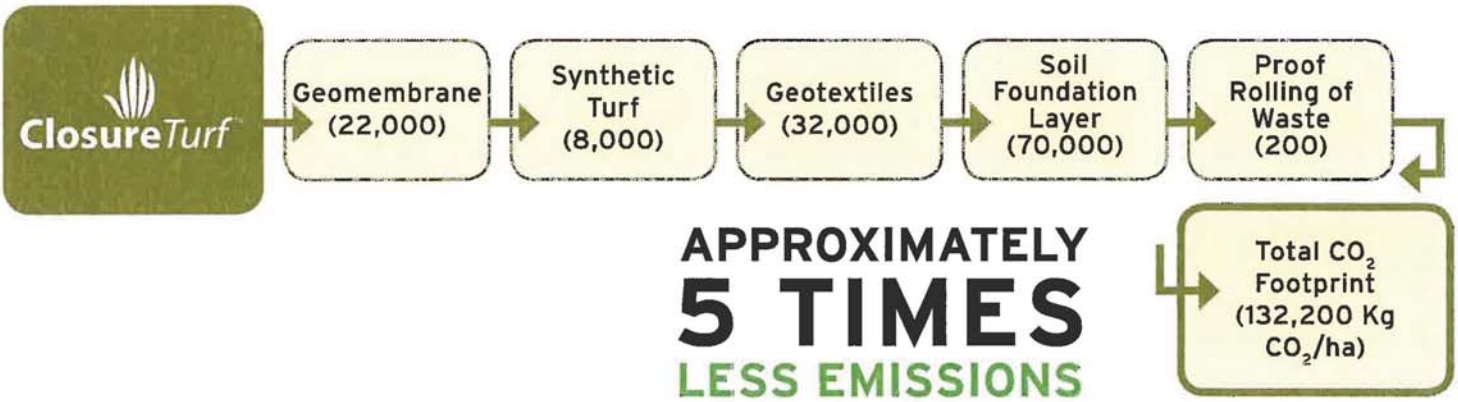




Sustainability

CO_2 Footprint: Traditional vs. ClosureTurf™*





APPROXIMATELY
5 TIMES
LESS EMISSIONS

* Source; Koerner, R., "Traditional vs. Exposed Geomembrane Landfill Covers–Cost and Sustainability Perspectives," Geosynthetic Magazine, October 2012



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Watershed Geosynthetics™

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v.5.14



ATTACHMENT 3

FINAL COVER STABILITY ANALYSIS

FINAL COVER STABILITY ANALYSIS
UKIAH LANDFILL CLOSURE
February 2015

WASTE MASS SLOPE STABILITY

A stability and seismic hazards analysis has been performed for the final closure of the Ukiah Landfill and is presented in the JTD Final Closure Plan (EBA, 2008). A summary of the static stability and seismic response of the final landfill waste mass configuration presented in the JTD is as follows:

- A seismic hazards analysis concluded that the design earthquake is a Maximum Credible Earthquake (MCE) with an estimated magnitude 7.1Mw occurring on the Maacama Fault, resulting in an average peak bedrock acceleration of 0.66g derived from multiple attenuation relationships.

- Slope stability of the entire waste mass was modeled by evaluating failure mechanisms passing through refuse and the base of the landfill and indicate a static factor of safety greater than 1.7 for failure through the base of the landfill.

- Pseudo-static analyses performed to determine the yield acceleration (Ky) and evaluate the stability of the waste mass under seismic conditions was also performed. The yield acceleration calculated for the entire waste mass was 0.13g.

- Seismic displacement analyses using the program YSLIP_PM (Matasovic, 1997) indicate that permanent seismically induced displacements will be less than 8 inches for failure through the base of the landfill.

FINAL COVER SYSTEM SLOPE STABILITY

The shear strength of the various interfaces present in the proposed alternative final cover system were evaluated and the resulting static and psuedo-static slope stability analyzed. The design characteristics of the current proposed alternative final cover system includes the following components (in descending order):

- An engineered synthetic turf cover with sand infill ballast.

- A linear low-density polyethylene structured geomembrane liner

- A landfill gas pressure relief layer consisting of strip drains, pressure relief values, and associated collection piping components; and

- A 12-inch-thick (minimum) foundation layer moisture conditioned and compacted to 90 percent relative compaction.

Shear Strength Properties

Geosynthetic material interfaces, whether between two geosynthetic materials or between a geosynthetic and native or compacted soil material are typically the weakest interfaces in a final cover system, causing block-type or wedge failures to occur. Table 1 presents the shear strength properties use in the slope stability analysis

Table 1
Slope Stability Properties and Stability Results

INTERFACE[1]	FRICTION ANGLE (Φ°)	COHESION/ADHESION (PSF)	STATIC (FS)[4,5]	PSEUDO-STATIC (FS)[4,5]	SEISMIC PERMANENT DISPLACEMENT (Inch)
Foundation Soil/LLDPE	32°[2]/28°[3]	3[2]/3[3]	2.8[3]	1.0[3]	<1
Internal shear strength[(6)]	35°[3]	3°[3]	3.3[3]	1.2[3]	<1

(1) LLDPE= linear low-density polyethylene geomembrane;
(2) Peak shear strength
(3) Post-peak shear strength (large displacement)
(4) Factor of Safety
(5) For maximum sideslope of 2:1 (26.5°)
(6) Interface of combined geosynthetic components (LLDPE/turf/sand ballast)

Stability Analysis

Slope stability of the proposed final cover system was modeled using the infinite slope method. This method provides a conservative approach to the evaluation of the stability of shallow failures of constant thickness along a defined interface. This method assumes the failure block is infinitely long and neglects resisting forces at the toe and along the sides. Analyses were performed for a LLDPE geomembrane/artificial turf with sand infill ballast cover system using a critical slope angle of 26.5 degrees (2H:1V).

The stability analysis was performed using a spreadsheet based on the principles and equations of the infinite slope stability analysis. Results of the infinite slope stability analysis indicate a minimum static factor of safety of 2.8 for failure at the LLDPE/subgrade interface and a minimum static factor of safety of 3.3 for failure above the LLDPE geomembrane (see Table 1). Spreadsheet files and equations used in the analysis are appended to this technical memorandum.

A pseudo-static analysis was performed to determine the yield acceleration (K_y) for the cover. The yield acceleration was determined using a trial and error procedure in which the seismic coefficient was varied until a factor of safety of 1.0 was obtained. The lowest yield acceleration calculated for the LLDPE geomembrane/artificial turf cover system was 0.70g. Because the maximum horizontal acceleration of 0.66g predicted by the site response analysis does not exceed the calculated yield acceleration, permanent seismic displacements of the LLDPE

geomembrane/artificial turf cover system are highly unlikely. The stability of slopes subject to seismic loading conditions can be further evaluated in terms of permanent displacements (deformations) that are expected to occur. The Newmark Method (1965) is commonly used to evaluate slopes under seismic loading conditions. The method evaluates the stability of slopes in terms of permanent deformations that result when seismically induced ground accelerations exceed the yield acceleration of the slope mass. The total amount of slope deformation is estimated by summing only the down-slope displacements that occur during each brief period of time when the yield acceleration of the slope mass is exceeded. As stated above, a pseudo-static analysis of the site determined that the yield acceleration is not exceeded by seismically induced strong ground motions, therefore no permanent displacements of the final cover system are predicted by the Newmark Method.

CONCLUSIONS

Results of the slope stability analysis using the infinite slope method indicate a minimum factor of safety of 2.8 for failure of the cover system utilizing a LLDPE geomembrane/artificial turf engineered alternative cover system constructed on maximum 2H:1V slopes under static conditions. These results suggest that the final landfill configuration will be stable throughout the postclosure maintenance period following closure in accordance with the Final Closure Plan Drawings and Technical Specifications.

The yield acceleration calculated for failure of the cover system is greater than the PGA predicted by the site response analysis, indicating that permanent seismic displacements of the LLDPE geomembrane/artificial turf cap are highly unlikely.

REFERENCES

EBA Engineering, 2008, *Joint Technical Document for City Of Ukiah Landfill Mendocino County, California;* January 2008, EBA Engineering, Santa Rosa, CA.

Makdisi, F.I. and Seed, H.B., 1978, *Simplified Procedure for Estimating Dam and Embankment Earthquake-Induced Deformations*, Journal of the Geotechnical Engineering Division, American Society of Civil Engineers, Vol. 104, No. GT7, July 1978.

Matasovic, N., 1997, *YSLIP_PM, A computer program for simulation of dynamic behavior of a rigid block on an inclined plane and calculation of permanent displacement of the block*, April 1997.

Newmark, N.M., 1965, *Effects of Earthquakes on Dams and Embankments, Fifth Rankine Lecture*, Geotechnique, Vol. 15, No. 2, 139-160.

LIMITATIONS

The conclusions presented in this technical memorandum are qualitative judgments based on a limited amount of quantitative testing performed at the time and sample locations. They are intended only for the indicated purpose and project site. Conclusions and recommendations

presented herein apply to site conditions existing at the time of our study and at those points were samples were collected. Services performed by EBA Engineering have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession practicing in the same locality under similar conditions at the time the services were provided. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this report or in any opinion or document.

EBA Engineering,



Damon Brown, PG, CEG, CHg
President

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
Subgrade Soil Against LLDPE Microspike
Static Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	110.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	28.0 °	tan ø =	**0.5317**
seismic coeff.	K_h =	0.00		
driving stress	τ =	**1.7570** PSF		
normal stress	σ =	**3.5240** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**3.5240** PSF		
resisting stress	S =	**4.8737** PSF		

Factor of Safety FS = 2.77

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
Subgrade Soil Against LLDPE Microspike
Pseudo-static Conditions

soil depth	z =	0.04	ft		
fraction sat.	m =	0.00		cos ß =	**0.8949**
slope angle	ß =	26.5	°	sin ß =	**0.4462**
				tan ß =	**0.4986**
soil unit. wt.	γ =	110.0	PCF		
cohesion	c' =	3	PSF		
friction angle	ø' =	28.0	°	tan ø =	**0.5317**
seismic coeff.	K_h =	0.66			
driving stress	τ =	**4.0828**	PSF		
normal stress	σ =	**2.3644**	PSF		
pore pressure	u =	**0.0000**	PSF		
effective stress	σ' =	**2.3644**	PSF		
resisting stress	S =	**4.2572**	PSF		

Factor of Safety FS = 1.04

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
LLDPE Microspike Against Turf
Static Saturated Conditions

soil depth	z =	0.04	ft		
fraction sat.	m =	0.00		cos ß =	**0.8949**
slope angle	ß =	26.5	°	sin ß =	**0.4462**
				tan ß =	**0.4986**
soil unit. wt.	γ =	100.0	PCF		
cohesion	c' =	3	PSF		
friction angle	ø' =	35.0	°	tan ø =	**0.7002**
seismic coeff.	K_h =	0.00			
driving stress	τ =	**1.5973**	PSF		
normal stress	σ =	**3.2036**	PSF		
pore pressure	u =	**0.0000**	PSF		
effective stress	σ' =	**3.2036**	PSF		
resisting stress	S =	**5.2432**	PSF		

Factor of Safety FS = 3.28

Infinite-Slope Stability Analysis with Parallel Seepage
City of Ukiah Landfill Final Closure
Geosynthetic Final Cover System
LLDPE Microspike Against Turf
Pseudo-static Conditions

soil depth	z =	0.04 ft		
fraction sat.	m =	0.00	cos ß =	**0.8949**
slope angle	ß =	26.5 °	sin ß =	**0.4462**
			tan ß =	**0.4986**
soil unit. wt.	γ =	100.0 PCF		
cohesion	c' =	3 PSF		
friction angle	ø' =	35.0 °	tan ø =	**0.7002**
seismic coeff.	K_h =	0.66		
driving stress	τ =	**3.7117** PSF		
normal stress	σ =	**2.1494** PSF		
pore pressure	u =	**0.0000** PSF		
effective stress	σ' =	**2.1494** PSF		
resisting stress	S =	**4.5050** PSF		

Factor of Safety FS = 1.21

ATTACHMENT 4

UPDATED CLOSURE AND POSTCLOSURE MAINTENANCE COST ESTIMATES

FINAL CLOSURE COST ESTIMATE WORKSHEET
CITY OF UKIAH LANDFILL

PROJECT DESCRIPTION

The information presented herein provides an itemized breakdown of costs to implement the final closure construction activities summarized in the Construction Drawings for the Final Closure of the City of Ukiah Landfill

PREPARED BY:	EBA ENGINEERING
GENERAL SITE INFORMATION	
Name of Solid Waste Landfill:	City of Ukiah Landfill
Solid Waste Facilities Permit No.:	23-AA-0019
Facility Operator:	City of Ukiah, Department of Public Works
Site Owner:	City of Ukiah, Department of Public Works
Site Location (CA coordinates, township & range or longitude/latitude, preferred)	SE 1/4, Section 10 Township 15 North, Range 12 West
Assessors Parcel Number:	178-130-010
Site Address :	3100 Vichy Springs Road Ukiah, CA

FINAL CLOSURE COSTS

1. Final Closure Costs			
a. Miscellaneous - Mobilization, Removal, Adjustment, Demolition	$	129,680	See Cost Estimate Worksheet - Item 1-13
b. Final Cover	$	6,752,703	See Cost Estimate Worksheet - Items 14-19, 33-39, 41
c. Drainage Facilities	$	552,908	See Cost Estimate Worksheet - Items 21-32
d. Access Roads	$	172,575	See Cost Estimate Worksheet - Item 20
e. Landfill Gas Extraction System	$	599,535	See Cost Estimate Worksheet - Items 42-68
f. Landfill Leachate Collection System Modifications	$	52,965	See Cost Estimate Worksheet - Items 69-73
g. Revegetation	$	27,000	See Cost Estimate Worksheet - Item 40
Contractor Bid Subtotal	$	8,287,366	
2. Design Support Engineering	$	15,000	
3. Construction Quality Assurance for Closure Construction	$	317,040	See Cost Estimation Backup
4. Landfill Structure Removal	$	-	Included in Above
5. Groundwater Monitoring Installations	$	-	None
6. Security	$	-	Included in Above
Final Closure Subtotal	$	8,619,406	
Final Closure Subtotal 20% Contingency	$	1,723,881	
TOTAL FINAL CLOSURE	$	10,343,287	

ENGINEER'S COST ESTIMATE
FINAL CLOSURE CONSTRUCTION
CITY OF UKIAH LANDFILL
August 14, 2015

ITEM No.	ITEM	UNIT	UNIT PRICE	QTY	TOTAL PRICE
1	Mobilization	LS	$ 100,000.00	1	$ 100,000
2	Adjust Existing Groundwater Monitoring Well to Grade	EA	$ 500.00	3	$ 1,500
3	Adjust Existing Leachate Wells to Grade	EA	$ 500.00	2	$ 1,000
4	Remove Existing CMP and HDPE Downdrains and Drain Outlets	LS	$ 5,000.00	1	$ 5,000
5	Remove Existing Leachate Piping	LS	$ 2,500.00	1	$ 2,500
6	Adjust Existing Leachate Manholes To Grade	EA	$ 1,000.00	5	$ 5,000
7	Install G5 Traffic Vault with Checker Plate Top	EA	$ 1,000.00	1	$ 1,000
8	Adjust Existing Gas Vault to Grade	EA	$ 500.00	2	$ 1,000
9	Install B2436 Gas Extraction Vault with Checker Plate Top	EA	$ 1,000.00	5	$ 5,000
10	Adjust Existing ARV and Vault to Grade	EA	$ 500.00	1	$ 500
11	Adjust Existing LFG Perimeter Monitoring Wells to Grade	EA	$ 500.00	4	$ 2,000
12	Remove Existing Fencing	LF	$ 2.00	90	$ 180
13	Structure Demolition	LS	$ 5,000.00	1	$ 5,000
14	Clearing and Grubbing	AC	$ 850.00	61.2	$ 52,020
15	Refuse Excavation and Relocation	CY	$ 10.00	13,500	$ 135,000
16	Refuse Disposal	TON	$ 120.00	75	$ 9,000
17	Sedimentation Basin Excavation	LS	$ 5,000.00	1	$ 5,000
18	Subgrade Preparation	SF	$ 0.10	1,937,730	$ 193,773
19	Fill (Foundation Layer and Engineered Fill)	CY	$ 3.50	114,500	$ 400,750
20	Access Roads	SF	$ 1.30	132,750	$ 172,575
21	Drain Inlets (4' x 4') Concrete	EA	$ 2,500.00	13	$ 32,500
22	Drain Inlets (2' x 2') Concrete	Ea	$ 1,000.00	5	$ 5,000
23	18" CMP Drain Pipe (Above Ground)	LF	$ 40.00	40	$ 1,600
24	18" CMP Drain Pipe (Buried)	LF	$ 55.00	120	$ 6,600
25	18" HDPE Drain Pipe (Buried)	LF	$ 55.00	1,733	$ 95,315
26	Sedimentation Basin Drainage Riser	LS	$ 2,500.00	1	$ 2,500
27	Type I Swale	LF	$ 1.50	735	$ 1,103
28	Type II Swale	LF	$ 6.00	7,965	$ 47,790
29	Type III Swale	LF	$ 35.00	5,540	$ 193,900
30	Drainage Channel Grading (excludes turf, geomembrane, hydrobinder)	LF	$ 10.00	2,685	$ 26,850
31	Grouted Riprap Outlets	EA	$ 2,000.00	6	$ 12,000
32	Loose Rock Riprap Inlets, Outlets, Channel Ends	SF	$ 35.00	3,650	$ 127,750
33	Erosion Control (Straw and Netting)	SF	$ 0.23	253,465	$ 58,297
34	Geomenbrane	SF	$ 1.05	1,937,730	$ 2,034,617
35	Geomembrane Surficial Strips	LF	$ 3.50	11,828	$ 41,398
36	Engineered Turf with 5/8" Sand Ballast Infill	SF	$ 1.90	1,817,870	$ 3,453,953
37	Engineered Turf with 2" Sand Ballast Infill	SF	$ 2.05	10,930	$ 22,407
38	Engineered Turf with HydroBinder Infill	SF	$ 2.65	108,930	$ 288,665
39	Engineered Turf/Geomembrane Anchor Trench	LF	$ 5.00	8,565	$ 42,825
40	Seeding and Fertilizing	AC	$ 2,500.00	10.8	$ 27,000
41	Temporary Erosion and Sediment Control	LS	$ 15,000.00	1	$ 15,000
42	Flare Station Concrete Slabs	CY	$ 800.00	11.5	$ 9,200
43	LFG Extraction Wells	VLF	$ 90.00	940	$ 84,600
44	Prefabricated Wellhead Assemblies	EA	$ 750.00	18	$ 13,500
45	Additional Borehole Setup	EA	$ 350.00	3	$ 1,050
46	Borehole Abandonment	VLF	$ 45.00	100	$ 4,500
47	LFG Collection Foot Assembly	EA	$ 800.00	56	$ 44,800
48	8" PVC Pipe and Fittings	LF	$ 16.00	12,195	$ 195,120
49	6" PVC Pipe and Fittings	LF	$ 15.00	179	$ 2,685
50	4" PVC Pipe and Fittings	LF	$ 14.00	500	$ 7,000
51	8" Isolation Valve	EA	$ 1,500.00	16	$ 24,000
52	6" Isolation valve	EA	$ 1,200.00	1	$ 1,200
53	8" Flexible Couplings	EA	$ 350.00	99	$ 34,650
54	6" Flexible Couplings	EA	$ 300.00	3	$ 900
55	Vacuum Test Ports	EA	$ 50.00	21	$ 1,050
56	Staked Pipe Supports	EA	$ 130.00	5	$ 650
57	Block Type Pipe Supports	EA	$ 50.00	1,300	$ 65,000

ENGINEER'S COST ESTIMATE
FINAL CLOSURE CONSTRUCTION
CITY OF UKIAH LANDFILL
August 14, 2015

ITEM No.	*ITEM*	*UNIT*	*UNIT PRICE*	*QTY*	*TOTAL PRICE*
58	Metal Frame Pipe Supports	EA	$ 130.00	5	$ 650
59	Buried Header Crossing	EA	$ 1,000.00	4	$ 4,000
60	Type 1 Road Crossing	EA	$ 2,500.00	4	$ 10,000
61	Type 2 Road Crossing	EA	$ 2,800.00	2	$ 5,600
62	2" HDPE Pipe and Fittings	LF	$ 15.00	2,110	$ 31,650
63	Condensate Drop Outs	EA	$ 2,000.00	6	$ 12,000
64	Condensate Discharge Points	EA	$ 1,000.00	6	$ 6,000
65	Flare Station Assembly	LS	$ 12,000.00	1	$ 12,000
66	Security Fencing	LF	$ 25.00	210	$ 5,250
67	Flare Station Aggregate Base	SF	$ 1.30	9,600	$ 12,480
68	Electrical and Telephone Feed	LS	$ 10,000.00	1	$ 10,000
69	12" Leachate Collection Piping	LF	$ 45.00	149	$ 6,705
70	6" Leachate Collection Piping	LF	$ 40.00	44	$ 1,760
71	Concrete Junction Boxes	EA	$ 2,000.00	3	$ 6,000
72	Leachate Sediment Chamber/Wet Well Lining	LS	$ 3,500.00	1	$ 3,500
73	Leachate UST	LS	$ 35,000.00	1	$ 35,000
	TOTAL				**$8,287,366**

LS	Lump Sum
CY	Cubic Yard
AC	Acre
SF	Square Feet
LF	Linear Feet
VLF	Vertical Linear Feet
EA	Each
PVC	Polyvinyl Chloride
HPDE	High-Density Polyethylene
LFG	Landfill Gas
UST	Underground Storage Tank

INSPECTION, TESTING AND REPORTING COSTS
CITY OF UKIAH LANDFILL

ITEM No.	ITEM	UNIT	UNIT COST	QTY	TOTAL COST	
DAILY INSPECTION, RECORDKEEPING & REPORTING						
1	EBA - Progress Meetings (incl. travel)	Day	$ 1,390.00	39	$ 54,210	Assumes 1 day per week for 39 weeks, 8 hrs. per day
2	EBA - Inspections (incl. travel)	Day	$ 1,070.00	39	$ 41,730	Assumes 1 day per week for 39 weeks, 8 hrs. per day
3	EBA - Administration	Day	$ 1,000.00	39	$ 39,000	Assumes 8 hrs. per week for admin., coordination
4	Daily Geotechnical Inspections (FL/EF)	Day	$ 1,000.00	46	$ 46,000	Assumes 2,500 CY/day for FL and EF material.
5	Daily Geomembrane Inspections	Day	$ 1,000.00	45	$ 45,000	Assumes 1 acre per day
6	Daily Engineered Turf Inspections	Day	$ 1,000.00	30	$ 30,000	Assumes 1.5 acre per day
7	Travel and per diem for Geotechnical and Geo./Turf Inspections	Trip	$ 150.00	75	$ 11,250	
8	Project Management for Geotechnical and Geo./Turf Inspections	Hr	$ 135.00	40	$ 5,400	
9	Final Construction Report	EA	$ 28,000.00	1	$ 28,000	
	SUBTOTAL (Daily Inspection, Recordkeeping & Reporting):				**$ 300,590**	
SAMPLING & TESTING PROGRAM						
1	ASTM D 638, Tensile Properties (Geomembrane)	EA	$ 70.00	19	$ 1,330	Assumes testing per every 100,000 SF
2	ASTM D 1505, Density (Geomembrane)	EA	$ 35.00	19	$ 665	Assumes testing per every 100,000 SF
3	ASTM D 1603, Carbon Black Content (Geomembrane)	EA	$ 35.00	19	$ 665	Assumes testing per every 100,000 SF
4	ASTM D 5596, Carbon Black Dispersion (Geomembrane)	EA	$ 25.00	19	$ 475	Assumes testing per every 100,000 SF
5	ASTM D 5994, Sheet Thickness (Geomembrane)	EA	$ 10.00	19	$ 190	Assumes testing per every 100,000 SF
6	ASTM D 6241, CBR Puncture (Turf)	EA	$ 70.00	19	$ 1,330	Assumes testing per every 100,000 SF
7	ASTM D 4595, Tensile Properties (Turf)	EA	$ 70.00	19	$ 1,330	Assumes testing per every 100,000 SF
8	ASTM D 96459, Rainfall Induced Erosion (Turf)	EA	$ 250.00	1	$ 250	Assumes testing one per lot
9	ASTM G 147, Fiber UV Stability (Turf)	EA	$ 35.00	19	$ 665	Assumes testing per every 100,000 SF
10	ASTM G 1545, Backing System UV Stability (Turf)	EA	$ 35.00	19	$ 665	Assumes testing per every 100,000 SF
11	ASTM D 7277, Hydraulic Overtopping (Turf)	EA	$ 250.00	1	$ 250	Assumes testing one per lot
12	ASTM D 4716, Transmissivity (Turf)	EA	$ 50.00	19	$ 950	Assumes testing per every 100,000 SF
13	ASTM D 5321, Internal Friction (Turf)	EA	$ 350.00	1	$ 350	Assumes testing per every 100,000 SF
14	ASTM D 6913, Sand Infill Gradation (Turf)	EA	$ 90.00	19	$ 1,710	Assumes testing per every 100,000 SF
15	ASTM D 5261, Yarn Weight (Turf)	EA	$ 35.00	1	$ 35	Assumes testing one per lot
16	ASTM D 2256, Tensile Strength of Yard (Turf)	EA	$ 70.00	1	$ 70	Assumes testing one per lot
17	ASTM D 422, Particle Size (FL/EF)	EA	$ 90.00	23	$ 2,070	Assumes testing per every 5,000 CY
18	ASTM D 1557, Moisture & Max. Relative Comp. (FL/EF)	EA	$ 140.00	23	$ 3,220	Assumes testing per every 5,000 CY
19	ASTM D 2487, Soil Classification (FL/EF)	EA	$ 10.00	23	$ 230	Assumes testing per every 5,000 CY
	SUBTOTAL (Sampling and Testing):				**$ 16,450**	
	TOTAL				**$ 317,040**	

Hr: Hour
EA: Each
FL: Foundation Layer
EF Engineered Fill

FINAL POSTCLOSURE MAINTENANCE COST ESTIMATE WORKSHEET
CITY OF UKIAH LANDFILL

PROJECT DESCRIPTION

The information presented herein provides an itemized breakdown of costs to implement postclosure maintenance activit for the City of Ukiah Landfill during the 30-year postclosure maintenance period.

PREPAREAD BY: EBA ENGINEERING

GENERAL SITE INFORMATION

Name of Solid Waste Landfill: City of Ukiah Landfill

Solid Waste Facilities Permit Number: 23-AA-0019

Facility Operator: City of Ukiah, Department of Public Works

Site Owner: City of Ukiah, Department of Public Works

Site Location (CA coordinates, township & range or longitude/latitude, preferred): SE 1/4, Section 10
Township 15 North, Range 12 West

Assessors Parcel Number: 178-130-010

Site Address: 3100 Vichy Springs Road
Ukiah, CA

FINAL POSTCLOSURE MAINTENANCE COSTS

1. Revegetation		
a. Regrading	$	1,185
b. Erosion Control	$	-
c. Reseeding	$	-
2. Leachate Management		
a. Leachate System Maintenance	$	2,600
b. Leachate/Condensate Disposal	$	690
c. Leachate Monitoring and Reporting	$	2,193
d. Leachate 5-year Constituents of Concern Testing (normalized to cost per year)	$	354
3. Environmental Monitoring		
a. LFG Collection System Operation, Monitoring and Maintenance	$	29,707
b. Annual Source Testing of Flare	$	3,860
c. AB32 Surface Emissions Monitoring and Reporting	$	11,632
d. Perimeter LFG Monitoring and Reporting	$	4,931
e. Perimeter Monitoring Probe Replacement (normalized to cost per year)	$	3,717
f. Perimeter Monitoring Probe Maintenance	$	299
g. Groundwater Monitoring and Reporting	$	41,998
h. Groundwater 5-year Constituents of Concern Testing (normalized to cost per year)	$	3,104

3. Environmental Monitoring *(continued)*		
i. Monitoring Well Replacement (normalized to cost per year)	$	5,724
j. Monitoring Well Maintenance	$	515
k. Surface Water Monitoring and Reporting	$	2,432
l. Surface Water 5-year Constituents of Concern Testing (normalized to cost per year)	$	365
4. Drainage Maintenance	$	2,720
5. Security	$	1,226
6. Inspection	$	3,152
7. Other		
a. 5-year Iso-Settlement Analysis (normalized to cost per year)	$	1,667
Final Postclosure Maintenance Subtotal	$	124,072
Subtotal x 30 years Postclosure Care	**$**	**3,722,158**

ATTACHMENT 5

UPDATED FINAL
POSTCLOSURE MAINTENANCE PLAN

FINAL
POSTCLOSURE MAINTENANCE PLAN

FOR

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

AUGUST 2015

Prepared for:

City of Ukiah
Department of Public Works
300 Seminary Avenue
Ukiah, CA 95482

Prepared by:

EBA Engineering
825 Sonoma Avenue
Santa Rosa, CA 95404

EBA Project No. 02-907

Mike Delmanowski, C.E.G., C.Hg.
Senior Hydrogeologist

CERTIFIED ENGINEERING GEOLOGIST
MICHAEL A. DELMANOWSKI
No. 1847
STATE OF CALIFORNIA

EBA ENGINEERING

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CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

FINAL POSTCLOSURE MAINTENANCE PLAN
27CCR, §21769(c)(2) and §21830

INTRODUCTION

The contents of this Final Postclosure Maintenance Plan (FPMP) for the City of Ukiah Landfill (Landfill) have been developed to comply with the requirements and applicable subsections set forth in 27CCR, §21180, §21190, §21769, and §21830. The following information describes the responsibilities and resources for carrying out postclosure maintenance upon closure. Specific inspection and maintenance activities are detailed in the subsequent sections.

Responsibilities

Maintenance responsibilities following landfill final closure will be assigned to the City of Ukiah Public Works Department (Public Works Department). The Public Works Department will be responsible for all inspection, maintenance and monitoring activities related to the Landfill such as:

- Final cover
- Drainage systems
- Final grading
- Landfill environmental control systems
- Emergency response

Resources

Current resources of the Public Works Department for inspection, maintenance and monitoring of the Landfill are as follows:

- *Technical Services Staff*:
  - Public Works Director/City Engineer (Registered Civil Engineer)
  - Deputy Director of Public Works (Registered Civil Engineer)
  - Engineering Technicians

- *Annual Maintenance Contracts*:
  - Gas control system

- *Annual Consultant Agreement for Environmental Monitoring and Consulting Services*:
  - Detection and corrective action monitoring systems
  - Gas monitoring system

EMERGENCY RESPONSE PLAN
27CCR, §21830(b)(1)

An Emergency Response Plan has been prepared for the Landfill in accordance with 27CCR, §21130 and is presented in Appendix C of this document. This plan identifies steps to be taken in the event of a failure or breakdown of the waste management unit (WMU) under potential contingency situations. Appropriate agency and business points of contact are also included in this plan.

INSPECTION RESPONSIBILITIES AND FREQUENCIES
27CCR, §21830(b)(2)

Routine and periodic inspection will be conducted by an Engineering Technician. At least twice a year and immediately after any special events such as major earthquakes, storms, and fires, a thorough and comprehensive inspection will be conducted by one of the two Registered Civil Engineers. Inspection frequency will be as shown in the following table:

TABLE 1
INSPECTION RESPONSIBILITIES AND FREQUENCIES

Activities	*Immediately*	*Monthly*	*Quarterly*	*Semi-Annually*
Special Events	RCE			
Security		ET(1)	ET(2, 3)	RCE
Final Cover		ET(1)	ET(2)	RCE
Final Grading		ET(1)	ET(2)	RCE
Drainage System		ET(1)	ET(2)	RCE
Leachate Control System		ET(1)	ET(2)	RCE
Detection and Corrective Action Monitoring System			C	
Gas Monitoring System			C	
Gas Control System		C		

RCE: Registered Civil Engineer
ET: Engineering Technician
C: Consultant

(1) During the wet season (October 1 through April 30)
(2) During the dry season (May 1 through September 30)
(3) Assumes consultant will check security monthly between quarterly inspections as part of gas control system monitoring.

PERSONS RESPONSIBLE FOR POSTCLOSURE MAINTENANCE
27CCR, §21830(b)(2)

The Landfill is wholly owned by the City of Ukiah (City) and operated and maintained by the Public Works Department. Personnel responsible for the postclosure maintenance of the landfill and their emergency phone numbers are as follows:

Name	Position	Emergency Phone Numbers
Rick Seanor	Deputy Director of Public Works	(707) 463-6296

The address for the person above is:

- City of Ukiah
  Public Works Department
  300 Seminary Avenue
  Ukiah, CA 95482

The listed number is for working hours. For off-hour emergencies, the City has an established notification procedure initiated by calling (707) 463-6281.

POSTCLOSURE LAND USE
27CCR, §21190 and §21830(b)(3)

The end use of the Landfill is a non-irrigated open space. The area will be returned to a natural setting with the exception that all necessary access roads, monitoring wells and drainage structures will remain.

CURRENT MONITORING AND CONTROL SYSTEMS
27CCR, §21830(b)(4)

Description of Systems

Current monitoring and control provisions at the Landfill include a leachate control system, a detection and corrective action monitoring system, a gas monitoring system, and a gas control system. Details of these respective systems are provided in the following subsections. A site plan showing the locations of the current monitoring and control systems is presented as Figure A-1 in Appendix A of this document.

Leachate Control System

The Landfill is unlined and is not equipped with an engineered or traditional blanket leachate collection and removal system (LCRS). Instead, leachate collection at the Landfill currently consists of a series of polyvinyl chloride (PVC) piping and French drain systems installed to collect leachate from seeps occurring along existing WMU slope faces. Leachate collected by these components is then conveyed by gravity flow to a primary buried pipeline located along the northern toe of the WMU. The buried pipeline, in turn, drains the leachate westward and ultimately discharges to the leachate management facilities located at the western toe of the WMU. A description of the leachate management facilities is as follows:

- Discharge from the primary buried pipeline is diverted to a subsurface concrete sedimentation chamber equipped with a valved sediment drain at its base. The clarified leachate within the chamber is then discharged (by gravity flow) to an adjacent pump station wet well (identified herein as the "leachate wet well") via a 10-inch diameter overflow line.

- Clarified leachate discharged to the leachate wet well is then pumped to a 63,500-gallon leachate aboveground storage tank (AST) for temporary storage. The leachate wet well is equipped with two (2) 25-gallon per minute (gpm), low-head, submersible pumps that are actuated by high/low water level controls. If the clarified leachate discharge rate exceeds the leachate wet well's pumping capacity (50 gpm), the excess leachate is currently diverted to an emergency leachate pond via a 10-inch diameter overflow line.

- As noted above, leachate from the leachate wet well is diverted to the leachate AST. The leachate AST is constructed of AWWA factory epoxy lined and coated bolted steel. As was the case for the leachate wet well, the AST is also equipped with a 10-inch diameter overflow line that diverts leachate to the emergency leachate pond in the case of an emergency.

- Leachate stored in the leachate AST is subsequently pumped to a sewer line connection located on Vichy Springs Road via a force main/gravity drain. The force main/gravity drain is constructed of 4-inch diameter PVC and is approximately 5,200 feet in length. The pump lift station for the leachate AST is equipped with two (2) 45-gpm pumps (one duty, one standby), thereby giving the system a total pumping capacity of 90 gpm.

Several upgrades to the leachate control system as described above will be implemented as part of the final closure construction project. These upgrades will include lining the existing leachate wet well and sedimentation chamber to provide a higher degree of containment. In addition, the emergency leachate pond will be backfilled and an underground storage tank (UST) system installed to provide new overflow protection provisions. Finally, the leachate wet well and leachate storage tank will be retrofitted with communication telemetry to enhance emergency capabilities.

Detection and Corrective Action Monitoring System

The current detection and corrective action monitoring system is designed to comply with the Landfill's existing Monitoring and Reporting Program (M&RP) per Waste Discharge Requirements Order No. R1-2002-0061. No changes to the monitoring system components are proposed as part of postclosure maintenance. Monitoring points associated with the current system can be summarized as follows:

- Leachate: The leachate wet well as described in the previous subsection is utilized as the leachate monitoring point. In addition, three leachate level monitoring wells (LW-1, LW-2 and LW-3) have been installed at the Landfill as part of a previous study. However, these leachate wells have not been used historically for monitoring as they are not identified in the existing M&RP.

  Groundwater: The groundwater monitoring system is comprised of 14 detection monitoring wells (87-1, 90-1, 90-2, 90-5, 90-6, 90-7, 90-8, 92-2, 92-3, 94-1, 94-2, 96-1, 96-2 and 96-3) and four corrective action monitoring wells (90-3, 90-4, 92-1 and 92-4). Seven of the aforementioned monitoring wells (87-1, 90-2, 90-3, 90-4, 90-5, 90-7 and 90-8) also serve as point of compliance wells.

- Surface Water: The surface water monitoring system consists of one upstream (S-1) and one downstream (S-2) monitoring point located along the ephemeral creek that flows along the northern margin of the WMU.

Table B-1 in Appendix B of this document provides a summary of the groundwater monitoring well construction characteristics. Please refer to the *January 2008 Joint Technical Document* (EBA Engineering [EBA], 2008) for copies of exploratory boring logs for the respective groundwater monitoring wells.

Gas Monitoring System

The gas monitoring system consists of ten gas monitoring points (GAS-1 through GAS-10) located at various locations along the Landfill property boundary. No changes to the monitoring system components are proposed as part of postclosure maintenance. Each of the gas monitoring points are equipped with one to four individual monitoring probes constructed of ¾-inch diameter PVC casing and capped with labcock valves. The monitoring probes range in depth from approximately 9 to 250 feet below ground surface (BGS). The number and depth of monitoring probes at each location are based on site lithology (i.e., permeable zones) and the maximum depth of refuse as measured within 1,000 feet of the monitoring point in question.

Table B-2 in Appendix B of this document provides a summary of the gas monitoring point construction characteristics. Please refer to the *January 2008 Joint Technical Document* (EBA, 2008) for copies of exploratory boring logs for the respective gas monitoring points.

Gas Control Systems

The Landfill is currently equipped with a partial perimeter gas collection system that was installed between the southwestern edge of the WMU and the property line in 1997 as a mitigation measure against subsurface gas migration. The system consists of 17 vertical extraction wells installed in native geologic materials and completed at depths ranging from 35 to 133 feet BGS. The wells are connected to a 6-inch diameter, high-density polyethylene (HDPE) header pipe that leads to a vacuum blower located at the western end of the WMU. The vacuum blower creates a vacuum in the header pipe that draws the gas from the soil through the extraction wells and subsequently to the blower. Discharge from the system is vented directly to the atmosphere via a 4-foot tall, 4-inch diameter stack. This system continues to operate on an intermittent basis. Please refer to Table B-3 in Appendix B of this document for individual gas extraction well construction characteristics.

A full-scale gas control system for the entire WMU is planned for installation as part of the final closure construction project. This system as currently proposed will consist of 18 extraction wells (EW-1 through EW-18), aboveground conveyance piping, and a flare station that will include a totally-enclosed vertical ground flare for combustion of the collected gas. Information pertaining to this system, including design criteria/rationale and details for the various system components, are presented in the *Design Plan for Landfill Gas Collection and Control System (Design Plan)* dated October 2013 (EBA, 2013). Technical Specifications and Construction Drawings for the system are also included as part of the Addendum No. 2 submittal.

It should be noted that once the full-scale gas control system is installed and operational, the need to operate the partial perimeter gas collection system may no longer be necessary. Under this scenario, the partial perimeter gas collection system will either abandoned or maintained for emergency use only.

Monitoring Tasks and Frequencies

The monitoring tasks and frequencies associated with the monitoring and control systems are in accordance with applicable regulations and corresponding facility/operating permits. Regulations and permits governing the respective monitoring/collection systems are summarized as follows:

- *Leachate Monitoring/Control:* Current WDR/M&RP
- *Groundwater Monitoring:* Current WDR/M&RP
- *Surface Water Monitoring:* Current WDR/M&RP
- *Gas Monitoring:* 27CCR, §20921
- *Gas Control:* Mendocino County Air Quality Management District (MCAQMD) – Permit to Operate

INSPECTION AND MAINTENANCE PROGRAM
27CCR, §21830(b)(5)

The following subsections provide a summary of the inspection and maintenance program that will be employed as part of postclosure maintenance. Specific features and components to be targeted by the program include the final cover, final grading, drainage system, leachate control system, detection and corrective action monitoring system, gas monitoring system, and security.

Final Cover

The final cover is designed to limit water infiltration, minimize leachate generation, prevent exposure of waste to people and animals, limit gas emissions, minimize odor, control fires and provide for a pleasant appearance. As such, the postclosure maintenance program will be instituted to ensure that the final cover continues to meet these objectives. The final cover areas will be visually inspected on a monthly or quarterly basis as previously outlined in Table 1 and evaluated for:

- Breaches in the liner system
- Odors
- Exposed refuse
- Slope failure
- Leachate seeps

Based on the nature of the final cover system and the absence of a vegetative soil layer, erosional damage does represent a potential concern at the Landfill. Thus, from an integrity perspective, a physical breach in the final cover's liner system would be the most probable cause prompting the need for final cover maintenance. In this regard, the detection of odors, exposed refuse and/or leachate seeps would be indicative of a potential breach. In the event a breach is identified, the damaged portion of the liner will be repaired as soon as practical depending upon contractor availability and liner material delivery, as well as weather. With that being said, every effort will be made to implement the repairs as soon as practical. In the interim, provisions will be employed to temporarily tarp and secure the area to prevent water infiltration into the refuse. All repairs to the liner will be to design conditions and in accordance with the Technical Specifications for the respective final cover components. Any underlying subgrade improvements will also be repaired in accordance with the foundation layer Technical Specifications.

Final Grading

Surface grading of a closed landfill, when properly designed and constructed, can be an economical method of controlling infiltration and promoting surface water run-off. The final grading configuration is designed to compensate for the effects of settlement, thereby preventing the need for difficult and costly maintenance and repair. Thus, the postclosure maintenance program will be implemented to ensure that the landfill final grades are maintained properly to ensure final cover integrity and effectiveness. The final cover areas

will be visually inspected on a monthly or quarterly basis as previously outlined in Table 1 and evaluated for:

- Visible depressions
- Ponded water
- Settlement and subsidence

Based on the steep slopes that exist throughout the WMU, any settlement that might occur that could potentially compromise drainage or induce ponding would likely be limited to bench areas. If such deficiencies are identified, provisions will be made to repair and restore the conditions as soon as practical, weather permitting. Repairs would entail the placement of suitable material (i.e., fine-grained soil, base rock with appreciable fines, etc.) within the limits of the deficient area to restore positive drainage conditions.

As an additional means of monitoring settlement and subsidence, the entire site will be aerially photographed every five years during the postclosure maintenance period and iso-settlement maps prepared to calculate any differential settlement. The iso-settlement maps will be generated with a maximum contour interval of 2 feet and a scale of 1 inch equal to 60 feet.

Drainage System

Drainage control problems can result in accelerated erosion of a particular area. In addition, differential settlement of drainage control structures can limit their usefulness and may result in failure to direct stormwater properly off of the site. Therefore, the postclosure maintenance program will be implemented to ensure that the integrity and effectiveness of the final drainage system are maintained throughout the postclosure maintenance period. The final drainage system will be inspected on a monthly or quarterly basis as previously outlined in Table 1 and evaluated for:

- Evidence of erosion
- Standing water
- Formation of gullies
- Settlement, blockage of and damage to drainage channels, structures, swales and culverts

Deficiencies, damage to and failure of the drainage system will be repaired and restored within two weeks, weather permitting, to design conditions and in accordance with construction specifications. Temporary repairs may be made until permanent repairs can be scheduled. Culverts and drainage basins will be cleaned of sediments before they are no longer able to function properly. Drainage inlet grates will be kept free of debris. Drainage channels will be maintained to permit free flow and sealed or repaired to maintain structural integrity of the system.

Leachate Control System

The leachate control system will be inspected on a monthly or quarterly basis as previously outlined in Table 1. In addition, preventive maintenance will be carried out on all components of the system at regular intervals to ensure proper operations. This consists of performing manufacturer's recommended maintenance on the pump system and monthly/quarterly (depending upon frequency shown in Table 1) inspection of the collection and storage system. This inspection includes assessing the condition of system components for possible leakage, failure, or damage, and adjusting individual pump controls or liquid levels for optimum performance. Any potential or existing failure points will be noted and repairs implemented promptly. The leachate collection lines will be flushed as needed to remove any sediment buildup in the piping system.

Detection and Corrective Action Monitoring System

The leachate wet well will be inspected on a monthly or quarterly basis in conjunction with the leachate control system inspection as described in the previous subsection. The surface water monitoring system, in turn, requires no maintenance since there is no dedicated equipment or features. Finally, in regards to groundwater, the monitoring wells will be inspected regularly in conjunction with the scheduled monitoring tasks (quarterly) for signs of failure or deterioration. If damage is discovered, the nature and extent of the problem will be recorded. A decision will be made to replace or repair the monitoring well. Possible repairs include redevelopment, chemical treatment, partial casing replacement or repair, resealing the annulus, pumping and testing. If a monitoring well needs to be replaced, it will be properly decommissioned. Damaged monitoring wells will be scheduled for repair or replacement within one (1) month after identifying the problem. As for general maintenance, the following provisions will be performed on a quarterly basis:

- Cut weeds in 2-foot radius around each well, as needed.
- Replace locking well caps, as needed.
- Lubricate enclosure locks and hinges, as needed.

As previously noted, three leachate level monitoring wells exist that have not been used historically for monitoring purposes. While these monitoring wells will be preserved as part of the final closure construction, it remains uncertain whether they will be incorporated into the site's future M&RP. In this regard, if damage is discovered during informal inspection of these monitoring wells, the nature and extent of the problem will be recorded and a decision will be made regarding their replacement, repair or abandonment.

Gas Monitoring System

The gas monitoring system will be inspected quarterly in conjunction with scheduled monitoring tasks. System components will be repaired and replaced as required to maintain full system capabilities as intended at initial installation. Quarterly maintenance provisions will include the following:

- Cut weeds in 2-foot radius around each point, as needed.

- Replace probe parts, as needed.
- Lubricate enclosure locks and hinges, as needed.

Site Security

Site security upon closure will conform with the requirements of 27CCR, §21135. Perimeter fencing will be maintained to exclude cattle from the site. Other security provisions will include:

- Lockable gate at the site entrance.

- Lockable utility boxes, or gates, or both, enclosing the environmental control systems.

- At least one sign posted in a visible location at the site access road indicating where the Final Closure Plan and FPMP are located. The sign will also include a telephone number for emergency notification and will remain throughout the postclosure maintenance period.

OPERATIONS AND MAINTENANCE PLAN FOR GAS CONTROL SYSTEM *27CCR, §21830(b)(6)*

Preventive maintenance for the existing partial perimeter gas collection system will be carried out on all mechanical equipment at manufacturer's recommended intervals. This includes cleaning, lubrication, and replacement of worn parts. The accessible portions of gas collection piping will be thoroughly inspected on a regular basis for detection of potential failure points and necessary repairs will be noted and implemented. System failures, such as pipe leaks or breaks that reduce gas collection efficiency and control effectiveness will be addressed to operating permit conditions. As previously noted, this system may become obsolete upon installation and operation of the full-scale gas control system. If that is the case, the maintenance provisions described above will be suspended accordingly.

The full-scale gas control system, including the totally-enclosed vertical ground flare, is currently under design and has yet to be formally approved by the MCAQMD. Thus, until the system is formally approved through the issuance of an Authority to Construct Permit, a formal Operations and Maintenance Plan for the system will be not be prepared. Upon its preparation, the Operations and Maintenance Plan will be submitted to the LEA, CalRecycle and MCAQMD under separate cover for incorporation into the FPMP.

REPORTING
27CCR, §21830(b)(7)

With the exception for the gas monitoring system (see below), the reporting requirements for the leachate control system, detection and corrective action monitoring system, and gas control system are permit specific. Under the current WDR/M&RP (Order No. R1-2002-0061), the leachate, groundwater, and surface monitoring and/or control data are reported to the RWQCB on a quarterly basis. However, a semi-annual reporting frequency is being requested as part of the new WDR to be issued for postclosure maintenance. As for gas control, documentation as to operation of the existing partial perimeter gas collection system is included as part of the perimeter gas monitoring reports prepared for 27CCR. As for the proposed full-scale gas control system, reporting will be dictated by the Permit to Operate to be issued by the MCAQMD. The reporting frequency recommended in the *Design Plan* (EBA, 2013) is annually.

In regards to the gas monitoring system, the scope and frequency of reporting is dictated by 27CCR, §20934, which requires quarterly report submittals within a time period specified by the Local Enforcement Agency (LEA) but no more than within 90 days of sampling. Each report shall include methane concentrations, documentation of sampling conditions (i.e., barometric pressure, atmospheric temperatures, general weather conditions, and probe pressures), instrumentation utilized, monitoring personnel, and a brief description of methods.

UPDATED POSTCLOSURE MAINTENANCE COST ESTIMATE
27CCR, §21830(b)(8)

An updated postclosure maintenance cost estimate is enclosed in Attachment 3 of this Addendum. In accordance with 27CCR, §21840(a)(2), the cost was calculated by multiplying the annual cost for maintenance and monitoring by 30 years (duration of postclosure maintenance period). As presented in Attachment 3, the updated postclosure maintenance cost in current dollars is $3,722,158.

REFERENCES

EBA Engineering, January 2008, *Joint Technical Document for City of Ukiah Landfill, Mendocino County, California (Volumes I through III), EBA Project No. 02-907;* Prepared for City of Ukiah Department of Public Works by EBA Engineering, Santa Rosa, California.

EBA Engineering, October 2013, *Design Plan for Landfill Gas Collection and Control System, City of Ukiah Landfill, Mendocino County, California, EBA Job No. 02-907 (Task 8);* Prepared for the City of Ukiah, Department of Public Works by EBA Engineering, Santa Rosa, California.

APPENDIX A

FIGURE A-1

LEGEND

- 90-1 — DETECTION GROUNDWATER MONITORING WELL
- 90-3 — CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 — SURFACE WATER SAMPLING STATION
- GAS-1 — PERIMETER LANDFILL GAS MONITORING POINT
- PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 — LEACHATE WELL

DATE OF AERIAL PHOTOGRAPHY: JUNE 28, 2013

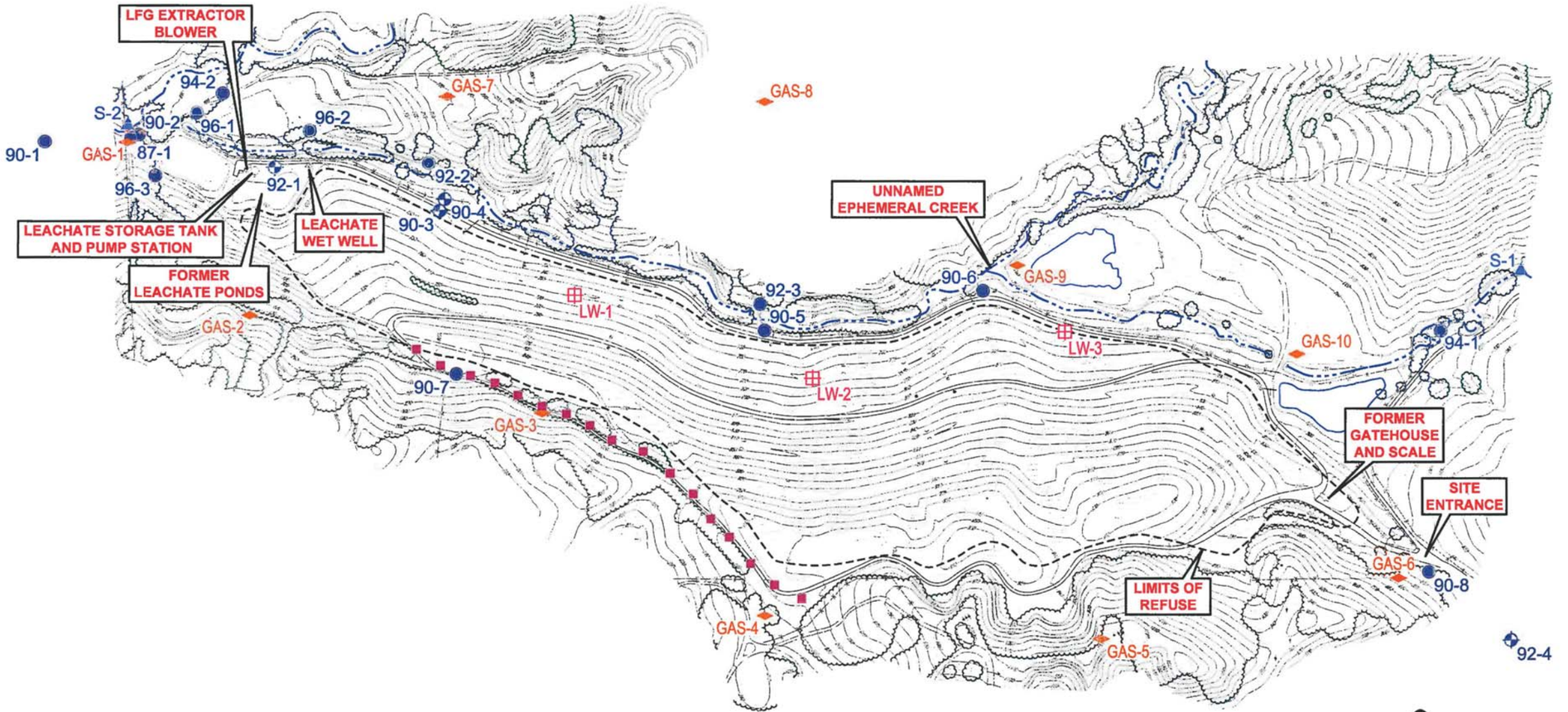

FIGURE A-1 02-907

MONITORING AND CONTROL SYSTEMS

CITY OF UKIAH LANDFILL
UKIAH, CALIFORNIA

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

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APPENDIX B

TABLES

Table B-1
Groundwater Monitoring Well Construction Information
City of Ukiah Landfill

Well No.	*Well Casing Dia.*	*Well Completion Depth*	*Well Screened Interval*	*Top of Casing Elevation (Feet MSL)*	*Screen Size*	*Filter Pack Interval*	*Filter Pack Material*
87-1	2"	16.0'	6.0' - 16.0'	684.95	0.020"	5.0' - 16.0'	#3 Monterey
90-1	2"	14.0'	5.5' - 14.0'	679.52	0.020"	5.0' - 14.0'	#3 Monterey
90-2	2"	49.0	19.0 - 49.0'	686.00	0.020"	18.0' - 50.0'	#3 Monterey
90-3	2"	35.0'	25.0' - 35.0'	722.39	0.020"	24.5' - 35.0'	#3 Monterey
90-4	2"	34.0'	19.0' - 34.0'	720.90	0.020"	18.0' - 35.0'	#3 Monterey
90-5	2"	34.0'	19.0' - 34.0'	746.37	0.020"	18.0' - 35.0'	#3 Monterey
90-6	2"	37.5'	17.5' - 37.5'	758.94	0.020"	16.5' - 39.25'	#2/16 Monterey
90-7	2"	159.0'	135.0 - 159.0'	832.85	0.020"	135.0' - 160.0'	#3 Monterey
90-8	2"	138.5'	110.0' - 138.5'	839.03	0.020"	97.0' - 140.0'	#3 Monterey
92-1	2"	28.0'	15.0' - 28.0'	707.89	0.010"	13.0' - 28.0'	#2/12 Monterey
92-2	2"	40.0'	20.0' - 40.0'	711.67	0.010"	18.0' - 40.0'	#2/12 Monterey
92-3	2"	49.5'	29.5' - 49.5'	745.50	0.010"	28.0' - 49.5'	#2/12 Monterey
92-4	2"	130.0'	90.0' - 130.0'	805.81	0.020"	86.0' - 130.0'	#3 Monterey
94-1	2"	12.0'	6.0' - 12.0'	796.97	0.020"	4.0' - 12.0'	#12/14 Monterey
94-2	2"	75.0'	55.0' - 75.0'	708.35	0.020"	52.0' - 75.0'	#2/12 Monterey
96-1	4"	23.5'	8.0' - 23.0'	702.34	0.010"	7.0' - 23.0'	#2/12 Lone Star
96-2	4"	28.5'	13.5' - 28.5'	702.09	0.010"	11.5' - 23.0'	#2/12 Lone Star
96-3	4"	26.5'	11/5' - 26.5'	701.74	0.010"	11.0' - 23.0'	#2/12 Lone Star

Dia. = Diameter
MSL = Mean Sea Level

Table B-2
Perimeter Landfill Gas Monitoring Point Construction Information
City of Ukiah Landfill

Point No.	*Total Depth*	*Top of Casing Elevation (Feet Mean Sea Level)*	*Probe*	*Gravel Pack Interval*	*Screened Interval*
GAS-1	11'	686.59	---	4.5' - 9'	5' - 9'
GAS-2	126'	839.65	Shallow	5' - 10'	5' - 10'
			Intermediate	13' - 60'	30' - 60'
			Deep	65' - 105', 110' - 126'	80' - 100', 110' - 125'
GAS-3	135'	861.42	Shallow	4' - 15'	5' - 15'
			Intermediate	20' - 66.5'	35' - 65'
			Deep	83.5' - 135'	85' - 135'
GAS-4	145'	919.33	Shallow	5' - 11'	5' - 10'
			Intermediate	15' - 75'	52.5' - 72.5'
			Deep	85' - 145'	113' - 143'
GAS-5	250'	1,032.24	Shallow	5' - 10'	5' - 10'
			Intermediate 1	15' - 113'	73' - 113'
			Intermediate 2	118' - 166.5'	126' - 166'
			Deep	171.5' - 250'	210' - 250'
GAS-6	144.5'	865.60	Shallow	6.5' - 14.5'	7.5' - 12'
			Intermediate	19' - 69'	20' - 68.5'
			Deep	74' - 144.5'	78' - 144'
GAS-7	84.5'	771.52	Shallow	5' - 11'	5.5' - 10.5'
			Intermediate	16' - 42.5'	16.5' - 42'
			Deep	47.5' - 84.5'	47.5' - 82.5'
GAS-8	174.5'	920.47	Shallow	6.5' - 12.5'	7.5' - 11'
			Intermediate	17' - 84'	18' - 84'
			Deep	89.5' - 171.5'	90' - 165'
GAS-9	30'	763.85	Shallow	4.5' - 9.5'	5' - 9'
			Intermediate	14.5' - 20'	15' - 19.5'
			Deep	25' - 30'	25.5' - 30'
GAS-10	59'	788.54	Shallow	4.5' - 10'	5' - 9.5'
			Intermediate	14.5' - 28'	15' - 27.5'
			Deep	33' - 59'	33' - 55

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Table B-3
Perimeter Landfill Gas Extraction Well Construction Information
City of Ukiah Landfill

Well No.	*Well Depth*	*Screened Interval*	*Plate Elevation (Feet MSL)*
PG-1	80'	27' - 76'	824.75
PG-1A	35'	15' - 35'	829.60
PG-2	90'	35.5' - 88'	838.09
PG-2A	40'	20' - 40'	852.19
PG-3	101'	44.5' - 99'	857.51
PG-3A	52'	24.5' - 47'	859.52
PG-4	107'	39' - 80'	868.00
PG-4A	50'	25' - 50'	873.24
PG-5	85'	44' - 83'	874.88
PG-5A	50'	24' - 50'	879.12
PG-6	93'	43' - 93'	889.07
PG-6A	51'	16' - 50'	899.90
PG-7	133'	45' - 120'	913.36
PG-7A	45'	15' - 42'	922.24
PG-8	117'	47' - 117'	927.50
PG-8A	50'	15' - 47'	931.22
PG-9	117'	47' - 114'	936.69

MSL = Mean Sea Level

APPENDIX C

EMERGENCY RESPONSE PLAN

Emergency Response Plan

City of Ukiah Landfill

Mendocino County, California

August 2015

Prepared For:

City of Ukiah
Public Works Department
Ukiah, California

Prepared By:

EBA ENGINEERING
825 Sonoma Avenue
Santa Rosa, California
EBA Job No. 02-907

1.0 INTRODUCTION

Division 2, Title 27, Article 2, Section 21130 of the California Code of Regulations (effective date: 7/18/98) requires the development of an Emergency Response Plan at landfill closure to address potential events that could impact the integrity of the landfill cover and related appurtenances resulting in the release of waste products. These regulations are included here for review.

27CCR, §21130

(a) the operator shall maintain a written postclosure Emergency Response Plan at the facility or at an alternate location as approved by the EA. The Emergency Response Plan must identify occurrences that may exceed the design of the site and endanger public health or the environment. The plan shall describe specific procedures that minimize these hazards to protect public health and safety. The events that the plan shall address include, but are not limited to: vandalism, fires, explosions, earthquakes, floods, the collapse or failure of artificial or natural dikes, levees or dams; surface drainage problems; and other waste releases.

(b) The Emergency Response Plan shall contain the following:

(1) identification of events which could require the implementation of emergency response actions: This section shall not apply to the gas monitoring provisions;

(2) a description of the actions to be taken, and the sequence and implementation timetable needed to mitigate the conditions;

(3) a statement regarding the general availability of equipment required to mitigate each type of emergency.

(c) The operator shall amend the Emergency Response Plan under the following conditions:

(1) whenever a failure or release occurs for which the plan did not provide an adequate response;

(2) when the postclosure land use and/or structures on the site change and these changes are not addressed in the existing plan; or

(3) if the EA notifies the operator in writing that the current Emergency Response Plan is inadequate under the provision of this section. The notifying agency shall include within the written notice the items that plan needs to consider for it to comply with this section. The operator shall submit an amended Emergency Response Plan to the EA within thirty (30) days of notification of an inadequacy.

(d) Whenever the operator amends the Emergency Response Plan pursuant to (c) (1 or 2), the operator shall submit a written copy of the amended plan to the EA.

2.0 SPECIFIC EVENTS AND RESPONSES

The following presents a summary of specific events requiring correction action at the City of Ukiah Landfill (Landfill) and actions to be taken to minimize the release of waste products.

Earthquake

Given the final closure configuration of the Landfill, a seismic event within the area should not result in slope failure or a release of waste products; however, such an event could impact the integrity of the final cover, drainage conveyance systems, or monitoring systems. The following is the sequence and schedule of actions to be taken in the event of an earthquake to minimize potential hazards.

- In event of an earthquake, the site will be inspected by a qualified engineer within 24-hours to evaluate the integrity of the landfill cover, ancillary facilities and the potential for hazardous conditions.
- Within 5 days, notify the Local Enforcement Agency (LEA), the Sheriff's Department, California Regional Water Quality Control Board – North Coast Region (RWQCB), and the California Department of Resources Recycling and Recovery (CalRecycle) of any failure.
- Contact with areas of damaged landfill cover or potentially hazardous areas/conditions will be limited.
- Areas of concern will be stabilized pending reconstruction activities.
- Reconstruction requirements and construction scheduling will be evaluated and prepared for submittal to the LEA, RWQCB, and CalRecycle within 7 days.
- Areas requiring repair will be reconstructed in accordance with the Construction Quality Assurance Plan to original design specifications and contours, or the Final Closure Plan will be amended/revised and approved by the LEA, CalRecycle, and RWQCB.
- The LEA, RWQCB and CalRecycle will be notified as to completion of construction activities.

Fires, Subsurface Fire, or Explosion

The potential for fire, subsurface fire, and/or explosion exists due the presence of landfill gas. In the event of a fire or explosion, mitigative actions, sequence of actions, and timetable to minimize potential hazards will include the following:

- Immediately make a determination of the severity of the fire or explosion.

- If the fire or explosion is deemed severe, the Sheriff's Department and the Fire Department will be immediately notified. Also notify CalRecyle, RWQCB, LEA and Mendocino County Air Quality Management District, and other authorities necessary to evaluate extent of damage.

- In the case of a surface fire or explosion, an area will be cordoned off from the incident and personnel will be retained on-site until the area has been declared safe.

- In the case of a subsurface fire that is not deemed severe, within 24 hours, turn off extraction wells in the adjoining area, then proceed with locating the source of the oxygen infiltration and repair the breach accordingly. If repair of breach will take longer than 48 hours, temporarily cover area of breach with soil to minimize further oxygen intrusion.

- If a subsurface fire is deemed severe:

  A. Secure the services of a consultant experienced in subsurface fires.

  B. Identify surface fractures, geologic features, or other cover features which may act as a conduit for oxygen infiltration.

  C. Determine the extent of subsurface fire through subsurface vapor and temperature monitoring.

  D. Cordon off area affected by fire.

  E. Evaluate the feasibility of extinguishing the fire by 1) remediation of conduits of air infiltration, 2) excavation of affected areas and extinguishing the fire using conventional means (water or foam vapor suppressant), 3) extinguishing the fire through CO2 injection, or 4) other methods identified by the consultant.

  F. Implement procedures to extinguish the fire.

- Repairs shall be made in accordance with the Construction Quality Assurance Plan.

- The LEA, RWQCB and CalRecycle will be notified as to completion of construction activities.

Surface Drainage Failures and Floods

In the event of a wash out due to a surface drainage failure or flood, mitigative actions, sequence of actions, and timetable to minimize potential hazards will include the following:

- Inspection and evaluation of any damage incurred to the landfill cover and determination of the potential for hazardous conditions.
- Areas identified as potentially hazardous will be cordoned off.
- The LEA, RWQCB, and CalRecycle will be notified of the failure.
- Reconstruction requirements and construction scheduling will be evaluated and prepared for submittal to the LEA, RWQCB, and CalRecycle within 7 days.
- Repairs will be made in accordance with the Construction Quality Assurance Plan.
- The LEA, RWQCB and CalRecycle will be notified as to completion of construction activities.

Vandalism

In the event that vandalism occurs that impacts the integrity of landfill closure facilities, mitigative actions, sequence of actions, and timetable to minimize potential hazards include the following:

- Inspection and evaluation of any damage incurred to the landfill cover and determination of the potential for hazardous conditions.
- Areas identified as potentially hazardous will be cordoned off.
- The LEA, RWQCB, and CalRecycle will be notified of the vandalism.
- Reconstruction requirements and construction scheduling will be evaluated and prepared for submittal to the LEA, RWQCB, and CalRecycle within 7 days.
- Repairs shall be made in accordance with the Construction Quality Assurance Plan.
- The LEA, RWQCB and CalRecycle will be notified as to completion of construction activities.

3.0 AVAILABLE EQUIPMENT

Standby equipment is available from the City of Ukiah Public Works Department on a priority basis.

4.0 EMERGENCY CONTACTS AND TELEPHONE NUMBERS

City of Ukiah Public Works Department:	(707) 463-6200
Fire Department:	911
Mendocino County Sheriff's Department:	911
Ambulance Service:	911
RWQCB:	(707) 576-2220
CalRecycle:	(916) 341-6360
LEA:	(707) 234-6625
Mendocino County Air Quality Management District:	(707) 463-4354

ATTACHMENT 6

TECHNICAL SPECIFICATIONS
FINAL CLOSURE CONSTRUCTION

TECHNICAL SPECIFICATIONS

for the

CITY OF UKIAH
DEPARTMENT OF PUBLIC WORKS

CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

October 2013
Revised August 2015

EBA Job No. 02-907

Prepared by:

EBA ENGINEERING
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(707) 544-0784

TECHNICAL SPECIFICATIONS
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

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DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Project description.

B. Work by Contractor

C. Work by Owner.

D. Work by Others.

1.02 PROJECT DESCRIPTION

A. The Project is titled "City of Ukiah Landfill Final Closure Construction". The City of Ukiah Landfill is located in Mendocino County, California approximately two miles east of the City of Ukiah. The Work site address is 3100 Vichy Springs Road, Ukiah, California 95482 (Sheet 1). The City of Ukiah Landfill was operated as a Class III solid waste disposal facility and is comprised of a single waste management unit that is approximately 40 acres in size. The Final Closure generally consists of the following construction features:

Site Preparation:
- Refuse excavation and relocation.
- Interim cover preparation.

Closure Turf Final Cover System (in ascending order):
- 1-foot thick foundation layer.
- Gas relief/venting system.
- LLDPE geomembrane liner.
- Engineered synthetic turf with specific grade sand infill ballast.

Miscellaneous items:
- Drainage and erosion control measures.
- Sedimentation basin improvements.
- Access roads.
- General earthwork, including various excavations and fills.
- Leachate overflow collection and storage system, including installation of a leachate underground storage tanks (UST).
- Landfill gas (LFG) collection system, including condensate drainage components.
- Installation of flare and blowers provided by others.
- Borrow area reclamation.
- Seeding and fertilizing.
- Security fencing.

1.03 WORK BY CONTRACTOR

A. Unless noted otherwise, the Contractor shall perform, or subcontract to perform, all Work shown on the Plans in accordance with the Technical Specifications.

B. The geosynthetics installation subcontractor or Installer and the Installer's foreman must have experience in placing 1,000,000 square feet of geomembrane material on at least three (3) landfill projects and at least on project installing closure turf.

C. Except as specifically noted, the Contractor shall provide the following Work:
   1. All labor and materials.
   2. All tools, construction equipment, and machinery.
   3. Any water, heat, and utilities required.
   4. All other facilities and services necessary for proper execution and completion of the Work.

D. The Contractor shall pay legally required sales, consumer, and use taxes.

E. The Contractor shall secure and pay for, as necessary for proper execution and completion of the Work, all applicable permits and licenses.

F. The Contractor shall comply with the requirements of all permits.

G. The Contractor shall give all required notices.

H. The Contractor shall comply with all codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of the work.

I. The Contractor shall within five (5) calendar days, submit written notice to the Design Engineer of observed variance of Contract Documents from legal requirements.

J. The Contractor shall give written notice to the Design Engineer of any conditions encountered at the Work site which are unforeseen, concealed, or materially different from those set forth in the Plans or Technical Specifications, or ordinarily encountered and generally recognized as inherent in the Work. Such written notice shall be given to the Design Engineer within five (5) calendar days of the discovery of any such facts.

K. If any Subcontractor or person employed by the Contractor appears to the Design Engineer to be incompetent or to act in a disorderly or improper manner, he or she shall be discharged immediately at the request of the Design Engineer, and such person shall not again be employed on the Work. This provision does not impose an obligation upon the Design Engineer to ensure proper or orderly behavior on the part of the Contractor's employees or the employees of the Contractor's subcontractors, nor shall the Engineer's failure to make such a request relieve the Contractor of the obligation to require employees and subcontractor employees to refrain from engaging in disorderly or improper conduct.

1.04 WORK BY OWNER

A. All portions of the Work specified to be performed by the "Owner" refers to the responsibilities of the City of Ukiah, Department of Public Works and are not the responsibility of the Contractor.

B. The Owner will award a contract to the Contractor for construction of the project, administer the contract, measure quantities for progress payments and final payment, and manage the contract. Performance of the Work will commence as indicated in the Bid Documents.

1.05 WORK BY OTHERS

A. All portions of the Work specified to be performed by the "Design Engineer", "CQA Officer", "CQA Monitor", "CQA Surveyor", "Soils Testing Laboratory" or "Geosynthetics Testing Laboratory" refer to the responsibilities of EBA Engineering (EBA, or subcontractors to EBA) which have contracted separately and directly with the Owner and are not the responsibility of the Contractor.

END OF SECTION

SECTION 01039
PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

A. Preconstruction meeting.

B. Progress meetings.

C. Preparatory meetings.

1.02 PRECONSTRUCTION MEETING

A. The Design Engineer will schedule the preconstruction meeting after awarding the Contract to the Contractor. The objectives of this meeting are to:
   1. Clearly define the roles, responsibility, and authority of each organization and individual involved in the project.
   2. Review details of the Construction Quality Assurance (CQA) program.
   3. Establish a foundation of cooperation to achieve quality construction.

B. The following agenda, as related to CQA, will be addressed by the Design Engineer or CQA Officer.
   1. Introduce and discuss role, authority, and responsibilities of each organization and individual involved in the project.
   2. Establish lines of communication.
   3. Review Technical Specifications and Plans.
   4. Distribute of the CQA Plan.
   5. Review of CQA activities to be performed.
   6. Discuss Contractor's construction schedule and workplan.
   7. Discuss Contractor's Construction Quality Control (CQC) procedures and responsibilities.
   8. Discuss submittal review and approval procedures.
   9. Discuss non-conformance and corrective action procedures.
   10. Discuss construction restrictions due to weather conditions.
   11. Discuss and schedule weekly progress meetings.
   12. Discuss health and safety issues.

C. Meeting minutes and items for resolution will be recorded by the Design Engineer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preconstruction meeting.
   1. Owner's Project Manager or representative.
   2. Contractor's Project Manager and on-site Superintendent.
   3. Installer's Project Manager and on-site Superintendent.
   4. Design Engineer's Project Manager and CQA Officer.

E. The Contractor's attendance at the preconstruction meeting is not a payable item. Any costs incurred by the Contractor for attendance at the preconstruction meeting should be included in the Contract Lump Sum Price for "Mobilization".

1.03 PROGRESS MEETINGS

A. In coordination with the Engineer, the CQA Officer will schedule and administer weekly progress meetings. The objectives of these meetings are to: 1) maintain lines of communication; 2) review procedures and results of the CQA program; and 3) maintain and improve the established foundation of cooperation to achieve quality construction. The following agenda will be addressed by the CQA Officer.

1. Review minutes of previous progress meeting.
2. Review work progress.
3. Review and update construction schedule and obtain a schedule from the Contractor, listing the construction activities for the following two (2) weeks.
4. Discuss CQA and CQC related field observations, testing results, problems, decisions, and conflicts.
5. Review and update Submittal Log.
6. Review status of pending Change Orders.

B. Meeting minutes and items for resolution will be recorded by the CQA Officer and distributed to all parties in attendance.

C. The following representatives from each organization are required to attend the weekly progress meetings.

1. Owner's Project Manager or representative.
2. Contractor's on-site Superintendent.
3. Installer's on-site Superintendent (during geosynthetics installation).
4. Design Engineer's Project Manager and CQA Officer.
5. Representative of major subcontractors performing work during the week of the weekly progress meeting

D. The Contractor's attendance at the progress meetings is not a payable item. Any costs incurred by the Contractor for attendance at the progress meetings should be included in the Contract Lump Sum Price for "Mobilization".

1.04 PREPARATORY MEETINGS

A. In coordination with the Design Engineer, the CQA Officer will schedule and administer, as needed, informal preparatory meetings prior to construction of the following items.

1. Refuse excavation and interim cover preparation.
2. Foundation layer placement.
3. GRL placement.
4. LLDPE Geomembrane and Engineered Turf installation.
6. General earthwork, drainage and erosion control, and access road construction, as needed.
7. Sedimentation basin improvements.
8. Leachate overflow collection and storage system installation.
9. LFG collection system installation.
10. Borrow area reclamation and Seeding and fertilizing.

B. The objective of the preparatory meetings is to establish a complete understanding of the upcoming unit of construction and CQA procedures and testing that will be implemented during construction. To achieve this objective, the following agenda will be addressed by the CQA Officer.
   1. Review "Products" section of the applicable Technical Specifications.
   2. Review "Execution" section of the applicable Technical Specifications.
   3. Discuss any construction and grade control staking needed to complete the Work.
   4. Discuss CQA testing, observation, and surveying to be performed.
   5. Verify that all submittals have been or will be received and approved by the CQA Officer in accordance with the schedule.
   6. Discuss Contractor's CQC responsibilities.
   7. Discuss Contractor's coordination, scheduling, and sequencing of the Work.
   8. Discuss Contractor's proposed equipment and manpower.

C. Meeting minutes and items for resolution will be recorded by the CQA Officer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preparatory meetings.
   1. Design Engineer's Project Manager or representative.
   2. Contractor's on-site Superintendent.
   3. On-site Superintendent of any Subcontractor, as applicable to the unit of construction.
   4. CQA Officer.
   5. CQA Monitor(s), as applicable to the unit of construction.

E. The Contractor's attendance at the preparatory meetings is not a payable item. Any costs incurred by the Contractor for attendance at the preparatory meetings should be distributed and included in the Contract Unit Price for the item for which the meeting is held.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01060
SURVEYING AND FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

A. Surveying and field engineering. All survey and layout for all improvements are to be provided by the Contractor.

B. Quality assurance.

C. Submittals.

D. Project record documents.

E. Examination.

F. Survey reference points.

G. Survey requirements.

H. Surveying accuracy and tolerances in setting of survey stakes.

I. Surveys for record drawings.

J. Payment.

1.02 RELATED SECTIONS

A. Information Available to Bidders: Topographic survey.

B. Section 01720 - Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 DESCRIPTION

A. Reference points: Reference points to be provided by Design Engineer pursuant to the General Conditions will include referenced monuments and elevation benchmarks in the vicinity of the Project. If displaced by Contractor, replacement of these reference points will be at the expense of Contractor.

B. Contractor will furnish all necessary detail surveys including all lines, grades, and elevation appropriate to control construction. At a minimum, construction surveys are required for top of foundation layer.

C. Use by Design Engineer: Design Engineer may at any time use line and grade points and markers established by Contractor. Contractor's surveys are a part of the Work and may be checked by Engineer at any time. Contractor is responsible for any lines, grades, or measurements which do not comply with specified or proper tolerances, or which are otherwise defective, and for any resultant defects in the Work. Contractor will be required to conduct re-surveys or check surveys to correct errors indicated by review of the field notebooks or otherwise detected.

3.02 QUALITY ASSURANCE

A. Employ a Land Surveyor or eligible Engineer registered in the State of California and acceptable to the Design Engineer to perform survey work of this Section.

B. Submit evidence of Land Surveyor's or eligible Engineer's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

C. Provide instruments and other survey equipment that are accurate, suitable for the surveys required in accordance with recognized professional standards, and in proper condition and adjustment at all times. Perform surveys under the direct supervision of a licensed Land Surveyor or eligible Engineer.

D. Record surveys in field notebooks.

3.03 SUBMITTALS FOR REVIEW

A. Submit name, address, and telephone number of Land Surveyor or eligible Engineer before starting survey work.

B. On request, submit documentation verifying accuracy of survey work.

C. Submit a certificate signed by the Land Surveyor or eligible Engineer, that the elevations and locations of the Work are in conformance with Contract Documents.

3.04 RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

B. Submit record documents under provisions of Section 01720.

3.05 EXAMINATION

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Design Engineer of any discrepancies discovered.

3.06 SURVEY REFERENCE POINTS

A. Contractor to locate and protect survey control and reference points.

B. Control datum for survey is that indicated on the Plans.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Design Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Owner.

3.07 SURVEY REQUIREMENTS

A. Provide field engineering services for all proposed improvements. Utilize recognized engineering survey practices.

B. Establish a minimum of two (2) permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on record documents.

C. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including: stakes for grading, fill, slopes, and all site improvements.

D. Periodically verify layouts by same means.

E. Contractor's layout work will include the following:
   1. Slope staking for top of erosion-resistant layer at 50-foot grid and grade breaks.
   2. All as-built surveys as specified here in.
   3. Surveys to measure completed units of Work specified here in.

F. Contractor must perform all additional slope staking, off-setting and other control staking necessary to perform the Work.

3.08 SURVEYING ACCURACY AND TOLERANCES IN SETTING OF SURVEY STAKES

A. Perform control traverse field surveys and computations to an accuracy of at least 1:10,000.

B. The tolerances applicable in setting survey stakes are as set forth below. Such tolerances cannot supersede stricter tolerances required by the Plans or Technical Specifications, and cannot otherwise relieve the Contractor of responsibility for measurements in compliance therewith.

Type of Mark	Horizontal Position	Elevation
Permanent reference points	1 in 10,000	±.01 ft
General excavation and earthwork	1 in 2,000	±.10 ft

C. Tolerances for the thickness of earthen layers shown on Plans and for elevations shown on the Plans are ±0.10 foot unless otherwise specified.

3.09 SURVEYS FOR RECORD DRAWINGS

A. Provide the Design Engineer with as-built record drawings (field surveyed) for items that were revised during construction and differ from the Plans including the following items:
1. Topography that depicts the top of the foundation layer.
2. Topography of ditches.
3. Locations of catch basins.
4. Alignment, ends, and invert elevations of pipes and culverts.
5. Topography of storm water retention basins and borrow area.
6. Locations of LFG collection system components, including collection system piping, LFG extraction wells, above ground condensate drain lines, condensate discharge points, flare station concrete pads, and flare station security fencing.
7. Location of leachate UST manway.

B. The Design Engineer may perform independent checks.

C. Provide record documents on 24" x 36" size drawings, and on a computer disk in AutoCAD. Use the coordinate system shown on the drawings.

PART 4 MEASUREMENT AND PAYMENT

4.01 PAYMENT

A. Payment for providing all surveying and field engineering is included in the Contract Unit Price paid for the various items of Work for which they are required. No separate or additional payment will be made therefore.

END OF SECTION

SECTION 01200
ACRONYM LIST

PART 1 GENERAL

1.01 SUMMARY

A. Standards, Institutes and Societies

B. Materials and Units

C. Miscellaneous

1.02 STANDARDS, INSTITUTES AND SOCIETIES

A. Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AASHTO	-	American Association of State Highway and Transportation Officials
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standards Institute
ASTM	-	American Society for Testing and Materials
AWWA	-	American Water Works Association
CAC	-	California Administrative Code
CFR	-	Code of Federal Regulations
CRSI	-	Concrete Reinforcing Steel Institute
CTM	-	California Test Methods
NEMA	-	National Electrical Manufacturer's Association
NEC	-	National Electric Code
NFPA	-	National Fire Protection Association
OSHA	-	Occupational Health and Safety Administration
RWQCB	-	Regional Water Quality Control Board
SWANA	-	Solid Waste Association of North America
SWRCB	-	State Water Resources Control Board
UL	-	Underwriters Laboratories Inc.
US	-	United States

1.03 MATERIALS AND UNIT S

A. Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AC	-	acre
AWG	-	American Wire Gauge
cm	-	centimeter
Closure Turf		Three (3) component final cover system composed of structured LLDPE geomembrane liner drainage studs

		and spike, engineered synthetic turf, and a specific grade of sand infill ballast.
CMP	-	corrugated metal pipe
Engineered Turf		Synthetic Turf component of Closure Turf
EPDM	-	ethylene propylene diene monomer
°F	-	degree Fahrenheit
ft	-	foot
g	-	gram
LLDPE	-	Linear Low-Density Polyethylene
HP	-	horse power
HydroBinder		Cementious infill used for surface drainage conveyance areas of Engineered Turf.
in	-	inch
”	-	inch
kN	-	kilonewtons
lb	-	pound
MARV	-	minimum average roll value
m	-	meter
mm	-	millimeter
mil	-	1/1000 of 1 inch
ml	-	milliliters
min	-	minute
No.	-	number
oz	-	ounce
%	-	percent
psf	-	pounds per square foot
psi	-	pounds per square inch
psig	-	pounds per square inch gauge
PVC	-	Polyvinyl Chloride
SDR	-	Standard Dimension Ratio
sec	-	second
TFE	-	tetrafluoroethylene
TRM	-	turf reinforcement mat
yd	-	yard

1.04 MISCELLANEOUS

A. Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AST	-	Above Ground Storage Tank
@	-	at
BMP	-	Best Management Practice
CQA	-	Construction Quality Assurance
CQC	-	Construction Quality Control
CSMP	-	Construction Storm Water Management Plan
EBA	-	EBA Engineering
=	-	equals
GCL	-	Geosynthetic Clay Liner
GRL	-	Gas Relief Layer

LFG	-	Landfill Gas
max.	-	maximum
min.	-	minimum
MQC	-	Manufacturer's Quality Control
MSDS	-	Material Data Safety Sheet
NOI	-	Notice of Intent
NPDES	-	National Pollutant Discharge Elimination System
PDF	-	Portable Document Format
POC	-	Point of Connection
QSD	-	Qualified SWPPP Developer
QSP	-	Qualified SWPPP Practitioner
REAP	-	Rain Event Action Plan
SAP	-	Storm Water Action Plan
SMARTS	-	Storm Water Multiple Application and Report Tracking System
SPC	-	Storm Water Pollution Control
Std.	-	Standard
SWPPP	-	Storm Water Pollution Prevention Plan
TEFC	-	Totally Enclosed Fan Cooled
UST	-	Underground Storage Tank
UV	-	Ultra-violet
WDID	-	Waste Discharge Identification
WPC	-	Water Pollution Control

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Submittal Control Log.

B. Submittal review and approval procedures.

1.02 SUBMITTAL CONTROL LOG

A. All submittals required by the Technical Specifications are included in individual sections. A Submittal Control Log will be maintained by the CQA Officer in coordination with the Contractor during construction. The Submittal Control Log documents: 1) submittal number; 2) referenced specification section; 3) submittal description; 4) submitter; 5) date received; 6) reviewer; 7) action taken determination; and 8) return date.

1.03 SUBMITTALS - GENERAL REQUIREMENTS

A. The Contractor shall submit to the Engineer all submittals required by the Contract Documents and as required herein, or subsequently required by modifications. All such items required to be submitted for review shall be furnished by and at the expense of the Contractor, and any work affected by them shall not proceed without such review. Submittals and their contents shall be properly prepared, identified, and transmitted as provided herein or as the Engineer may otherwise direct. Except for record documents, and instructional manuals for operation and maintenance, each submittal shall be approved before the material or equipment covered by the submittal is delivered to the site.

B. Unless otherwise specified, three (3) sets of printed submittals shall be submitted.

C. Contractor shall allow a total period of not less than two (2) calendar weeks for review and approval of submittals by the Engineer, not including the time necessary for delivery or mailing, and shall cause no delay in the Work. Extension of the Contract Time will not be granted because of the Contractor's failure to make timely and correctly prepared and presented submittals with allowance for the checking and review periods.

D. At the time of the submission, the Contractor shall give notice, in writing, in the submittal, of any deviation from the requirements of the Contract Documents. The deviations shall be clearly indicated or described. The Contractor shall state in writing, all variation in costs occasioned by the deviations, and his assumption of the cost of all related changes if the deviation is approved.

E. The Contractor shall deliver submittals by means of dated, signed, and sequence numbered transmittals on the Engineer provided forms, identifying as to initial or resubmittal status, and fully describing the submittal contents. In each transmittal, the Contractor shall state the Project Number and Name, Name and Address of Contractor, Name and Address of Sub-Contractor, Manufacturer, Distributor, and specification Section (as applicable), Articles, and

paragraphs to which the submittal pertains; accompanying data sheets, catalogs, and brochures shall be identified in the same manner. Where several types or models are contained in the literature, the Contractor shall delete non-applicable portions, or specifically indicate which portions are intended and applicable. Submittal transmittals shall fully index all items submitted.

1. Incomplete Submittals, including those not correctly transmitted, not correctly titled and identified, or not bearing the Contractor's review and approval stamp, will be returned to the Contractor without review.
2. Interrelated Submittals: Except where the preparation of a submittal is dependent upon the approval of a prior submittal, all submittals pertaining to the Work, shall be submitted simultaneously.

F. Every submittal of shop drawings, samples, materials lists, equipment data, instruction manuals, and other submittals upon which the proper execution of the Work is dependent, shall bear the Contractor's review and approval stamp certifying that the Contractor: 1) has reviewed, checked and approved the submittal and has coordinated the contents with the requirements of the Contract Documents, 2) has determined and verified all quantities, field measurements, field construction criteria, materials, equipment, catalog numbers, and similar data, or will do so, and 3) states the Work covered by the submittal is recommended by the Contractor and the Contractor's guarantee will fully apply thereto. Contractor's stamp shall be dated and signed by the Contractor in every case.

G. Submittals will be reviewed only for conformance with the design concept of the Project and with the information given in the Contract Documents. The approval of a separate item, as such, will not indicate approval of the assembly in which the item functions, nor shall approval be construed as revising, in any way, the requirements for a fully integrated and operable system, as specified. The approval of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents, or for any revision in resubmittals, unless the Contractor has given notice, in writing, of the deviation or revision at the time of submission or resubmission, and written approval has been given to the specific deviation or revision, nor shall any approval relieve the Contractor of responsibility for errors or omissions in the submittals, or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, and completion of the Work.

H. The Contractor shall make all required corrections and shall resubmit the required number of corrected submittals until approved by the Engineer. The Contractor shall direct specific attention, in writing, to revisions other than the corrections called for on previous submittals, and shall state, in writing, all variations in costs, and his assumption of the cost of related changes. Identify each resubmittal with number of the original submittal, followed by consecutive letters starting with "A" for first resubmittal, "B" for second resubmittal, etc. Note that in addition to any applicable liquidated damages, the Owner reserves the right to deduct monies from the amounts due to Contractor to cover the cost of Engineer's review time beyond the second submission.

I. The Contractor shall check submittals returned to him for correction and ascertain if the corrections result in extra cost to him above that included under the Contract Documents, and shall give written notice to the Engineer within five (5) days, if in his opinion, such extra cost results from corrections. By failing to notify the Engineer or by starting any Work covered by a submittal, the Contractor waives all claims for extra costs resulting from required

corrections.

J. No Work represented by required submittals shall be purchased, or paid for, or commenced until the applicable submittal has been approved. Work shall conform to the approved submittals and all other requirements of the Contract Documents, unless subsequently revised by an appropriate modification, in which case, the Contractor shall prepare and submit revised submittals as may be required. The Contractor shall not proceed with any related Work which may be affected by the Work covered under submittals until the applicable submittals have been approved.

K. Piecemeal submittals will be returned unreviewed. However, for mechanical equipment and the like, separate submittals for embedded items, embedded metal work and anchors, will be reviewed, as applicable.

1.04 OTHER SUBMITTALS.

A. Provide no less than two (2) copies of other submittals such as calculations, manufacturer's certified reports, operational demonstration and system validation reports specified elsewhere in the Contract Documents, one (1) of which will be retained by the Engineer and the rest of which will be returned to the Contractor marked to show the required corrections.

1.05 FORM OF APPROVAL.

A. Copies of submittals which are returned to the Contractor and which are subject to approval will be marked with notations (1), (2), (3) or (4), and may also be marked with notation (6), in which case the action so indicated shall be taken by the Contractor.
   1. No Exceptions Taken.
   2. Furnish as Corrected
   3. Revise and Resubmit.
   4. Not reviewed.
   5. Rejected.

B. Returned copies of drawings marked with either notation (1), or (2) authorize Contractor to proceed with the fabrication, or construction, or any combination thereof, covered by such returned drawings, provided, that such fabrication, or construction shall be subject to the comments, if any, shown on such returned copies.

C. Returned copies of drawings marked with notation (3), (4) or (5) shall be corrected as necessary and a revised submittal shall be submitted in the same manner as before.

D. Returned copies of drawings marked with either notation (3), (4) or (5) shall be resubmitted not later than seven (7) days after date of transmittal by Engineer.

E. The Submittal Control Log will be reviewed and updated in coordination with the Contractor at the weekly progress meetings.

END OF SECTION

SECTION 01500
MOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all services associated with the mobilization and demobilization of personnel, equipment, supplies, and incidentals to the Work site in accordance with this Section.

B. The Contractor shall supply and implement all construction facilities and temporary controls in accordance with this Section and as shown on the Plans.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Standard Plans Book.* California Department of Transportation, 2010.

1.03 SUBMITTALS

A. At least 14 calendar days prior to mobilizing to the Work site, the Contractor shall submit a Dust Control Plan for approval by the Design Engineer prior to commencement of the Work. The plan shall comply with the requirements of the Mendocino County Air Quality Management District and shall identify procedures to minimize dust related impacts with the intent of eliminating dust nuisance complaints from adjacent areas or regulatory agencies.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MOBILIZATION

A. The Contractor shall perform preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the Work site; for the establishment of all offices, buildings, and other facilities necessary for execution of the Work; and for all other work and operations which must be performed or costs incurred prior to beginning the Work in accordance with Section 11 of the Standard Specifications.

B. The Contractor shall give written notice to the Design Engineer at least 48 hours prior to transporting oversize and/or overload equipment to the Work site.

3.02 DEMOBILIZATION

A. The Contractor shall perform any work and operations, including, but not limited to, those necessary for the removal of personnel, equipment, supplies, temporary utilities (underground

and above ground), construction facilities, excess, surplus, waste materials and incidentals from the Work site prior to application for final payment.

B. The Contractor shall clean and repair damage caused by installation or use of construction facilities or temporary controls.

3.03 CONSTRUCTION FACILITIES

A. General
1. Unless noted otherwise within these Technical Specifications or allowed through specific agreement with the Design Engineer, the Contractor shall provide and pay for all labor, materials, tools, equipment, machinery, necessary permits, water, heat, utilities, and any other facilities or services necessary to complete the Work in accordance with these Technical Specifications and as shown on the Plans.
2. Provision of all construction facilities shall be coordinated with the Design Engineer.

B. Access Roads
1. The Contractor may construct and maintain any haul road necessary to execute the Work or use existing haul and access roads at the Work site.
2. The Contractor shall repair any existing roads damaged by the Contractor during construction, as directed by the Design Engineer.

C. Staging Area
1. The Contractor shall utilize a staging area for equipment and materials storage, and personnel parking. The location of the staging area shall be determined in coordination with the Design Engineer.

D. Temporary Buildings
1. The Contractor may provide and maintain a weather-tight temporary office trailer, for the use of the Contractor and any Subcontractors, equipped as desired by the Contractor.
2. The Contractor shall provide a weather-tight temporary office trailer, for the use of the Owner and CQA representatives, equipped with a table, desk, and chairs. The Contractor shall locate the trailer at a location approved by the Design Engineer.
3. The Contractor's office trailer shall be located adjacent to the CQA office trailer as determined by the Design Engineer.
4. The Contractor shall install a security fence around their office trailer and the CQA Office, as directed by the Design Engineer. The fences shall be chain link, a minimum 6 feet in height with three strands of barbed wire and a minimum 12-foot-wide gate.

E. Temporary Utilities
1. Electricity
   a. The Contractor shall provide and pay to connect to electrical power required for construction facilities and execution of the Work including, but not limited to, a temporary electric feeder from electrical service, adequate power outlets with branch wiring and distribution boxes located as required, flexible power cords as required, and main service disconnect and overcurrent protection at convenient location.

b. The Contractor shall provide and pay for the electrical service and all power required for the temporary office trailer for use by the Owner and CQA representatives for the duration of the project.

2. Telephone and Facsimile
   a. The Contractor shall provide, maintain, and pay for separate telephone and facsimile service for the Contractor's office trailer and the CQA Officer's trailer, as needed.
3. Water
   a. Construction Water
      1. The Contractor shall be responsible for developing a water supply for construction water and dust control and delivering and applying water as needed. Full compensation for developing a water supply and delivering and applying water shall be considered as included in the Contract Unit Price paid for the various contract items requiring water.
   b. Drinking Water
      1. Drinking water shall be provided by the Contractor from a potable source so piped or transported as to keep it safe, fresh, and served from single service containers or satisfactory types of sanitary drinking stands or fountains. Drinking water services and facilities shall be furnished in strict accordance with existing governing health regulations.
4. Sanitary Facilities
   a. The Contractor shall furnish, install, and maintain ample sanitary facilities as required for the Contractor's and Design Engineer's employees and for the employees of any Subcontractors.
   b. A sufficient number of enclosed temporary toilets shall be conveniently placed as required by the sanitary codes of state and local government.

3.04 TEMPORARY CONTROLS

A. General
   1. The Contractor shall comply with all codes, ordinances, rules, regulations, orders, or other legal requirements of public authorities, which bear on performance of the Work.
   2. The Contractor shall instruct all personnel and maintain strict control of all Work activities to protect and maintain the integrity of all existing environmental monitoring and control systems for the landfill.

B. Safety
   1. The Contractor shall submit a Health and Safety Plan with an Emergency Contact List to the Design Engineer prior to commencement of the Work and in accordance with Section 01800 (Health and Safety) of these Technical Specifications.
   2. The entire Work site is subject to shutdown, at the discretion of the Design Engineer, due to heavy rain, high winds, or other inclement weather.
   3. The Contractor's equipment and vehicles shall not travel at speeds of more than 20 miles per hour within 200 feet of any active work areas, equipment, or personnel.

C. Equipment Fueling and Maintenance
   1. The Contractor shall perform equipment fueling and maintenance within a contained

area, to be constructed by the Contractor in a location approved by the Design Engineer to prevent any release of fuel or other contaminants. The Contractor shall immediately remediate any leaks, spills, or other release of fuel or other contaminants as directed by the Design Engineer.

D. Drainage Control

1. The Contractor shall provide ample means and devices with which to promptly remove and dispose of all water from any source entering the Work areas and maintain these at all times during execution of the Work and until the final Work has been approved by the Design Engineer.

E. Erosion and Sediment Control

1. Temporary erosion and sediment control measures shall be implemented by the Contractor for all Work areas in accordance with the SWPPP prepared as part of Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications.

F. Dust Control

1. Dust control measures shall be implemented by the Contractor for all Work areas in accordance with the Contractor's approved Dust Control Plan submitted under Section 14-9.02A of the Standard Specifications.

PART 4 MEASUREMENT AND PAYMENT

2.01 MOBILIZATION

A. Payment for mobilization, demobilization, construction facilities and temporary controls including temporary erosion control described in these Technical Specifications is considered as included in the Contract Lump Sum Price paid for "Mobilization" and includes all compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the Work specified herein and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Payment for "Mobilization" shall be as follows:

1. When the monthly partial payment estimate exceeds 5% the contract amount, not including any amount paid for Mobilization, 5% of the contract amount or 50% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

2. When the monthly partial payment estimate exceeds 10% the contract amount, not including any amount paid for Mobilization, 7.5% of the contract amount or 75% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

3. When the monthly partial payment estimate exceeds 20% the contract amount, not including any amount paid for Mobilization, 9.5% of the contract amount or 95% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

4. When the monthly partial payment estimate exceeds 50% the contract amount, not

including any amount paid for Mobilization, 10% of the contract amount or 100% of the amount bid for Mobilization shall be included in the progress payment, whichever is lesser.

5. After the Engineer determines that the work is substantially complete, any amount bid for Mobilization exceeding 10% of the contract amount will be paid in the final payment.

END OF SECTION

SECTION 01550
STORM WATER POLLUTION PREVENTION

PART 1 GENERAL

1.01 SUMMARY

A. Preparation, implementation, and monitoring of the Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharge of pollutants from the Work site into receiving waters. This includes, but is not limited to the prevention of sedimentation from the Work site into storm drains and natural drainages and the prevention of pollution discharges derived from equipment fueling and maintenance/repairs, improper dumping, spills, or leakage from storage tanks or transfer areas.

B. Prohibit illicit discharge (non-rainwater) into the storm drain system or natural drainages.

C. Construct any and all necessary systems to eliminate contaminants from entering the storm drain system or natural drainages.

D. Clean up and control of Work site materials, spoils, and debris.

E. Removal of contaminants produced by the Project.

F. Implement erosion and sediment control measures to prevent discharge of sediment to the storm drain system and natural drainages (see Section 02960 [Temporary Erosion and Sediment Controls] of these Technical Specifications).

G. The Work shall include the provision of all labor, materials, equipment, and apparatus not specifically mentioned herein or noted on the Plans, but which are incidental and necessary to complete the Work specified.

1.02 REFERENCES

A. *California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ (NPDES No. CAS000002)*. State Water Resources Control Board, 2010.

B. *California Storm Water Best Management Practice Handbooks:*
   1. Municipal
   2. Industrial/Commercial
   3. Construction Activity

1.03 REGULATORY REQUIREMENTS

A. Contractor shall comply with the State Water Resources Control Board (SWRCB), Regional Water Quality Control Board (RWQCB), county, city, municipal, and other local agency requirements regarding storm water discharges and management. The State does not obtain

local permits.

1.04 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A. A SWPPP shall be prepared for the Project by the Contractor. SWPPP preparation includes obtaining SWPPP acceptance, amending the SWPPP, preparing a Construction Storm Water Management Plan (CSMP) and a Storm Water Action Plan (SAP), and monitoring and inspecting Water Pollution Control (WPC) practices at the Work site and shall include:

1. Storm water sampling and analysis including reporting of storm water quality per qualifying rain event. If specified for the risk level, the work includes preparation, collection, analysis, and reporting of storm water samples for turbidity, pH, and other constituents.
2. Preparation of the Storm Water Annual Report including certifications, monitoring and inspection results, and obtaining Storm Water Annual Report acceptance.
3. If specified for the project risk level, preparation of a Rain Event Action Plan (REAP) including preparing and submitting REAP forms and monitoring weather forecasts.

B. The Contractor shall amend the SWPPP, as necessary, during construction showing the best management practices (BMPs) for the prevention and control of pollutants and erosion of the Work site. The SWPPP shall be in accordance with all of the requirements of the General Construction Storm Water Permit (Permit). Contractor is responsible to implement the SWPPP and make revisions to the SWPPP as necessary until completion of the Project. Information on the Permit can be found on the internet at http://www.swrcb.ca.gov/stormwtr/construction.htm. The Contractor shall prepare the Notice of Intent (NOI) to the SWRCB and provide to the Owner for filing at the SWRCB.

1.05 RISK LEVEL

A. The Risk Level for this Project is Level D.

1.06 QUALITY ASSURANCE

A. All work performed under this Contract and all Contractors and their associates and/or employees are required to comply with all applicable storm water regulations and to implement BMPs at all times.

B. A SWPPP shall be provided by the Contractor for the proposed control of contaminants entering the storm water system and natural drainages. The SWPPP must be approved by the Design Engineer prior to commencement of work.

C. All employees and subcontractors shall be trained on the storm water pollution prevention requirements contained in these Technical Specifications.

D. A supply of spill clean-up materials such as rags or absorbents shall be kept readily accessible on-site at all times.

1.07 SUBMITTALS

A. The Contractor shall submit a site-specific SWPPP prepared by a Qualified SWPPP Developer (QSD). The Contractor shall amend the SWPPP when required, prepare a CSMP, and perform water pollution control work under the oversight of a Qualified SWPPP Practitioner (QSP), as specified in the General Permit. All reports and data that must be submitted to the SWRCB will be uploaded by the Contractor's QSP to the Storm Water Multiple Application and Report Tracking System (SMARTS) website for final submittal. Final submittal and certification will be performed by the Owner.

B. Within 14 calendar days of Authorization to Proceed, the Contractor shall submit three (3) printed copies of the SWPPP and Site Map and one (1) electronic copy in a Portable Document Format (PDF) to the Design Engineer for review. The Contractor shall allow five (5) working days for the Design Engineer's review. If revisions are required, the Design Engineer will provide comments, and the Contractor shall revise and resubmit the SWPPP and Site Map in printed and electronic form within five (5) working days of receipt of the Design Engineer's comments. Within three (3) working days of receipt of the Design Engineer's approved SWPPP, the Contractor shall submit three (3) paper copies of the approved SWPPP to the Design Engineer and prepare the NOI and upload all pertinent documentation to SMARTS for final submittal and certification by the Design. The SWRCB will review the NOI and the issue a Waste Discharge Identification (WDID) number for the Project.

C. The Contractor shall not perform work that may cause water pollution until the state has issued a WDID number for the Project. The Design Engineer's review and approval of the SWPPP shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State and local laws, regulations, and requirements.

D. The Contractor shall keep a copy of the approved SWPPP at the Work site. The SWPPP shall be made available when requested by a representative of the RWQCB, SWRCB, United States Environmental Protection Agency, or the local storm water management agency. Requests from the public shall be directed to the Owner.

E. The Contractor shall submit a Construction Management Plan that includes proposed provisions to prevent pollution and debris from reaching the water channel and shall include wet weather protection, erosion measures, methods, and location for cleaning tools and equipment dust control, litter prevention, debris collection and removal, location of portable toilets, storm water management controls, and hazardous material (including fuel) management at the Work site.

F. The Contractor shall submit Storm Water Training Records including training dates and subjects for employees and subcontractors including:
   1. Within five (5) working days of SWPPP acceptance for existing employees.
   2. Within five (5) working days following training of all new employees (Contractor and subcontractors).
   3. At least five (5) working days prior to subcontractors starting work for subcontractor's employees.

G. The SWPPP including the CSMP and SAP, SWPPP amendments, training records, REAPs, sampling and analysis results, exceedance reports, visual monitoring reports, inspection reports, BMP status reports, annual reports, and reporting on Storm Water Pollution Control (SPC) practices, shall be prepared and submitted to the Design Engineer under the direction of a QSD.

1.08 PERMIT

A. Within three (3) working days of receipt of the Design Engineer's approved SWPPP, the Contractor shall submit three (3) paper copies of the approved SWPPP to the Owner and prepare the NOI and upload all pertinent documentation to SMARTS for final submittal and certification by the Owner. The SWRCB will review the NOI and the issue a WDID number for the Project.

B. The Owner shall pay required fees and pay annual renewal fees until completion of the Project.

1.09 LIABILITIES AND PENALTIES

A. Review of the SWPPP, amended and finalized by the Contractor from an initiated plan, shall not relieve the Contractor from liabilities arising from non-compliance of storm water pollution regulations.

B. Contractor will be held responsible for paying penalties for violations of permit conditions. In the event of any fines against the City, due to non-compliance by the Contractor, the City shall recover all costs of the fines from the Contractor.

1.10 IMPLEMENTATION

A. The Contractor shall not perform work that may cause water pollution until the SWRCB has issued a WDID number for the Project. The City's review and approval of the SWPPP shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State, and local laws, regulations, and requirements.

B. Contractor shall comply with the requirements of the Permit and the SWPPP. Contractor shall update the SWPPP and have the SWPPP map available at the Work site at all times.

C. Contractor shall implement BMPs for control of all pollutants including sediment, fuel and other petroleum and non-petroleum hydrocarbon products, concrete waste, fertilizers, soil amendments and other construction related pollutants.

D. Contractor shall implement an effective combination of erosion and sediment controls by stabilizing all disturbed soil, paying particular attention to exposed slopes. Back up erosion prevention measures with sediment control measures. Ensure all control measures are adequate, in place, and in operable condition.

E. Contractor shall conduct site inspections before, during extended storm events, and after each storm event to identify areas that may contribute to erosion and sediment problems or any other pollutant discharges. If additional control measures are needed, implement them

immediately. Document all inspection findings and actions taken in detailed, site specific inspection reports. These reports must be maintained on site for review.

F. Contractor shall maintain and repair all erosion prevention and sediment control measures throughout the season and until completion of the project. Replacement supplies shall be kept on the Work site.

G. Contractor shall train all site personnel in erosion prevention and sediment control techniques, and the responsibilities under the Permit.

H. Contractor shall conduct weekly training meetings and training for personnel collecting water samples.

I. Contractor shall immediately report to the RWQCB office any instances of sediment or other pollutant discharges from the Work site.

J. Contractor shall obtain services and pay for any sampling, testing, and analysis of storm water as required for compliance with the General Permit and the SWPPP.

K. Contractor shall make the SWPPP available to the RWQCB staff and correct any requirements imposed as a result of their inspections.

1.11 CERTIFICATION AND REPORTS

A. Prior to July 1 of each year during the construction period, submit two (2) copies of the Annual Report that the construction activities are in compliance with the General Permit and the SWPPP to the Design Engineer for review.

B. At Completion of the Project, submit records of all inspections, compliance certifications and noncompliance reports to the SWRCB.

C. Upon Completion of the Project, the Contractor shall file a Notice of Termination with the SWRCB.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 HAZARDOUS MATERIAL/WASTE MANAGEMENT/MATERIALS MANAGEMENT

A. Designated areas of the Work site shall be proposed by the Contractor for approval by the Design Engineer suitable for material delivery, storage, and waste collection as far from catch basins, drainage inlets, and natural drainages as possible.

B. All hazardous materials such as fuels and solvents and all hazardous waste such as waste oil and antifreeze shall be labeled and stored in accordance with State and Federal regulations.

C. All hazardous materials and all hazardous waste shall be stored in accordance with secondary containment regulations, and it is recommended that these materials and waste be covered as needed to avoid potential management of collected rainwater as a hazardous waste.

D. Regular hazardous waste collection shall be arranged for to comply with time limits on the storage of hazardous waste.

E. Granular materials shall be stored a minimum 10 feet from the closest catch basin and drainage inlet associated with the storm drain system. The Contractor shall not allow these granular materials to enter the storm drain system or natural drainages.

F. Warning signs shall be posted in areas containing or treated with chemicals.

G. An accurate up-to-date inventory, including Material Safety Data Sheets (MSDSs) of hazardous waste stored on site shall be kept and available to assist emergency response personnel in the event of a hazardous materials incident.

H. Maintenance and fueling of vehicles and equipment shall be performed in a designated, bermed area, or over a drip pan that will not allow run-off of spills. Vehicles and equipment shall be regularly checked and have leaks repaired promptly. Secondary containment shall be used to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.

3.02 DUST CONTROL

A. The Contractor's Dust Control Plan required under Section 01500 (Mobilization) of these Technical Specifications shall comply with the requirements of the Mendocino County Air Quality Management District.

B. A minimum of two (2) water trucks with operators shall be in operation at all times during excavation to provide dust control at all excavation, haul road, stockpile and staging areas. If necessary, additional water trucks or other equipment with operators shall be provided and used by the Contractor to maintain these areas in a misted condition at all times during excavation.

C. Access and haul roads shall be watered on a continuous basis to control dust.

D. The Contractor will be restricted from areas where dust cannot be controlled and excessive equipment speeds, which cause dust, may be regulated by the Owner.

E. The Design Engineer will require all excavation activities to cease if the Contractor's dust control efforts do not follow the approved SWPPP, or fail to meet any of the requirements of this Part, until such time that the Contractor can demonstrate a return to compliance.

F. Other methods of dust control and suppression may be used, however; Design Engineer approval must be obtained prior to such use.

3.03 CONCRETE WASTE MANAGEMENT

A. Concrete trucks shall not be washed out into storm drains or natural drainages.

B. Concrete trucks and equipment shall be washed out off-site or in a designated area on-site where the water will flow onto dirt or into a temporary pit or bermed area. The water shall percolate into the soil and the hardened concrete placed in a waste container for disposal. If a suitable soil or bermed area is not available on-site, the wash water shall be collected and removed off-site and disposed of properly.

3.04 EROSION AND SEDIMENT CONTROL

A. Stabilize all denuded areas and install and maintain all temporary erosion and sediment control continuously between October 15th and April 15th of each year, until permanent erosion controls have been installed (see Section 02960 [Temporary Erosion and Sediment Controls] of these Technical Specifications).

B. Divert on-site runoff around exposed areas and divert off-site runoff around the Work site (e.g., swales and dikes).

C. Incorporate provisions for preventing erosion and trapping sediment on-site, such as sediment basins or traps, earthen dikes or berms, silt fences, check dams, storm drain inlet protection, soil blankets or mats, covers for soil stock piles, and/or other measures.

3.05 CONSTRUCTION SITE BMPs

A. Store, handle, and dispose of construction materials and waste properly, so as to prevent their contact with storm water.

B. Control and prevent the discharge of all potential pollutants, including concrete, petroleum products, chemicals, washwater or sediments, and non-storm water discharges to storm drains and natural drainages.

C. Use sediment controls or filtration to remove sediment when dewatering site and obtain all necessary permits.

D. Avoid cleaning, fueling, or maintaining vehicles on-site, except in a designated area where washwater is contained and treated.

E. Delineate with field markers clearing limits, easement, setbacks, sensitive or critical areas, buffer zones, trees, and drainage courses.

F. Protect adjacent properties and undisturbed areas from construction impacts using vegetative buffer strips, sediment barriers or filters, dikes, mulching, or other measures as appropriate.

G. Perform clearing and earth moving activities only during dry weather.

H. Limit and time applications of fertilizers to prevent polluted runoff.

I. Limit construction access routes and stabilize designated access points.

J. Avoid tracking dirt or other materials off-site; clean off-site paved areas using dry sweeping methods.

K. The Contractor shall train and provide instruction to all employees and subcontractors regarding the construction BMPs.

3.06 SITE CLEANUP

A. The cleaning of equipment or materials shall not be performed on-site using soaps, solvents, degreasers, steam cleaning, or equivalent methods.

B. All cleanup must be performed in a designated area that will not allow the cleaning rinse to flow off-site or into on-site storm drains or natural drainages.

3.07 PERFORMANCE REQUIREMENTS

A. The SWPPP is a minimum requirement. Revisions and modifications to the SWPPP are acceptable only if they maintain levels of protection equal to or greater than originally specified.

B. Read and be thoroughly familiar with all of the requirements of the SWPPP.

C. Inspect and monitor all work and storage areas for compliance with the SWPPP prior to any anticipated rain.

D. Complete any and all corrective measures as may be directed by regulatory agencies.

E. Costs: Contractor to pay all costs associated with the implementation of the requirements of the SWPPP in order to maintain compliance with the Permit. This includes installation of all Housekeeping BMPs, General Site and Material Management BMPs, inspection requirements, maintenance requirements, and all other requirements specified in the SWPPP.

PART 4 MEASUREMENT AND PAYMENT

4.01 STORM WATER POLLUTION PREVENTION

A. Measurement and payment for storm water pollution prevention shall be considered as included in the Contract Lump Sum Price paid for "Temporary Erosion and Sediment Controls" addressed in Section 02960 (Temporary Erosion and Sediment Controls) of these Technical Specifications.

END OF SECTION

SECTION 01720
RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUBMITTALS

A. Quality Control Submittals: Written procedures for maintaining and markup of record documents.

B. Contract Closeout Submittal: Submit record documents in accordance with the requirements of this section. Submit prior to application for final payment.

1.02 QUALITY ASSURANCE

A. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.

B. Accuracy of Records:

1. Coordinate changes within record documents, making legible and accurate entries on each page of Technical Specifications and each sheet of Plans and other documents where such entry is required to show change.
2. Purpose of Project record documents is to provide factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.

C. Make entries within 24 hours after receipt of information that a change in Work has occurred.

D. Prior to submitting each request for progress payment, request Design Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in delay of Progress Payment made by the Owner.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Maintain record documents completely protected form deterioration, loss, and damage until completion of Work.

B. In event of loss of recorded data, use means necessary to again secure data to Design Engineer's acceptance.

1. Such means shall include, if necessary in Design Engineer's opinion, removal and reconstruction of covering materials, at no cost to Owner.

PART 2 PRODUCTS

2.01 RECORD DOCUMENTS

A. Promptly following commencement of Contract Times, secure from Owner at no cost to Contractor, one complete set of Contract Documents. Plans will be full size.

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

A. General:
1. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
2. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

B. Preservation
1. Maintain record documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make record documents and samples available at all times for observation by Design Engineer.

C. Making Entries on Plans
1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
   a. Color Coding:
      i. Green when showing information deleted from Plans.
      ii. Red when showing information added to Plans.
      iii. Blue and circled in blue to show notes.
2. Date entries
3. Call attention to entry by "cloud" drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including but not limited to:
   a. Horizontal and vertical locations of existing and new underground facilities and appurtenances, and other underground structures, equipment or Work. Reference to at least two measurements of permanent surface improvements.
   b. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
   c. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
   d. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and Design Engineer's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.

5. Dimensions on Schematic Layouts: Show on record documents, by dimension, the centerline of each run of items such as described in the previous subparagraph above.
   a. Clearly identify the item by accurate note such as "cast iron drain," galv. water," and the like.
   b. Show, by symbol or note, vertical location of item ("under slab", "exposed", and the like).
   c. Make identification sufficiently descriptive that it may be related reliably to the Technical Specifications.

D. Make entries in other pertinent record documents as accepted by Design Engineer.

E. If record documents are not accepted by Design Engineer, secure a new copy of that record document from Design Engineer at Design Engineer's usual charge for reproduction and handling, and carefully transfer change data to new copy to acceptance of Design Engineer.

END OF SECTION

SECTION 01800
HEALTH AND SAFETY

PART 1 GENERAL

1.01 SUMMARY

A. Site safety.

B. LFG hazards.

C. Other landfill related hazards.

1.02 SITE SAFETY

A. All safety requirements are applicable to the Work to be performed under the Contract and any subsequent addenda, modifications, alterations, and extensions thereto.

B. The Contractor shall be solely and completely responsible for conditions of the Work site, including the safety of all persons and property during performance of the Work and provision of safety measures on weekends and holidays. This requirement will apply continuously and shall not be limited to normal working hours.

C. The Contractor shall comply with all federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Agency, and Division of Industrial Safety, State of California, and other such safety measures as may be required by the above mentioned regulatory agencies.

D. Contractor shall be solely and completely responsible for the safety of all construction personnel performing the Work, including all Subcontractors. Contractor shall be ultimately responsible for any and all necessary safety precautions and safety programs.

E. Contractor shall also be held responsible for their own compliance with the provisions of this Section, as well as the compliance of all Subcontractors with the provisions of this Section. Contractor shall be held responsible for any and all violations of the provisions of this Section, as well as violations of any federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Agency, and Division of Industrial Safety, State of California, and other such safety statutes and requirements which apply to the Work.

F. No act, service, drawing review or construction review by the Owner, Design Engineer, CQA Officer or their Consultants is intended to include review of the adequacy of the Contractor's safety measures in, on, or near the Work site.

G. If a conflict should occur between the safety requirements of the Standard Specifications, these Technical Specifications, the approved Health and Safety Plan, Referenced Standards, or other federal, state, and local safety codes, ordinances, and regulations, the more stringent requirement shall prevail.

1.03 LFG HAZARDS

A. The Contractor is advised that decomposing refuse produces LFG, which is approximately 50 percent methane and 50 percent carbon dioxide by volume. LFG may be present in the Work area. LFG is colorless, can be odorless, may contain benzene, vinyl chloride, hydrogen sulfide, and other toxic constituents, is combustible, and contains little or no oxygen. LFG can migrate through soil near the surface so the Contractor is therefore advised of the need for precautions against fire, explosion, and asphyxiation when working in or near excavations which are in or near refuse fill areas.

B. The Contractor shall be responsible for informing his or her employees and Subcontractors and their employees of the potential danger of LFG on and near landfills.

C. Smoking shall be prohibited at all times and at all locations within the limits of the Work shown on the Plans.

D. The Contractor shall be familiar with "A Compilation of Landfill Gas Field Practices and Procedures" as prepared by the Solid Waste Association of North America (SWANA).

E. LFG has the potential to create hazardous conditions if not controlled or recognized. Some of the hazards of LFG include:
   1. Fires which may start spontaneously from exposed and/or decomposing refuse.
   2. Fires and explosions which may occur from the presence of methane gas.
   3. Oxygen deficiency in underground trenches, excavations, vaults, conduits and structures.
   4. The potential presence of hydrogen sulfide, a highly toxic and flammable gas.
   5. The potential presence of benzene, vinyl chloride, and other toxic gases which are known to the State of California to cause cancer, birth defects, and reproductive harm.
   6. Water vapor in LFG often becomes over saturated and condenses as a liquid in contained pipes and vessels. This condensate may contain the toxic constituents found in LFG.

1.04 OTHER LANDFILL-RELATED HAZARDS

A. The Contractor is advised that solid waste fills and the decomposing refuse therein may present other unique health and safety considerations. Such considerations include, but are not limited to:
   1. Unstable ground and surface cave-ins due to decomposition and differential settlement of refuse when working over, in, or near refuse fill areas.
   2. Possible caving of trenches and excavations when working over, in, or near refuse fill areas.
   3. Potentially hazardous materials in or near refuse fill areas.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 HEALTH AND SAFETY PLAN

A. Prior to start of construction, the Contractor shall submit a written Health and Safety Plan, to the Design Engineer indicating all proposed safety measures. Said plan shall be prepared in accordance with the requirements of Part 29 of the Code of Federal Regulations (29 CFR) 1910.120.

B. The Health and Safety Plan shall comply with all federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Administration (OSHA), and Division of Industrial Safety, State of California. The Contractor shall comply with Section 5-1.02A of the Standard Specifications for safety plan requirements for trenches and excavations. Contractor's attention is further directed to Section 6705 of the Labor Code concerning trench excavation safety plans.

3.02 SITE SAFETY MONITOR

A. The Contractor shall provide a person who will be designated as the Site Safety Monitor.

B. The Site Safety Monitor shall be thoroughly trained in rescue procedures, and use of safety equipment and gas detectors as required by the Health and Safety Plan.

C. At a minimum the Site Safety Monitor shall have taken a certified 40-hour OSHA safety course and 8-hour supplementary health and safety supervisor course which meets the requirements of 29 CFR 1910.120. Certificates of participation shall be submitted to the Design Engineer prior to start of construction.

D. The Site Safety Monitor shall have the delegated authority to order any person or worker to follow safety rules related to LFG or other site safety hazards. Failure to observe these rules shall be sufficient cause for removal of the person or worker from the Work site.

E. Supplemental to the Contractor's regular safety program, the Site Safety Monitor shall develop and institute procedures to inform all workers and the public visiting the Work site of the potential for the presence of methane and other landfill gases emanating from the natural decomposition of refuse buried at or near the Work site, and the importance of safety precautions to provide for the safety of workers and the public.

3.03 TRENCH AND EXCAVATION SAFETY

A. Contractor shall comply with all requirements of the trench and excavation safety, including provisions of Section 5-1.02A of the Standard Specifications and all occupational safety and health requirements of the Labor Code. In particular, the Contractor shall:

1. Submit to the Design Engineer at least 14 calendar days in advance of excavation, a detailed plan showing the design of sheeting, shoring, bracing, slopes, or other provisions to be made for worker protection from the hazard of caving ground during excavation. Sheeting and shoring plans shall be designed and stamped by a Registered Civil or Structural Engineer with experience in shoring design. The Contractor shall be solely responsible for ensuring the safety of any excavation. Shoring and submittal of any plans for sheeting, shoring,

bracing, slopes, or other provisions to be made for worker protection shall not relieve the Contractor from this responsibility.

2. If required, obtain a permit from the division of Industrial Safety for the construction of excavations that are 5 feet in depth or deeper and into which a person or persons is (are) required to descend.

B. Contractor shall provide all necessary materials to sheet, shore, brace, or otherwise provide for worker protection in temporary excavations as well as may be required to prevent adjacent surface settlement or damage to public and private property and to ensure safe working conditions at the Work site.

C. Contractor shall remove all sheeting, shoring, bracing or similar structures in accordance with the above requirements and in such a manner as to prevent any damage to the Work.

D. The Contractor shall repair all damages resulting from improper sheeting, shoring, bracing or similar measures, or damages resulting from failure to provide such measures at no expense to the City.

PART 4 MEASUREMENT AND PAYMENT

4.01 HEALTH AND SAFETY

A. Payment for providing all health and safety measures, including preparation of required Health and Safety Plan, is included in the Contract Unit Price paid for the various items of Work for which they are required. No separate or additional payment will be made therefore.

END OF SECTION

DIVISION 2

SITE WORK

SECTION 02200
REMOVAL, REPLACEMENT, AND ADJUSTMENT OF EXISTING FACILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Existing facilities that interfere with the Work shall be removed, reset, relocated, adjusted, or otherwise modified as specified herein, as shown on the Plans, or as directed by the Engineer. The Contractor shall perform all removal, replacement, abandonment, and adjustment of existing facilities in accordance with this Section and at the locations and details shown on the Plans including the following:

1. Adjust three (3) existing groundwater monitoring wells to grade;
2. Adjust two (2) existing leachate wells to grade;
3. Remove existing CMP and HDPE downdrains and drain outlets to creek;
4. Remove and/or abandon existing leachate piping;
5. Adjust of five (5) existing leachate manholes to grade;
6. Remove and replace existing vault boxes;
7. Install G5 traffic vault with checker plate top over existing valve;
8. Adjust existing gas vault to grade;
9. Adjust existing air release valve and vault to grade;
10. Adjust four (4) existing landfill gas perimeter monitoring wells/vaults to grade;
11. Remove existing fencing at site entrance; and
12. Demolish existing scale house structure.

B. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to implement the respective removal, replacement, and adjustment activities outlined above and within this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Standard Plans Book.* California Department of Transportation, 2010.

1.03 SUBMITTALS

A. At least 14 calendar days prior to beginning any replacement work in accordance with the requirements of this Section, the Contractor shall provide three (3) copies to the Design Engineer manufacturer's product data sheets for any new materials used in the replacement or adjustment of existing facilities.

1.04 PROJECT CONDITIONS

A. Except for materials indicated to be stockpiled or to remain the City's property, cleared materials are the Contractor's property. Remove cleared materials from the project site and dispose of in lawful manner.

B. Salvaged Materials: Carefully remove items indicated to be salvaged and store where indicated on Plans or where designated by the City. Avoid damaging materials designated for

salvage.

C. Unidentified Materials:
   1. If unidentified materials are discovered, including hazardous materials that may require additional removal other than is required by the Contract Documents, immediately report the discovery to the City.
   2. I necessary, the City will arrange for any testing or analysis of the discovered materials and shall provide instruction regarding the removal and disposal of unidentified materials.

PART 2 PRODUCTS

2.01 SOIL MATERIAL

A. Backfill excavations resulting from removal operations with onsite or import materials conforming to the specification for compacted engineered fill as described in Section 02224 (Engineered Fill).

2.02 VAULT BOXES

A. New or replacement vault boxes shall be pre-cast boxes with solid concrete or steel lids at the sizes and dimensions as indicated on the Plans. Extension risers shall be used as necessary to raise vault box to grade. Vault boxes shall be Christy boxes or equivalent with traffic rated cover where indicated.

PART 3 EXECUTION

3.01 GENERAL

A. Items demolished or removed that are not to be salvaged or reused in the Work shall become the property of the Contractor and shall be legally disposed of or recycled.

B. Verify that utilities have been disconnected and capped before starting demolition operations.

3.02 DOWNDRAIN AND DRAIN OUTLET REMOVAL

A. Unless indicated on the Plans to remain, all existing aboveground and below ground CMP and HDPE downdrains and drain pipe including any hardware shall be removed within the limits of Work.

B. Backfill trench excavations resulting from removal operations with onsite or import materials conforming to the specification for compacted engineered fill as described in Section 02224 (Engineered Fill). Compact to 90% relative compaction.

3.03 LEACHATE PIPING REMOVAL/ABANDONMENT

A. Cut existing leachate pipe at points shown on the Plans. The pipe cuts shall be square, perpendicular to the center of the pipe. Cap or plug with concrete the ends of the piping where indicated.

B. Unless piping is shown on the Plans to be abandoned in place, excavate and remove piping for disposal per section 1.04A.

C. Backfill excavations resulting from removal operations with onsite or import materials conforming to the specification for compacted engineered fill as described in Section 02224 (Engineered Fill). Compact to 90% relative compaction.

3.04 LEACHATE MANHOLE ADJUSTMENT

A. Frames and covers of existing leachate manholes shall be adjusted to grade with new materials similar in character to those in the original structure in accordance with the provisions of these specifications.

C. After the existing cover and frame has been removed, the top of the structure to be raised shall be trimmed to provide a suitable foundation for the new material.

D. When reconstruction or adjustment of a concrete structure requires partial removal of concrete, sufficient concrete shall be removed to permit new reinforcing steel to be spliced to existing reinforcing steel. Existing reinforcement that is to be incorporated in new work shall be protected from damage and shall be thoroughly cleaned of adhering material before being embedded in new concrete.

E. Concrete removal shall be performed without damage to the portion that is to remain in place. Damage to the existing concrete, which is to remain in place, shall be repaired to a condition equal to that existing prior to the beginning of removal operations. The cost of repairing existing concrete damaged by the Contractor's operations shall be at the Contractor's expense.

F. At the option of the Contractor, raising devices may be used in place of adjusting manholes to grade with new materials similar in character to those in the original structure.

G. The shape and size of the raising devices shall match the existing frame and shall produce an installation which is equal to or better than the existing installation in stability, support and non-rocking characteristics. Each section of the raising device shall be fastened securely to the existing frame.

3.05 DEMOLITION

A. Demolish indicated existing buildings as shown on the Plans. Use methods required to complete the Work within limitations of governing regulations.

B. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental protection regulations. Do not use water when it may damage construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Proceed with demolition of structural framing members systematically, from higher to lower level.

D. Remove below-grade construction, including footings and foundation walls completely.

E. Remove existing utilities within limits of structure completely. Fill depressions and voids

with onsite or import fill compacted to a relative compaction of 90%.

F. Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory onsite or import fill compacted to a relative compaction of 90%.

PART 4 MEASUREMENT AND PAYMENT

4.01 ADJUST GROUNDWATER MONITORING WELLS TO GRADE

A. Adjustment of groundwater monitoring wells to grade shall be measured by each well that is adjusted. Payment shall be included in the Contract Unit Price per each well adjusted for "Adjust Groundwater Monitoring Wells to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 ADJUST LEACHATE WELLS TO GRADE

A. Adjustment of leachate wells to grade shall be measured by each well that is adjusted. Payment shall be included in the Contract Unit Price per each well adjusted for "Adjust Leachate Wells to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 REMOVE EXISTING CMP AND HDPE DOWNDRAINS AND DRAIN OUTLETS

A. Measurement and payment for removal of existing above ground and underground CEP and HDPE downdrains and drain outlets shall be included in the Contract Lump Sum Price for "Remove Existing CMP and HDPE Downdrains and Drain Outlets" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the removal as shown on the Plans, as specified herein, and as directed by the Design Engineer, including pipe removal, excavations, disposal, and trench backfill and compaction. No additional compensation will be allowed therefore

4.04 REMOVE EXISTING LEACHATE PIPING

A. Measurement and payment for removal and abandonment of existing leachate piping shall be included in the Contract Lump Sum Price for "Remove Existing Leachate Pipe" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the removal as shown on the Plans, as specified herein, and as directed by the Design Engineer, including cutting and capping pipe, excavation, pipe removal, and trench backfill and compaction. No additional compensation will be allowed therefore.

4.05 ADJUST LEACHATE MANHOLES

A. Adjustment of leachate manholes to grade shall be measured by each manhole that is adjusted. Payment shall be included in the Contract Unit Price per each manhole adjusted for "Adjust Leachate Manhole to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to

complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.06 INSTALL G5 TRAFFIC VAULT WITH CHECKER PLATE COVER

A. Installation of G5 traffic vault with checker plate cover shall be measured by each vault that is installed. Payment shall be included in the Contract Unit Price per each vault removed and replaced for "Install G5 Traffic Vault with Check Plate Cover" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the replacement as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.07 ADJUST EXISTING GAS VAULT TO GRADE

A. Adjustment of gas vault to grade shall be measured by each vault that is adjusted. Payment shall be included in the Contract Unit Price per each manhole adjusted for "Adjust Existing Gas Vault to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.08 INSTALL B2436 GAS EXTRACTION VAULT WITH CHECKER PLATE TOP

A. Installation of B2436 gas extraction vault with checker plate cover shall be measured by each vault that is installed. Payment shall be included in the Contract Unit Price per each vault removed and replaced for "Install B2436 Gas Extraction Vault with Check Plate Cover" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the replacement as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.09 ADJUST EXISTING AIR RELEASE VALVE AND VAULT TO BOX GRADE

A. Adjustment of existing air release valve and vault box to grade shall be measured by each valve adjustment that is performed. Payment shall be included in the Contract Unit Price per each vault removed and replaced for "Adjust Existing Air Release Valve and Vault Box to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the replacement as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.10 ADJUST LFG PERIMETER MONITORING WELLS

A. Adjustment of LFG perimeter monitoring wells to grade shall be measured by each well that is adjusted. Payment shall be included in the Contract Unit Price per each well adjusted for "Adjust LFG Monitoring Wells to Grade" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the adjustment as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.11 REMOVE EXISTING FENCING

A. Measurement and payment for removal of existing fencing shall be included in the Contract Lump Sum Price for "Remove Existing Fencing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the removal as shown on the Plans, as specified herein, and as directed by the Design Engineer, including cutting and capping pipe, excavation, pipe removal, and trench backfill and compaction. No additional compensation will be allowed therefore.

4.12 STRUCTURE DEMOLITION

A. Measure and payment for the demolition of the existing scale house structure shall be included in the Contract Lump Sum Price for "Structure Demolition" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the demolition as shown on the Plans, as specified herein, and as directed by the Design Engineer, including demolition of structure and foundation, removal of utilities, disposal of materials, and backfill and compaction of voids and depressions. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02207
AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all aggregate materials, including aggregate base for the construction of access roads and placement within and around the flare station, pipe bedding for trenches, gravel for the GRL, rock riprap for lined swales and outfalls, gravel pack material for LFG extraction wells, coarse rock for the construction entrance, concrete sand for the GCL, and tank bedding and backfill for the leachate UST, in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to install the respective aggregate materials.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. *California Test Methods*. California Department of Transportation, Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM C 33	Standard Specification for Concrete Aggregates.
B.	ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates.
C.	ASTM D 2434	Standard Test Method for Permeability of Granular Soils (Constant Head).
D.	CTM 229	Method of Test for Durability Index.
E.	CTM 301	Method for Determining the Resistance "R" Value of Treated and Untreated Bases, Subbases, and Basement Soils by the Stabilometer.

1.04 SUBMITTALS

A. At least 14 calendar days prior to beginning any aggregate material installation, the Contractor shall provide three (3) copies of the name and location of the proposed borrow source, and laboratory test results on the aggregate materials from the proposed borrow source to the Design Engineer which show that the aggregate materials have the properties specified in Part 2 of this Section. The Design Engineer will provide the

Contractor with an approval or rejection of the borrow source and aggregate materials within two (2) working days of receipt of the borrow source information and laboratory test results.

1.05 QUALITY ASSURANCE

A. Testing of the aggregate materials shall be conducted in accordance with the CQA Plan.

B. If the Design Engineer's review of Contractor's submittals indicates that an aggregate material(s) does not meet specified requirements, the Contractor shall provide an alternative material(s) and submit corresponding test results to the Design Engineer for approval.

PART 2 PRODUCTS

2.01 GENERAL

A. Each aggregate product shall come from the same source throughout the Work.

2.02 AGGREGATE BASE

A. The aggregate base material shall be clean, hard, sound, durable, uniform in quality, free of any surface coatings, and free of any detrimental quantity of soft, friable, thin, elongated, or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substance. The aggregate base material may contain Portland cement concrete and asphalt concrete meeting the grading specifications.

B. Aggregate base shall conform to requirements of Section 26 of the Standard Specifications and these Technical Specifications. Aggregate base shall meet the requirements for Class 2, ¾-inch maximum per the Standard Specifications.

2.03 SAND BALLAST INFILL

A. Sand Ballast Infill will meet Particle Size Parameters of ASTM C-33 for fine aggregates as shown in Table 1 below:

Table 1: Sand Ballast Infill ASTM C-33-03 Particle Size Distribution

ASTM C-33-03	
Sieve	Percent Passing
9.5 mm (3/8 in.)	100
4.75 mm (No. 4)	95 to100
2.36 mm (No. 8)	80 to 100

1.18 mm (No. 16)	50 to 85
600 µm (No. 30)	25 to 60
300 µm (No. 50)	5 to 30
150 µm (No. 100)	0 to 10

2.04 HYDROBINDER INFILL

A. HydroBinder™ is a cementious product used as the infill component for surface drainage conveyance areas.

B. HydroBinder™ infill Shall be HydroBinder™ Cementitious Infill. The HydroBinder™ infill material may be delivered in either pallet form of 80 lb. bags or 3000 lb. bulk super sacks.

C. Cement, except as otherwise specified herein, will be a brand of Portland Cement, meeting ASTM C 150 and will be Type I or Type II. Only one brand of cement will be used throughout the duration of this Contract.

D. The cementitious infill mix design will conform to the requirements of ASTM C 387 for high strength mortars.

E. The cementious infill will have a minimum 28 day compressive strength of 5000 psi.

2.05 PIPE BEDDING

A. Pipe bedding material shall conform to Section 19-3.02E(2) of the Standard Specifications.

2.06 LOOSE ROCK RIPRAP

A. Stone and/or recycled concrete for loose rock riprap shall conform to Section 72-5.02 of the Standard Specifications and the following size requirements:

Screen Size	% (By Weight) Retained Above
4" x 4"	95-100
6" x 6"	75-100
9" x 9"	25-100

2.07 GROUTED ROCK RIPRAP

A. Stone and/or recycled concrete for grouted rock riprap shall be "Light" class rock per Section 72-2.02 of the Standard Specifications.

2.08 GRAVEL PACK

A. Gravel pack material for the LFG extraction wells shall be 1- to 2-inch diameter non-calcareous washed rock.

2.09 CONCRETE AGGREGATE

A. Coarse and fine aggregate for concrete shall conform to ASTM C 33 as determined by the Supplier. All aggregate shall be thoroughly washed. Maximum aggregate size shall be 3/4 inches in diameter.

2.10 COARSE ROCK FOR CONSTRUCTION ENTRANCE

A. Coarse rock for construction entrance shall be 2- to 3-inch crushed stone.

2.11 TANK BEDDING AND BACKFILL

A. Tank bedding shall consist of filter sand.

B. Tank backfill shall be clean naturally rounded aggregate with a mix of particle sizes not less than 1/8-inch or more than ¾-inch (pea gravel) in accordance with the tank manufacturer's specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall provide all construction, grading control, and other staking necessary to construct the aggregate materials to the lines, grades, and thickness shown on the Plans.

3.02 STOCKPILING

A. Materials shall be stockpiled at the Work site at a location(s) designated by the Design Engineer.

B. Stockpiles shall be of sufficient quantity to meet Project schedule and requirements.

C. Surface water shall be directed away from stockpile site(s) so as to prevent erosion or deterioration of materials.

3.03 STOCKPILE CLEANUP

A. Surplus aggregate material stockpiles shall be removed or left in a clean and neat condition. Stockpile area surface(s) shall be graded to prevent free standing surface water.

3.04 PLACEMENT

A. Aggregate base shall be placed in accordance with the requirements for aggregate base placement in Section 02310 (Access Roads) and Section 15300 (Flare Station) of these Technical Specifications.

B. Pipe bedding shall be placed in accordance with the requirements for backfilling in Section 02225 (Trenching and Backfilling) of these Technical Specifications.

C. Sand ballast infill and HydroBinder infill shall be placed in accordance with the requirements for infill placement, respectively in Section 02773 (Engineered Turf) of these Technical Specifications.

D. Rock riprap shall be placed in accordance with the requirements for placement in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

E. Gravel pack material shall be placed in accordance with the requirements for backfilling in Section 15100 (Landfill Gas [LFG] Extraction Wells) of these Technical Specifications.

F. Coarse rock shall be placed at the construction entrances in accordance with the requirements of Section 02960 (Temporary Erosion and Sediment Controls) of these Technical Specifications.

G. Concrete sand shall be placed in accordance with the requirements of Section 02774 (Geosynthetic Clay Liner [GCL]) of these Technical Specifications.

H. Tank bedding and backfill shall be placed in accordance with the requirements of Section 15500 (Leachate Overflow and Collection System) of these Technical Specifications.

PART 4 MEASUREMENT AND PAYMENT

4.01 AGGREGATE BASE

A. Measurement and payment for aggregate base shall be included in the Contract Unit Prices for "Access Roads" addressed in Section 02310 (Access Roads) and "Flare Station" addressed in Section 15300 (Flare Station) of these Technical Specifications.

4.02 SAND BALLAST INFILL

A. Measurement and payment for sand ballast infill shall be included in the Contract Unit Prices for "Engineered Turf " addressed in Section 02773 (Engineered Turf) of these Technical Specifications

4.03 HYDROBINDER INFILL

A. Measurement and payment for HydroBinder infill shall be included in the Contract Unit Prices for "Engineered Turf " addressed in Section 02773 (Engineered Turf) of these Technical Specifications

4.04 PIPE BEDDING

A. Measurement and payment for pipe bedding shall be included in the Contract Unit Price paid for the various items of Work for which pipe bedding is required.

4.04 LOOSE AND GROUTED ROCK RIPRAP

A. Measurement and payment for loose and grouted rock riprap shall be included in the Contract Unit Price paid for the various items of Work for which loose and grouted riprap is required.

4.05 GRAVEL PACK

A. Measurement and payment for gravel pack shall be included in the Contract Unit Price for "LFG Extraction Wells" addressed in Section 15100 (Landfill Gas [LFG] Extraction Wells) of these Technical Specifications.

4.06 CONCRETE AGGREGATE

A. Measurement and payment for concrete aggregate shall be included in the Contract Unit Price paid for the various items of Work for which concrete aggregate is required.

4.07 COARSE ROCK FOR CONSTRUCTION ENTRANCE

A. Measurement and payment for coarse rock for the construction entrance shall be considered as included in the Contract Lump Sum Price paid for "Mobilization" addressed in Section 01500 (Mobilization) of these Technical Specifications.

4.09 TANK BEDDING AND BACKFILL

A. Measurement and payment for tank bedding and backfill for the leachate UST installation shall be considered as included in the Contract Unit Price paid for "Leachate UST" addressed in Section 15500 (Leachate Overflow and Collection System) of these Technical Specifications.

END OF SECTION

SECTION 02222
EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall perform all excavation work including clearing, grubbing, stripping, excavation, and grading of the on-site borrow area and construction of the final cover Closure Turf Cap System soil layers (i.e., foundation layer), sedimentation basins, drainage and erosion control structures, LFG collection system and condensate drain/discharge components, and leachate UST in accordance with this Section and at the locations and to the dimensions shown on the Plans.

B. The Contractor shall excavate refuse in selected areas and relocate the refuse to the designated refuse relocation area shown on the Plans. Incidental refuse excavation and disposal shall also be performed as part of the installation of drainage, LFG collection system, and condensate drain/discharge components.

C. Excavation to be performed by the Contractor shall also include construction of any necessary haul roads, stockpiling of all excavated materials, hauling and disposal of any excavated refuse, and provisions for temporary dust, erosion, and drainage control measures.

D. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to implement the respective excavation activities outlined above and within this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

1.03 SUBMITTALS

A. Temporary erosion and sediment control measures associated with excavation activities shall be addressed in the Work site's SWPPP prepared as part of Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications.

B. The Contractor shall provide the Design Engineer with certified weight tags issued by the permitted transfer station or solid waste disposal facility for all loads of refuse transported off-site for disposal.

1.04 QUALITY ASSURANCE

A. Observation

1. The CQA Monitor will periodically observe performance of the excavations to verify conformance with the execution requirements in Part 3 of this Section.

2. If any portion(s) of the excavations are determined by the CQA Monitor to not meet the requirements of this Section, the Contractor, at his expense, shall rework or replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

B. Surveying

1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the excavations to the lines, grades, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Project for use by the Contractor's Land Surveyor or eligible Engineer.
2. All grades and dimensions of completed areas of the excavations shall be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA field surveying that any portion(s) of the excavations does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Unless provided otherwise within this Section, all excavation activities shall conform to the applicable requirements of Section 16 and 19 of the Standard Specifications.

B. The Contractor shall instruct all personnel and maintain strict control over all excavation activities to protect and maintain the integrity of all existing environmental monitoring and control systems and any other facilities for the existing landfill. The cost of repairing any damage to these existing features will be determined by the Owner and be borne by the Contractor. The total repair cost to be borne by the Contractor will include those for exploration to determine extent of damage, mobilization of work crews, materials, material delivery, CQA testing and observation, and additional design.

3.02 CLEARING AND GRUBBING

A. The existing interim cover soil on the landfill surface and natural ground surface within the limits of the on-site borrow area as depicted on the Plans shall be cleared of all vegetative growth, such as brush, grass, weeds, or other deleterious material.

B. Clearing and grubbing shall be performed prior to beginning excavation in any area.

C. Cleared and stripped topsoil shall be stockpiled separately from excavated material or disposed of in accordance with this Section.

3.03 REFUSE EXCAVATION AND RELOCATION

A. Refuse shall be excavated at the designated locations beneath the existing power lines to the lines, grades and dimensions shown on the Plans.

B. Excavated refuse shall be relocated to the designated refuse relocation area shown on the Plans.

C. Relocated refuse placed within the designated refuse relocation area shall be spread in uniform lifts not to exceed 2 feet in thickness and each lift compacted with a minimum of four (4) passes using a dozer.

D. Relocated refuse lifts shall be covered with a minimum of 6 inches of soil at the end of each working day to minimize vector hazards and odor nuisance.

E. Within five (5) working days of completing the refuse excavation work beneath the existing power lines, the refuse relocation area shall be completely covered with a minimum of 12 inches of prepared and compacted foundation layer material in accordance with Section 02240 (Foundation Layer) of these Technical Specifications.

3.04 INCIDENTAL REFUSE EXCAVATION AND DISPOSAL

A. Refuse shall be excavated as necessary to accommodate the installation of drainage, LFG collection system, and condensate drain/discharge components at the locations and to the details shown on the Plans.

B. Excavated refuse may be temporarily stockpiled on and covered with visqueen at a designated location on-site, or discharged directly into a roll-off bin or dump truck. If temporarily stockpiled, the refuse must be removed by the end of each working day and transferred into a roll-off bin or dump truck for subsequent transport and disposal by the Contractor to a permitted transfer station or solid waste disposal facility. Refuse remaining on-site overnight in a roll-off bin or dump truck shall be covered at the end of each working day. Excavated refuse shall not remain on-site for more than a 48-hour period.

C. The Contractor shall not mix excess, surplus, or waste materials from other general construction activities with the refuse derived from the excavation work described in this Section. Those materials shall be managed and paid for separately under the Contract Lump Sum Price for "Mobilization" as outlined in Section 01500 (Mobilization) of these Technical Specifications.

3.05 SOIL EXCAVATION

A. The horizontal control points and one (1) benchmark shall be provided by the Design Engineer in the vicinity of the Work site. It shall be the responsibility of the Contractor to maintain control points and property line markers and to provide and maintain construction staking, grading control, or other staking necessary to perform the excavation and construct the stockpile.

B. Control points and property line markers that are removed, damaged, or destroyed by the Contractor shall be reestablished by the Contractor at the Contractor's expense.

C. Boulders encountered by the Contractor during excavation shall be removed, separated by size as directed by the Design Engineer, and stockpiled separately from excavated material or disposed of in accordance with this Section.

D. Excavation for drainage and erosion control structures shall conform to Section 19-1.03E of the Standard Specifications.

3.06 GRADING

A. The excavation shall be constructed in conformance with the lines, grades, and dimensions shown on the Plans; all distances and measurements, except elevations and structural dimensions, shall be made on a horizontal plane unless otherwise stated in this Section.

B. When completed, the grading plane for the drainage channels and sedimentation basins at any point shall not vary more than 0.10 foot above or below the grade shown on the Plans on slopes less than 10 percent nor vary more than 0.20 foot above or below the grade shown on the Plans on slopes greater than 10 percent.

C. Unsuitable materials, as determined by the Design Engineer, encountered at the subgrade elevation shall be removed and stockpiled separately from excavated material or disposed of in accordance with this Section. If, after removal of the unsuitable materials, a surface in accordance with Part 3 of this Section does not result, overexcavation correction procedures in this Section shall be followed.

D. If any portion of the excavation area is excavated by the Contractor below the design (prepared subgrade) elevations shown on the Plans, the Contractor shall perform overexcavation correction procedures, resulting in a surface which meets the requirements of Part 3 of this Section, as directed by the Design Engineer. Overexcavation correction procedures may consist of excavating, grading, and surface preparation of the entire overexcavated slope, or some portion thereof, to a lower subgrade elevation determined by the Design Engineer; backfilling with engineered fill and compacting to provide a firm and unyielding subgrade in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications; or as otherwise directed by the Design Engineer. The cost of overexcavation correction procedures, redesign, additional surveying, and other incidental fees resulting from the overexcavation shall be paid by the Contractor, unless the overexcavation is performed at the direction of the Design Engineer to remove unsuitable materials at the subgrade elevation.

3.07 HAUL ROAD CONSTRUCTION

A. The Contractor shall construct and maintain any haul roads necessary to perform excavation.

B. The location of all haul roads proposed for construction and use by the Contractor must be approved by the Design Engineer.

3.08 DUST CONTROL

A. Dust control shall comply with the Contractor's approved Dust Control Plan.

B. A minimum of two (2) water trucks with operators shall be in operation at all times during excavation to provide dust control at all excavation, haul road, stockpile and staging areas. If

necessary, additional water trucks or other equipment with operators shall be provided and used by the Contractor to maintain these areas in a misted condition at all times during excavation.

C. The Design Engineer will require all excavation activities to cease if the Contractor's dust control efforts do not follow the approved Dust Control Plan, or fail to meet any of the requirements of this Part, until such time that the Contractor can demonstrate a return to compliance.

3.09 EROSION AND SEDIMENT CONTROL

A. Erosion and sediment control measures shall be implemented by the Contractor in accordance with the approved SWPPP, and as directed by the Design Engineer for all excavation work areas including haul roads and stockpile areas, adjacent areas which have been disturbed, or other affected areas.

B. The Contractor shall maintain erosion and sediment control measures until the final graded surface of the excavation is approved by the Design Engineer. If erosion creates a final subgrade surface which is not in accordance with any requirements of this Section, overexcavation correction procedures in this Section shall be performed by the Contractor, at the expense of the Contractor, including payment of all incidental fees.

3.10 DRAINAGE CONTROL

A. The Contractor shall provide ample means and devices with which to promptly remove and dispose of all water from any source entering the excavation or stockpile area(s) and maintain these at all times during excavation and until the final graded surface of the excavation and stockpile are approved by the Design Engineer. The Contractor shall perform excavation in the borrow source area in a manner that allows for the discharge and retention of storm water that does no conflict with the Contractor's excavation activities in the borrow area.

3.11 ARCHAEOLOGICAL AND PALEONTOLOGICAL RESOURCES

A. The Design Engineer shall serve as the Archaeological and Paleontological Monitor. The Contractor shall notify the Design Engineer in the event that he suspects that an archaeological or paleontological discovery is found during excavation for the Design Engineer's investigation. Should a paleontological or archaeological discovery be made during excavation, the Contractor shall cease work in that area until the discovery is evaluated or recovered. The Contractor may resume work elsewhere on the Work site that does not disturb the discovery until the evaluation or recovery is completed. Should the discovery result in an unavoidable delay to the Contractor, the Contractor shall immediately notify the Design Engineer of the delay in writing. Additional working days will be allowed for such a delay. The Contractor shall not charge the Owner for the delay under Sections 8-1.09 or 8-1.10 of the Standard Specifications until such delay exceeds a total of 20 hours for the Project, after which the Contractor may be entitled to compensation under said sections.

PART 4 MEASUREMENT AND PAYMENT

4.01 CLEARING AND GRUBBING

A. Clearing and grubbing shall be measured by the acre cleared and grubbed. Payment shall be

included in the Contract Unit Price per acre for "Clearing and Grubbing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the clearing and grubbing as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 REFUSE EXCAVATION AND RELOCATION

A. Refuse excavation and relocation shall be measured by the in-place cubic yards to be removed and includes all excavation, loading, transport, placement, compaction, and cover soil. Payment shall be included in the Contract Unit Price per cubic yard for "Refuse Excavation and Relocation" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the refuse excavation and relocation as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 INCIDENTAL REFUSE EXCAVATION AND DISPOSAL

A. Measurement and payment for incidental refuse excavation shall be included in the Contract Unit Price paid for the various items of Work for which incidental refuse excavation is required.

B. Disposal of refuse shall be measured by the tonnage of refuse disposed of off-site at a permitted transfer station or solid waste disposal facility. Payment shall be included in the Contract Unit Price per ton for "Refuse Disposal" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to dispose of refuse as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 SOIL EXCAVATION

A. Sedimentation basin excavation shall be measured on a lump sum basis for the complete excavation of storm water retention basins to the grades and elevations shown on the Plans. Payment shall be included in the Contract Lump Sum Price for "Sedimentation Basin Excavation" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to excavate the sedimentation basins as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Measurement and payment for soil excavation associated with construction of the foundation layer, drainage and erosion control structures, LFG collection system and condensate drain/discharge components, and the leachate overflow collection and storage system shall be included in the Contract Unit Price paid for these various items of Work for which soil excavation is required.

END OF SECTION

SECTION 02224
ENGINEERED FILL

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall install all engineered fill including all fill needed for construction of sedimentation basin improvements, backfilling of the former leachate pond, fill required for conforms outside engineered turf closure area, as well as incidental engineered fill placement for access road subgrades, buried header crossings, road crossings, and backfilling anchor trenches, and pipe/conduit trenches in the flare station area, in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, equipment, transportation and incidentals as necessary to prepare the subgrade, excavate, haul, place, moisture condition, compact, and grade the material to install the engineered fill.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of engineered fill shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If field and/or laboratory testing by CQA Monitor indicate that any area(s) of engineered fill does not meet compacted moisture content and dry density requirements, the Contractor shall rework the material in that area(s) at his expense until the engineered fill is in conformance with the requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to pay for testing of the recompacted engineered fill material.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from disking or aerating the subject materials to achieve acceptable conditions.

B. Surveying

1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the engineered fill to the lines, grades, contour lines, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Project for use by the Contractor's Land Surveyor or eligible Engineer.
2. All grades and dimensions of completed areas of the engineered fill may be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA verification surveying that any portion(s) of the engineered fill does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 PRODUCTS

2.01 SOURCE

A. On-site material meeting the requirements of this Section and as follows shall be used for engineered fill. The Contractor may need to segregate suitable on-site material for use as engineered fill.

B. Material excavated from within the on-site borrow area, sedimentation basins, and leachate UST excavation meeting the requirements of this Section shall be used for engineered fill.

C. It is expected that sufficient suitable material for engineered fill will be available from the on-site sources described in these Technical Specifications. The Contractor may need to segregate or select material from these sources for use as engineered fill, however the Contractor will not be required to mechanically screen or import material for engineered fill.

2.02 PROPERTIES

A. Engineered fill material shall be soil or soil/rock mixture that is free of organic matter, debris, and/or deleterious or other unsuitable materials.

B. Engineered fill material shall not contain rocks or clods over 6 inches in greatest dimension, and not more than 15 percent by dry weight shall be larger than 2 inches in greatest dimension or as approved by the Design Engineer.

PART 3 EXECUTION

3.01 PLACEMENT

A. Prior to placement of engineered fill on native ground, scarify the exposed soils in-place to a depth of approximately 6 inches, moisture condition to within 1 to 3 percentage points of optimum moisture content, and compact as engineered fill to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

B. General engineered fill shall be placed in 6-inch lifts with a maximum uncompacted thickness of 8 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform

condition in each layer. Engineered fill material shall then be brought to a uniform moisture content within 1 to 3 percentage points of the optimum moisture content, mixed as required to establish uniform moisture, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557.

PART 4 MEASUREMENT AND PAYMENT

4.01 ENGINEERED FILL

A. Engineered fill for the sedimentation basin improvements, backfilling the former leachate pond, access roads, and areas outside the engineered turf closure area, shall be included in the Contract Unit Price for "Fill (Foundation Layer and Engineered Fill)" addressed in Section 02240 (Foundation Layer) of these Technical Specifications and includes all excavation, transport, placement, moisture conditioning and compaction. The quantity for "Fill (Foundation Layer and Engineered Fill" shall be a final pay quantity as described in Section 9-1.015 of the Standard Specifications and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install engineered fill as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 INCIDENTAL ENGINEERED FILL

A. Measurement and payment for incidental engineered fill shall be included in the Contract Unit Price paid for the various items of Work for which incidental engineered fill is required.

END OF SECTION

SECTION 02225
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall perform all trenching and/or backfilling operations necessary to install corrugated metal pipe (CMP) catch basins, down drains and overflow pipes, sedimentation basin outlet, buried pipes and conduits, anchoring of the LLDPE and engineered turf cover (if necessary), and construction of the GRL condensate trench drains in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation and incidentals as necessary to implement the trenching and backfilling operations.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of trenching and backfilling shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If field testing by the CQA Monitor indicates that the moisture content or density of any lift, or portion thereof, of trench and former leachate pond backfill fails to meet the specified requirement, the subject layer or portion thereof shall be re-worked, at the Contractor's expense, until the required moisture and density have been attained. No additional backfill shall be placed until the in-place fill has been inspected and accepted by the Design Engineer.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from discing or aerating the subject materials to achieve acceptable conditions.

PART 2 PRODUCTS

2.01 PIPE BEDDING

A. Pipe bedding shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.02 TRENCH BACKFILL

A. Backfill material for the condensate drain line trenches as shown on the Plans shall consist of material excavated from the trench unless specified otherwise by the Design Engineer.

2.03 ENGINEERED FILL

A. Backfill material for trenches with pipe bedding and for the GCL/geonet composite anchor trenches shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 TRENCH PREPARATION

A. Required points of connection, lines, levels, contours, and datum locations shall be identified by the Contractor. Locations for points of connection that are shown on the Plans are approximate. The Contractor shall locate utilities to best serve the intended use and to avoid mechanical and structural interference.

3.02 TRENCH EXCAVATING

A. Trenches shall be excavated to the lines and grades as shown on the Plans. Water or materials that interfere with the work shall be removed.

B. Soft areas of trench subgrade not capable of compaction in place shall be cut out.

C. The trench bottom shall be firm, continuous, relatively smooth and free of rocks and/or unsuitable material prior to the installation of pipe bedding or trench backfill material.

3.03 SHORING, SHEETING, AND BRACING OF TRENCH

A. The trench shall be braced and supported with sheets when necessary to prevent caving during excavation in unstable material, or to protect adjacent structures, property, and workers.

B. The Contractor shall secure a trench permit from the California Division of Industrial Safety prior to the excavation of any trench over 5 feet in depth.

C. Shoring and sheeting shall be removed as the backfill is completed in a manner that will not damage the pipe or permit voids in the backfill.

D. All sheeting, shoring, and bracing of trenches shall conform to the safety requirements of the federal, state, or local public agency having jurisdiction. The most stringent of these requirements shall apply.

3.04 PIPE/CONDUIT TRENCH BACKFILLING

A. Trenches shall be backfilled to the lines and grades as shown on the Plans.

B. Placement methods shall be employed that do not disturb or damage buried drainage pipes and conduits in the trench.

C. Pipe bedding material shall be placed at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth and compacted to 90 percent of maximum dry density as determined by ASTM D 1557.

D. Pipe bedding shall be placed around the sides and to the top of the pipe/conduit, tamped in place, and compacted to 90 percent of maximum dry density as determined by ASTM D 1557.

E. Optimum moisture content of pipe bedding material shall be maintained to attain required compaction density.

F. Portion of trench above pipe bedding shall be backfilled with engineered fill in accordance with Section 02224 (Engineered Fill) of these Technical Specifications.

G. Jetting of trenches shall not be permitted, unless allowed by the Design Engineer.

H. For buried pipe that does not require pipe bedding or engineered fill (condensate drain pipe), the trench backfill shall be placed in a manner that will not damage the pipe. The trench backfill shall be compacted to a firm consistency consistent with surrounding erosion-resistant layer material.

3.05 ANCHOR TRENCH BACKFILLING (IF NECESSARY)

A. A placement method shall be employed that does not damage the LLDPE geomembrane/engineered turf in the trench.

B. The portion of the trench above the LLDPE geomembrane/engineered turf shall be backfilled with engineered fill in accordance with Section 02224 (Engineered Fill) of these Technical Specifications.

C. Jetting of trenches shall not be permitted, unless allowed by the Design Engineer.

D. Trenches shall be backfilled to the lines and grades as shown on the Plans.

PART 4 MEASUREMENT AND PAYMENT

4.01 TRENCHING

A. Measurement and payment for trenching per this Section shall be considered as included in the Contract Unit Price paid for the various items of Work for which it is required.

4.02 SHORING, SHEETING, AND BRACING

A. Measurement and payment for any shoring, sheeting and trench bracing per this Section shall be considered as included in the Contract Unit Price paid for the various items of Work for which they are required.

4.03 TRENCH BACKFILLING

A. Measurement and payment for backfilling of trenches per this Section shall be considered as included in the Contract Unit Price paid for the various items of Work for which it is required.

END OF SECTION

SECTION 02240
FOUNDATION LAYER

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall prepare all existing interim cover soil to be incorporated into the foundation layer and place all new foundation layer material as necessary in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare, haul, place and grade soil material to install the foundation layer.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 — Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the foundation layer, including verification of thickness, shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If field and/or laboratory testing by CQA Monitor indicates that any area(s) of the foundation layer does not meet compacted moisture content and dry density requirements, the Contractor shall rework the material in that area(s) at his expense until the foundation layer is in conformance with the requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to pay for testing of the recompacted foundation layer material.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from discing or aerating the subject materials to achieve acceptable conditions.

B. Surveying
   1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the foundation layer to the lines, grades, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Work site for use by the Contractor's Land

Surveyor or eligible Engineer.

2. All grades and dimensions of completed areas of the foundation layer may be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA verification surveying that any portion(s) of the foundation layer does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

C. Foundation Layer Thickness

1. If field testing by CQA Monitor indicates that any area(s) of the foundation layer does not meet the minimum thickness requirements, the Contractor shall place additional foundation layer material at his expense until the deficient area(s) is in conformance with the requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to pay for testing of the new foundation layer placement area(s).

PART 2 PRODUCTS

2.01 SOURCE

A. On-site material meeting the requirements of this Section and as follows shall be used for the foundation layer.

B. Material excavated from within the on-site borrow area meeting the requirements of this Section shall be used for the foundation layer.

C. It is expected that sufficient suitable material for the foundation layer will be available from the on-site borrow area described in these Technical Specifications. The Contractor may need to segregate or select material from the borrow area for use as foundation layer material, however the Contractor will not be required to mechanically screen or import material for the foundation layer.

2.02 PROPERTIES

A. Foundation layer material shall be soil or soil/rock mixture that is free of organic matter, debris, and/or deleterious or other unsuitable materials.

B. Foundation layer material shall not contain rocks or clods over 6 inches in greatest dimension, and not more than 15 percent by dry weight shall be larger than 2 inches in greatest dimension or as approved by the Design Engineer.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. All vegetative growth on existing interim cover soil surfaces shall be removed in accordance with the "Clearing and Grubbing" procedures presented in Section 02222 (Excavation) of these Technical Specifications.

B. The existing interim cover soils shall be fine graded to eliminate rough or low areas.

C. The existing interim cover soils shall be scarified within the limits shown on the Plans to a depth of approximately 12 inches, moisture conditioned to within 1 to 3 percentage points of optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

3.02 PLACEMENT OF NEW FOUNDATION LAYER MATERIAL

A. In areas requiring additional foundation layer material as shown on the Plans, new foundation layer material shall be placed in 6-inch lifts with a maximum uncompacted thickness of 8 to 12 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition in each layer. Foundation layer material shall then be brought to a uniform moisture content within 1 to 3 percentage points of the optimum moisture content, mixed as required to establish uniform moisture, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557.

3.03 SURFACE GRADING

A. When completed, the surface of the foundation layer shall conform to the grades shown on the Plans after placement and compaction and at no point on the completed grading plane shall the grade vary above the designated grades by more than 0.10 feet.

B. When completed, the surface of all foundation layer slopes greater than 10 percent shall conform to the grades shown on the Plans. At no point on the completed grading plane shall the grade vary below the designated grades measured perpendicular to the slope, nor by more than 0.20 feet above the designated grades as measured perpendicular to the slope.

PART 4 MEASUREMENT AND PAYMENT

4.01 SUBGRADE PREPARATION

A. Subgrade preparation shall be measured by the square foot and includes all fine grading, scarification, moisture conditioning and recompaction. Payment shall be included in the Contract Unit Price per square foot completed for "Subgrade Preparation" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to prepare the subgrade as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 NEW FOUNDATION LAYER MATERIAL

A. New foundation layer material shall be measured by the in-place cubic yard installed and includes all excavation, transport, placement, moisture conditioning and compaction. The quantity for "Fill (Foundation Layer and Engineered Fili)" shall be a final pay quantity as described in Section 9-1.015 of the Standard Specifications and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install new foundation layer material as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02310
ACCESS ROADS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall construct all access roads, including grading and subgrade preparation, in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare and construct the access roads.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the access roads shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If any portion(s) of the access road construction is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall rework or remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.
   4. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from discing or aerating the subject materials to achieve acceptable conditions.

PART 2 PRODUCTS

2.01 REINFORCEMENT GEOTEXTILE

A. Reinforcement geotextile for the access road construction shall conform to the requirements of Section 02771 (Reinforcement Geotextile) of these Technical Specifications.

2.02 AGGREGATE BASE

A. Aggregate base for the access road construction shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall provide all construction, grading control, and other staking necessary to construct the access roads to the lines, grades, and dimensions shown on the Plans.

3.02 SUBGRADE

A. Where access roads are not constructed on engineered fill, the subgrade for the access roads shall be scarified a minimum of 6 inches, uniformly moisture conditioned to within 1 to 3 percentage point of optimum moisture content and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557.

B. Where access roads are constructed on engineered fill, the engineered fill shall be placed and compacted in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

3.03 REINFORCEMENT GEOTEXTILE

A. Prior to placing geotextile on the subgrade for access roads, the stability of the subgrade shall be checked in the presence of the CQA Officer by proof rolling with a roller or loaded water truck. Areas which are not suitable shall be allowed to air dry until stable or shall be over-excavated and backfilled with aggregate base, at the Contractor's expense.

B. Reinforcement geotextile shall be installed over the access road subgrade and seamed as specified in Section 02771 (Reinforcement Geotextile) of these Technical Specifications, as shown on the Plans, and in accordance with the manufacturer's instructions.

C. Reinforcement geotextile panels shall be installed (unrolled) in the direction of traffic (longitudinally).

D. Reinforcement geotextile panels shall be overlapped a minimum of 2 feet on sides and ends.

E. Trucks and other construction equipment shall not drive on reinforcement geotextile prior to covering with the full thickness of aggregate base.

3.04 AGGREGATE BASE

A. Prior to placing aggregate base on subgrade for access roads, the stability of the subgrade shall be checked in the presence of the CQA Officer by proof rolling with a roller or loaded water truck. Areas which are not suitable shall be allowed to air dry until stable or shall be over-excavated and backfilled with aggregate base, at the Contractor's expense.

B. Trucks shall back-dump aggregate base onto the reinforcement geotextile, driving on

previously dumped aggregate base to progress.

C. The aggregate base shall be spread in uniform loose lifts not exceeding 8 inches in thickness.

D. The aggregate base shall be moisture conditioned to within 1 to 3 percentages points of optimum moisture content, and compacted to a minimum of 95 percent of maximum dry density per ASTM D 1557.

E. Access roads shall be "proof rolled" in the presence of the Design Engineer or their representative with a heavy wheel-load vehicle, such as a loaded water truck, to identify weak areas. Weak areas shall be reworked to the Design Engineer's satisfaction without additional compensation.

PART 4 MEASUREMENT AND PAYMENT

4.01 ACCESS ROADS

A. Access roads shall be measured by the square foot in place as determined by the actual length constructed by the actual width constructed and includes all grading, subgrade preparation, reinforcement geotextile and aggregate base. Payment shall be included in the Contract Unit Price per square foot installed for "Access Roads" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the access roads as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02722
DRAINAGE AND EROSION CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install (including necessary excavations) all drain inlets, drain pipes, sedimentation basin drainage risers, earthen and lined swales, rock riprap swales, rock riprap outfalls and inlets, and erosion control materials in accordance with this Section and at the locations and to the dimensions and grades shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare and construct the various drainage and erosion control features.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plan.* California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 SUBMITTALS

A. At least 14 calendar days prior to beginning any drainage or erosion control construction in accordance with the requirements of this Section, the Contractor shall provide three (3) copies to the Design Engineer of the name and location of material sources, laboratory test results and/or material data sheets conforming with relevant details shown on the Plans.

B. The Contractor shall provide the name and location of source, laboratory test results, and product data sheets (mix design) for the concrete to be used showing that the material meets or exceeds the product requirements. If more than one (1) concrete mix is to be used, mix designs for each area shall be submitted and clearly marked as to the area of Work that the mix is intended for.

C. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall submit the following to the Design Engineer for approval:
   1. Samples, manufacturer's product data sheets, and manufacture's installation guidelines for the following materials to verify that the materials meet or exceed the corresponding product requirements:
      a. CMP, fittings and anchor assembly stakes and hardware.
      b. Turf reinforcement mat (TRM) and anchorage stakes.

c. Erosion control netting and anchorage staples.

1.05 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the drainage and erosion control structures shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
3. If any portion(s) of the drainage and erosion control structures is determined by the CQA Monitor to not meet the requirements of this Section, based on either testing or observations, the Contractor shall, at his expense, rework or remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

B. Surveying
1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the drainage components to the lines, grades, and dimensions shown on the Plans. The Design Engineer will provide data on existing control points in the vicinity of the Work site for use by the Contractor's Land Surveyor or eligible Engineer.
2. All lines, grades and dimensions of installed drainage components may be verified by the Design Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA verification surveying that any portion(s) of the drainage components does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 PRODUCTS

2.01 DRAIN INLETS

A. Drain inlets shall be as shown on the Plans. Drain inlets shall be manufactured of cast in place concrete or prefabricated reinforced concrete or approved steel equivalent to the dimensions set forth in the Plans.

B. Concrete for the drain inlets shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.02 PIPE AND FITTINGS

A. The CMP for the drain pipe shall be of 16 gauge continuous helical lock corrugated steel pipe conforming to the requirements of Section 66 "Corrugated Metal Pipe" of the Standard Specifications. All CMP and standard assembly fittings required for complete assembly shall be galvanized conforming to the requirements of Section 66-1.02 E(1) of the Standard Specifications for zinc coated steel.

B. High density polyethylene (HDPE) pipe shall be Type S corrugated polyethylene pipe with smooth interior and shall conform to the requirements in AASHTO Designation M294. The pipe shall be manufactured from high-density polyethylene virgin compounds.

C. Pipe (including all couplings and fabricated fittings) shall be supplied from the source approved by the Design Engineer based on the submittal requirements in Part 1.04 of this Section.

D. Anchor assembly stakes and hardware for above ground CMP shall conform to Section 75-1.02 of the Standard Specifications. All hardware shall be galvanized after fabrication. All pipe stakes shall be either galvanized after fabrication, or be fabricated from pre-galvanized pipe. If pre-galvanized pipe is used, weld areas shall be cleaned and painted with zinc-rich primer.

2.03 PIPE BEDDING

A. Pipe bedding shall conform to the requirements of Section 02207 (Aggregate Base) of these Technical Specifications.

2.04 BACKFILL

A. Backfill above the pipe bedding shall consist of material excavated from the trench/excavation unless specified otherwise by the Design Engineer.

2.05 EROSION MATTING

A. Erosion matting as shown on the Plans for erosion mat lined swales shall be lined with TRM and shall be made of thermally-welded PVC monofilaments in a two-dimensional web as manufactured by Greenstreak and distributed as "PEC-MAT," or approved equivalent.

B. Anchorage for the TRM shall be wooden survey stakes, 1 inch by 4 inches in dimension, and approximately 10 to 12 inches in length.

2.06 ROCK RIPRAP

A. Loose and grouted rock riprap for the swales and outfalls shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.07 CONCRETE

A. Concrete for the drain inlets, sedimentation basin's drainage riser foundation, and grouted riprap outfalls shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.08 EROSION CONTROL

A. Straw for erosion control shall be certified weed free.

B. Erosion control netting shall be lightweight polypropylene having an approximate 0.50-inch x 0.50-inch mesh.

C. U-staples to anchor the netting shall be 0.50-inch by 10-inch U-staples as recommended by the netting manufacturer or as approved by the Design Engineer.

2.09 WOOD POSTS AND RAILING

A. The wood used for the posts and railing at the drainage inlets shall be construction common or better grade redwood. The wood shall be painted with two coats of premium quality exterior grade flat white latex paint approved by the Engineer. Nails used to fasten the rails to the posts shall be galvanized box gauge.

2.10 STEEL GRATE

A. The steel grate on the drainage inlet shall be made of #6 reinforcing bars at a 12 inch spacing. The bars shall be shop welded to form the grate per Plans. The ends of the bars in the upper mat shall be bent downward ¾ inch so that they will rest flat on the bottom of the notch at the top of the drainage inlet. The steel in the reinforcing bars may be Grade 40 or 60.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall provide all construction, grading control, and other staking necessary to construct drainage and erosion control structures to the lines and grades shown on the Plans.

3.02 STOCKPILING

A. The Contractor shall stockpile drainage and erosion control materials in an area(s) approved by the Design Engineer.

3.03 EXCAVATION

A. Excavation for drainage and erosion control structures shall be in conformance with the requirements specified in Section 02222 (Excavation) of these Technical Specifications.

3.04 DRAIN INLETS AND DRAIN PIPE

A. Trenching for drain inlets and buried drain pipe shall be in conformance with the requirements specified in Section 02225 (Trenching and Backfilling) of these Technical Specifications.

B. Placement of drain inlets/buried drain pipe and associated bedding and backfill material shall be in conformance with Section 66-1 of the Standard Specifications and Section 02225 (Trenching and Backfilling) of these Technical Specifications.

C. Above ground drain pipe shall be placed and anchored in conformance with Section 66 of the Standard Specifications and as shown on the Plans.

3.05 SEDIMENTATION BASIN DRAINAGE RISERS

A. Vertical slots shall be cut in the sedimentation basin drainage risers to the dimensions, orientation and frequency as shown on the Plans.

B. Trenching for the drainage riser foundations shall be in conformance with the requirements specified in Section 02225 (Trenching and Backfilling) of these Technical Specifications.

C. Minor concrete for the drainage riser foundations shall be installed as shown on the Plans and placed in conformance with Section 03300 (Concrete) of these Technical Specifications.

D. Placement of backfill material shall be in conformance with Section 66-1 of the Standard Specifications and Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.06 EARTHEN SWALES

A. Earthen swales shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

3.07 EROSION MAT LINED SWALES

A. The TRM shall be installed as shown on the Plans and per manufacturer's recommendations.

B. Trenches for terminal and check slots (anchorage) shall be excavated into the erosion-resistant layer as shown on the Plans. Backfill of trenches shall be compacted to 90 percent of maximum dry density as determined by ASTM D 1557.

C. TRM placed at the top of swale (finish surface) shall be at or below the final grade so surface drainage can flow freely into the swale.

D. TRM shall first be installed in the upstream terminal end slow and rolled downstream with care taken to assure that the TRM conforms to the flow surface of the channel and is not in tension.

E. All splices shall be shingled downstream.

F. Anchorage stakes shall be installed as shown on the Plans and per manufacturer's recommendations.

3.08 LOOSE ROCK RIPRAP LINED SWALES

A. The earthen portion of the swale shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

B. Rock riprap shall be placed on the earthen swales to the dimensions as shown on the Plans. Rock riprap shall be placed to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Rock riprap shall not be placed by dumping.

D. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire length of the swale. The placed rock riprap shall be free of pockets of small stones or clusters of larger stones.

3.09 GROUTED ROCK RIPRAP OUTFALLS

A. The footprint of the outfall shall be excavated to the dimensions as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

B. Rock riprap shall be placed within the excavated footprint to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Rock riprap shall not be placed by dumping.

D. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution over the entire footprint of the outfall. The placed rock riprap shall be free of pockets of small stones or clusters of larger stones.

E. Placement of concrete for the grouted rock riprap shall be in conformance with Section 03300 (Concrete) of these Technical Specifications.

3.10 ROCK RIPRAP INLET PROTECTION

A. The earthen portion of the swale or inlet shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 (Excavation) of these Technical Specifications.

B. Rock riprap shall be placed on the earthen swale at inlets to the dimensions as shown on the Plans. Rock riprap shall be placed to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Rock riprap shall not be placed by dumping.

D. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire area of protection. The placed rock riprap shall be free of pockets of small stones or clusters of larger stones.

3.11 EROSION CONTROL

A. Following the application of seed and fertilizer, straw shall be blown onto landfill and borrow area surface slopes that are steeper than 10 percent. Blown straw shall be applied to achieve a minimum thickness of 1.5 inches in place.

B. Following application of the straw, cover the straw with erosion control netting. Space netting anchors at a frequency of 1 foot on center along the edges, and one (1) every 35 square feet for interior areas. Space the butt joints 1 foot apart.

PART 4 MEASUREMENT AND PAYMENT

4.01 DRAIN INLETS AND DRAIN PIPE

A. Drain inlets shall be measured by each drain inlet installed and include all trenching, CMP, backfill, concrete, metal cover, and bars at the opening. Payment shall be included in the Contract Unit Price per each unit installed for "Drain Inlets" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the drain inlets as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Above ground drain pipe shall be measured by the linear foot in place and include all pipe, couplings, and anchor assemblies. Payment shall be included in the Contract Unit Price per linear foot installed for the various sizes and types of "Above Ground Drain Pipe" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the above ground drain pipe as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

C. Buried drain pipe shall be measured by the linear foot in place and include all trenching, pipe bedding, pipe and couplings, backfill, and compaction. Payment shall be included in the Contract Unit Price per linear foot installed for the various sizes and types of "Buried Drain Pipe" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the buried drain pipe as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 SEDIMENTATION BASIN DRAINAGE RISERS

A. Sedimentation basin drainage risers shall be measured on a lump sum basis for the complete installation of the drainage risers. Payment shall be included in the Contract Lump Sum Price for "Sedimentation Basin Outlet" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the sedimentation basin drainage risers as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 SWALES

A. Earthen swales (Type I) shall be measured by the linear foot in place and include all excavation and grading. Payment shall be included in the Contract Unit Price per linear foot installed for "Type I Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type I swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Earthen swales with TRM (Types II and IV) shall be measured by the linear foot in place and include all excavation, grading and TRM materials. Payment shall be included in the Contract Unit Prices per linear foot installed for "Type II Swales" and "Type IV Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type II and Type IV swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

C. Earthen swales with loose rock riprap (Type III) shall be measured by the linear foot in place and include all excavation, grading and riprap. Payment shall be included in the Contract Unit Price per linear foot installed for "Type III Swales" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the Type III swales as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 GROUTED ROCK RIPRAP OUTFALLS

A. Grouted rock riprap outfalls shall be measured by each grouted rock riprap outfall installed and include all excavation, rock riprap and concrete. Payment shall be included in the Contract Unit Price per each unit installed for "Grouted Rock Riprap Outfalls" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the grouted rock riprap outfalls as shown on the Plans, as specified herein, and as directed by the Design Engineer. The Contractor shall make provisions for additional material needed to account for excessive voids between rocks, as no additional compensation will be allowed therefore.

4.05 ROCK RIPRAP INLET PROTECTION

A. Rock riprap inlet protection shall be measured by each rock riprap inlet installed and include all excavation and rock riprap. Payment shall be included in the Contract Unit Price per each unit installed for "Rock Riprap Inlet Protection" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the rock riprap protection as shown on the Plans, as specified herein, and as directed by the Design Engineer. The Contractor shall make provisions for additional material needed to account for excessive voids between rocks, as no additional compensation will be allowed therefore.

4.06 EROSION CONTROL

A. Erosion control straw/netting shall be measured by the square foot in place and includes all straw, netting and anchorage. Payment shall be included in the Contract Unit Price per square foot installed for "Erosion Control" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the erosion control materials as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02771
REINFORCEMENT GEOTEXTILE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all reinforcement geotextile in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials (including sewing thread), equipment, transportation, and incidentals as necessary to install the reinforcement geotextile, including that needed for testing and joining materials in field (sewing, heat bonding, etc.).

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM D 4533	Test Method for Trapezoid Tearing Strength of Geotextiles.
B.	ASTM D 4632	Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
C.	ASTM D 4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of reinforcement geotextile rolls to the Work site, the Contractor shall submit three (3) copies of the following to the Design Engineer for approval:

1. Samples, product data sheets, and complete description of reinforcement geotextiles that meet or exceed the product requirements of this Section.
2. Manufacturer's Quality Control (MQC) testing reports for reinforcement geotextiles to be delivered to the Work site. At a minimum, results of those tests specified in Part 2 of this Section must be included in the MQC testing reports.
3. Manufacturer's recommended procedures for transporting, unloading, storage, handling, installation, repair, and seaming (sewing, heat bonding, and lapping) of reinforcement geotextiles.
4. Samples, product data sheets, and complete description of sewing thread recommended by the Manufacturer to sew the reinforcement geotextile.

1.05 TRANSPORT AND STORAGE

A. The reinforcement geotextile rolls shall be transported to the Work site by the Contractor with opaque protective coverings in a closed trailer.

B. At least seven (7) calendar days prior to any Work site delivery, the Contractor shall notify the Design Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Design Engineer prior to site delivery.

C. Unloading and storage (stacking) of the reinforcement geotextile rolls at the Work site shall be the responsibility of the Contractor; who shall observe and certify, in writing, that the unloading and storage of reinforcement geotextile rolls was performed in accordance with the submitted Manufacturer's recommended procedures.

D. The Contractor shall transport reinforcement geotextile rolls from the storage area in a manner that does not damage the reinforcement geotextiles, and in accordance with the Manufacturer's recommended procedures.

1.06 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the reinforcement geotextile shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
   3. If any portion(s) of the reinforcement geotextile installation is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 REINFORCEMENT GEOTEXTILE

A. Reinforcement geotextile shall be constructed of polypropylene materials and shall be resistant to damage under normal construction activities, and to biological and chemical degradation.

B. Reinforcement geotextile shall be a woven geotextile manufactured for the purposes of separation, confinement, and roadway subgrade reinforcement.

C. Physical properties of the reinforcement geotextile shall be tested at a minimum testing frequency of once per every 100,000 square feet of reinforcement geotextile manufactured and the physical properties shall be as follows:

Test Method	Property	Required Value/MARV
ASTM D 4632	Grab Tensile	
	-Machine Direction	315 lb.
	-Cross Direction	315 lb.
ASTM D 4632	Grab Elongation	
	-Machine Direction	12%
	-Cross Direction	12%
ASTM D 4833	Puncture	120 lb.
ASTM D 4533	Trapezoid Tear Strength	
	-Machine Direction	113 lb.
	-Cross Direction	113 lb.

D. Geotextile products which can be used and meet these specifications are TC Mirafi 600X, Synthetic Industries Geotex 315ST, or equivalent.

2.02 SEWING THREAD

A. The thread used for sewing of reinforcement geotextiles shall be polymeric and have strength properties equal to or greater than the reinforcement geotextile.

B. The thread used for sewing of reinforcement geotextiles shall be chemical resistant.

C. The thread used for sewing the reinforcement geotextiles shall be equivalent to that recommended by the reinforcement geotextile Manufacturer submitted in accordance with Part 1.04A of this Section.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. The Contractor shall verify that the material and surface upon which the reinforcement geotextile is to be placed is complete and in accordance with the Technical Specifications for that material or surface prior to reinforcement geotextile installation.

3.02 INSTALLATION

A. Reinforcement geotextile shall be installed in accordance with Manufacturer's instructions.

B. Reinforcement geotextile shall be installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

C. Reinforcement geotextile panels shall be overlapped with sufficient material to create a prayer fold for sewing operations.

D. Reinforcement geotextile shall be ballasted during installation and until the reinforcement geotextile is covered with the overlying material.

E. Temporary anchorage for the reinforcement geotextile during placement shall be the responsibility of the Contractor.

F. Reinforcement geotextile shall be anchored as shown on the Plans when installation is complete.

G. Reinforcement geotextile damaged during installation shall be removed and/or repaired with a sewn patch.

H. Terminal ends of reinforcement geotextile, where the type and purpose of the reinforcement geotextile changes as shown on the Plans, shall be overlapped a minimum of 4 feet.

I. Portions of the reinforcement geotextile wasted by the Installer, and rendered unusable, as determined by the CQA Monitor, shall be transported by the Contractor off-site to a permitted transfer station or solid waste disposal facility for disposal at the Contractor's expense.

3.03 SEAMING

A. All seams for reinforcement geotextile filter shall be made by sewing; alternate seaming methods may be allowed if it is demonstrated by the Contractor that the method will create a seam that is acceptable for the intended purpose and will not reduce the properties of the reinforcement geotextile below those specified in Part 2 of this Section or cause damage to any underlying geosynthetic materials.

B. Soil materials which could adversely affect sewing operations shall be cleaned from the reinforcement geotextile prior to sewing.

C. A prayer fold shall be created within the overlap prior to sewing.

D. The prayer fold shall be sewn with a 401 two-thread chain stitch.

PART 4 MEASUREMENT AND PAYMENT

4.01 REINFORCEMENT GEOTEXTILE

A. Measurement and payment for reinforcement geotextile shall be included in the Contract Unit Price for "Access Roads" addressed in Section 02310 (Access Roads) of these Technical Specifications.

END OF SECTION

SECTION 02772
GEOMEMBRANE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and transport to the site all geomembrane as shown on the Plans and a sufficient amount of extrudate rod to complete the extrusion welding necessary for testing and repairing the geomembrane.

B. The Contractor shall furnish all labor, tools, supervision, transportation, and equipment necessary for the installation of the geomembrane, including that needed for testing and welding materials in the field.

1.02 REFERENCES

A. ASTM D 638 Standard Test Method for Tensile Properties of Plastics.

B. ASTM D 746 Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

C. ASTM D 792 Standard Test Method for Specific Gravity and Density of Plastics by Displacement.

D. ASTM D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting.

E. ASTM D 1204 Standard Test Method for Linear Dimensional Changes to Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures.

F. ASTM D 1505 Test Method for Density of Plastics by the Density-Gradient Technique.

G. ASTM D 1603 Test Method for Carbon Black in Olefin Plastics.

H. ASTM D 3895 Standard Test Method for Copper Induced Oxidative Induction Time of Polyolefins by Thermal Analysis.

I. ASTM D 6392 Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.

J. ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.

K. ASTM D 5397 Standard Test Method for Notched Constant Tensile Load Test of Geomembrane.

L. ASTM D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.

M. ASTM D 5617 Standard Test Method for Multi-Axial Tension Test for Geosynthetics.

N. FTMS 101C Puncture Resistance.

O. ASTM D 5994 Sheet Thickness for Textured Geomembrane.

1.03 QUALIFICATIONS (Not Used - See Section 01010-1.03B)

1.04 SUBMITTALS

A. At least 14 days prior to delivery of geomembrane rolls to the site, the Contractor shall submit the following, in triplicate, to the Engineer for approval:
   1. A Certificate of Compliance stating that all resin used for the product to be supplied is from a single source in the United States or Canada, of the same general type, and meets the requirements of Part 2.01 of this Section.
   2. Manufacturer's Quality Control (MQC) test results for the geomembrane base resin.
   3. Samples, product data sheets, and a complete description of the geomembrane to be supplied that meets or exceeds the product requirements of Part 2.02 of this Section.
   4. A 2-foot by 2-foot (minimum size) sample from the same geomembrane specimen tested in accordance with Part 2.02G of this Section and possessing a degree of texturization representative of the material that will be shipped to the site.
   5. MQC test results for the geomembrane rolls to be delivered to the site. At a minimum, the results of the tests specified in Part 2.02 of this Section must be included in the MQC testing reports.
   6. Manufacturer's recommended procedures for transporting, unloading, storage, handling, installation, repair, seaming (extrusion and fusion welding), and seam testing of geomembrane.
   7. A Certificate of Compliance stating that the extrudate rod material meets the product requirements of Part 2.03 of this Section.

B. At least 14 days prior to beginning installation of geomembrane, the Contractor shall submit the following, in triplicate, to the Engineer for approval:
   1. Installer's Geomembrane Installation Quality Control Plan, which includes testing procedures and frequencies.
   2. Shop Drawings showing the proposed geomembrane panel layout and details of field fabrications including skirt and sleeve pipe boots.
   3. Installer's Qualifications including the following:
      a. Resume of Installer's foreman.
      b. Resume of Installer's master welder.
      c. Resumes of Installer's welding and quality control personnel.

C. Upon completion of the geomembrane installation, the Contractor shall submit the following, in triplicate, to the Engineer.
   1. Installer's warranty in compliance with Part 1.07B of this Section.
   2. As-built geomembrane panel layout drawings showing all panels, testing, sampling, and repair locations.

1.05 TRANSPORT AND STORAGE

A. At least seven days prior to any site delivery, the Contractor shall notify the Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Engineer prior to site delivery.

B. Unloading and storage (stacking) of the geomembrane rolls at the site is the responsibility of the Contractor; however, unloading and storage of geomembrane rolls shall be performed in accordance with the submitted Manufacturer's recommended procedures.

C. The Contractor shall transport geomembrane rolls from the storage area in a manner that does not damage the geomembrane, and in accordance with the Manufacturer's recommended procedures.

D. The storage area for the geomembrane rolls will be located by the Contractor and must be approved by the Engineer.

1.06 QUALITY ASSURANCE TESTING

A. The CQA Monitor will take at least one sample for every 100,000 square feet of geomembrane delivered to the site and perform the following quality CQA conformance testing to verify that the product meets the requirements of Part 2.02 of this Section.
   1. Tensile Properties (ASTM D638).
   2. Density (ASTM D1505).
   3. Carbon Black Content (ASTM D1603).
   4. Carbon Black Dispersion (ASTM D5596).
   5. Sheet Thickness (ASTM D5994)

B. The CQA Monitor will take at least one sample per lot of geomembrane delivered to the site for CQA conformance testing to verify compliance with the interface shear strength requirements of Part 2.02F of this Section.

C. Geomembrane shipped to the site that does not contain a degree of texturization comparable to the approved texture sample submitted in accordance with Part 1.04A of this Section will be rejected by the Engineer.

D. Sampling for CQA conformance testing may be performed by the CQA Monitor at the manufacturing plant prior to shipping.

E. The CQA Monitor will collect samples and send them to the Geosynthetics Testing Laboratory for seam testing in accordance with Part 3.05E of this Section. Within 48 hours of sampling, the Engineer will accept or reject the seams based on the results of laboratory testing.

F. The Contractor shall assist with seam sampling by cutting samples and repairing sample locations at the direction of the CQA Monitor.

1.07 WARRANTIES

A. The Contractor shall provide a five-year prorata warranty for the geomembrane against deterioration due to exposure to the elements, either exposed or buried.

B. The Contractor shall provide a two-year non-prorata warranty for the geomembrane against installation defects.

PART 2 PRODUCTS

2.01 RESIN

A. The resin used for manufacturing the geomembrane shall be new virgin material, first quality, compounded Linear Low-density Polyethylene (LLDPE), and manufactured specifically for producing geomembrane.

B. Preferred, but not required to have a 4- to 6-inch wide smooth edge to promote welding.

D. No mixing of different resin types shall occur during geomembrane manufacturing.

E. No second run or recycled materials shall be used during geomembrane manufacturing.

F. The resin used for manufacturing the geomembrane shall have a Specific Gravity (ASTM D 792) of minimum 0.940 g/cm^3 after addition of carbon black and other additives.

G. The resin used for manufacturing the geomembrane shall not contain more than 1 percent (by weight) additives other than carbon black.

H. The resin used for manufacturing the geomembrane shall not contain more than 3.5 percent (by weight) total additives.

2.02 GEOMEMBRANE

A. All geomembrane shall be manufactured by the same Manufacturer in the United States or Canada.

B. Geomembrane shall have a structured studded drainage surface on the top side and a spiked friction surface on the bottom side using a method which fully integrates the texture asperities with the sheet, such as Super Gripnet®, or equivalent; no spray-on texturing shall be allowed.

C. Additives for UV protection, thermal stability, or processing agents must not "bloom" to the surface of the geomembrane over time or inhibit welding.

D. Finished geomembrane rolls shall be free from blemishes, holes, pin holes, bubbles, blisters, excessive gels, undispersed resins, undispersed carbon black, contamination by foreign materials, nicks, and cuts.

E. Geomembrane shall meet the following minimum average roll values for the following properties.

TEST	MINIMUM AVERAGE ROLL VALUE[1]	MQC[3] TEST FREQUENCY
Sheet Thickness (ASTM D 5994)	50-mil ±10 % [2]	10 per roll
Density (ASTM D 792, Method B)	0.993 g/cm^3	1 per rail car
Tensile Strength @ Break (ASTM D 6693)	105 ppi	1 per 100,000 ft^2
Elongation @ Break (ASTM D 638)	300 %	1 per 100,000 ft^2
Tear Resistance (ASTM D 1004)	30 lb	1 per 100,000 ft^2
Puncture Resistance (ASTM D 4833)	55 lb	1 per 100,000 ft^2
Carbon Black Content (ASTM D 4218)	2.0 to 3.0 %	1 per 100,000 ft^2
Carbon Black Dispersion (ASTM D 5596)	All Category 1 or 2	1 per 100,000 ft^2
Oxidation Induction Time (ASTM D 3895)	140 minutes minimum @ 200°C	1 per 100,000 ft^2
Low Temperature Brittleness (ASTM D 746)	< -40°F	Certification
Dimensional Stability (ASTM D 1204)	2 % maximum change	Certification
Drainage Stud Height (ASTM D 7466)	130-mil	1 per 100,000 ft2
Friction Spike Height (ASTM D 7466)	175-mil	1 per 100,000 ft2

[1] The average of all measurements on any roll shall not be less than the MARV value.
[2] The minimum allowable thickness for any measurement shall not be less than 10% of the nominal specified thickness. The average of all measurements on any roll shall not be less than 48 mils.
[3] Manufacturing Quality Control.

I. The geomembrane shall have the following minimum seam strength and test failure criteria when welded in accordance with the submitted Manufacturer's recommended procedures:
   1. For peel test specimens:
      a. The failure mode shall be a film tear bond (FTB).
      b. There shall be no more than 10 percent peel penetration into the weld.
      c. The quantitative value for the peel strength shall be a minimum of 75 ppi.
   2. For shear test specimens:
      a. The failure mode shall be film tear bond (FTB).
      b. The specimen shall achieve a 2-inch elongation with the grips initially set one inch back from the edge of the weld.
      c. The quantitative value for bonded seam strength shall be a minimum of 120 ppi.

2.03 EXTRUDATE ROD

A. All extrudate rod shall be made from same resin as the geomembrane.

B. All additives shall be thoroughly dispersed throughout the rod.

C. Extrudate rod shall be free of contamination by moisture or foreign materials.

2.04 FIELD FABRICATIONS

A. All geomembrane used for field fabrications shall be obtained from the approved geomembrane rolls to be used for the panel installation which meet the material property requirements of Part 2.02 of this Section.

B. The Installer shall fabricate and weld all skirt and sleeve pipe boots in the locations shown on the Plans, and as shown on the approved Shop Drawings.

2.05 FIELD TESTING EQUIPMENT

A. A field tensiometer shall be used by the Installer for seam strength testing and be calibrated and accurate to within 2 pounds.

B. A one-inch (width) by six-inch (length) cutting die shall be used for cutting seam strength test specimens from bulk seam samples.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. The Installer shall verify that the subgrade surface upon which the geomembrane is to be placed is smooth, uniform, firm and unyielding, and free from rocks or other debris. No protrusions, ruts, or ridges greater in depth or height than 1.0 inch shall be allowed prior to geomembrane installation.

B. The Contractor and Installer shall complete and sign the Subgrade Acceptance Form provided by the CQA Monitor, verifying that the surface which the GCL will be installed upon is acceptable. The CQA Monitor and the Design Engineer will also verify that the surface which the GCL will be installed upon is acceptable. Once the Contractor has signed the Subgrade Acceptance Form, it is the Contractor's responsibility to maintain the surface in the condition required by Part 3.01A of this Section.

C. The Contractor is responsible for temporary anchorage during installation and until permanent ballast is fully installed.

D. Prior to and at the middle of each geomembrane welding work shift and whenever adjustments are made to the welding machines, the Installer shall prepare and test trial welds for each welding machine that are being used or will be used during that work shift. Trial welds shall be prepared for both fusion and extrusion welding machines. Trial weld samples for fusion welding machines shall be a minimum of 6-feet in length; trial weld samples for extrusion welding machines will be a minimum of 3-feet in length with the trial weld centered on and running the length of the sample. Trial welds shall be tested as follows.
   1. Trial welds shall be allowed to cool to ambient conditions, prior to testing. After cooling, excessive material shall be cut from the beginning and the end of the trial weld sample (approximately 4-inches from each end). Using the cutting die, four 1-inch specimens shall be cut at an even spacing along the length of the trial weld.
   2. Using the field tenisometer, two non-adjacent specimens shall be tested for peel adhesion (peel) and two for bonded seam strength (shear). Both sides of fusion

welds shall be tested for peel. The rate of separation for both the peel and the shear tests shall be 2 inches per minute. The CQA Monitor will be present for, and observe, all trial weld tests.

3. All peel test specimens shall meet all of the following criteria:
   a. The failure mode shall be a film tear bond (FTB).
   b. There shall be no more than 10 percent peel penetration into the weld.
   c. The quantitative value for the peel strength shall be a minimum of 75 ppi.
4. All shear test specimens shall meet all of the following criteria:
   a. The failure mode shall be film tear bond (FTB).
   b. The specimen shall achieve a 2-inch elongation with the grips initially set one inch back from the edge of the weld.
   c. The quantitative value for bonded seam strength shall be a minimum of 120 ppi.
5. If any of the four test specimens do not meet the peel or shear criteria, the entire trial weld will be rejected and that machine shall not be used for installation of the geomembrane until passing a retest. Retesting shall consist of repeating the entire trial weld sampling and testing procedure on a new weld performed with the failing machine. If the retested trial weld fails, that welding machine shall not be used for installation of the geomembrane until proper adjustments or repairs and a passing trial weld test results. If the welding machine continually fails field testing, the machine shall be tagged and completely removed from work area.

3.02 INSTALLATION

A. Geomembrane panels shall be deployed parallel to the slope by unrolling down the entire length of the slope. Corrections or adjustments shall be made to panels which become askew to the parallel line of the slope. End-to-end panel butt seams shall occur on benches.

B. The textured geomembrane shall be placed in direct and uniform contact with underlying protective cover subgrade soil, with the spikes down and the stud side up. The geomembrane surface shall not be dragged over the underlying subgrade; a plastic slip sheet or other means shall be used to position the geomembrane without dragging it over the subgrade.

C. Adjacent geomembrane panel edges shall be overlapped a minimum of 4-inches for fusion welding. The alignment of the overlap shall be kept consistent by marking overlap indicator points.

D. Geomembrane damaged during handling, transport, or deployment shall be removed or repaired as directed by the Engineer.

E. Geomembrane installation and seaming methods shall not damage underlying subgrade or soil materials; any damage to underlying soil materials shall be repaired at the expense of the Contractor.

F. The Installer shall only deploy the quantity of geomembrane which can be completely welded and anchored by the end of the work shift or day.

G. The Contractor shall prepare an adequate number of sandbags to ballast the geomembrane during deployment. Geomembrane rolls may also be used for ballast provided that no damage to the deployed geomembrane occurs. Only plastic ties shall be used to close sandbags; no

metal or wire ties shall be used. Sandbags shall be removed prior to deploying overlying materials and after completion of permanent closure turf ballast installation. Sandbags shall be disposed of as directed by the Engineer. Sandbag fill shall not be disposed of within the limits of work unless the fill consists of material which meets the Specification for the material it is disposed upon. Adequate sandbags and timely covering are required to prevent wind shifting of geomembrane. If shifting of geomembrane occurs, inspection of underlying subgrade will be required to ensure the subgrade has not been compromised. Repairs or replacement will be required if displacement or damage has occurred .

H. The Installer shall deploy and seam the geomembrane in a manner which minimizes wrinkles; however, the Installer shall be responsible for, and coordinate with the Manufacturer in, providing the proper amount of slack in the installed geomembrane to compensate for contraction due to local temperature extremes prior to covering. Stress-bridging and "fishmouths" shall not be allowed.

I. Immediately after geomembrane panels running through ditch flow lines or at toes of slopes are welded, sandbags shall be placed end-to-end along the entire length of the flow or toe line to prevent geomembrane stress-bridging at those locations.

J. Portions of the geomembrane wasted by the Installer, and rendered unusable, as determined by the CQA Monitor, shall be transported and disposed of by the Contractor.

K. No equipment will be allowed on slopes exceeding 15% on the partially constructed turf cap system until after the completed installation of the sand infill ballast. On slopes less than 15%, ATV type vehicles will be allowed prior to infill placement if the tire /track pressure is less than 5 psi.

L. Following full specified sand infill ballast thickness installation, shall be limited to light duty vehicles with drivability tire/track pressures of less than 35 psi.

3.03 FUSION WELDING

A. Fusion welding shall only take place when the ambient temperature is between 40°F and 110°F. The Installer shall measure ambient temperature 6-inches above the deployed geomembrane. Special weather seaming plans shall be submitted by the Installer and approved by Engineer to perform fusion welds outside this ambient temperature range.

B. All geomembrane seams shall be fusion welded by the double-track method leaving an air gap for leak testing. Extrusion welding shall only be used for repairs, patches, and fabrications.

C. Fusion welding machines shall complete trial weld procedures and pass field testing as specified in Part 3.01 of this Section prior to welding the geomembrane seams.

D. A power source capable of producing sufficient and constant voltage under the combined line load of other welders and equipment shall be used.

E. The surface of the geomembrane to be welded shall be thoroughly cleaned.

F. Geomembrane panels shall be welded at the same speed, temperature, roller pressure, and gauge settings used to prepare the trial weld; the Installer shall adjust the above settings as

temperature conditions indicate and record welding machine number, operator, machine settings, time, and date for each seam welded.

3.04 EXTRUSION WELDING

A. Extrusion welding guns shall complete trial weld procedures and pass field testing as specified in Part 3.01 of this Section prior to welding patches or fabrications.

B. Geomembrane patches to be extrusion welded shall overlap the underlying geomembrane panel a minimum of 4 inches.

C. The Installer shall cut square repair patches with rounded corners large enough to extend a minimum of 4 inches beyond the repair area in all directions.

D. The geomembrane patch shall be tack-welded to the underlying geomembrane panel to prevent movement during grinding and extrusion welding operations.

E. A disc grinder shall be used to remove surface debris and oxidation from the outer edge of overlapped geomembrane patches and the underlying geomembrane. Grinding parallel to seam shall not be allowed.

F. The nozzle of the extrusion gun shall be purged to remove solidified extrudate before each use.

G. The extrusion weld shall completely cover the entire width of the grind area and extend 4 inches up any intersecting fusion weld.

H. A cap strip patch shall be extrusion welded at all fusion welded seam intersections of three or more geomembrane panels.

3.05 QUALITY CONTROL

A. General
   1. The Installer shall perform all quality control procedures and testing in accordance with the approved Geomembrane Installation Quality Control Plan.
   2. The Installer shall maintain an accurate geomembrane panel layout drawing during installation. The drawing shall include: 1) roll and panel numbers; 2) seam numbers; 3) geomembrane limits; 4) anchor trench locations; and 5) seam test sample dates and locations.

B. Deployment
   1. The Installer shall coordinate with the CQA Monitor in assigning geomembrane panel and corresponding seam numbers.
   2. The Installer shall maintain, and submit to the CQA Monitor, daily deployment logs and panel layout drawings as the deployment progresses and record panel and seam numbers, panel dimensions, and deployment quantities.

C. Fusion Welding
   1. The Installer shall maintain, and submit to the CQA Monitor, daily welding logs on which are recorded welding machine number, operator, machine settings, time, and

date for each seam welded.

2. The entire length of each fusion welded seam shall be air-pressure tested by the Installer. The Installer shall provide an air pump capable of generating and maintaining 40 psi of pressure and equipped with a regulator and pressure gauge. The Installer shall provide pressure feed needles with pressure gauges accurate to 1 psi and perform the following air pressure test procedure:
   a. Seal both ends of the fusion welded seam with vise-grip plate clamps or an extrusion weld. Heat may be applied to the seam ends to aid in sealing the seam in conjunction with the clamps. Due to the potential hazard of igniting landfill gas, propane torches or any other flame producing device shall not be used.
   b. At one end of the seam, insert air pressure needle into the fusion weld channel.
   c. Pressurize the channel to 40 psi and maintain pressure for 5 minutes.
   d. Release air from the opposite end of the seam to verify that the entire length of the fusion weld channel was pressurized. If channel pressure is not maintained with a maximum allowable pressure loss of 2 psi over the 5-minute test period or does not stabilize at all; the Installer shall locate the defective area, isolate it, and repeat air pressure test procedures in each direction from the defective area.
   e. The Installer shall maintain air pressure test logs on which are recorded seam numbers, beginning and ending air pressures, beginning and ending test times, lengths of tested seam, defective areas found, and confirmation of repair.

D. Extrusion Welding
   1. The Installer shall maintain, and submit to the CQA Monitor, daily welding logs on which are recorded welding machine number, operator, machine settings, time, and date.
   2. The Installer shall vacuum test each extrusion welded along its entire length. The Installer shall provide a vacuum pump capable of generating and maintaining a pressure of 30 inches of mercury, and equipped with a regulator and vacuum gauge. The Installer shall also provide a vacuum box with a gasket-type seal and a clean view window, and vacuum gauge accurate to 1 psi and perform the following vacuum test procedure:
      a. Saturate the extrusion weld with a soap and water solution.
      b. Place view box over the saturated weld, create an air tight seal, and apply vacuum in the box.
      c. Maintain the vacuum for 10 seconds and examine weld for forming bubbles which indicate leaks. Mark detected leaks for follow up extrusion weld repair. Retest detected leaks after repair to verify that the leaks were successfully repaired.
      d. The Installer shall maintain vacuum test logs on which are recorded repair numbers, vacuum test dates, and vacuum test results.

E. Seam Test Sampling Procedures
   1. The CQA Monitor will determine seam test sample locations at minimum intervals of 500 lineal feet of welded seam. The CQA Monitor may decrease or increase this frequency based on previous seam test results. The Installer shall cut the seam test sample where indicated by the CQA Monitor.

2. The Installer shall repair sample holes with an extrusion welded patch in accordance with Part 3.04 of this Section and perform a vacuum test in accordance with Part 3.05D of this Section.
3. Seam test samples shall be 12-inches wide by 36-inches long with the weld centered along the length of the sample. Sample sizes may be modified at the request of the CQA Monitor. The Installer shall cut one 1-inch specimen from each end of the sample and field test the specimens for peel adhesion in accordance with Part 3.01 of this Section. If these specimens pass the field peel test, the CQA Monitor will divide the remaining sample and submit one specimen to the Geosynthetics Testing Laboratory for further testing and retain one for archive. If either of the specimens fail the field peel test, the Installer shall perform Failed Seam Analysis Procedures in accordance with Part 3.07 of this Section.
4. The Installer may take and test any sample at its option; however, all sampling and testing shall be done under the observation of the CQA Monitor and all tests and repairs shall be in accordance with the procedural requirements of this Part.

3.06 LABORATORY TESTING

A. The Geosynthetics Testing Laboratory will perform the following test procedure at the direction of the Engineer:
1. Test five specimens from each sample submitted for peel adhesion and five specimens from each sample for bonded seam strength (ASTM D 6392).
2. All specimens must meet the criteria specified in Part 3.01C of this Section for each type of test.
3. Both sides of fusion welded seams shall be tested for peel adhesion.

B. The Engineer's acceptance of the welded geomembrane seams will be based on the results of laboratory seam analysis.

C. The Engineer will notify the Installer of acceptance or rejection of the seam within 24 hours of submission of the samples to the Geosynthetics Testing Laboratory.

3.07 FAILED SEAM ANALYSIS PROCEDURES

A. The Installer shall perform the following procedures in the event of a seam failure determined by field or laboratory testing:
1. The Installer shall mark the failed seam at a distance of 10 feet in each direction from the failed test sample location. The Installer shall cut a 12-inch by 12-inch sample from each location, then cut one 1-inch wide specimen from each end of the sample, and field test the specimens for peel adhesion in accordance with Part 3.01 of this Section. If all specimens pass the field peel test, the Installer shall cut, and submit to the CQA Monitor, a 12-inch wide by 18-inch long sample from each location for laboratory seam testing. If any of the specimens fail the field peel test at either location, the Installer shall continue sampling the failed seam at 10-foot intervals until specimens successfully pass the field peel tests and a sample can be submitted for laboratory testing. If specimens continually fail field peel tests at the 10-foot intervals, the entire seam or portion of the welded seam shall be repaired by the Installer as directed by the Engineer.
2. The Installer shall repair the failed length of seam determined by field peel testing with an 18-inch wide extrusion welded cap strip in accordance with Part 3.04 of this

Section. The installer shall vacuum test the cap strip in accordance with Part 3.05D of this Section.

3. If the retest sample fails laboratory testing in accordance with Part 3.06 of this Section, the Installer shall repeat the interval sampling and testing procedure.

B. At the discretion of the CQA Monitor, seam test samples will be taken from extrusion welded cap strips exceeding 100 feet in length.

PART 4 MEASUREMENT AND PAYMENT

4.01 GEOMEMBRANE

A. Geomembrane material shall be measured on a horizontal plane in plan view by the square foot of the in-place material installed. The quantity for "Geomembrane" shall be a final pay quantity as described in Section 9-1.02C, "Final Pay Quantities," of the Standard Specifications and as shown on the Plans. The price paid per square foot for geomembrane shall include full compensation for providing all labor, equipment, tools, and incidentals required for installation of the geomembrane as shown on the Plans, as specified herein, and as directed by the Engineer and no additional compensation will be allowed therefor. The Contractor shall make provisions for additional material needed to account for overlaps, anchorage, and waste, as no additional compensation will be allowed therefor.

4.02 GEOMEMBRANE SURFICIAL STRIPS

A. Geomobrane material for the surficial strips shall be measured by the lineal foot for the 3.5 foot wide strips. The price per lineal foot for geomembrane surficial strips shall be included in the Contract Unit Price per lineal foot installed for "Geomembrane Surficial Strips" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the geomembrane surficial strips as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefor.

END OF SECTION

SECTION 02773
ENGINEERED TURF

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all engineered turf in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals necessary to install the engineered turf, sand ballast infill, and HydroBinder® Infill, including that needed for testing and connecting materials in field.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM D 1505	Standard Test Method for Density of Plastics by the Density-Gradient Technique.
B.	ASTM D 4218	Test Method for Carbon Black in Olefin Plastics.
C.	ASTM D 4491	Test Methods for Water Permeability of Geotextiles by Permittivity.
D.	ASTM D 4632	Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
E.	ASTM D 4716	Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
F.	ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile.
G.	ASTM D 5035	Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).
H.	ASTM D 5199	Standard Test Method for Measuring Nominal Thickness Geotextiles and Geomembranes.
I.	ASTM D 5261	Test Methods for Mass Per Unit Area (weight) of Woven Fabrics.
J.	ASTM D 5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.

K. ASTM D 6243 Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by the Direct Shear Method.

L. ASTM D 7005 Ply Adhesion of Geocomposites.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of engineered turf rolls to the Work site, the Contractor shall submit three (3) copies of the following to the Design Engineer for approval:
   1. Samples, product data sheets, and complete description of engineered turf that meets or exceed the product requirements of this Section.
   2. MQC testing reports for engineered turf to be delivered to the Work site. At a minimum, results of those tests specified in Part 2 of this Section must be included in the MQC testing reports.
   3. For the geonet base resin:
      a. A Certificate of Compliance stating that all resin used for the product to be supplied is from a single source in the United States or Canada, of the same general type, and meets the requirements of Part 2 of this Section.
      b. MQC test results.
   4. Manufacturer's recommended procedures for transporting, unloading, storage, handling, installation, repair, and seaming (sewing, heat bonding, lapping, and plastic ties) of the geonet composite.
   5. Samples, product data sheets, and complete description of plastic fasteners (ties) recommended by the Manufacturer to join the geonet and sewing thread recommended by the Manufacturer to sew the geotextile.
   6. Panel layout showing machine direction of rolls.

1.05 TRANSPORT AND STORAGE

A. The engineered turf rolls shall be shipped by the Supplier with protective coverings in a closed trailer or a covered open trailer.

B. At least seven (7) calendar days prior to any Work site delivery, the Contractor shall notify the Design Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Design Engineer prior to Work site delivery.

C. Unloading and storage (stacking) of the engineered turf rolls at the Work site shall be the responsibility of the Contractor; however, unloading and storage of engineered turf rolls shall be performed in accordance with the submitted Manufacturer's recommended procedures. engineered turf rolls shall be stacked no more than three (3) high.

D. The Contractor shall transport engineered turf rolls from the storage area in a manner that does not damage the geonet composite, and in accordance with the Manufacturer's recommended procedures.

1.06 QUALITY ASSURANCE

A. Testing and Observation

1. Testing and observation of the engineered turf shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
3. If any portion(s) of the engineered turf installation is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 ENGINEERED TURF

A. The engineered turf is a synthetic structured material consisting of one or more geotextiles tufted with polyethylene yarns that resemble grass blades such as DuraTurf manufactured by Shaw, or equivalent. Engineered turf shall be manufactured of UV-stabilized yarn oriented into a stable network that maintains its structure during handling, placement and long-term service.

B. The engineered turf shall be chemical resistant and cannot be heat burnished or contain recycled materials.

C. The engineered turf shall have the following minimum average roll values:

ENGINEERED TURF COMPONENT

Product Data	Test Method	Values
CBR Puncture	ASTM D6241	800 lb. (MARV)
Tensile Product (MD/XD)	ASTM D4595	1,000 lb/ft min (MARV)
Rainfall Induced Erosion	ASTM D96459	< 0.45% infill Loss 6 in/hr
Aerodynamic Evaluation	GTRI Wind Tunnel	120 mph with maximum uplift of 0.12 lb/sf
Engineered Turf Fiber UV Stability	ASTM G147	> 60% retained tensile strength at 100 years (projected)
Backing System UV Stability (Exposed)	ASTM G1545 Modified Cycle 1.UVA340	110 lbs/ft retained tensile strength at 6500 hours (projected)
Steady State Hydraulic Overtopping (ClosureTurf® with HydroBinder™)	ASTM D7277/D7276	5 ft overtopping resulting in 29 ft/s velocity and 8.8 psf shear stress for Manning N Value of 0.02
Full Scale Wave Overtopping Test Cumulative Volume (ClosureTurf® with HydroBinder™)	Colorado State University Wave Simulator	165,000 ft^3/ft
Full Scale Wave Overtopping Test Wave Overtopping Discharge(ClosureTurf® with HydroBinder™)	Colorado State University Wave Simulator	4.0 $ft^3/s/ft$
Transmissivity w/ underlying structured geomembrane Normal stress 50 psf and 0.33 gradient (m2/sec)	ASTM D4716	2.5E -03m^2/sec., min.
Internal Friction of combined components	ASTM D5321	35°, min.
Sand Infill Gradation and Ballast	ASTM D6913	ASTM C-33 Fine Aggregates
Yarn Weight (Total Product Weight)	ASTM D5261	19 oz. / sq. yd. (25 oz. / sq. yd. +-1 oz.)
Tensile Strength of Yarn	ASTM D2256	15 lbs. min.

2.02 SEWING THREAD

A. The thread used for sewing of engineered turf shall be polymeric and have strength properties equal to or greater than the engineered turf.

B. The thread used for sewing of engineered turf shall be chemical resistant.

C. The thread used for sewing the engineered turf shall be equivalent to that recommended by the engineered turf Manufacturer submitted in accordance with Part 1.04A of this Section.

2.03 SAND BALLAST INFILL

A. Sand Ballast Infill will meet Particle Size Parameters of ASTM C 33-03 for fine aggregates as shown in the following Table 1:

Table 1: Sand Ballast Infill

Sieve	Percent Passing
9.5 mm (3/8")	100
4.75 mm (No. 4)	95 to 100
2.36 mm (No. 8)	80 to 100
1.18 mm (No. 16)	50 to 85
600 µm (No. 30)	25 to 60
300 µm (No. 50)	5 to 30
150 µm (No. 100)	0 t0 10

2.04 HYDROBINDER™ INFILL

A. HydroBinder™ is a cementious product used as the infill component for surface drainage conveyance areas.

B. HydroBinder™ infill Shall be HydroBinder™ Cementitious Infill. The HydroBinder™ infill material may be delivered in either pallet form of 80 lb. bags or 3000 lb. bulk super sacks.

C. Cement, except as otherwise specified herein, will be a brand of Portland Cement, meeting ASTM C 150 and will be Type I or Type II. Only one brand of cement will be used throughout the duration of this Contract.

D. The cementitious infill mix design will conform to the requirements of ASTM C 387 for high strength mortars.

E. The cementious infill will have a minimum 28 day compressive strength of 5000 psi.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. The Installer shall verify that the material and surface upon which the engineered turf is to be placed is complete and in accordance with these Technical Specifications for that material prior to beginning geonet installation.

B. The Contractor is responsible for temporary anchorage during installation and until permanent anchorage is constructed and completed.

3.02 INSTALLATION

A. Engineered turf shall be installed in accordance with the Manufacturer's instructions.

B. Engineered turf shall be installed with the machine (lengthwise) direction of the roll oriented down the slope in accordance with the Panel Layout.

C. Engineered turf panels shall be deployed from the top of the slope in a way that the engineered turf is laid substantially smooth and filaments are pointing upslope after deployment is complete.

D. The first engineered turf panel deployed shall have the turf filaments facing upward. Subsequent panels shall be deployed turf side down, and on top of the previously installed panel. After seaming each panel, the panel shall be flipped onto the geomembrane component with care to avoid pulling of tufts in the drainage studs.

E. End-to-end panel overlaps shall only occur on benches, unless the length of a slope between benches exceeds the total length of a full engineered turf roll.

F. Engineered turf shall be installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

G. A single stitch prayer type seam shall be constructed using a Nulong sewing machine or equivalent. Sewing thread shall be 207 Polyester or equivalent. Sewing will occur between the 1st and 2nd row of Engineered Turf stitches.

H. Engineered turf shall be ballasted during installation and until the engineered turf is covered with the sand ballast infill material.

I. On slopes exceeding 15%, no equipment will be allowed on the partially constructed turf cap system until after the completed installation of the sand ballast infill. On slopes less than 15%, ATV type vehicles will be allowed prior to infill placement if the tire /track pressure is less than 5 psi.

J. Following full specified sand ballast infill thickness installation, shall be limited to light duty vehicles with drivability tire/track pressures of less than 35 psi.

K. Engineered turf damaged during installation shall be removed and/or repaired with a sewn or fastened patch at the direction of the Design Engineer.

L. Portions of the engineered turf wasted by the Installer, and rendered unusable, as determined by the Design Engineer, shall be transported by the Contractor and disposed of off-site at a permitted transfer station or solid waste disposal facility.

3.03 SAND BALLAST INFILL PLACEMENT

A. Sand ballast infill shall be placed between the tufts of the engineered turf and:
   1. Shall be per plan either 5/8 inch thick or 2 1/8 inch thick, with a thickness tolerance of +/-1/8 inch. Measuring the sand ballast infill thickness will be performed utilizing a digital caliper, or approved alternate measuring device approved by the CQA Officer.
   2. Shall consist wholly of sand meeting ASTM C-33-03 for fine aggregates. See Section2.03 - SAND BALAST INFILL - Table 1 for sand infill ballast grain size parameters.
   3. Engineered turf areas that are to receive sand ballast infill must be accepted by the CQA Officer before placement of sand ballast infill takes place

B. Sand ballast infill shall be worked into the Engineered Turf between the synthetic yarn blades.

C. Conveyor systems and/or Express Blowers shall be used to spread and place the sand ballast infill.

C. The Contractor shall explained with detail in the Preparatory Meeting the method of sand infill deployment to be used.

D. Previously installed components shall not be displaced or damaged as a result of the sand ballast infill component installation.

E. A standard washer will be utilized as a plate for the point of entry into the sand ballast infill for consistent depth control.

3.04 INFILL – HYDROBINDER® PLACEMENT

A. See also Section 2.04 - HydroBinder® INFILL.

B. The HydroBinder® infill layer may be placed using any appropriate equipment capable of completing the work. Manual hand spreading is acceptable when equipment isn't practical.

C. The Contractor shall explain in detail during the Preparatory Meeting the method of HydroBinder® infill deployment.

D. Installation of HydroBinder® infill will only be performed by a Manufacture's approved installer using techniques and equipment approved by the Manufacture.

E. The HydroBinder® shall be installed into the turf while it is in a dry state. The HydroBinder® will be worked into the tufts so the tufts are in an upright position.

F. The HydroBinder® infill shall be placed dry to a thickness of 7/8 inch with a tolerance of +/- 1/8 inch.

G. The hydration process must occur on the same day as the HydroBinder® infill placement. The required HydroBinder® infill thickness will be achieved prior to the hydration process.

H. The cemented infill shall be hydrated thoroughly, however care must be taken to avoid

displacement of the non-hydrated infill. The objective is to soak the area to start the hydration process but not to inundate with water beyond saturation.

I. Once hydration is completed as described, backfill and compaction of the vertical anchor trenches (if applicable) shall take place.

K. The HydroBinder® shall be at minimum performance levels within 24 hours. HydroBinder® that does not meet minimum performance levels within 24 hours will be removed and replaced.

3.05 REPAIR

A. All damaged areas or holes shall be repaired with a patch by the Installer as directed by the Design Engineer.

B. Repairs to engineered turf are completed by using a heat-bonded seam. All tie-in seams along flatter slopes less than 15% with length greater than 25 feet will use an approved leistering machine so consistent pressure is achieved throughout the seam. A hand held heat gun with a pressure wheel shall be used for repair of smaller areas. The patch shall extend 2 feet beyond the edge of the damaged area or hole.

C. Contractor may also demonstrate techniques and practices for approval. Field demonstration and approval by the CQA Officer and the Manufacturer is required before incorporating any alternative repair technique.

PART 4 MEASUREMENT AND PAYMENT

4.01 ENGINEERED TURF WITH 5/8" SAND BALLAST INFILL

A. Engineered Turf with 5/8" Sand Ballast Infill shall be measured by the square foot of engineered turf in place covering the entire limits of waste, installed to the toes of all slopes on the landfill or five feet beyond the limits of waste, whichever is greater, as shown on the Plans. The quantity measured for engineered turf shall be as measured on a horizontal plane in plan view and shall include an allowance for overlaps, anchorage and waste. Payment shall be included in the Contract Unit Price per square foot installed for "Engineered Turf with 5/8" Sand Ballast Infill" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered turf and sand ballast infill, including that needed for testing and connecting materials in field as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 ENGINEERED TURF WITH 2" SAND BALLAST INFILL

A. Engineered Turf with 2" Sand Ballast Infill shall be measured by the square foot of engineered turf in place covering the entire limits of waste, installed to the toes of all slopes on the landfill or five feet beyond the limits of waste, whichever is greater, as shown on the Plans. The quantity measured for engineered turf shall be as measured on a horizontal plane in plan view and shall include an allowance for overlaps, anchorage and waste. Payment shall be included in the Contract Unit Price per square foot installed for "Engineered Turf with 2" Sand Ballast Infill" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered turf and sand ballast infill, including that needed for testing and connecting materials in field as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore

4.03 ENGINEERED TURF WITH HYDROBINDER INFILL

B. Engineered Turf with HydroBinder® Infill shall be measured by the square foot of engineered turf in place covering the entire limits of waste, installed to the toes of all slopes on the landfill or five feet beyond the limits of waste, whichever is greater, as shown on the Plans. The quantity measured for engineered turf shall be as measured on a horizontal plane in plan view and shall include an allowance for overlaps, anchorage and waste. Payment shall be included in the Contract Unit Price per square foot installed for "Engineered Turf with HydroBinder® Infill" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered turf and HydroBinder® infill, including that needed for testing and connecting materials in field as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore .

4.04 ENGINEERED TURF/GEOMEMBRANE ANCHOR TRENCH

A. Engineered turf/geomembrane anchor trench shall be measured by the lineal foot of anchor trench installed, as shown on the Plans. The quantity measured for the anchor trench shall be measured on the horizontal plan and shall include trenching, placement of material in trench, and backfilling. Payment shall be included in the Contract Unit Price per lineal foot installed for "Engineered Turf/Geomembrane Anchor Trench" and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the engineered tur/geomembrane anchor trench, as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore

END OF SECTION

SECTION 02900
SEEDING AND FERTILIZING

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall seed and fertilize the erosion-resistant layer and on-site borrow area surfaces, earthen drainage swales, and all construction-related disturbed surfaces in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to seed and fertilize the various areas identified herein.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

1.03 SUBMITTALS

A. Prior to seeding, the Contractor shall submit to the CQA Monitor, in triplicate, the name and location of material sources, laboratory test results, and/or material data sheets conforming to the relevant details shown on the Plans as outlined herein.

B. After seeding, the Contractor shall submit to the CQA Monitor the certified tags from the seed bags.

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the seeding, fertilizing and mulching shall be conducted in accordance with the CQA Plan.
   2. If any portion(s) of the seeding and fertilizing is determined by the CQA Monitor to not meet the requirements of this Section, the Contractor, at his expense, shall rework that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 SEED

A. Seeding shall conform to the provisions of Section 20-2.10 (Seed) and Section 20-3.04 (Seeding and Fertilizing) of the Standard Specifications.

B. The seed shall consist of the following mix of species and corresponding application rates:
   1. Trilfolium Incarnaium (Crimson Clover): 25 lbs/AC
   2. Hordeum Vulgare (Common Barley): 50 lbs/AC

3.	Festuca Rubra (Creeping Red Fescue):	50 lbs/AC
4.	Lolium Perenne (Perennial Ryegrass):	25 lbs/AC

2.02 FERTILIZER

A. Fertilizer shall consist of the following components and percentages:

Ammonia Phosphate Sulfate	16 percent
Phosphoric Acid	20 percent
Water Soluble Potash	0 percent

PART 3 EXECUTION

3.01 GENERAL

A. The method and equipment used to spread the seed and fertilizer shall be subject to the approval of the Design Engineer.

B. Seed and fertilizer shall be applied after the after the access roads, drainage structures , and erosion-resistant layer have been placed to grade.

C. Seed and fertilizer shall not be applied to the access roads, rock riprap swales, and sedimentation basins.

3.02 APPLICATION

A. The application of seed and fertilizer shall be performed by hydroseeding methods using the following steps:
1. *Step 1:* Seed and fiber shall be hydroseeded onto the designated surfaces at a rate of 150 lbs/AC and 500 lbs/AC, respectively.
2. *Step 2:* Hydromulch with tackifier and fertilizer shall then be applied at rates of 500 lbs/AC (fiber), 150 lbs/AC (tackifier [M-binder, organic bean base glue]), and 200 lbs/AC (fertilizer).

B. All products shall be spread uniformly over all areas subject to revegetation.

PART 4 MEASUREMENT AND PAYMENT

4.01 SEEDING AND FERTILIZING

A. Seeding and fertilizing shall be measured by the acre installed and includes all seed, fertilizer, tackifier and fiber. No adjustments in compensation will be made in the Contract Unit Price paid for "Seeding and Fertilizing" as a result of an increase or decrease in the quantity of revegetation products used, regardless of the reason for the increase or decrease, even if the increase or decrease exceeds 25 percent of the Design Engineer's Estimate. The provisions in Section 4-1.03B (Increased or Decreased Quantities) of the Standard Specifications shall not apply.

B. Payment shall be included in the Contract Unit Price per acre installed for "Seeding and Fertilizing" addressed in this Section and shall include full compensation for providing all

materials, labor, equipment, tools, and incidentals required for seeding and fertilizing as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02960
TEMPORARY EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall implement all erosion control provisions consisting of, but not limited to, the construction of permanent and temporary facilities and taking measures as are necessary to prevent, control and abate water, mud, and erosion damage to public and private property as a result of the construction of this Project. Erosion control shall apply year round to all areas where earthen material is exposed on the Work site and shall not be limited to those areas outlined in these Technical Specifications or as shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to implement the erosion control provisions.

1.02 REFERENCES

A. *Caltrans Standard Specifications (Section 20).* California Department of Transportation, May 2006.

B. *California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ (NPDES No. CAS000002).* State Water Resources Control Board, 2010.

1.03 SUBMITTALS

A. The Contractor shall prepare and implement a SWPPP for construction activities in accordance with Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications.

PART 2 PRODUCTS

2.01 STRAW BALES

A. Straw for bales shall be noxious weed free and shall be derived from wheat, rice or barley.

2.02 STRAW WATTLES

A. Straw wattles shall be fiber rolls composed of bio-degradable fibers stuffed in a photo-degradable open weave netting.

2.03 ROCK FOR CONSTRUCTION ENTRANCE

A. Rock for the construction entrance shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.04 SILT FENCING

A. Silt Fencing: Filter fabric shall be a pervious sheet of synthetic polymer composed of at least 85% by weight ethylene, propylene, amide, ester, or vinylidene yarn, woven or non-woven. It shall contain stabilizers and/or inhibitors to resist deterioration by heat, water, and ultra-violet light. The fabric shall conform to the following:
   1. The Equivalent Opening Size (U.S. Standard Sieve) shall be within the range 70-100.
   2. The tensile strength (per ASTM D4632) shall be at least 120 pounds.

B. Silt Fencing Posts: Posts for silt fences shall be either 4-inch diameter wood or 1.33 pounds per linear foot steel with a minimum length of 3 feet. Steel posts shall have projections for fastening wire to them.

PART 3 EXECUTION

3.01 SCHEDULE

A. Construction or implementation of erosion control measures shall be performed year round. Between October 15 and May 15 of each year, such temporary erosion control features as are necessary to prevent damage during the forthcoming winter season shall be constructed and remain functional.

B. The Contractor shall comply with the pollution control measures referenced in these Technical Specifications as part of the overall program to control erosion and de-silt runoff.

C. All temporary erosion control facilities shall be maintained during temporary suspension of Work periods.

3.02 PROTECTION

A. All areas of exposed earth created by the Contractor beyond what is shown on the Plans and referred to in these Technical Specifications and areas cleared and grubbed prior to excavation or embankment operations which are subject to wind erosion and runoff shall also be subject to these Technical Specifications, except that the Contractor shall be fully responsible for all costs and liabilities associated with water pollution and temporary erosion control work in these areas.

3.03 TEMPORARY EROSION CONTROL FACILITIES

A. The Contractor shall conduct his operations in such a manner that storm water runoff will be contained within the Work site or channeled into the storm drain system which serves the runoff area. Storm water runoff from one area shall not be allowed to divert to another runoff area.

B. Temporary down drains, drainage structures, and other devices shall be provided to channel storm water runoff water into the respective permanent storm drain systems during construction. Permanent drainage structures, not fully completed, shall be modified as required to accept de-silted runoff.

C. Fill areas, while being brought to grade, and during periods of completion prior to final

construction, shall be protected by various measures to eliminate erosion and the siltation of downstream facilities and adjacent areas. These measures may include, but shall not be limited to:

1. Temporary down drains, either in the form of pipes or paved ditches with protected outfall areas;
2. Graded berms around areas to eliminate erosion of embankment slopes by surface runoff;
3. Embankment slopes, not included as part of the construction contract and constructed by the Contractor for temporary access roads, shall be compacted by track walking the face of the slope in a direction perpendicular to the slope contours. Several passes may be required to adequately compact the slope face.

D. Contour graded areas shall be protected against erosion and the resulting siltation of downstream facilities and adjacent areas during grading operations. Various measures may include, but shall not be limited to:

1. Use of graded contour berms to control sheet flow.
2. Supplemental grading of large areas around temporary or unfinished inlet structures, such as inside ramp loops.

E. Culvert pipe used in conjunction with temporary erosion control measures which was new when delivered to the Work site and, in the opinion of the Design Engineer, is not damaged and whose dimensions and other properties conform to the requirements for new material may be used in the new Work.

PART 4 MEASUREMENT AND PAYMENT

4.01 TEMPORARY EROSION AND SEDIMENT CONTROL

A. Measurement and payment for temporary erosion and sediment control provisions including preparation and implementation of a SWPPP shall be considered as included in the Contract Lump Sum Price paid for "Temporary Erosion and Sediment Controls" as addressed in this Section and Section 01550 (Storm Water Pollution Prevention) of these Technical Specifications and includes all compensation for providing all materials, labor, equipment, tools, and incidentals required to complete the Work specified herein and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 03300
CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall supply, transport to the Work site, and install all concrete for construction of drain inlets and the pads at the flare station, post footings for the metal frame pipe supports and security fencing, foundation for the sedimentation basin's drainage riser, and grouted rock riprap outfalls in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to prepare and construct the various concrete structures.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. *Manual of Standard Practice*, Concrete Reinforcing Steel Institute (CRSI), 2009.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM A 615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
B.	ASTM C 31	Standard Specification for Making and Curing Concrete Test Specimens in the Field.
C.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
D.	ASTM C 143	Standard Test Method for Slump of Portland Cement Concrete.
E.	ASTM D 1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall provide three (3) copies of the following information to the Design Engineer for approval:
   1. Name and location of the source for the concrete and reinforcing bars.
   2. Laboratory test results for the concrete and reinforcing bars.

3. Manufacturer's product data sheets for the concrete and reinforcing bars to verify that the materials meet or exceed the corresponding product requirements.

1.05 QUALITY ASSURANCE

A. Testing and Observation
1. Testing and observation of the concrete components shall be conducted in accordance with the CQA Plan.
2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
3. If any portion(s) of the concrete is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 CONCRETE

A. Concrete shall be supplied from the same approved source during construction of each structure.

B. Concrete for the drain inlets and flare station concrete pads shall be Type II Portland cement concrete meeting all material requirements of Sections 90-1 and 90-2 of the Standard Specifications and shall exhibit a maximum 4-inch slump when tested in accordance with ASTM C 143 and have a designated 28-day compressive strength of 2,500 psi (drain inlets) and 3,000 psi (flare station concrete pads) when tested in accordance with ASTM C 31 and ASTM C 39.

C. Concrete for post footings and the sedimentation basin's drainage riser foundation shall be minor concrete conforming to the requirements of Section 90-10 of the Standard Specifications.

D. Concrete for the grouted rock riprap outfalls shall be minor concrete conforming to the requirements of Sections 72-5.02 and 90-10 of the Standard Specifications.

2.02 REINFORCEMENT

A. Reinforcing bars shall be billet-steel bars for concrete reinforcement conforming to ASTM A 615, Grade 40, #4 bars.

2.03 FORMS

A. Forms used in concrete installations shall be APA "Plyform" or equivalent as designed by then Contractor and exhibiting sufficient strength to hold the concrete.

2.04 EPOXY

A. Epoxy used for securing dowels or anchors in concrete shall be Simpson "SET – Epoxy" or Covert "CIA-Gel 7000 Epoxy".

2.05 AGGREGATE BASE

A. Aggregate base for the flare station concrete pads shall conform to the requirements of Section 02207 (Aggregate Base) of these Technical Specifications.

2.06 ENGINEERED FILL

A. Engineered fill for the flare station concrete pads shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The locations, dimensions, and final elevations of the concrete slabs shall be as shown on the Plans or as staked by the Design Engineer.

B. The footprint areas for the flare station concrete pads as shown on the Plans shall be cleared and grubbed in accordance with the requirements of Section 02222 (Excavation) of these Technical Specifications.

C. Following clearing and grubbing, the flare station concrete pad areas shall be overexcavated to a depth of 18 inches and recompacted as engineered fill in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications. Overexcavation is not required if compaction data beneath the concrete slab footprints are available from the former leachate pond backfilling operations that demonstrate that the upper 18 inches meet the engineered fill compaction requirements.

D. Aggregate base for the flare station concrete pads shall be spread in a uniform loose lift not exceeding 8 inches in thickness, moisture conditioned to within 1 to 3 percentage points of the optimum moisture content, and compacted to a minimum of 95 percent of maximum dry density per ASTM D 1557.

3.02 REINFORCEMENT

A. All reinforcement shall be installed in conformance with CRSI's "Manual of Standard Practice".

B. All reinforcement shall be free from rust, oil, dirt, or any other coating.

C. Continuous reinforcing bars shall be lapped at splices at a minimum of 32 diameters.

D. Unless otherwise noted, reinforcement shall have a minimum concrete cover of 3 inches.

E. Reinforcement shall not be damaged and shall be securely supported and anchored to avoid movement during placement of concrete.

3.03 FORMWORK

A. Design and erection of concrete formwork shall be the responsibility of the Contractor. Strength of concrete formwork shall be sufficient to hold the concrete with minimal or no leakage. Shoring and bracing shall be provided to ensure stability of formwork. Three-quarter-inch chamfer strips shall be used at exposed corners.

3.04 CONCRETE SLAB PLACEMENT

A. Subgrade and forms shall be moistened prior to placing concrete.

B. Care shall be taken to not damage or displace the reinforcing steel components.

C. Concrete shall be placed in a continuous operation and thoroughly vibrated to ensure consolidation around reinforcement.

D. The final surface of the concrete slabs shall have a non-slip broom finish.

E. The Contractor shall repair or patch all significant cracks, spalls and irregularities in formed or finished surfaces or other defects, as required to attain the workmanship standards herein.

3.05 MINOR CONCRETE PLACEMENT

A. Minor concrete for post footings and the sedimentation basin's drainage riser foundation shall be installed as shown on the Plans and in conformance with Sections 51 and 90-10 of the Standard Specifications, as applicable.

B. Minor concrete for the grouted rock riprap shall be placed in conformance with Section 72-5.04 of the Standard Specifications.

3.06 EPOXY SECURED DOWELS OR ANCHORS

A. The diameter and depth of the drill hole shall be as indicated. If not included, the hole shall be drilled 1/8-inch larger and ten (10) times deeper than the diameter of the dowel or anchor.

B. The hole shall be thoroughly cleaned by blowing it out with compressed air and by using a wire brush.

C. Placement of epoxy in the hole shall be performed using a dispensing tool provided by, or recommended by the manufacturer. The hole shall be completely filled with epoxy.

D. The dowel or anchor shall be placed in the hole and the epoxy allowed sufficient time to completely cure before disturbing the dowel or anchor.

PART 4 MEASUREMENT AND PAYMENT

4.01 CONCRETE SLABS

A. The concrete slabs for the flare station shall be measured by the cubic yard of concrete installed and includes all subgrade and pad preparation work, aggregate base, reinforcement steel, formwork, and epoxy secured dowels and anchors. Payment shall be included in the Contract Unit Price per cubic foot installed for "Flare Station Concrete Slabs" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the flare station concrete slabs as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 DRAIN INLETS

A. Measurement and payment for concrete associated with the drain inlets shall be included in the Contract Unit Price for "Drain Inlets" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

4.03 CONCRETE POST FOOTINGS

A. Measurement and payment for concrete post footings associated with the metal frame pipe supports and security fencing for the flare station shall be included in the Contract Unit Prices for "Metal Frame Pipe Supports" addressed in Section 15200 (LFG Collection System Components) and "Security Fencing" addressed in Section 15300 (Flare Station), respectively, of these Technical Specifications.

4.04 DRAINAGE RISER FOUNDATION

A. Measurement and payment for concrete associated with the sedimentation basin's drainage riser foundation shall be included in the Contract Unit Price for "Sedimentation Basin Outlet" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

4.05 GROUTED ROCK RIPRAP OUTFALLS

A. Measurement and payment for concrete associated with the grouted rock riprap outfalls shall be included in the Contract Unit Price for "Grouted Rock Riprap Outfalls" addressed in Section 02722 (Drainage and Erosion Controls) of these Technical Specifications.

END OF SECTION

SECTION 15100
LANDFILL GAS (LFG) EXTRACTION WELLS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall install all LFG extraction wells as shown on the Plans and in accordance with these Technical Specifications. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to install the LFG extraction wells.

1.02 REFERENCES

A. *Caltrans Standard Specifications*. California Department of Transportation, 2010.

1.03 SUBMITTALS

A. At least 14 calendar days prior to commencement of drilling operations, the Contractor shall submit the following to the Design Engineer for approval:
   1. Drilling subcontractor information, including name of subcontractor, proof of State of California drilling contractor license (Class C-57), type and make of drill rig, names and experience of drill rig operator and helpers, and proposed operating procedures.
   2. The name and location of source, laboratory test results, and/or product data sheets for the following materials to verify that the materials meet or exceed the requirements in Section 7-1.2:
      a. PVC well casing and fittings.
      b. Gravel pack material.
      c. Bentonite.
      d. PVC well bore seal.
      e. Prefabricated Well Head Assemblies.
   3. Manufacturer's recommended installation procedures and operation instructions for prefabricated well head assemblies.
   4. Copies of approved drilling permits (if required) issued by the local governing agency.

B. At the completion of each working day, the Contractor shall prepare a work order summarizing the total footage drilled and amount of materials used for well construction, and submit it to the Design Engineer for approval.

C. The Contractor shall submit to the Design Engineer performance test results for the prefabricated well head assemblies within 14 calendar days of completion of the testing.

1.04 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and/or observation of the casing, annular materials, PVC well bore seal and prefabricated well head assembly installations shall be conducted in

accordance with the CQA Plan.

2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
3. If any portion(s) of the LFG extraction well installations is determined by the Design Engineer to not meet the requirements of this Section based on observations, the Contractor, at his expense, shall mitigate that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 LFG EXTRACTION WELLS

A. PVC WELL CASING AND FITTINGS: PVC well casing and fittings for the LFG extraction wells shall conform to the requirements of Section 15200 (LFG Collection System Components) of these Technical Specifications.

B. GRAVEL PACK: Gravel pack material shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

C. BENTONITE SEAL: Bentonite seal material shall be 100 percent premium grade bentonite clay.

D. PVC WELL BORE SEAL: PVC well bore seals shall consist of a prefabricated pipe boot and a 10-foot by 10-foot skirt manufactured from 30 mil PVC and designed specifically for the intended purpose. The boot portion shall have a minimum length of 4 feet and shall be sized to accommodate a 4-inch diameter well casing.

E. SOIL BACKFILL: Soil backfill material shall be erosion-resistant layer material in accordance with Section 02250 (Erosion-Resistant Layer) of these Technical Specifications.

2.02 PREFABRICATED WELL HEAD ASSEMBLIES

A. Prefabricated well head assemblies for LFG extraction wells shall be Series 3100 PVC well heads manufactured by Real Environmental Products [(209) 296-7900], or approved equivalent. The overall assembly shall include: Series 3100 PVC well head equipped with a 1.5-inch diameter PVC gate valve and dedicated thermometer; orifice assembly with four (4) interchangeable orifice plates with bore diameters of ½ inch, ¾inch, 1 inch and 1-1/2 inch; elastomeric adaptor for connection between the well casing and well head; and a 2-inch diameter PVC flexible hose for connection between the well head and the LFG collection system piping.

2.03 CLOSURE TURF RELIEF VALVE AND COLLECTION FOOT

A. The closure turf LFG relief valves are a component of the closure turf to provide necessary release of pressure in the event the LFG system malfunctions. These relief valves are to be provided by the turf manufacturer of the closure turf.

B. The closure turf LFG collection foot is a component of the closure turf to provide the interface between the surficial collection strips, the geomembrane, and the LFG collection well head. The collection foot and surficial collection strips are to be provided

by the turf manufacturer of the closure turf.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor's attention is directed to the details contained in the Plans for information regarding individual well construction characteristics.

B. The locations of LFG extraction wells will be staked by the Design Engineer prior to the commencement of drilling operations.

C. All required drilling permit(s), fees, and inspections shall be arranged, and paid for, by the Contractor.

3.02 DRILLING

A. Drilling and installation of LFG extraction wells shall be by a drilling contractor licensed (Class C-57) in the State of California.

B. Individual LFG extraction wells shall be drilled and installed in a single day so as to minimize the potential for LFG emissions from the borehole. Installation shall include placement of casing, gravel pack, and surface seal (including lower and upper hydrated bentonite seals). The top of the casing shall be capped until installation of the prefabricated well head assembly. In the event of equipment breakdown or other unforeseen circumstance prohibits complete installation of the LFG extraction well within the same working day, provisions shall be made to cover and seal the exposed borehole at the surface to prevent LFG emissions.

C. The boreholes for the LFG extraction wells shall be drilled using a bucket auger drill rig capable of drilling 24-inch diameter boreholes. The Design Engineer will prepare boring logs and associated records.

D. The borehole depths listed in the Plans are estimated and may be adjusted in the field by the Design Engineer.

E. Spoils generated as part of drilling operations may be temporarily stockpiled in proximity of the borehole, or discharged directly into a roll-off bin or dump truck. If temporarily stockpiled, the spoils must be removed by the end of each working day and transferred into a roll-off bin or dump truck for subsequent transport and disposal by the Contractor in accordance with Section 02222 (Excavation) of these Technical Specifications. Spoils remaining on-site overnight in a roll-off bin or dump truck shall be covered at the end of each working day. Spoils shall not remain on-site for more than a 48-hour period.

F. As soon as drilling is completed, a safety screen shall be placed over the top of the borehole. This screen shall stay in place until backfilling is within 4 feet of the surface. The safety screen size should be large enough to accommodate all backfill materials and activities yet not large enough for any human to accidentally fall through.

G. The borehole shall be straight and the well casing shall be installed in the center of the borehole. The Contractor shall take all tension off of the pipe by mechanical means and

center the well casing in the middle of the borehole before starting to backfill.

H. PVC well casing joints shall be solvent cemented and secured with 3/8-inch long Type 316 stainless steel lag screws.

I. The completion height of the well casing above ground surface shall be such that the final height of the installed prefabricated well head assembly is 5 feet above final grade.

J. Obstructions and saturated conditions may be encountered during drilling; the Contractor is expected to make reasonable effort to drill through obstructions and saturated conditions and may only abandon the borehole if written approval is obtained from the Design Engineer.

3.03 BACKFILLING

A. Backfilling operations shall commence immediately after well drilling is completed and the well casing has been installed in the borehole. Backfill materials shall be installed as shown on the Plans and as directed by the Design Engineer.
   1. If water is encountered during drilling, the Design Engineer may elect to have the borehole remain open overnight to allow the water level to stabilize. Under this scenario, the Contractor shall make provisions to cover and secure the borehole as a safety precaution and to prevent LFG emissions.

B. The gravel pack shall be poured or scooped through the safety screen at a rate that will not endanger the integrity of the well casing.

C. The upper and lower bentonite seals shall be formed by evenly distributing the bentonite material around the annulus of the well casing and then adding fresh water in a manner that will allow for a thorough saturation of the bentonite. The proportion of water added versus bentonite material shall be in accordance with the bentonite manufacturer's recommendations. This process shall be continued until the minimum bentonite seal thickness as specified on the Plans has been achieved.

D. Soil backfill shall be placed from the top of the lower bentonite seal to the bottom of the upper bentonite seal in a manner that will promote self compaction and avoid bridging of the soil backfill material.

E. The PVC well bore seal shall be installed in accordance with the manufacturer's recommendations around the well casing and placed at the location shown on the Plans. At a minimum, the following provisions shall be implemented during PVC well bore seal installation:
   1. The boot portion of the well bore seal shall be secured around the well casing with stainless steel straps to provide an air-tight connection. Following placement of erosion-resistant layer material, the boot shall be installed in a collapsed position above the final grade to accommodate potential settlement.
   2. Following installation, the PVC well bore seal shall be covered with the overlying GCL material or soil (temporary) if the PVC well bore seal is going to be exposed for more than three (3) working days.

F. For each completed LFG extraction well, the Design Engineer will make a record of borehole and well completion details to include the following information:

1. Boring log summarizing materials and conditions encountered.
2. Well construction log outlining completion depths and intervals for well casing and construction materials.
3. Map showing the well location by grid coordinates and ground surface elevation.
4. Numbering system to correlate each well with its corresponding well log.

3.04 INSTALLATION OF PREFABRICATED WELL HEAD ASSEMBLIES

A. The prefabricated well head assemblies shall be handled and installed in accordance with the manufacturer's recommendations and as shown on the Plans.

B. Provisions shall be made to ensure that the well head is installed such that the interior extension tube assembly is concentric within the well casing.

C. The completion height of the well head assembly shall be 5 feet above final grade as shown on the Plans.

D. The PVC flexible hose connection between the well head and LFG collection system piping shall be installed with sufficient slack (6 to 8 inches) to accommodate expansion and contraction. "IPS Weld-On 795" plastic pipe cement, or approved equivalent, shall be used for flexible hose connections to the well head and LFG collection system piping.

3.05 ABANDONMENT OF LFG EXTRACTION WELL BOREHOLE (IF REQUIRED)

A. Boreholes approved by the Design Engineer for abandonment shall be backfilled with refuse and/or soil to the final grade and compacted. If refuse is used, the refuse should be mechanically compacted within the borehole using the bucket auger to eliminate potential voids.

B. Upon completion of borehole abandonment activities, the area around the borehole shall be restored to meet the surrounding grades as shown on the Plans.

3.06 PERFORMANCE TESTING

A. During testing of the entire LFG collection system as described in Section 15300 (Flare Station) of these Technical Specifications, the Contractor shall test the prefabricated well head assemblies to verify proper operation. The scope of testing shall include the following:
1. Testing of static and differential pressure ports with valve completely open and completely closed.
2. Operation of temperature gauge.
3. Operation of gas sample port.
4. General inspection of well head assembly, PVC flexible hose, and fittings for leaks.

B. Testing of the static and differential pressure ports and gas sample port shall be conducted using a LANDTEC GEM-2000 Analyzer. The Contractor shall measure and record the following information for subsequent submittal to the Design Engineer:
1. Static and differential pressure (valve open and closed).
2. Temperature (valve open and closed).
3. Gas composition: methane, carbon dioxide, oxygen and balance (valve open and

closed).

PART 4 MEASUREMENT AND PAYMENT

4.01 LFG EXTRACTION WELLS

A. LFG extraction wells shall be measured by the vertical linear foot installed and includes all drilling, backfilling, and materials. Payment shall be included in the Contract Unit Price per vertical linear foot installed for "LFG Extraction Wells" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the LFG extraction wells as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 PREFABRICATED WELL HEAD ASSEMBLIES

A. Prefabricated well head assemblies shall be measured by each assembly installed and include supply of four (4) interchangeable orifice plates for each assembly. Payment shall be included in the Contract Unit Price per each unit installed for "Prefabricated Well Head Assemblies" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the prefabricated well head assemblies as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 ADDITIONAL BOREHOLE SET-UP

A. Additional borehole set-up (resetting on boreholes allowed to sit overnight for water level stabilization) shall be measured by each set-up required. Payment shall be included in the Contract Unit Price per each occurrence for "Additional Borehole Set-up" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to implement an additional borehole set-up as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 BOREHOLE ABANDONMENT

A. Borehole abandonment shall be measured by the vertical liner foot of borehole abandoned and includes all drilling, backfilling, and materials. Payment shall be included in the Contract Unit Price per vertical linear foot of borehole drilled/backfilled for "Borehole Abandonment" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to implement each borehole abandonment as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 REFUSE DISPOSAL

A. Measurement and payment for disposal of refuse generated by the LFG extraction well drilling operation shall be included in the Contract Unit Price for "Refuse Disposal" addressed in Section 02222 (Excavation) of these Technical Specifications.

4.06 PERFORMANCE TESTING

A. Measurement and payment for performance testing of the prefabricated well head assemblies described in this Section shall be included in the Contract Unit Price paid for "Prefabricated Well Head Assemblies". No additional compensation will be allowed therefore.

4.07 CLOSURE TURF RELIEF VALVES AND LFG COLLECTION FOOT ASSEMBLY

A. Measurement and payment for the closure turf relief valves described in this Section shall be included in the Contract Unit Price paid for the "Geomembrane" addressed in Section 02772 (Geomembrane) of these Technical Specifications. The relief valves are to provided by the manufacturer of the geomembrane material. No additional compensation will be allowed therefore.

B. Measurement and payment for the LFG closure turf collection foot assembly described in this Section shall be included in the Contact Unit Price per each assembly installed for "LFG Collection Foot Assembly" and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the LFG collection foot including the piping, well head assembly, flexible connector, and connection to the LFG collection header as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15200
LFG COLLECTION SYSTEM COMPONENTS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all required LFG collection system components, including PVC and HDPE pipe, fittings, and valves, flexible couplings, pipe supports and anchors, condensate drop-outs, and condensate discharge points, as shown on the Plans and in accordance with these Technical Specifications. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals, including excavation and backfilling services, necessary to install the respective LFC collection system components outlined above.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, May 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. American National Standards Institute (ANSI).

E. Plastic Pipe Institute.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A.	ASTM A 193	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
B.	ASTM A 194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
C.	ASTM A 325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength.
D.	ASTM D 1784	Standard Specification for Rigid PVC Compounds and Chlorinated PVC Compounds.
E.	ASTM D 1785	Standard Specification for PVC Plastic Pipe, Schedules 40, 80, and 120.
F.	ASTM D 2464	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 80.

G.	ASTM D 2466	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 40.
H.	ASTM D 2467	Standard Specification for Socket-Type PVC Plastic Pipe Fittings, Schedule 80.
I.	ASTM D 2513	Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
J.	ASTM D 2564	Standard Specification for Solvent Cements for PVC Plastic Piping Systems.
K.	ASTM D 2855	Standard Specification for Making Solvent-Cemented Joints with PVC Pipe and Fittings.
L.	ASTM D 3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
M.	ASTM D 3350	Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall provide three (3) copies of the following to the Design Engineer for approval:
   1. Manufacturer's product data sheets for the following materials to verify that the materials meet or exceed the corresponding product requirements:
      a. PVC pipe, fittings, and valves (including gasket, seal, bearing and gear materials).
      b. HDPE pipe and fittings.
      c. Vacuum test port fittings.
      d. PVC-HPDE transition coupling.
      e. Flexible couplings and band clamps.
      f. Staked pipe supports and anchors (including stakes, pipe clamps and miscellaneous fittings).
      g. Metal frame pipe supports (including metal frames, pipe clamps and miscellaneous fittings).
      h. Primer and paint.
   2. Manufacturer's recommended procedures for handling (transporting, unloading, storage, etc.), installation, and welding of PVC and HDPE pipe, fittings, and valves, as applicable.

B. At least 14 calendar days prior to conducting performance testing, the Contractor shall submit proposed procedures for the following to the Design Engineer for approval:
   1. Vacuum pressure test of HDPE condensate drain pipe.
   2. Gravity flow discharge test of condensate discharge points.

C. Within 14 calendar days of completion of performance testing for the respective components, the Contractor shall submit to the Design Engineer test results for the following system components:
   1. PVC LFG collection system pipe.
   2. HDPE condensate drain pipe.
   3. Condensate discharge points.

1.05 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the LFG collection system component installations shall be conducted in accordance with the CQA Plan.
   2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
   3. If any portion(s) of the LFG collection system component installations is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall remove and replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

PART 2 PRODUCTS

2.01 PVC PIPE AND FITTINGS

A. PVC pipe shall meet the requirements of ASTM D 1784 and ASTM D 1785 for Schedule 40 and Schedule 80 PVC pipe. The pipe shall be manufactured from a PVC compound which meets the requirements of Cell Classification 12454-B PVC as outlined in ASTM D 1784.

B. PVC fittings shall meet the requirements of ASTM D 2464, ASTM D 2466, and ASTM D 2467 for Schedule 40 and Schedule 80 PVC pipe fittings. Fittings unavailable in Schedule 40 may be replaced with Schedule 80. The fittings shall be manufactured from a PVC compound which meets the requirements of Cell Classification 12454-B PVC as outlined in ASTM D 1784.
   1. Fittings shall be industrial, heavy duty, hub style.
   2. Socket fittings shall be pressure rated as for the corresponding pipe size prescribed by ASTM D 1785. Threaded fittings shall be pressure rated at 50 percent of the rating for socket fittings.
   3. *Flanges:* Flanges shall meet the following specifications:
      a. Flanges shall be one-piece solid design or two-part van stone type which use the tapered, serrated face and full-face gasket technique for joining and are comparable with ANSI B16.5 Class 150 metal flanges.
      b. Flanges shall be non-shock and pressure rated at 150 psi for water service at 73°F, and have a minimum burst requirement of 3.3 times the rate pressure.
      c. Bolts shall be Type 316 stainless steel ASTM A 193, Grade B8M hex head and nuts shall be ASTM A 194, Grade 8m hex head.
      d. Gaskets shall be full-face neoprene.

4. *Branch Saddles:* Branch saddles shall either be socket style affixed using PVC cement or clamp-on style secured using stainless steel screws.

2.02 PVC BUTTERFLY VALVES (ISOLATION VALVES)

A. Butterfly valves used for isolating LFG collection system piping segments shall be wafer-type design with a body and disc manufactured from a PVC compound which meets the requirements of Cell Class 12454-B PVC as outlined in ASTM D 1784 and shall be compatible with associated PVC pipe fittings. The PVC butterfly valves shall also meet the following material and performance specifications:

1. Shaft shall be cadmium-plated steel alloy or 300 series stainless steel, positively attached to the disc, and totally sealed from exposure to the process gas or environment. The shaft shall also have a directional indicator on top to indicate disc position with handle removed.
2. Valve body shall be of the wafer design for ease of installation and maintenance and shall be compatible with ANSI B16.5 Class 150 metal flanges.
3. Seat material shall be Viton.
4. Bearings shall be corrosion resistant TFE or polypropylene 20 percent glass filled.
5. Secondary seal material shall be Viton and correspond to the seat material for maximum chemical resistance.
6. Handles and worm gear operators shall be corrosion resistant.
7. Valves shall be non-shock, rated at 150 psi for water service at 73°F, and have a minimum burst requirement of 3.3 times the rate pressure.

2.03 PVC BALL VALVES

A. PVC valves shall be ball-type design with the major components manufactured from a PVC compound which meets the requirements of Cell Class 12454-B PVC as outlined in ASTM D 1784 and shall be compatible with associated PVC pipe fittings. The PVC ball valves shall also meet the following material and performance specifications:

1. Ball seats shall be virgin TFE and the stem/body seals and seat energizers shall be Viton.
2. PVC socket type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2467.
3. Threaded type connectors shall conform to the requirements of ASTM D 2466 and ASTM D 2464 and ANSI B1.20.1 for tapered pipe threads.
4. The valve assembly shall be of construction such that a two-piece body is screwed together to contain seats which are maintained under compressive load against the ball.
5. Valves shall be non-shock, rated at 150 psi for water service at 73°F, and have a minimum burst requirement of 3.3 times the rated working pressure.

2.04 PVC CEMENT

A. PVC cements shall meet the requirements of ASTM D 2564 for solvent cemented PVC joints.

2.05 VACUUM TEST PORTS

A. Vacuum test ports for the LFG collection system piping shall be 1/8-inch flow, ¼-inch threaded polypropylene quick disconnect couplings.

2.06 HDPE PIPE AND FITTINGS

A. HDPE pipe and fittings for the condensate drain piping shall be SDR 9 and rated PE 3408 by the Plastics Pipe Institute. The HDPE pipe shall have a cell classification per ASTM D 3350 of 345444C

B. HDPE pipe and fittings shall meet the following criteria:
   1. The nominal inside diameter of the HDPE pipe shall be true to the pipe size shown on the Plans in accordance with ASTM D 2513.
   2. HDPE fittings for use in laying pipe shall have standard dimensions that conform to ASTM D 3261.
   3. Where possible, HDPE pipe and fittings should be produced by the same manufacturer from identical materials meeting the requirements of this specification. Special or custom fittings may be exempted from this requirement.

2.07 PVC-HDPE TRANSITION COUPLING

A. The PVC-HDPE transition coupling used in the condensate discharge point assemblies to the existing leachate drain shall be Series 735 transition couplings manufactured by Poly-Cam, Inc. [(763) 786-6682], or approved equivalent.

2.08 FLEXIBLE COUPLINGS

A. Flexible couplings shall be 18-inch long LANDTEC Models FLXH-060-180T (6-inch pipe diameter) and FLXH-080-180T (8-inch pipe diameter), or approved equivalent.

B. Band clamps used to secure the flexible couplings shall be stainless steel LANDTEC Models HC-060 (6-inch pipe diameter) and HC-080 (8-inch pipe diameter), or approved equivalent.

2.09 STAKED PIPE SUPPORTS AND ANCHORS

A. Stakes for pipe supports and anchors shall be galvanized carbon steel and shall be a minimum of 3 feet in length. The upper portion of the stakes shall contain appropriately-sized holes to allow for the connection and adjustment of angle braces and bolts. The hole spacing shall be at a minimum of 2 inches on-center.

B. Pipe clamps shall be galvanized carbon steel and as shown on the Plans.

C. Miscellaneous fittings (i.e., angle braces, bolts, nuts and washers) shall be zinc-coated carbon steel and conform to ASTM A 325.

2.10 METAL FRAME PIPE SUPPORTS

A. Metal frames for pipe supports shall be 1-5/8-inch hot-dipped galvanized carbon steel as manufactured by UNISTRUT® (Part No. P1000HS[HG]), or approved equivalent.

B. Pipe clamps shall be galvanized carbon steel and as shown on the Plans.

C. Miscellaneous fittings (i.e., angle braces, bolts, nuts and washers) shall be zinc-coated carbon steel and conform to ASTM A 325.

2.11 BLOCK PIPE SUPPORTS

A. Blocks for pipe supports shall be 8" x 8" x16" masonry blocks with a 2 x 8 redwood cap and #4 rebar stakes covered with rubber hose.

2.12 CORRUGATED METAL PIPE (CMP)

A. CMP for pipe supports or sleeves shall be of 16 gauge CMP continuous helical lock steel conforming to the requirements of Section 66-3 of the Standard Specifications. All CMP shall be galvanization compatible and conform to the requirements of Section 66-3.02 of the Standard Specifications for zinc coated steel.

2.13 CONCRETE

A. Concrete for metal frame pipe supports and block pipe supports shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.14 PIPE BEDDING

A. Pipe bedding for buried header crossings shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.15 ENGINEERED FILL

A. Engineered fill for buried header crossings and road crossings shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. The alignment and locations of the LFG collection system components will be staked by the Design Engineer prior to installation.

B. PVC and HDPE pipe, fittings, and valves shall be installed by skilled laborers experienced in installation of such materials.

C. All exposed PVC pipe and fittings shall be painted.

3.02 LFG COLLECTION SYSTEM PIPING

A. LFG collection system piping, including flexible couplings, isolation valves and condensate drop-out points, shall be installed as shown on the Plans.

B. All PVC pipe, fittings and valves shall be handled carefully in loading and unloading, and in such a manner as to avoid shock during placement. PVC pipe, fittings and valves shall not be dropped or dumped.

C. Prior to painting and installation, all PVC pipe, fittings and valves shall be inspected for cuts, scratches, or other damages. Pipe, fittings and valves with imperfections shall not be used.

D. Prior to installation, all PVC pipe and fittings to be left exposed shall be steam cleaned and allowed to dry, then painted with an undercoat coat of high-quality, water-based exterior latex primer, followed by a topcoat of high-quality, ultra-violet resistant, water-based exterior latex paint. The pipe shall be painted to within 6 inches of each end of the pipe section length. Light sanding may be necessary to achieve an acceptable bond. The paint shall be medium gray or white in color, or as specified by the City. Within 24 hours of cleaning, the first coat shall be applied followed by the second coat no more than 48 hours after the first coat has dried. The pipe joints shall be painted in this manner after installation.

E. PVC pipe, fittings and valves shall be joined with socket and solvent cement welding in accordance with ASTM D 2855. Joining of PVC pipe, fittings and valves shall be in accordance with these specifications and the pipe manufacturer's recommendations.

F. All PVC pipe cuts shall be square and perpendicular to the centerline of the pipe. In addition, PVC pipe ends shall be beveled prior to applying primer and solvent cement so that the primer or cement are not wiped off during insertion into the fitting socket.

G. All burrs, chips, etc. generated as a result of cutting operations shall be removed from the pipe interior and exterior. In addition, the inside of the piping shall be kept clean of dirt and debris. Piping left overnight shall be capped.

H. A coating of CPS primer as recommended by the PVC pipe supplier shall be applied to the entire interior surface of the fitting socket, and to an equivalent area on the exterior of the pipe prior to applying solvent cement.

I. The solvent cement shall comply with the requirements of ASTM D 2564 and shall be applied in strict accordance with manufacturer's specifications.

J. PVC pipe, fittings and valves shall not be primed or solvent welded when it is raining or when ambient temperature is below 40°F or above 100°F.

K. After solvent welding, the PVC pipe, fittings and valves shall remain undisturbed until cement has thoroughly set. As a guideline for joint setting time, use 1 hour for ambient temperatures 60°F to 100°F, or 2 hours when ambient temperature is 40°F to 60°F.

L. Flexible couplings shall be installed at the locations shown on the Plans. The flexible

couplings shall be installed per the pipe separation criteria specified in the Plans based on the ambient temperature at the time of installation. The stainless steel band clamps shall be secured around the ends of the flexible coupling in such a manner as to provide an air-tight joint.

M. Vacuum test ports shall be installed at the locations and orientations shown on the Plans. The ports shall be installed by drilling and tapping an appropriate sized hole in the LFG collection pipe to allow insertion of the threaded quick disconnect coupling. The ports shall be installed currently with the LFG collection pipe installation and near the end of pipe sections (but not within coupled joints) to facilitate the removal of PVC shavings introduced into the pipe by the drilling/tapping process.

N. Staked pipe supports shall be installed under the selected pipe segments as specified on the Plans. The staked pipe supports shall be spaced at 10 feet on-center along the full length of the pipe segments. The height of the pipe supports shall be adjusted as appropriate to ensure positive slope of LFG collection system piping. Stakes shall be driven no less than 12 inches and no more than 18 inches below final surface grades.

O. Staked pipe anchors shall be installed every 50 linear feet (minimum) of LFG collection system piping, as well as at the locations of all tee, elbow and wye fittings (both ends, but not on the fittings themselves) and at flexible couplings located on slopes as shown on the Plans. Pipe clamps shall be secured around the LFG header system pipe to ensure that the pipe does not move. Securing of the pipe clamps shall be done in such a manner as to not damage the pipe. No portion of the fittings and flexible couplings shall rest on the stake pipe anchors. Stakes shall be driven no less than 12 inches and no more than 18 inches below final surface grades.

P. Metal frame pipe supports shall be installed at selected road crossings and near the flare station at the locations shown on the Plans. Concrete for the pipe supports shall be batched and placed in accordance with the requirements of Section 03300 (Concrete) of these Technical Specifications. The height of cross-bar pipe supports shall be adjusted as appropriate to ensure positive slope of LFG collection system piping.

3.03 BURIED HEADER CROSSINGS

A. Trenching across bench sections shall be to the depth and dimensions shown on the Plans. *Do not excavate deeper than necessary to maintain adequate buffer above the underlying GCL.*

B. Pipe bedding material and LFG collection system piping shall be placed to the dimensions shown on the Plans. LFG collection system piping shall be sloped at a minimum of 3 percent to maintain proper condensate drainage capabilities.

C. The remainder of trench shall be backfilled with engineered fill in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications and as shown on the Plans.

3.04 ROAD CROSSINGS

A. CMP used for pipe support or protective sleeve shall be installed in the orientations shown on the Plans. When used as a pipe support, the CMP shall be aligned with the center line of the drainage swale.

B. A small section of reinforcement geotextile used in the access road construction shall be wrapped around the CMP protective sleeve where it will be in direct contact with the underlying CMP pipe support in order to provide a cushion between the two CMPs.

C. LFG collection system piping shall be inserted through the CMP protective sleeves in a manner that will not damage or compromise the LFG collection system piping.

D. Engineered fill shall be placed around and over the CMPs as shown on the Plans and in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

E. The final surface of the road crossing shall be completed in accordance with the requirements of Section 02310 (Access Roads) of these Technical Specifications and as shown on the Plans.

3.05 CONDENSATE DRAIN PIPE AND FITTINGS

A. The HDPE pipe and fitting manufacturer shall package products for shipment in a manner suitable for safe transport and shall be subsequently handled in accordance with the manufacturer's recommendations.

B. Prior to installation, all HDPE pipe and fittings shall be inspected for cuts, scratches, or other damages. Pipe and fittings with imperfections shall not be used.

C. Trench excavation and backfill for buried HDPE pipe and fittings shall be as shown on the Plans.

D. HDPE pipe connection ends and fittings shall be joined by butt fusion procedures in accordance with the HDPE pipe and fitting manufacturer's recommended procedures.

E. The Contractor shall not bend the HDPE pipe to a degree greater than the minimum radius recommended by the manufacturer.

F. The HDPE pipe shall not be subjected to strains that will overstress or buckle piping or impose excessive stress on joints.

G. Open ends of fused HDPE pipe shall be covered or capped at the end of each working day to prevent entry by animals or debris.

H. For segments completed above ground, provide sufficient slack to allow for thermal expansion and contraction so as to not promote excessive stress on the piping following installation.

I. For segments completed below ground, the Contractor shall allow for thermal expansion or contraction of the HDPE pipe within the trench and coordinate pipe backfill operations

to avoid buildup of thermal stresses. Whenever possible, segment tie-ins shall be completed within the trench to prevent overstressed conditions.

J. Following placement of HDPE pipe, sufficient time shall be allowed (per manufacturer's recommendations) for the pipe to adjust to trench temperature prior to testing, segment tie-ins, or backfilling activities.

3.06 CONDENSATE DROP-OUTS

A. Condensate drop-outs, including u-trap assemblies, shall be installed at the locations and to the dimensions shown on the Plans. *Do not excavate deeper than necessary to maintain adequate buffer above the underlying GCL.*

B. The transition from PVC to HDPE shall be at the flange connection as shown on the Plans.

C. PVC and HDPE pipe, fittings and valves shall be installed in accordance with Part 3.01 (LFG Collection System Piping) and Part 3.05 (Condensate Drain Pipe and Fittings) of this Section.

D. Staked pipe anchors shall be installed at various points on the u-trap piping as shown on the Plans to prevent movement associated with thermal expansion. Staked pipe anchors shall be installed per the instructions outlined in Part 3.01 (LFG Collection System Piping) of this Section.

E. Following construction of u-trap assemblies and prior to start of LFG collection system operations, the u-trap assemblies shall be filled with clean water.

3.07 CONDENSATE DISCHARGE POINTS

A. Condensate discharge points shall be installed at the locations and to the dimensions shown on the Plans.

B. Soil and/or refuse shall be excavated to expose the existing condensate drain. If refuse is encountered, the refuse shall be removed and disposed of in accordance with Section 02222 (Excavation) of these Technical Specifications.

C. When entering excavations to install branch saddles, miscellaneous piping and/or backfill materials, the Contractor's Health and Safety Plan shall be followed accordingly, including trench safety, LFG hazards and possible confined space entry (i.e., oxygen-deficient atmosphere).

D. PVC and HDPE pipe and fittings shall be installed in accordance with Part 3.01 (LFG Collection System Piping) and Part 3.04 (Condensate Drain Pipe and Fittings) of this Section.

E. For condensate discharge points located within the limits of the final cover system, the respective final cover system components shall be placed and installed in accordance with Sections 02240 (Foundation Layer), 02245 (Gas Relief Layer [GRL]), 02774 (Geosynthetic Clay Liner [GCL]), 02773 (Geonet Composite), and 02250 (Erosion-

Resistant Layer) of these Technical Specifications. Portions below the final cover system shall be backfilled as engineered fill in accordance with Section 02224 (Engineered Fill) of these Technical Specifications.

F. For condensate discharge points located outside the limits of the final cover system, the excavation shall be backfilled with engineered fill in accordance with Section 02224 (Engineered Fill) of these Technical Specifications.

3.08 PERFORMANCE TESTING

A. *PVC LFG Collection System Pipe:* After all PVC pipe and fittings have been joined, including flexible couplings, all connections shall be visually inspected to verify that the connections are securely intact. Tension on the stainless steel straps for the flexible couplings shall also be checked to ensure that the ends of the flexible couplings are adequately secured to the LFG collection system piping and that the tension within the flexible couplings is appropriate based on the given ambient temperature.

B. *HDPE Condensate Drain Pipe:* Before the HDPE condensate drain pipe is connected to the PVC piping system and existing leachate drain, each HDPE condensate drain pipe segment shall be tested and withstand a minimum of 5 psig vacuum for a period of not less than 10 minutes without any drop in pressure. Vacuum shall be measured by a mercury manometer, slope gauge, or an equivalent device calibrated to read increments of not greater than 0.1 psi. The source of the vacuum shall be isolated before the test is made. Testing shall be performed prior to backfilling segments of the HDPE condensate drain pipe that are to be buried. It shall be the Contractor's responsibility to ensure that proper safety precautions are observed during the testing.

C. *Condensate Discharge Points:* After the HDPE condensate drain pipe is connected to the leachate drain but prior to connecting it to PVC piping system, the functionality of each HDPE condensate drain pipe segment shall be tested to verify each segment's ability to transmit water to the existing leachate drain. Testing shall include introducing water at the uppermost point (i.e., highest elevation) of each segment and verifying the influx of water into the existing leachate drain utilizing the closest downgradient manhole as the point of observation.

PART 4 MEASUREMENT AND PAYMENT

4.01 LFG COLLECTION SYSTEM PIPING

A. PVC pipe and fittings for the LFG collection system piping shall be measured by the linear foot of each for each size of pipe installed and includes all fittings. Payment shall be included in the Contract Unit Price per linear foot installed for "PVC Pipe and Fittings" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the PVC pipe and fittings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

B. Isolation valves shall be measured by each isolation valve installed. Payment shall be included in the Contract Unit Price per each unit installed for "Isolation Valves" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the isolation valves as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

C. Flexible couplings shall be measured by each flexible coupling installed. Payment shall be included in the Contract Unit Price per each unit installed for "Flexible Couplings" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the flexible couplings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

D. Vacuum test ports shall be measured by each vacuum test port installed. Payment shall be included in the Contract Unit Price per each unit installed for "Vacuum Test Ports" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the vacuum test ports as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore

E. Staked and block pipe supports shall be measured by each staked or block type pipe support installed. Payment shall be included in the Contract Unit Price per each unit installed for "Staked Pipe Supports" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the stake pipe supports as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

F. Staked pipe anchors shall be measured by each staked pipe anchor installed. Payment shall be included in the Contract Unit Price per each unit installed for "Staked Pipe Anchors" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the stake pipe anchors as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

G. Metal frame pipe supports shall be measured by each metal frame pipe support installed and includes all fittings and concrete post footings. Payment shall be included in the Contract Unit Price per each unit installed for "Metal Frame Pipe Supports" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the metal frame pipe supports as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

H. Buried header crossings shall be measured by each buried header crossing (Type 1 or 2) installed and includes all trenching and backfill materials. *PVC pipe and fittings for the LFG collection system piping are not included in this payment as they are addressed separately.* Payment shall be included in the Contract Unit Prices per each unit installed for "Type 1 Buried Header Crossing" and "Type 2 Buried Header Crossing" addressed in this Section and shall include full compensation for providing all materials, labor,

equipment, tools, and incidentals required to install the buried header crossings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

I. Road crossings shall be measured by each road crossing (Type 1 or 2) installed and includes all trenching, CMP sleeves and supports, and backfill materials. *PVC pipe and fittings for the LFG collection system piping and reinforcement geotextile/aggregate base associated with the access road construction are not included in this payment as they are addressed separately.* Payment shall be included in the Contract Unit Prices per each unit installed for "Type 1 Road Crossing" and "Type 2 Road Crossing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the road crossings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 CONDENSATE DRAIN PIPING

A. HDPE pipe and fittings for the condensate drainage system piping shall be measured by the linear foot installed and includes all fittings. *HDPE pipe and fittings for the condensate drop-outs and condensate discharge points are not included in this payment as they are addressed separately* Payment shall be included in the Contract Unit Price per linear foot installed for "HDPE Pipe and Fittings" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the HDPE pipe and fittings as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 CONDENSATE DROP-OUTS

A. Condensate drop-outs, including u-trap assemblies, shall be measured by each condensate drop-out installed. Payment shall be included in the Contract Unit Price per each unit installed for "Condensate Drop-outs" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the condensate drop-outs as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 CONDENSATE DISCHARAGE POINTS

A. Condensate discharge points shall be measured by each condensate discharge point installed. Payment shall be included in the Contract Unit Price per each unit installed for "Condensate Discharge Points" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the condensate discharge points as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 PERFORMANCE TESTING

A. Measurement and payment for performance testing of the various LFG collection system components described in this Section shall be included in the Contract Unit Price paid for the various items of Work for which they are required. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15300
FLARE STATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall assemble all required flare station components and associated appurtenances and implement improvements as shown on the Plans and in accordance with these Technical Specifications, including: installation of a skid-mounted packaged combustion system; installation of condensate drainage line between the skid-mounted packaged combustion system and leachate wet well; completion of all electrical, telephone, and mechanical connections; installation of security fencing; and placement of aggregate base within and around the flare station area as shown on the Plans.

B. The Contractor shall furnish all labor, supervision, tools, materials, equipment, and incidentals necessary to assemble all required flare station components and associated appurtenances, including all required piping, fittings, and connections.

C. The Contractor shall not begin flare station assembly activities requiring hookup to the LFG collection system until performance testing of that system is completed in accordance with Section 15100 (Landfill Gas [LFG] Extraction Wells) and Section 15200 (LFG Collection System Components) of these Technical Specifications.

D. The Owner will be responsible for purchasing and arranging delivery of the skid-mounted packaged combustion system. Since the manufacturer of this unit will not be selected until December 2013 or January 2014, actual plans and specifications for these units are not currently available. The design plans, specifications, and installation instructions for the aforementioned system will be supplied to the Contractor a minimum of six (6) weeks prior to commencement of the scheduled LFG collection system installation activities. The Contractor shall be responsible for reviewing the design plans, specifications, and installation instructions in a timely manner and furnishing all necessary materials required to complete the Work in accordance with the approved Construction Schedule.

E. The Contractor shall be responsible for mechanical and electrical assembly and connections of the skid-mounted packaged combustion system. As noted above, actual plans and specifications for these units are not currently available. Based on these circumstances, an assumed scope of work has been developed based on the Design Engineer's experience on similar projects. Whereas the assumed scope of work presented herein is considered representative of what the assembly will entail, the actual work scope is subject to minor revisions based on requirements specified by the selected flare manufacturer.

F. Assembly of the skid-mounted packaged combustion system will require use of a 5 ton crane. The crane will also be required for unloading the skid-mounted packaged combustion system upon its delivery to the Work site. The Contractor shall be responsible for furnishing and operating the crane to implement these tasks. The Design Engineer or Owner will coordinate the delivery schedule of the skid-mounted packaged

combustion system with the Contractor.

G. A representative of the manufacturer of the skid-mounted packaged combustion system will be present during start-up and troubleshooting of the system. Written approval of the system installation and operation by the manufacturer will be required prior to Owner's acceptance of the flare station components. The Owner will pay for the manufacturer's inspection services under the provisions and requirements of this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans*. California Department of Transportation, 2010.

C. *American Society for Testing and Materials.* Current Edition.

D. American Institute of Steel Construction (AISC).

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

1.04 SUBMITTALS

A. At least 14 calendar days prior to commencement of flare station assembly, the Contractor shall submit to the Design Engineer copies of any building permits (if required) issued by the local governing agency.

B. Within 14 calendar days of completion of flare station assembly, the Contractor shall submit to the Design Engineer copies of any building inspection reports (if required) issued by the local governing agency.

C. At least 14 calendar days prior to conducting performance testing, the Contractor shall submit proposed procedures for the following to the Design Engineer for approval:
   1. Skid-mounted packaged combustion system operation.
   2. Hydrostatic pressure test of PVC condensate discharge pipe.

D. Within 14 calendar days of completion of performance testing for the respective components, the Contractor shall submit to the Design Engineer test results for the following system components:
   1. Skid-mounted packaged combustion system.
   2. PVC condensate discharge pipe.

1.05 QUALITY ASSURANCE

A. Testing and Observation
   1. Testing and observation of the flare station components shall be conducted in accordance with the CQA Plan.

2. The Contractor shall cooperate with the CQA Monitor during observation and testing.
3. If any portion(s) of the flare station components is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall fix that portion(s) to meet the requirements of this Section as directed by the Design Engineer.
4. Abraded and otherwise damaged portions of shop-applied paint shall be cleaned and repainted per the flare manufacturer's recommendations. Welded seams and and other un-coated surfaces, heads and nuts of field-installed bolts, and surface where paint was damaged during installation shall be given a coat of specified primer, followed by top coat paint once the primer has completely dried.

PART 2 PRODUCTS

2.01 SKID-MOUNTED PACKAGED COMBUSTION SYSTEM

A. The skid-mounted packaged combustion system will be furnished by the Owner. In general, the system will be comprised of the following primary equipment components:
1. *Primary Skid Assembly* (AISC designed) housed on a galvanized structural steel skid. This skid will be installed on the eastern flare station concrete pad as shown on the Plans. Primary equipment components mounted to the skid include:
   a. Gas-liquid separator.
   b. Two (2) centrifugal blowers equipped with TEFC electric motors and variable frequency drive.
   c. 4-inch to 8-inch diameter LFG process piping (stainless steel or HDPE) equipped within an automatic block valve.
   d. Control station assembly that includes a self-supporting steel rack with a weather-proof control panel, main power supply disconnect, power transformer, and pilot gas control system.
2. *Totally-Enclosed Vertical Ground Flare* constructed of A-36 carbon steel. The flare will be installed on the western flare station concrete pad as shown on the Plans. The flare stack diameter will be 4 to 5 feet (estimated) with an overall height of approximately 25 feet (estimated). Primary equipment components mounted to the skid include:
   a. One (1) or two (2) combustion air dampers.
   b. Self-checking ultra-violet flame scanner.
   c. Purge air blower.
   d. Thermocouples.
3. *Miscellaneous Appurtenances* including a flow meter, inlet flame arrestor, continuous chart recorder, and an automatic telephone dialer system.
4. All piping, conduit and manual valves are pre-piped/pre-wired to the greatest extent possible and are mounted within the skid boundaries.

2.02 ELECTRICAL CONDUIT, WIRE AND FITTINGS

A. Electrical conduit, wire, and fittings for the flare station shall conform to the requirements of Section 15400 (Flare Station Electrical and Telephone Feed) of these Technical Specifications.

2.03 PVC PIPE, FITTINGS AND BALL VALVE

A. PVC pipe, fittings and ball valve for the condensate drainage line between the skid-mounted packaged combustion system and leachate wet well shall conform to the requirements of Section 15200 (LFG Collection System Components) of these Technical Specifications.

2.04 PIPE BEDDING

A. Pipe bedding for the buried portion of the condensate drainage line shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.05 ENGINEERED FILL

A. Engineered fill for the buried portion of the condensate drainage line shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

2.06 CHAIN LINK FENCE

A. Chain link fence materials for the security fence shall conform to the requirements of Section 80-4.01 of the Standard Specifications and as shown on the Plans.

2.07 CONCRETE

A. Concrete for the security fence post footings shall conform to the requirements of Section 03300 (Concrete) of these Technical Specifications.

2.08 AGGREGATE BASE

A. Aggregate base placed on the completed ground surface within and around the flare station shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

PART 3 EXECUTION

3.01 FLARE STATION ASSEMBLY

A. All required building permits, fees, and inspections shall be arranged and paid for by the Contractor.

B. Assembly of the flare components shall be performed by skilled laborers experienced in installation of similar equipment.

C. The skid-mounted packaged combustion system shall be installed in strict accordance with the manufacturer's specifications. Design drawings and installation instructions will be provided to the Contractor upon selection of the flare manufacturer. In general, installation of the skid-mounted packaged combustion system will include the following tasks:

1. *Mechanical Assembly*

a. Mount/anchor the primary skid assembly and totally-enclosed vertical ground flare to the concrete slabs.
b. Connect inlet flame arrestor to the totally-enclosed vertical ground flare.
c. Connect LFG process piping from the primary skid assembly to the flame arrestor.
d. Mount thermocouples (three or four) onto the totally-enclosed vertical ground flare (elevated).
e. Connect the LFG collection system header pipe from the wellfield to the primary skid assembly.

2. *Electrical Assembly*
   a. Connect main power supply, telephone line, and conduit to the control station assembly.
   b. Connect thermocouple wire and conduit between the thermocouples (elevated) and the control station assembly.

D. Abraded and otherwise damaged

3.02 CONDENSATE DRAINAGE LINE

A. Trenching and pipe bedding placement shall conform to the requirements of Section 02225 (Trenching and Backfilling) of these Technical Specifications.

B. Handling and installation of the PVC pipe, fittings and ball valve shall conform to the requirements of Section 15300 (LFG Collection System Components) of these Technical Specifications.

C. The condensate drainage line shall be installed at a minimum slope of 1 percent in the direction of the leachate wet well.

D. The wall of the leachate wet well shall be penetrated at the appropriate depth by coring or other means to allow for insertion of the condensate drainage line. The annular space between the condensate drainage line and the wall of the leachate wet well shall be sealed using non-shrink grout.

E. Following placement of pipe bedding material, the remainder of the trench shall be backfilled with engineered fill in accordance with the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

3.03 SECURITY FENCE

A. The chain link fence and gates shall be installed as shown on the Plans and in accordance with the requirements of Section 80-4.02 of the Standard Specifications.

B. All line, corner, and gate post assemblies shall be constructed with concrete post footings in accordance with the requirements of Section 03300 (Concrete) of these Technical Specifications.

C. Soil between fence posts shall be leveled to create a 2-inch clearance under the fence fabric.

3.04 FLARE STATION AGGREGATE BASE

A. Aggregate base within and around the flare station shall be placed to the dimensions shown on the Plans.

B. The aggregate base shall be spread in uniform loose lifts not exceeding 8 inches in thickness.

C. The aggregate base shall be moisture conditioned to within 1 to 3 percentage points of optimum moisture content, and compacted to a minimum of 95 percent of maximum dry density per ASTM D 1557. The final compacted thickness shall be a minimum of 6 inches.

3.05 PERFORMANCE TESTING

A. *Skid-Mounted Packaged Combustion System:* The skid-mounted packaged combustion system shall be tested to verify proper operation in accordance with the manufacturer's recommendations. Performance testing shall be supervised by the flare manufacturer's on-site inspector and shall encompass all aspects of system operations, including but not limited to the verification of proper operation of the following components:

1. Gas-liquid separator.
2. Blowers.
3. Automatic ignition and pilot gas control system.
4. Automatic temperature controls, including thermocouples and actuated louver assembly.
5. Automatic block valve operation.
6. Flow meter and continuous chart recorder.
7. Control panel gauges and indicator lighter.
8. Safety shut-down and alarm systems, including automatic telephone dialer system.

Written approval from the flare manufacturer's representative for the system installation and operation will be required prior to the Owner's acceptance of the flare station components. The written approval shall certify that the equipment was properly installed and connected, is in accurate alignment, and is free of undue stress imposed by piping or mounting bolts. The performance testing and acquisition of the manufacturer's approval shall be done within a 3-day work period.

During performance testing of the flare station, the entire LFG collection system well field shall be visually inspected to identify any problems or breaks in the system that may have resulted from system operations.

B. *Condensate Drainage Line:* The PVC condensate drainage line between the flare station and existing leachate wet well shall be hydrostatically pressure tested in accordance with the pipe manufacturer's recommended procedures. It shall be the Contractor's responsibility to ensure that proper safety precautions are observed during the testing.

PART 4 MEASUREMENT AND PAYMENT

4.01 FLARE STATION ASSEMBLY

A. Measurement and payment for flare station assembly shall be included in the Contract Lump Sum Price for "Flare Station Assembly" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, general electrical work, and incidentals required to assemble the flare station as shown on the Plans, as specified herein and within the flare manufacturer's specifications, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 CONDENSATE DRAINAGE LINE

A. Measurement and payment for the condensate drain line shall be included in the Contract Lump Sum Price above for "Flare Station Assembly" of this Section. No additional compensation will be allowed therefore.

4.03 SECURITY FENCE

A. Security fencing for the flare station shall be measured by the linear foot installed and includes all posts, chain link fence fabric, gates, slats and fittings. Payment shall be included in the Contract Unit Price per linear foot installed for "Security Fencing" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the security fence as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 FLARE STATION AGGREGATE BASE

A. Aggregate base placed within and around the flare station shall be measured by the square foot installed. Payment shall be included in the Contract Unit Price per square foot installed for "Flare Station Aggregate Base" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the aggregate base as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.05 PERFORMANCE TESTING

A. Measurement and payment for performance testing of the skid-mounted packaged combustion system and condensate discharge pipe described in this Section shall be included in the Contract Lump Sum Price paid for "Flare Station Assembly". No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15400
FLARE STATION ELECTRICAL AND TELEPHONE FEED

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install the electrical and telephone feed for the flare station as shown on the Plans and in accordance with these Technical Specifications, which includes extending electrical and telephone services from the existing service point locations to the flare station control panel. The Contractor shall furnish all labor, tools, supervision, equipment, and materials necessary to provide the flare station electrical and telephone feed.

B. The Owner will be responsible for upgrading the power supply at the existing electrical service point shown on the Plans to accommodate the following power requirements for the flare station: 480 volts, 3 phase, 60 hertz, 100 amps, and 35 HP. In addition, the Owner will be responsible for extending telephone service to the service point shown on the Plans.

1.02 APPLICABLE STANDARDS AND SPECIFICATIONS

A. California Administrative Code (CAC) - Title 24.

B. County Ordinances.

C. National Electrical Code (NEC).

D. National Electrical Manufacturer's Association (NEMA).

E. National Fire Protection Association (NFPA).

F. Underwriters Laboratory Inc. (UL).

1.03 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall submit the following to the Design Engineer for approval:

1. Name and location of source, product data sheets, and manufacturer's installation instructions for the following materials to verify that the materials meet or exceed the product requirements specified herein:
   a. Wire.
   b. Conduit and fittings.
   c. Meter socket.
   d. Pull boxes.
   e. Panel.
   f. Junction and outlet boxes.

B. At least 14 calendar days prior to commencement of a specific task, the Contractor shall submit to the Design Engineer copies of electrical permits (if required) issued by the local governing agency.

C. Within 14 calendar days of completion of all electrical work, the Contractor shall submit to the Design Engineer copies of electrical inspection reports (if required) issued by the local governing agency.

1.04 QUALITY ASSURANCE

A. Testing and Observation
1. The Contractor shall notify the Design Engineer of progress of all Work in order that the Design Engineer may make the appropriate site inspections.
2. The Contractor shall cooperate with the Design Engineer during testing and observation.
3. If any portion(s) of the electrical components is determined by the Design Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall repair or replace that portion(s) to meet the requirements of this Section as directed by the Design Engineer.

1.05 HAZARDOUS CLASSIFICATION

A. All underground electrical installed shall be classified as Class 1, Division 2. Above ground electrical work from the ground surface to within 18 inches above the ground surface shall be classified as Class 1, Division 2.

PART 2 PRODUCTS

2.01 GENEAL

A. All electrical materials shall be new, meet UL requirements, and bear appropriate UL labels.

2.02 WIRE

A. Wire shall be NEC standard copper wire and shall bear UL and manufacturer's labels. Wire shall provide proper connection and operation of all equipment. Requirements for connection of the respective electrical components are as follows:
1. *Main Power Supply:* Copper AWG No. 2, THW (four [4] wires total).
2. *Automatic Telephone Dialer System:* Standard telephone line (one [1] wire total).

2.03 CONDUIT AND FITTINGS

A. All exposed conduit and fittings shall be rigid PVC type, Schedule 80. All buried conduit and fittings shall be rigid PVC type, Schedule 40. Conduit size requirements for the respective electrical components are as follows:
1. *Main Power Supply:* 1-1/4 inch conduit.
2. *Automatic Telephone Dialer System:* ½ inch conduit.

2.04 METER SOCKET

A. Meter socket for main power supply shall be NEMA 3R, raintight-outdoor, UL listed, with drip shield top that requires no gasketing. Size of meter socket shall accommodate power service requirements.

2.05 JUNCTION AND OUTLET BOXES

A. Junction and outlet boxes shall be NEMA 4 galvanized metal type, cast iron, or malleable iron with proper cover and/or mounting lugs as required.

2.06 WARNING TAPE

A. Direct burial warning tape reading "CAUTION, ELECTRICAL LINE BURIED BELOW", 4 mil polyethylene with foil laminate shall be installed in all underground electrical installations. Panduit, Motivator 3M, or approved equivalent.

2.07 PIPE BEDDING

A. Pipe bedding for conduit shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.08 ENGINEERED FILL

A. Engineered fill for backfill above the pipe bedding shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. All required electrical permits, fees, and inspections shall be arranged and paid for by the Contractor.

B. The Contractor shall furnish, install, and maintain all temporary power and lighting systems needed for construction. After construction is completed, the Contractor shall remove all temporary power equipment and devices.

C. All electrical work shall be conducted by skilled electricians and laborers experienced in this type of work. All equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 and the NEC.

D. The Contractor shall verify that the wire and conduit sizes specified herein for the main power supply and automatic telephone dialer system are appropriate for the intended use.

E. The Contractor shall install all electrical components in accordance with the NEC, NFPA and local codes and regulations for installation in a Class 1, Division 1 or Class 1, Division 2 classified locations as defined in Part 1.05 of this Section and shown on the Plans. Nothing on the Plans or in these Technical Specifications is to be construed to permit work not conforming to these governing codes and standards.

F. Installation of electrical and telephone feed shall be performed in accordance with the local electrical and telephone company rules and regulations.

G. The electrical and telephone feed from the existing service points to the flare station control panel shall be completed below grade as shown on the Plans.

H. The Contractor shall verify service and panel locations and all other service requirements prior to starting Work. Except for Work specifically excluded from the Contract, the Contractor shall provide all Work required by the serving utility companies to render utility services to the Project.

3.02 PREPARATION

A. The Contractor shall handle electrical materials carefully during loading and unloading. All means necessary shall be used to protect electrical materials before, during and after installation and to protect the installed work of other trades. In the event of damage, provisions shall be made to immediately make repairs and replacement necessary to the approval of the Design Engineer.

B. The Contractor shall inspect materials for damage and imperfections prior to installation. Damaged materials or materials with imperfections shall not be used.

3.03 TRENCHING AND BACKFILLING

A. Trenching and placement of pipe bedding and engineered fill shall conform to the requirements of Section 02224 (Engineered Fill) and Section 02225 (Trenching and Backfilling) of these Technical Specifications.

3.04 INSTALLATION

A. All equipment, motors, conduit and outlets, as applicable, shall be permanently and effectively grounded in accordance with NEC, CAC - Title 24 and local codes.

B. Conduits shall be sloped towards pull boxes. Conduits shall run in straight lines except where a change in direction is necessary. Couplings shall be staggered for maximum duct line strength.

C. Buried conduit and fittings shall not be dropped or dumped into trenches and the ends of conduit shall be kept closed with approved conduit seals during construction. Immediately prior to pulling wire or cable, a swab shall be drawn through all conduits to force out water and foreign materials.

D. Junction boxes shall be installed in an accessible location as required for splicing, connections and pulling of wire.

E. All above ground conduit shall be properly secured on pipe supports or concrete slabs.

F. The meter socket installed at the existing service pole shall comply with the height and fastening specifications outlined in the local electric company rules and regulations.

3.05 CLEAN-UP

A. All exposed portions of electrical installation shall be thoroughly cleaned, including the removal of all traces of soil, labels, grease, oil, and other foreign matter. Only cleaners recommended by the manufacturer shall be used.

PART 4 MEASUREMENT AND PAYMENT

4.01 ELECTRICAL AND TELEPHONE FEED

A. The electrical and telephone feed shall be measured by the linear foot installed, including trench excavation and backfill. Payment shall be included in the Contract Unit Price per linear foot installed for "Electrical and Telephone Feed" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the electrical and telephone feed as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 GENERAL ELECTRICAL WORK

A. Measurement and payment for general electrical work associated with assembly of the flare station shall be included in the Contract Lump Sum Price for "Flare Station Assembly" addressed in Section 15300 (Flare Station) of these Technical Specifications. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 15500
LEACHATE OVERFLOW COLLECTION AND STORAGE SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, transport to the Work site, and install all leachate overflow collection and storage system components, including a 10,000 gallon double wall fiberglass reinforced leachate UST, tank accessories, field testing, collection system piping and accessories, and lining of the existing sediment chamber and leachate wet well in accordance with this Section and at the locations and to the dimensions shown on the Plans. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to install the leachate overflow collection and storage system.

B. The existing sediment chamber is a concrete manhole structure, approximately nine feet deep (base to top of manhole); four feet in diameter with a 30" high riser cone (48" to 24" in diameter). The existing wet well is approximately 18 feet deep and five feet in diameter and contains two submersible pumps.

C. The Contractor accepts full responsibility for proper handling and installation of the leachate UST and shall insure that good workmanship, practices, and construction procedures are followed during the handling and installation of the leachate UST, regardless of the inclusion or omission of any applicable suggestion in this Section.

1.02 REFERENCES

A. *Caltrans Standard Specifications.* California Department of Transportation, 2010.

B. *Caltrans Standard Plans.* California Department of Transportation, May 2010.

C. *American Society for Testing Materials.* Current Edition.

D. *Occupational Safety and Health Agency (OSHA) Construction Standards.* Current Edition.

E. American National Standards Institute (ANSI).

F. American Water Works Association (AWWA).

1.03 APPLICATBLE STANDARDS AND SPECIFICATIONS

A.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
B.	ASTM D 143	Standard Test Method for Slump of Portland Cement Concrete.
C.	ASTM D 3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC)

Sewer Pipe and Fittings.

D. ASTM D 4414 Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages.

E. ASTM F 477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

F. UL Standard for Safety 1316.

1.04 SUBMITTALS

A. At least 14 calendar days prior to delivery of materials to the Work site, the Contractor shall provide three (3) copies of the following information to the Design Engineer for approval:
   1. Manufacturer's product data sheets for the following materials to verify that the materials meet or exceed the corresponding product requirements:
      a. Leachate UST, fittings, and accessories.
      b. Collection piping and fittings.
      c. Concrete junction boxes and accessories.
   2. Manufacturer's recommended procedures for handling (transporting, unloading, storage, etc.) and installation of each of the products identified in Subsection 1.04(A)(1) of this Part.

B. Field Test Reports: Tank tightness test at delivery and after installation.

C. At least 14 calendar days prior to commencement of lining the leachate sediment chamber and wet well, the Contractor shall submit the following to the Design Engineer for approval:
   1. Procedures for removal and re-installation of the existing pumps within the leachate wet well.
   2. Name, location and experience of Subcontractor responsible for installation of lining product. Subcontractor shall have sufficient prior experience in the installation of the lining product.
   3. Manufacturer's recommended application procedures for lining product.
   4. Product data and chemical resistance data.

1.05 TRANSPORT AND STORAGE

A. Unloading and storage of the leachate UST and collection piping at the Work site shall be the responsibility of the Contractor and shall be performed in accordance with the manufacturer's recommended procedures.

1.06 QUALITY ASSURANCE

A. Governing Standards, as applicable:
   1. Manufacturer of the leachate overflow storage tank shall be in the business of manufacturing tanks with materials conforming to the requirements of ANSI/AWWA D120-02 Thermosetting Fiberglass-Reinforced Plastic Tanks.
   2. Tank manufacturer shall be in the business of manufacturing tanks to UL 1316 standards.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

A. Pipe for gravity drain lines shall be PVC per AWWA C-900, with integral wall, bell and spigot joints. Pipe and fitting shall meet wall and strength minimum of SDR 26, and the requirements of ASTM D 3034. Joints shall be equipped with rubber rings. The bell shall consist of an integral wall section with a solid cross section rubber ring factory assembled, securely locked in place to prevent displacement. Rubber rings shall meet the requirements of ASTM F 477. All fittings and accessories shall be manufactured and furnished by the pipe supplier and have bell and/or space configurations identical to that of the pipe.

2.02 PIPE ACCESSORIES

A. All fittings and accessories shall be manufactured and furnished by pipe supplier of same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.03 PIPE BEDDING

A. Pipe bedding shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.04 CONCRETE JUNCTION BOXES

A. Concrete junction boxes for the leachate collection piping shall be as shown on the Plans. Concrete boxes shall be manufactured of cast in place concrete or prefabricated reinforced concrete or approved steel equivalent to the dimensions set forth in the Plans.

B. Concrete for the junction boxes shall be a 6 sack Portland cement Type II mix and must meet the requirements of a maximum slump of 4 inches and a minimum 28-day compressive strength of 2,500 psi when tested in accordance with ASTM C 143 and ASTM C 39, respectively.

2.05 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Lining material for the existing sediment chamber and wet well shall be a solids epoxy resin based coating formulated for use in chemically aggressive sewer systems. It is the intent that this material shall provide waterproofing, sealing, st4ructural reinforcement, and corrosion protection of the existing sediment chamber and wet well.

B. The coating material shall be resistant to attack from the following: volatile organic compounds; bleaches; sulfuric, acetic, hydrochloric, phosphoric, nitric, chromic, oleic, and stearic acids; sodium and calcium hydroxides; ammonium, sodium, calcium, magnesium, and ferric chlorides; ferric sulfate, hydrogen sulfides, petroleum oil and greases, vegetable and animal oils, fats, greases, soaps and detergents. The coating shall be impermeable to sewage gases and liquid and shall be non-conducive to bacterial or fungus growth.

2.06 LEACHATE UST

A. Design Criteria
   1. *Internal Load:* Tank shall withstand a 5 psig air pressure test with 5:1 safety factor. Contractor shall individually test tank for leakage prior to installation. Maximum test pressure is 5-psi.
   2. *Vacuum Test:* To verify structural integrity, tank shall be vacuum tested by the manufacturer at the factory to 11.5 inches of mercury.
   3. *Surface Load:* Tank shall withstand surface H-20 axle loads when properly installed according to current manufacturer's installation instructions.
   4. *External Hydrostatic Pressure:* Tank shall be capable of being buried in ground with 7 feet of overburden over the top of the tank, the hole fully flooded, and a safety factor of 5:1 against general buckling.
   5. Tank shall support accessory equipment such as drop tubes when installed according to tank manufacturer's recommendations and limitations.

B. Tank shall be double wall, horizontal glass fiber reinforced tank manufactured with 100 percent resin and glass-fiber reinforcement. No sand fibers. Capacity shall be as indicated on Plans.

C. Product Storage:
   1. Tank shall be capable of storing chemicals or leachate with specific gravity up to 1.1.
   2. Tank shall be vented to atmospheric pressure.
   3. Tanks shall be capable of storing products identified in the manufacturer's current standard limited warranty.

D. Interstitial Space: Double wall tank shall have a space between the walls to allow for the free flow and containment of leaked material from the primary tank. The space also allows the insertion of a monitoring device through a monitoring fitting.

2.07 TANK ACCESSORIES

A. Manway: Flanged 22-inch (minimum) inside diameter manway with UL listed gasket, bolt and cover.

B. NPT Fittings: NPT fittings shall be sized and located as indicated on Plans. Fittings shall be UL listed. All fittings are to be 4 inches in diameter and supplied with plugs. NPT fittings shall withstand a minimum of 150 foot-pounds of torque and 1,000 foot-pounds of bending, both with a 2:1 safety factor. The monitor fitting shall consist of a 4-inch NPT fitting on the tank.

C. Striker plates shall be installed under each service fitting and manway opening.

D. Float Switch and Alarm Panel: One (1) mechanical float switch shall be provided and set at bottom of tank to detect presence of any liquid. The float switch shall be approved for use with intrinsically safe, Class I, Division 1 applications and shall be connected to an alarm panel located at pump station structure, warning lights only. The alarm shall also be connected to an existing auto-dialer.

E. A 2-inch diameter PVC vent pipe shall be installed from tank to the surface with a goose-neck and screen.

F. Anchor Straps: Anchor straps shall be of glass fiber reinforced type and located per manufacturer's recommendations. Each strap shall be capable of withstanding the maximum buoyance force of the tank assuming the tank empty and submerged in groundwater. Number and location of straps shall be per manufacturer's recommendations.

G. Concrete Deadman: Two concrete deadman, 12" x 12" x the tank length, shall be installed at the bottom of the tank excavation as shown on the Plans.

2.08 TANK BEDDING AND BACKFILL

A. Tank bedding and backfill shall conform to the requirements of Section 02207 (Aggregate Materials) of these Technical Specifications.

2.09 ENGINEERED FILL

A. Backfill material above the pipe bedding and tank bedding shall conform to the requirements of Section 02224 (Engineered Fill) of these Technical Specifications.

PART 3 EXECUTION

3.01 BRACING AND SHORING

A. As required by the Trench Construction Safety Orders of the California Construction Safety Orders of the Division of Occupational Safety and Health, bracing and shoring shall be installed in trenches or excavations of 5 feet or greater depth to insure the safety of workers and to protect and facilitate the Work.

B. Bracing and shoring shall comply with Section 5-1.02A and 7-1.01E of the Standard Specifications.

3.02 GENERAL PIPE INSTALLATION

A. Contractor shall verify location of point of connection (POC) at the existing leachate collection piping as shown the Plans by potholing to determine the location and depth (elevation).

B. For the gravity drain pipe, the trench subgrade shall provide uniform support at a uniform slope along full length of pipe.

C. Contractor shall furnish all necessary fittings, fixtures, hardware, plates, fasteners, etc. to provide complete installation.

D. Location of pipes, fixtures, fittings, and drains that are shown on the Plans are approximate. The Contractor shall locate fittings and drains to best serve the intended use and to avoid mechanical and structural interferences. Location of valves, drains, and fittings must be approved by the Design Engineer prior to installation.

E. All installations shall be secure and watertight.

3.03 PIPE INSTALLATION

A. Excavation of pipe trenches shall be in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

B. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

C. Pipe, fittings, and accessories shall be installed in accordance with manufacturer's instructions. Sealed joints shall be watertight.

D. Pipe shall be placed to the lines and grades as shown on the Plans.

E. The pipe shall be laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe.

F. The horizontal alignment of the pipe shall be laid such that any point shall not vary more than 0.10 feet from the design alignment established and shown on the Plans.

G. Pipe bedding material shall be placed at sides and over top of pipe in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans.

H. Trench backfill above the pipe bedding shall be in accordance with Section 02225 (Trenching and Backfilling) of these Technical Specifications and as shown on the Plans. Pipe shall not be displaced or damaged when compacting.

3.04 CONCRETE JUNCTION BOXES

A. Excavation for concrete junction boxes shall be in accordance with Section 02222 (Excavation) of these Technical Specifications and as shown on the Plans.

B. Concrete junction boxes shall be installed in accordance with manufacturer's instructions. Placement of the concrete junction boxes into the excavation shall be performed in a manner that will not induce damage or compromise future stability.

C. Backfill for concrete structures shall conform to the provisions in Section 19-3 of the Standard Specifications.

3.05 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Sequencing of this task shall be after installation of the condensate discharge line from the flare station to the leachate wet well in order to ensure that the new penetration is properly sealed by the lining application.

B. The Contractor's Health and Safety Plan shall be followed accordingly, including LFG

hazards and possible confined space entry (i.e., oxygen-deficient atmosphere), for all phases of Work.

C. Prior to start of Work, provisions shall be made to divert leachate from the existing leachate drain from discharging into the leachate sediment chamber. The leachate may be diverted to the new leachate UST (if already installed) or collected in a temporary holding tank of sufficient size.

D. Once discharge into the leachate sediment chamber has been diverted, all leachate shall be pumped from the leachate sediment chamber and wet well. The pumped leachate may be discharged to the existing leachate AST, new leachate UST (if already installed), or temporary holding tank.

E. If sediment is present at the base of the leachate sediment chamber and/or wet well, provisions shall be made to remove all sediment. Removed sediment may be disposed of with refuse excavated from other site activities, or transported separately and disposed of at a permitted transfer station or solid waste disposal facility.

F. Existing pumps and any other equipment/features that may inhibit application product shall be removed and stored in a dry and secure location.

G. The interior walls and base shall be cleaned to remove all dirt, dust, corrosion products, loose concrete, debris, grease, oils, growths, and foreign matter and residues. Residual generated by the cleaning operations shall be removed and managed in the same manner as described previously for leachate and sediment.

H. Sufficient time shall be provided to allow the surfaces of the interior walls and base to dry. Drying time may be expedited by mechanical means. Coatings shall be applied only to a sound clean surface profile consistent with the manufacturer's published recommendation.

I. Cracks, joints, eroded and damaged areas shall be sealed with a compatible grout/mortar as recommended by the coating manufacturer prior to application of the coating material.

J. Coating material shall be applied in a manner and thickness consistent with the manufacturer's published recommendation. Coatings shall be applied in a manner consistent with all applicable environmental and health and safety regulations. At a minimum, during application, the applicators shall use protective clothing, eye protection, chemical resistant gloves, and air respirators. Coating shall be applied to provide full and sufficient coverage of all interior walls and base and shall be free of blisters, pinholes, holidays, or discontinuities. Application shall be performed in strict accordance with recommended manufacturer's procedures.

K. Pumps and any other equipment/features that were removed shall be re-installed and normal operation of the leachate sediment chamber/wet well restored per pre-existing conditions.

3.06 TANK HANDLING

A. Contractor Acceptance Inspection: The Contractor is responsible for damage in shipment according to the checklist included in the tank shipment. Any discrepancies should be

reported to the Design Engineer.

B. The tank shall not be dropped, rolled or impacted. The tank shall be set on smooth ground, free of rocks and foreign objects, and chock tanks to prevent movement.

3.07 TANK INSTALLATION

A. The tank excavation shall be large enough to provide:
   1. 2 feet of clearance between the tank sides and ends and the excavation walls in stable soil.
   2. 12 inches of bedding under the tank.

B. Excavation for the tank shall be in accordance with Section 02222 (Excavation) of these Technical Specifications and as shown on the Plans. Contractor shall slope or shore sides of tank hole excavation as required to comply with the requirements of "OSHA Construction Standards".

C. The tank and all related piping and accessories shall be installed as per manufacturer's printed instructions.

D. Tank backfill shall be as follows:
   1. Tank bedding material shall be evenly placed over bottom of the excavation to attain a minimum thickness of 12 inches.
   2. A 12-inch lift of tank backfill shall initially be placed evenly around the tank. Care shall be taken to push backfill material completely beneath tank bottom and under end caps to provide necessary tank support, without voids.
   3. A second 12-inch lift of tank backfill shall be placed evenly around the tank using the same procedures described above.
   4. After completion of the second lift, tank backfill can be brought to the top of the tank without additional handwork.
   5. The tank shall never be left on the bed without tank backfill to the top of tank if there is any chance of more than 12 inches of water in the hole.
   6. Once tank backfill material has been placed completely over the tank to the depth shown on the Plans, backfill the remainder of the tank excavation with engineered fill in accordance with Section 02224 (Engineered Fill) of these Technical Specifications.

3.08 PERFORMANCE TESTING

A. UST Air Test:
   1. Prior to setting the tank, the Contractor shall perform an aerostatic leakage test in the presence of the Design Engineer.
   2. Pressurizing the relatively small annular space between two (2) tank shells can occur very quickly. A pressure of over 5 psi may cause damage to the tank structure which may not be immediately apparent. For all such tests, an air gauge with maximum ½ psi increments shall be used.
   3. The Contractor shall provide a valve and manifold arrangement with two (2) air gauges to perform tests.
   4. Testing shall be in accordance with the tank manufacturer's instructions.

5. While tank is under pressure, the entire tank, including fittings, should be wetted with a soapy solution to inspect for minor leaks which otherwise might not be evident.

B. Leachate Sediment Chamber/Wet Well:
   1. Visual inspection to verify a leak-free, uniform appearance.
   2. The applied wet film thickness shall be verified per ASTM D 4414, Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages.
   3. The leachate sediment chamber and wet well shall be operated after the lining application and re-assembly of the pumps and other equipment/features to verify that the system is operating in accordance with pre-existing conditions.

C. If tests indicate Work does not meet specified requirements, all Work shall be removed, replaced and retested at no cost to the City.

PART 4 MEASUREMENT AND PAYMENT

4.01 LEACHATE COLLECTION PIPING

A. Leachate collection system piping shall be measured by the linear foot of collection piping installed and includes all piping, fittings, trenching, and backfilling. Payment shall be included in the Contract Unit Price per linear foot installed for the various sizes and types of "Leachate Collection Piping" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the leachate collection piping as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.02 CONCRETE JUNCTION BOXES

A. Concrete junction boxes for the leachate collection piping shall be measured by each box installed and include all trenching, backfill, concrete, and cover. Payment shall be included in the Contract Unit Price per each unit installed for "Concrete Junction Boxes" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to install the concrete junction boxes as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.03 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

A. Measurement and payment for lining of the leachate sediment chamber/wet well shall be included in the Contract Lump Sum Price for "Leachate Sediment Chamber/Wet Well Lining" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, and incidentals required to line the leachate sediment chamber/wet well as shown on the Plans, as specified herein, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

4.04 LEACHATE UST

A. Measurement and payment for the leachate UST shall be included in the Contract Lump Sum Price for "Leachate UST" addressed in this Section and shall include full compensation for providing all materials, labor, equipment, tools, general electrical work, and incidentals required to install the leachate UST and accessories as shown on the Plans, as specified herein and within the tank manufacturer's specifications, and as directed by the Design Engineer. No additional compensation will be allowed therefore.

END OF SECTION

ATTACHMENT 7

CONSTRUCTION QUALITY ASSURANCE PLAN
FINAL CLOSURE CONSTRUCTION

CONSTRUCTION
QUALITY ASSURANCE PLAN

for the

CITY OF UKIAH
DEPARTMENT OF PUBLIC WORKS

CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

October 2013
Revised August 2015

EBA Job No. 02-907

Prepared by:

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CONSTRUCTION QUALITY ASSURANCE PLAN
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

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DIVISION 1

GENERAL INFORMATION

CQA SECTION 01000
INTRODUCTION

PART 1 GENERAL

1.01 PROJECT DESCRIPTION

A. The City of Ukiah Landfill is located in Mendocino County, California approximately two miles east of the City of Ukiah. The Work site address is 3100 Vichy Springs Road, Ukiah, California 95482 (Sheet 1). The City of Ukiah Landfill was operated as a Class III solid waste disposal facility and is comprised of a single waste management unit that is approximately 40 acres in size.

B. This Construction Quality Assurance (CQA) Plan applies to the final closure of the City of Ukiah Landfill. The final closure project encompasses approximately 65 acres in area and consists of the following construction features:

Site Preparation:
- Refuse excavation and relocation.
- Interim cover preparation.

Final Cover System (in ascending order):
- 1-foot thick foundation layer.
- Gas relief/venting system.
- LLDPE geomenbrane.
- Engineered synthetic turf with specific grade sand infill balast.

Miscellaneous items:
- Drainage and erosion control measures.
- Sedimentation basin improvements.
- Access roads.
- General earthwork, including various excavations and fills.
- Leachate overflow collection and storage system, including installation of a leachate underground storage tanks (UST).
- Landfill gas (LFG) collection system, including condensate drainage components.
- Borrow area reclamation.
- Seeding and fertilizing.
- Security fencing.

C. A detailed scope of construction for each unit of construction is presented in Section 01010 of this CQA Plan.

1.02 PURPOSE

A. The purpose of this CQA Plan is to provide a detailed guidance document for correct and thorough CQA verification procedures implemented during construction. This CQA Plan is also intended to identify, prevent, and correct problems and deficiencies that may occur during construction. This CQA Plan details general and specific requirements of the CQA program that will be implemented during construction to verify and document that construction is in compliance with the contract documents and the design intent.

Requirements of the CQA program include the following:

1. Product quality assurance verification testing to verify that all materials are in compliance with the Technical Specifications.
2. Construction monitoring and documentation to verify that each unit of construction is in compliance with the Technical Specifications and that construction was executed correctly using industry-standard construction methods and the proper materials.
3. Review and approval of product submittals to verify that construction materials are in compliance with the Technical Specifications.
4. Testing to verify that installed or constructed components are in compliance with the Technical Specifications.
5. CQA documentation consisting of Daily Summary Reports, CQA field logs, testing forms, installation logs, document control binders, material control logs, testing reports, photographic documentation, technical revisions, design modifications, record as-built drawings, and corrective action determination and verification reports.
6. Preparation of the CQA Certification Report that documents the CQA program implemented during construction and that construction was completed in compliance with the contract documents and the design intent. The CQA Certification Report will be submitted to the California Regional Water Quality Control Board, North Coast Region (RWQCB).

B. Although the CQA Plan provides a foundation for the CQA program, this plan may be modified and revised as appropriate prior to and during construction. All modifications and revisions to the CQA program will be documented in the CQA Certification Report.

1.03 PROJECT ORGANIZATION

A. The City of Ukiah, Department of Public Works (City) is the owner and operator of the City of Ukiah Landfill and has ultimate responsibility for the Project, including overall project management and project funding. For purposes of this CQA Plan, the City will be referred to as "Owner". The Owner has contracted with the following organizations to complete construction in accordance with the project documents listed in Part 1.02 of Section 01090 (References) of this CQA Plan.

1. EBA Engineering (EBA) - Design Engineer and CQA Certifying Engineer.
2. To Be Determined – Construction Contractor and Subcontractors.

B. EBA is the Design and CQA Certifying Engineer for the Project. As the Design Engineer, EBA is responsible for the design and site engineering related to the design. Site engineering includes: 1) review and approval of product and construction submittals required by the contract documents; 2) technical issues related to construction; 3) interpretation of the Technical Specifications and the Construction Drawings (herein after referred to as "Plans"); and 4) design modifications and technical revisions. For purposes of this CQA Plan, EBA will be referred to as "Design Engineer" when functioning as the Design Engineer.

As the CQA Certifying Engineer, EBA is responsible for certifying to the Owner and RWQCB that construction is in compliance with the contract documents and the design intent. Specific responsibilities of the CQA Certifying Engineer include: 1) providing a professional engineer or certified engineering geologist registered in the state of California; 2) implementing and managing the CQA program outlined in Part 1.02 of this Section; 3) review of all CQA documentation; and 4) preparation of the CQA Certification Report. EBA will provide an on-site CQA Team to implement and manage the CQA program consisting of a CQA Officer, CQA Monitors, a CQA Surveyor, and Geosynthetics and Soils CQA Testing Laboratories. For purposes of this CQA Plan, EBA will be referred to as "CQA Officer"

when functioning as the CQA Certifying Engineer.

C. The Construction Contractor is responsible for overall performance of the earthwork, including construction of drainage and erosion control measures, in accordance with the contract documents and as shown on the construction drawings. For purposes of this CQA Plan, the Construction Contractor will be referred to as "Contractor".

D. The Project Organization for CQA is shown on Table 01000-1, CQA Organization Chart

1.04 CQA PLAN FORMAT

A. This CQA Plan closely parallels the format of the Technical Specifications in the contract documents. The intent of this parallel format is to avoid discrepancies between the two documents, therefore preventing misinterpretations and misunderstandings between the Owner, Contractor, Design Engineer and CQA Certifying Engineer. This format also organizes all necessary quality assurance verification procedures for each unit of construction into a single section.

B. Division 1 of this plan presents general information about the construction project and the CQA program.

C. Division 2 of this plan provides detailed and specific CQA procedures to be implemented by the CQA Officer for each unit of construction. Division 2 is written instruction and direction for members of the CQA Team.

END OF CQA SECTION 01000
INTRODUCTION

CQA ORGANIZATION CHART
City of Ukiah Landfill
FINAL CLOSURE CONSTRUCTION PROJECT

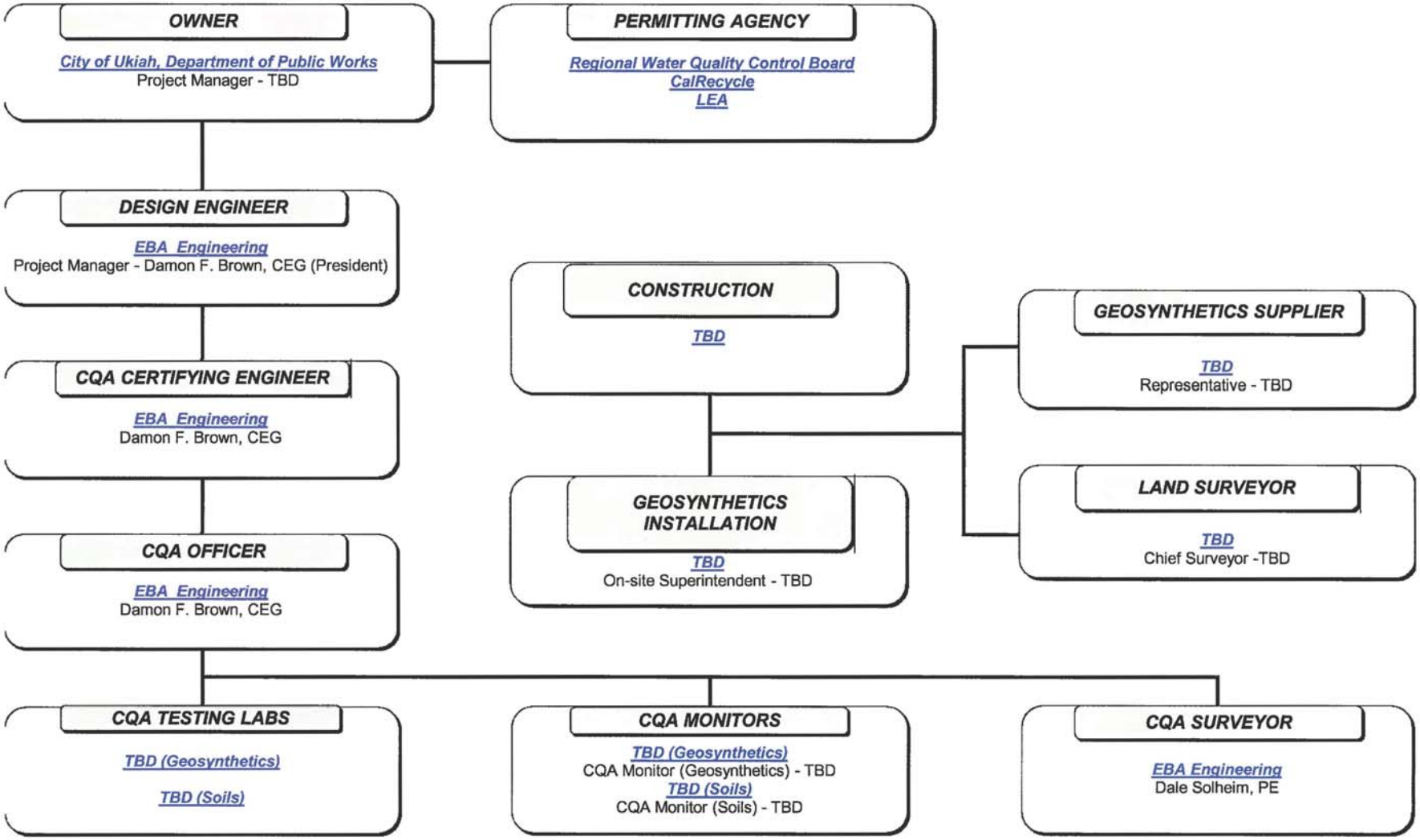

TABLE 01000-1

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CQA SECTION 01010
SCOPE OF CONSTRUCTION

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Work to be performed by the Design Engineer

B. Work to be performed by the Owner.

C. Contractor's scope of work.

1.02 WORK TO BE PERFORMED BY THE DESIGN ENGINEER

A. The Design Engineer will provide three (3) reference control points with benchmark elevations in the vicinity of the Work site. All other necessary control or reference points needed to perform construction will be established by the Contractor.

1.03 WORK TO BE PERFORMED BY THE OWNER

A. The Owner will provide the following construction materials and services:
   1. Material for engineered fill.
   2. Material for the foundation layer.
   3. Skid-mounted packaged combustion system, including totally-enclosed vertical ground flare.
   4. Extension of adequate power and telephone service to the location of the skid-mounted packaged combustion system.

1.04 CONTRACTOR'S SCOPE OF WORK

A. The Contractor's scope of work includes the following.
   1. Mobilization of construction equipment and personnel.
   2. Excavation of on-site borrow material for construction of final cover system soil components, as well as sedimentation basin improvements.
   3. Construction of final cover system, including interim cover preparation and placement/installation of foundation layer, geomembrane, engineered turf, hydrbinder, and sand ballast.
   4. Seeding and fertilizing of disturbed areas and on-site borrow area.
   5. Excavation and construction of, and supply of materials for, drainage and erosion control measures.
   6. Construction of, and supply of materials for, access roads.
   7. Construction of, and supply of materials for, leachate overflow collection and storage system, including installation of new leachate UST and lining of existing leachate sediment chamber and wet well.
   8. Construction of, and supply materials for, LFG collection and control system, including installation of LFG extraction wells, LFG collection system piping and condensate drainage components.

9. Installation of Owner-supplied skid-mounted packaged combustion system, including totally-enclosed vertical ground flare.
10. Construction of, and supply of materials for, security fencing.

END OF CQA SECTION 01010
SCOPE OF CONSTRUCTION

CQA SECTION 01039
PROJECT MEETINGS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Communication and coordination between the Design Engineer, Contractor, and CQA Team are most important to achieve the common goals of quality construction and successful completion of the project.

B. A series of project meetings will be held for the purpose of establishing a successful environment of communications, coordination, and overall teamwork; the meetings will be administered by the CQA Officer to: 1) clearly define responsibility and authority of each organization involved in the project; 2) resolve communication problems, misunderstandings, and misinterpretations; 3) find solutions to unanticipated developments; and 4) identify, prevent, and correct problems and deficiencies that may occur during the construction process.

C. Project meetings include the following.
1. Preconstruction meeting.
2. Progress meetings.
3. Preparatory meetings.

1.02 PRECONSTRUCTION MEETING

A. A preconstruction meeting will be held to discuss topics relating to the commencement of the project.

B. The objectives of this meeting are to: 1) clearly define the roles, responsibility, and authority of each organization and individual involved in the project; 2) review specific requirements of the CQA program; and 3) establish a foundation of cooperation to achieve quality construction. The following agenda, as related to CQA, will be addressed by the Design Engineer:
1. Introduce and discuss roles, authority, and responsibilities of each organization and individual involved in the project.
2. Establish lines of communication.
3. Review Technical Specifications and Plans.
4. Distribution of the CQA Plan.
5. Review of CQA activities to be performed.
6. Discuss Contractor's construction schedule and workplan.
7. Discuss Contractor's Construction Quality Control (CQC) procedures and responsibilities.
8. Discuss submittal review and approval procedures.
9. Discuss non-conformance and corrective action procedures.
10. Discuss construction restrictions due to weather conditions.
11. Discuss and schedule weekly progress meetings.
12. Discuss health and safety issues.
13. Discuss preparatory meetings.

C. A Meeting/Discussion Summary Report (see Part 1.08 of Section 01400 of this CQA Plan) will be completed by the CQA Officer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preconstruction meeting:
   1. City's Project Manager or representative.
   2. Contractor's Project Manager and on-site Superintendent.
   3. Installer's Project Manager and on-site Superintendent.
   4. Design Engineer's Project Manager and CQA Officer.

1.03 PROGRESS MEETINGS

A. The CQA Officer will schedule and administer weekly progress meetings. The objectives of these meetings are to: 1) maintain lines of communication; 2) review work progress and CQA activities performed previously; 3) discuss upcoming construction and related CQA activities; and 4) maintain and improve the established foundation of cooperation to achieve quality construction. The following agenda will be addressed by the CQA Officer.
   1. Review minutes of previous progress meeting.
   2. Review work progress.
   3. Review and update construction schedule and obtain a 2-week look-ahead schedule from the Contractor.
   4. Discuss CQA and CQC related field observations, testing results, problems, decisions, and conflicts.
   5. Review and update Submittal Log.

B. A Meeting/Discussion Summary Report (see Section 01400 of this CQA Plan) will be completed by the CQA Officer and distributed to all parties in attendance.

C. The following representatives from each organization are required to attend the weekly progress meetings.
   1. City's Project Manager or representative.
   2. Contractor's on-site Superintendent.
   3. Installers on-site Superintendent (during geosynthetics installation).
   4. Design Engineer's Project Manager and CQA Officer.

1.04 PREPARATORY MEETINGS

A. The CQA Officer will schedule and administer informal preparatory meetings prior to beginning construction/implementation of the following items.
   1. Refuse excavation and interim cover preparation.
   2. Foundation layer placement.
   3. Geomembrane placement.
   4. Turf installation.
   5. Sand ballast placement.
   6. General earthwork, drainage and erosion control, and access road construction, as needed.
   7. Sedimentation basin improvements.
   8. Leachate overflow collection and storage system installation.
   9. LFG collection system installation.
   10. Borrow area reclamation.
   11. Seeding and fertilizing.

B. The objective of these preparatory meetings is to establish a complete understanding of the upcoming unit of construction and CQA activities that will be implemented during construction. To achieve this objective, the following agenda will be addressed by the CQA Officer.

1. Review "Products" part of the applicable section of the Technical Specifications.
2. Review "Execution" part of the applicable section of the Technical Specifications.
3. Discuss any construction and grade control staking needed to perform and complete the Work.
4. Discuss CQA testing, observation, and surveying to be performed.
5. Verify that all submittals have been, or will be, received by the CQA Officer and approved by the Design Engineer in accordance with the schedule.
6. Discuss Contractor's CQC responsibilities.
7. Discuss Contractor's coordination, scheduling, and sequencing of the work.
8. Discuss Contractor's proposed equipment and manpower.

C. A Meeting/Discussion Summary Report (see Section 01400 of this CQA Plan) will be completed by the CQA Officer and distributed to all parties in attendance.

D. The following representatives from each organization are required to attend the preparatory meetings.

1. Design Engineer's Project Manager or representative.
2. Contractor's on-site Superintendent.
3. On-site Superintendent of any Subcontractor, as applicable to the unit of construction.
4. CQA Officer.
5. CQA Monitor(s), as applicable to the unit of construction.

END OF CQA SECTION 01039
PROJECT MEETINGS

CQA SECTION 01050
GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Conformance testing.

B. Construction monitoring.

C. Construction testing.

D. Project meetings.

E. Submittal review and approval.

F. Documentation.

1.02 CONFORMANCE TESTING

A. Prior to using a product or material in construction, sampling and testing will be performed to verify that construction products and materials to be used are in conformance with the Technical Specifications.

B. Conformance testing requirements, methods, and sampling frequencies are given for each unit of construction in Division 2 of this CQA Plan.

C. All product and material conformance test samples will be recorded on the appropriate Master Testing Control Log, assigned a sample number, and processed by the CQA Officer for either on-site or off-site testing. The Master Testing Control Logs document: 1) sample numbers; 2) product or material types; 3) required testing; 4) sampling locations and dates; 5) testing personnel or organization; 6) testing completion dates; and 7) a brief summary of the testing results. The Master Testing Control Log for soils are presented in Appendix C.

D. At the request of the Design Engineer, conformance test samples will be archived at the Work site or an alternate location determined by the Owner for a period of one year. Archived samples will be stored in sealed plastic containers tagged with: 1) the sample number; 2) product or material type; 3) the project name and number; 4) sample date and location; and 5) the date for discarding the sample.

E. The following products or materials require conformance testing.
1. Miscellaneous aggregate materials.
2. Engineered fill.
3. Foundation soil layer.
4. Geomembrane.
5. Engineered turf.
6. Erosion-resistant layer.
7. Concrete.

1.03 CONSTRUCTION MONITORING

A. Each unit of construction will be monitored to verify compliance with the Technical Specifications and that construction was executed correctly using industry-standard construction methods and the proper materials.

B. Monitoring guidelines and procedures are specified for each construction unit in Division 2 of this CQA Plan and include the following:
   1. Field tests.
   2. Observations.
   3. Field surveys.
   4. Physical measurements.

1.04 CONSTRUCTION TESTING

A. Construction testing will be performed during installation and construction to verify compliance with the Technical Specifications.

B. Construction testing may be performed by the Contractor, Design Engineer, or CQA personnel as required for each construction unit in Division 2 of this CQA Plan and includes the following:
   1. Engineered fill.
   2. Foundation layer.
   3. Aggregate base for access roads.
   4. Geomembrane.
   5. Engineered turf.
   6. Sand ballast.

1.05 PROJECT MEETINGS

A. In accordance with Section 01039 of this CQA Plan.

1.06 SUBMITTAL REVIEW AND APPROVAL

A. In accordance with Section 01300 of this CQA Plan.

1.07 DOCUMENTATION

A. In accordance with Section 01400 of this CQA Plan.

END OF CQA SECTION 01050
GENERAL REQUIREMENTS

CQA SECTION 01090
REFERENCES

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Project Reference Documents.

B. Industry Standards and Technical Reference Documents.

C. Soils Testing Standards and Methods.

D. Geosynthetics Testing Standards and Methods.

E. Landfill Gas Collection System Testing Standards and Methods.

F. Concrete Testing Standards and Methods.

G. Acronyms.

H. Contact Addresses and Telephone Numbers.

1.02 PROJECT REFERENCE DOCUMENTS

A. The following project reference documents provide support and background information for use in conjunction with this CQA Plan.

1. *Joint Technical Document for City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, January 2008.
2. *Response to RWQCB Comments Dated February 21, 2008, Joint Technical Document, City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, April 21, 2008.
3. *January 2008 Joint Technical Document Addendum, Response to Regulatory Comments, Final Closure and Postclosure Maintenance Plans, City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, June 20, 2013.
4. *Design Plan for Landfill Gas Collection and Control System, City of Ukiah Landfill, Mendocino County, California;* EBA Engineering, October 2013.

1.03 INDUSTRY STANDARDS AND TECHNICAL REFERENCE DOCUMENTS

A. The following industry standards and technical reference documents were used in the preparation of this CQA Plan.

1. *ASTM Standards and Other Specifications and Test Methods on the Quality Assurance of Landfill Liner Systems.* American Society for Testing and Materials, Current Edition.
2. *Technical Guidance Document, Quality Assurance and Quality Control for Waste Containment Facilities [EPA/600/R-93/182].* United States Environmental Protection Agency, September 1993.
3. *Federal Register (Vol. 56, No. 196, pp. 50978 - 51119). Part II, Environmental Protection Agency, 40 CFR Parts 257 and 258 - Solid Waste Disposal Facility*

Criteria; Final Rule [EPA/OSW-FR-91-004 FRL-4011-9]. United States Environmental Protection Agency, October 9, 1991.

4. *California Code of Regulations, Title 27 - Combined SWRCB/CIWMB Regulations, Division 2, Subdivision 1, Chapter 3, Subchapter 2, Article 4, Section 20324.* Effective July 18, 1997.
5. *Caltrans Standard Specifications.* California Department of Transportation, 2010.
6. *Caltrans Standard Plans.* California Department of Transportation, 2010.
7. *California Test Methods. California Department of Transportation, Current Edition.*
8. *California Building Code. Current Edition.*

1.04 SOILS TESTING STANDARDS AND METHODS

A. The following standard soils testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM C 33	Standard Specification for Concrete Aggregates.
2.	ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates.
3.	ASTM D 422	Standard Test Method for Particle-Size Analysis of Soils.
4.	ASTM D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).
5.	ASTM D 2434	Standard Test Method for Permeability of Granular Soils (Constant Head).
6.	ASTM D 2487	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
7.	ASTM D 2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
8.	ASTM D 2922	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9.	ASTM D 3017	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
10.	ASTM D 4959	Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating.
11.	CTM 229	Method of Test for Durability Index.
12.	CTM 301	Method for Determining the Resistance "R" Value of Treated and Untreated Bases, Subbases, and Basement Soils by the Stabilometer.

1.05 GEOSNYTHETICS TESTING STANDARDS AND METHODS

A. The following standard geosynthetics testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM D 1505	Test Method for Density of Plastics by the Density-Gradient Technique.
2.	ASTM D 4218	Test Method for Carbon Black Content.
3.	ASTM D 4355	Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water.
4.	ASTM D 4491	Test Methods for Water Permeability of Geotextiles by Permittivity.
5.	ASTM D 4533	Test Method for Trapezoid Tearing Strength of Geotextiles.
6.	ASTM D 4632	Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
7.	ASTM D 4633	Standard Test Method for Energy Measurement for

Dynamic Penetrometers.

8.	ASTM D 4716	Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
9.	ASTM D 4751	Test Method for Determining the Apparent Opening Size of a Geotextile.
10.	ASTM D 4759	Standard Practice for Determining the Specification Conformance of Geosynthetics.
11.	ASTM D 4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
12.	ASTM D 5035	Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).
13.	ASTM D 5199	Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.
14.	ASTM D 5261	Test Methods for Mass Per Unit Area (weight) of Woven Fabrics.
15.	ASTM D 5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.

1.06 LANDFILL GAS EXTRACTION SYSTEM TESTING STANDARDS AND METHODS

A. The following standard geosynthetics testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM A 193	Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service.
2.	ASTM A 325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength.
3.	ASTM D 1784	Standard Specification for Rigid PVC Compounds and Chlorinated PVC Compounds.
4.	ASTM D 1785	Standard Specification for PVC Plastic Pipe, Schedules 40, 80, and 120.
5.	ASTM D 2464	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 80.
6.	ASTM D 2466	Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 40.
7.	ASTM D 2467	Standard Specification for Socket-Type PVC Plastic Pipe Fittings, Schedule 80.
8.	ASTM D 2513	Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
9.	ASTM D 2564	Standard Specification for Solvent Cements for PVC Plastic Piping Systems.
10.	ASTM D 2855	Standard Specification for Making Solvent-Cemented Joints with PVC Pipe and Fittings.
11.	ASTM D 3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
12.	ASTM D 3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
13.	ASTM D 3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
14.	ASTM D 3350	Standard Specification for Polyethylene Plastic Pipe and

		Fittings Materials.
15.	ASTM D 3786	Standard Test Method for Methoxyl and Hydroxypropyl Substitution in Cellulose Ether Products by Gas Chromatography.
16.	ASTM D 7001	Standard Specification for Geocomposites for Pavement Edge Drains and Other High-Flow Applications.
17.	ASTM F 477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
18.	ASTM F 2648	Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Pipe Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.

1.07 CONCRETE TESTING STANDARDS AND METHODS

A. The following standard concrete testing methods and procedures apply as referenced in the Technical Specifications and/or this CQA Plan.

1.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2.	ASTM C 42	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
3.	ASTM C 143	Standard Test Method for Slump of Portland Cement Concrete.
4.	ASTM C 150	Standard Specification for Portland Cement.
5.	ASTM C 260	Standard Specification for Air-Entraining Admixtures for Concrete.
6.	CBC Section 1701	Structural Tests and Special Inspections.
7.	CBC Section 1905	Concrete Quality, Mixing and Placing.

1.08 STEEL TESTING STANDARDS AND METHODS

A. The following standard steel testing methods and procedures apply as referenced in these Technical Specifications and/or the CQA Plan.

1.	ASTM A 36	Standard Specification for Carbon Structural Steel.
2.	ASTM A 90	Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coating.
3.	ASTM A 185	Standard Specifications for Steel Welded Wire Reinforcement, Plain, for Concrete.
4.	ASTM A 313	Specification for Chromium-Nickel Stainless and Heat-Resisting Steel Spring Wire.
5.	ASTM A 370-97a	Test Methods and Definitions for Mechanical Testing of Steel Products.
6.	ASTM A 615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
7.	ASTM A 641	Specification for Zinc Coated (Galvanized) Carbon Steel Wire.
8.	ASTM A 764	Specification for Steel Wire, Carbon, Drawn Galvanized and Galvanized at Size for Mechanical Springs.
9.	ASTM A 975-97	Standard Specification for Double-Twisted Hexagonal Mesh Gabions and Revet Mattresses (Metallic-Coated Steel Wire or Metallic-Coated Steel Wire with Polyvinyl Chloride (PVC) Coating).

1.09 ACRONYMS

A. Whenever the following acronyms for standards, institutes and societies are referenced in the Technical Specifications or this CQA Plan, the following meanings apply:

1.	AASHTO	American Association of State Highway and Transportation Officials
2.	AISC	American Institute of Steel Construction
3.	ANSI	American National Standards Institute
4.	ASTM	American Society for Testing and Materials
5.	AWWA	American Water Works Association
6.	CAC	California Administrative Code
7.	CFR	Code of Federal Regulations
8.	CRSI	Concrete Reinforcing Steel Institute
9.	CTM	California Test Methods
10.	NEMA	National Electrical Manufacturer's Association
11.	NEC	National Electric Code
12.	NFPA	National Fire Protection Association
13.	OSHA	Occupational Health and Safety Administration
14.	RWQCB	Regional Water Quality Control Board
15.	SWANA	Solid Waste Association of North America
16.	SWRCB	State Water Resources Control Board
17.	UL	Underwriters Laboratories Inc.
18.	US	United States

B. Whenever the following acronyms for materials and units are referenced in the Technical Specifications or this CQA Plan, the following meanings apply:

1.	AC	acre
2.	AWG	American Wire Gauge
3.	cm	centimeter
4.	CMP	corrugated metal pipe
5.	EPDM	ethylene propylene diene monomer
6.	°F	degree Fahrenheit
7.	ft	foot
8.	g	gram
9.	HDPE	High Density Polyethylene
10.	HP	horse power
11.	in	inch
12.	”	inch
13.	kN	kilonewtons
14.	lb	pound
15.	MARV	minimum average roll value
16.	m	meter
17.	mm	millimeter
18.	mil	1/1000 of 1 inch
19.	ml	milliliters
20.	min	minute
21.	No.	number
22.	oz	ounce

23.	%	percent
24.	psf	pounds per square foot
25.	psi	pounds per square inch
26.	psig	pounds per square inch gauge
27.	PVC	Polyvinyl Chloride
28.	SDR	Standard Dimension Ratio
29.	sec	second
30.	TFE	tetrafluoroethylene
31.	TRM	turf reinforcement mat
32.	yd	yard

C. Whenever the following miscellaneous acronyms are referenced in the Technical Specifications or this CQA Plan, the following meanings apply:

1.	AST	Above Ground Storage Tank
2.	@	at
3.	BMP	Best Management Practice
4.	CQA	Construction Quality Assurance
5.	CQC	Construction Quality Control
6.	CSMP	Construction Storm Water Management Plan
7.	EBA	EBA Engineering
8.	=	equals
9.	GCL	Geosynthetic Clay Liner
10.	GRL	Gas Relief Layer
11.	LFG	Landfill Gas
12.	max.	maximum
13.	min.	minimum
14.	MQC	Manufacturer's Quality Control
15.	MSDS	Material Data Safety Sheet
16.	NOI	Notice of Intent
17.	NPDES	National Pollutant Discharge Elimination System
18.	PDF	Portable Document Format
19.	POC	Point of Connection
20.	QSD	Qualified SWPPP Developer
21.	QSP	Qualified SWPPP Practitioner
22.	REAP	Rain Event Action Plan
23.	SAP	Storm Water Action Plan
24.	SMARTS	Storm Water Multiple Application and Report Tracking System
25.	SPC	Storm Water Pollution Control
26.	Std.	Standard
27.	SWPPP	Storm Water Pollution Prevention Plan
28.	TEFC	Totally Enclosed Fan Cooled
29.	UST	Underground Storage Tank
30.	UV	Ultra-violet
31.	WDID	Waste Discharge Identification
32.	WPC	Water Pollution Control

1.10 CONTACT ADDRESSES AND TELEPHONE NUMBERS

A. The following are addresses, telephone numbers, and fax numbers for individual contacts at each organization involved in the project.

City of Ukiah
Department of Public Works
300 Seminary Avenue
Ukiah, CA 95482
Telephone: (707) 463-6282
Fax: (707) 463-6204

EBA Engineering
825 Sonoma Avenue
Santa Rosa, CA 95404
Contact Name: Damon F. Brown, P.G., C.E.G., C.Hg.
Telephone: (707) 544-0784
Fax: (707) 544-0866

END OF CQA SECTION 01090
REFERENCES

CQA SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Submittal Control Log.

B. Submittal review and approval procedures.

1.02 SUBMITTAL CONTROL LOG

A. The Submittal Control Log lists all submittals required by the Technical Specifications. The Submittal Control Log will be maintained by the CQA Officer in coordination with the Contractor during construction. The Submittal Control Log documents: 1) submittal number; 2) referenced specification section; 3) submittal description; 4) submitter; 5) date received; 6) reviewer; 7) action taken determination; and 8) return date.

1.03 SUBMITTAL REVIEW AND APPROVAL PROCEDURES

A. Three (3) copies of each submittal listed in the Submittal Control Log will be submitted to the CQA Officer by the Contractor in accordance with the Technical Specifications. The submittals will be forwarded by the CQA Officer to the Design Engineer for review and approval. The Design Engineer may perform a preliminary review of submittals for compliance with the Technical Specifications and issue a verbal *Approval for Use* to the CQA Officer who, in turn, will notify the Contractor that no corrective action determinations were required prior to issuing a verbal *Approval for Use*. All submittals which are not in compliance with the Technical Specifications must be immediately forwarded to the Design Engineer for review and corrective action determinations.

B. At the completion of the review process, the Design Engineer will return two (2) copies of each submittal to the CQA Officer with *Action Taken* determinations stamped on both copies of the submittal. The *Action Taken* determinations and the return dates will be recorded on the Submittal Control Log. One copy of the reviewed submittal will be returned to the Contractor and the other copy will be archived by the CQA Officer in the submittal documentation control binder.

C. The Submittal Control Log will be reviewed and updated in coordination with the Contractor at the weekly progress meetings.

END OF CQA SECTION 01300
SUBMITTALS

CQA SECTION 01400
DOCUMENTATION

PART 1 GENERAL

1.01 SECTION SUMMARY

A. Daily Summary Report.

B. Daily Field Log (Inspection Data Sheet).

C. Construction monitoring forms.

D. Laboratory testing reports.

E. Non-conformance/Corrective Action Form.

F. Acceptance Report.

G. Meeting/Discussion Summary Report.

H. Photograph Log.

I. Document Control.

J. As-built Record Documents.

K. CQA Certification Report.

L. Documentation archive storage.

1.02 DAILY SUMMARY REPORT

A. A summary report will be prepared daily by the CQA Officer. This report will organize and summarize all construction and CQA activities (monitoring and testing) completed during each day. The Daily Summary Report will contain or reference the following information:

1. Title block containing: 1) project name; 2) project number; 3) project location; 4) name of Owner; 5) name of Contractor; 6) date and day; 7) Document Control Number (see Part 1.10 of this Section); and 8) weather conditions.
2. Summary of construction activities for each unit of construction including equipment, personnel, and subcontractors utilized for each unit of construction and identification of the general area(s) where construction took place.
3. General summary of CQA activities (monitoring and testing) completed for each unit of construction with reference to attached Daily Field Logs (see Part 1.03 of this Section) which describe construction monitoring, construction testing results, and quality control procedures and test results.
4. General description of any non-conformance with the Plans or Technical Specifications and the corrective action measures taken with reference to attached Non-conformance/Corrective Action Forms (see Part 1.06 of this Section) which contain a more detailed description of the non-conformance issue and its corrective

action.

5. List of any materials received and status of submittal(s).
6. List of project meetings or pertinent discussions with reference to attached Meeting/Discussion Summary Report (see Part 1.08 of this Section).
7. Other miscellaneous information.
8. Signature of CQA Officer.

B. A sample Daily Summary Report is included in Appendix A, Project Documentation Forms.

1.03 DAILY FIELD LOG (INSPECTION DATA SHEET)

A. Each CQA Monitor will maintain an individual Daily Field Log (or Inspection Data Sheet) which will be assigned a cross-referencing Document Control Number (see Part 1.10 of this Section) and contain daily entries of the CQA Monitor.

B. On the Daily Field Log, the CQA Monitors will provide a written account of construction activities, construction monitoring, construction testing, and quality control procedures performed during the day for the monitored construction unit(s), as well as any observations (i.e., notes, charts, sketches, or photograph reference).

C. Construction monitoring forms (see Part 1.04 of this Section) and laboratory testing forms (see Part 1.05 of this Section) will be attached to, or referenced in, the Daily Field Log.

1.04 CONSTRUCTION MONITORING FORMS

A. Construction activities, construction monitoring, and construction testing will be recorded on appropriate construction monitoring forms. The following construction monitoring forms, or similar forms, will be issued by the CQA Officer for this project and are presented in the following appendices:

1. Soils Monitoring Forms (Appendix B)
   a. Soils Test Request - Sample Custody Log
   b. Nuclear Density/Moisture Test Data
2. Geosynthetics Monitoring Forms (Appendix C)
   a. Geomembrane Delivery and Control Log
   b. Engineered Turf Delivery and Control Log
   c. Geomembrane Test Request – Sample Custody Log
   d. Engineered Turf Test Request – Sample Custody Log
   e. Geomembrane Deployment/Seaming Log
   f. Geomembrane Repair Log
   g. Engineered Turf Deployment/Seaming Lot
   h. Engneered Turf Repair Log

B. Completed construction monitoring forms will be submitted by the CQA Monitor to the CQA Officer for review with Daily Field Logs, or at the completion of testing, and will be addressed by the CQA Officer in the Daily Summary Reports.

1.05 LABORATORY TESTING REPORTS

A. Laboratory testing reports will be issued by the Soils and Geosynthetics CQA Testing Laboratories for conformance and construction testing. Laboratory testing reports will be issued for the following testing during the project.

1. Moisture content, particle size analysis, Atterberg limits, Unified Soil Classification,

and/or moisture-density relationship testing for miscellaneous aggregate materials, engineered fill, foundation layer, and erosion-resistant layer materials.
2. Particle size analysis for sand ballast.
3. Conformance testing for geomembrane.
4. Conformance testing for engineered turf.
5. Conformance testing for concrete.

B. Laboratory testing reports will be addressed by the CQA Officer in the Daily Summary Report on the date of receipt.

1.06 NON-CONFORMANCE/CORRECTIVE ACTION FORM

A. A Non-conformance/Corrective Action Form will be issued by the Owner to the CQA Officer who will notify the Contractor or Installer of construction or materials not in compliance with the Plans or Technical Specifications, or for defective workmanship or materials even if in compliance with the Plans and Technical Specifications. The Non-conformance/Corrective Action Form will contain or reference the following information:
1. Title block containing: 1) project name; 2) project number; 3) project location; 4) name of Owner; 5) name of Contractor; 6) date and day; and 7) Document Control Number (see Part 1.10 of this Section).
2. Description of the non-conformance issue, construction unit, and location.
3. Reference to the technical specification(s) and/or plan(s) for which materials or construction are not in compliance.
4. Description of corrective action measures necessary to fully correct the area of non-conformance with the Plans and/or Technical Specifications as determined by the Owner.
5. Specification variance or revisions to the As-built Record Drawings (see Part 1.11 of this Section) required.
6. If necessary, any Daily Field Log, construction monitoring forms, laboratory testing report(s), Meeting/Discussion Summary Report, or Photograph Log pertaining to the non-conformance issue will be referenced by Document Control or Photograph Number to fully substantiate the non-conformance issue and corrective action determination.
7. Signature of the CQA Officer verifying that corrective measures determined by the Owner have been taken by the Contractor or Installer.

B. A sample Non-conformance/Corrective Action Form is included in Appendix A, Project Documentation Forms.

1.07 ACCEPTANCE REPORT

A. An Acceptance Report will be prepared for each Construction Unit to verify that all materials and construction are in compliance with the Plans and Technical Specifications. The Acceptance Report will reference all relevant Daily Summary Reports, Daily Field Logs (Inspection Data Sheets), and Non-conformance/Corrective Action Forms by the Document Control Number.

B. A sample Acceptance Report is included in Appendix A, Project Documentation Forms.

1.08 MEETING/DISCUSSION SUMMARY REPORT

A. A Meeting/Discussion Summary Report will be prepared for each scheduled Project Meeting (see Section 01039 of this CQA Plan) and any pertinent discussion between the Contractor and CQA personnel. The Meeting/Discussion Summary Report will contain the following information:

1. Title block containing: 1) project name; 2) project number; 3) project location; 4) name of Owner; 5) name of Contractor; 6) date and time; 7) meeting location; and 8) Document Control Number (see Part 1.10 of this Section).
2. Meeting name or general discussion subject matter.
3. List of meeting attendees or discussion participants.
4. Minutes of scheduled Project Meetings or synopsis of discussion.
5. List of any items needing resolution resulting from the meeting or discussion.
6. Signature of CQA Officer.

B. A sample Meeting/Discussion Summary Report is included in Appendix A, Project Documentation Forms.

1.09 PHOTOGRAPH LOG

A. All construction activities will be continually photographed to clearly show and define construction methods and as-built conditions of completed units of construction. Photographs will include: 1) product or material sources; 2) construction methods in progress for each unit of construction; 3) completed units of construction; 4) damaged, rejected, or substandard materials and construction; 5) corrective action measures to rectify damaged, rejected, or substandard construction; 6) completed units of construction after completion of corrective action measures; and 7) design modifications. Photographs will be identified by number, date, and time of the photograph. The CQA Officer will maintain a cross-referencing photography log documenting the subject matter of each photograph.

B. A sample Photograph Log is included in Appendix A, Project Documentation Forms.

1.10 DOCUMENT CONTROL

A. A unique Document Control Number will be assigned to all CQA documents generated during construction and implementation of this CQA Plan.

B. The Document Control Number will organize and index all CQA documentation for cross-referencing, to allow easy access to all documents, and to enable a reviewer to identify and retrieve original CQA documentation for any completed unit of construction.

C. Complete documentation of all CQA activities will be controlled and secured in a series of 3-ring binders maintained by the CQA Officer with a duplicate copy maintained at the offices of the Owner, at the option of the Owner. This documentation control structure organizes and indexes all CQA documents and is intended to allow easy access to all documents for review and audit by the Owner, Design Engineer, or regulatory agencies. The following is a preliminary list and contents of the *CQA Documentation Binders* to be established and maintained by the CQA Officer.

1. Title: *Daily Summary Reports and Field Logs.*
   Color code (optional): Blue.
   Contents: Daily Summary Reports prepared by the CQA Officer and Daily Field

Logs completed by the CQA Monitors.

2. Title: *Project Administration Documentation.*
   Color code (optional): Red.
   Contents: Non-conformance/Corrective Action Forms, Acceptance Reports, Meeting/Discussion Summary Reports, Owner correspondence, Design Engineer correspondence, Contractor correspondence, and miscellaneous correspondence.
3. Title: *Contractor Daily Field Reports.*
   Color code (optional): Green.
   Contents: Any Daily Field Reports prepared by the Contractor (or Installer).
4. Title: *Submittals.*
   Color code (optional): Purple.
   Contents: Updated Submittal Control Log, submittal transmittal cover sheets, and all reviewed and approved (or other status) submittals.
5. Title: *Soils CQA.*
   Color code (optional): White.
   Contents: Construction monitoring forms and laboratory testing reports for soils.
6. Title: *Geosynthetics CQA.*
   Color code (optional): Orange.
   Contents: Construction monitoring forms and laboratory testing reports for geosynthetics.
7. Title: *CQA Plan.*
   Color code (optional): Teal.
   Contents: CQA Plan.
8. Title: *Photography Log.*
   Color code (optional): Yellow.
   Contents: Construction and CQA photographs and cross-referencing Photograph Logs.

1.11 AS-BUILT RECORD DOCUMENTS

A. As-built Record Documents will be maintained by the CQA Officer and will be reviewed and verified by the Design Engineer.

B. The As-built Record Documents will show actual as-built conditions of construction, including an aerial topographic survey illustrating the final construction grades and configuration, and will adequately reflect that construction is in substantial compliance with the design intent of the Plans and Technical Specifications; irrelevant deviations in actual construction that do not substantially affect the design intent will not be incorporated into the As-built Record Documents, but will be addressed in the CQA Certification Report (see Part 1.12 of this Section).

C. As-built Record Documents will be prepared during the construction process by making modifications as they occur to a single set of construction drawings designated as the *Site As-built Record Documents*; at the completion of construction the CQA Officer will incorporate all as-built conditions into the *Final As-built Record Documents.*

D. The final As-built Record Documents will contain revision numbers, dates, and reviewer initials; and will be signed and stamped by the CQA Certifying Engineer.

1.12 CQA CERTIFICATION REPORT

A. At the completion of the project, the CQA Certifying Engineer will prepare a CQA Certification Report and submit it to the Owner. The CQA Certification Report will consist of information and data generated by the CQA program and will document that the final closure construction is in compliance with the design intent of the Plans and Technical Specifications. At a minimum, the CQA Certification Report will contain the following information.

1. Summary of construction methods for each unit of construction completed.
2. Summary of the CQA program implemented during construction and specific CQA activities (monitoring and testing) performed for each unit of construction completed.
3. Results of conformance testing and construction testing.
4. Revisions made to Plans and variances from Technical Specifications allowed.
5. Final As-built Record Documents.
6. Statement of compliance with the design intent of the Plans and Technical Specifications, signed and stamped by the CQA Certifying Engineer, a professional engineer or certified engineering geologist registered in the State of California.

1.13 DOCUMENTATION ARCHIVE STORAGE

A. At the completion of the project and after submittal of the CQA Certification Report and As-built Record Documents to the Owner, all original documentation generated by construction and the CQA program will be archived at the Owner's administrative office with duplicate copies stored at the offices of the Design Engineer and CQA Certifying Engineer.

END OF CQA SECTION 01400
DOCUMENTATION

DIVISION 2

CONSTRUCTION QUALITY ASSURANCE PROCEDURES

CQA SECTION 02207
AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the aggregate materials are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 AGGREGATE MATERIALS

A. Verify that the following aggregate materials meet the applicable product requirements of Section 02207 (Aggregate Materials) of the Technical Specifications:
1. Aggregate base.
2. Pipe bedding.
3. Sand ballast.
4. Loose rock riprap.
5. Grouted rock riprap.
6. Gravel pack.
7. Concrete aggregate.
8. Coarse rock for construction entrance.
9. Concrete sand.
10. Tank bedding and backfill.

2.02 CONFORMANCE TESTING

A. Prior to aggregate base, pipe bedding, tank bedding and tank backfill placement operations, sample these respective materials to be used at the Work site and send the samples to the Soils Testing Laboratory to perform following test as specified:
1. Moisture-Density Relationship (ASTM D 1557); one (1) per source.

B. Prior to sand ballast placement operations, sample the actual sand material to be used at the Work site and send the samples to the Soils Testing Laboratory to perform at least one (1) of each of the following tests as specified:
1. Sieve Analysis (ASTM C 136) per every 10,000 cubic yards.
2. Permeability (ASTM D 2434 [modified]) per every 10,000 cubic yards.

C. Verify that the respective aggregate materials are derived from the approved sources throughout the Work.

PART 3 EXECUTION

3.01 STOCKPILING

A. Verify that the Contractor places all aggregate materials in the appropriate stockpile areas designated in the Plans and in accordance with all requirements in the Technical Specifications.

B. Verify that provisions are made to direct surface water away from stockpile site(s) so as to prevent erosion or deterioration of materials.

END OF CQA SECTION 02207
AGGREGATE MATERIALS

CQA SECTION 02222
EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that all excavation work associated with the various construction tasks are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of the Contractor's Storm Water Pollution Prevention Plan (SWPPP) as required in the Technical Specifications.

B. Collect certified weight tags issued by the permitted transfer station or solid waste disposal facility for all loads of refuse transported off-site for disposal.

C. Verify compliance with the submittal schedule and update Submittal Log.

D. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning of any portion of general earthwork, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the Contractor has located all underground utilities prior to performing any excavation for drainage and/or erosion control structures outside the limits of Work shown on the Plans.

3.02 CLEARING AND GRUBBING

A. Verify that all areas delineated for construction as shown on the Plans, including interim cover soil on the landfill surface and natural ground surface within the limits of the on-site borrow area, are cleared of all vegetative growth, such as brush, grass, weeds, or other deleterious material.

B. Verify that clearing and grubbing is performed prior to beginning excavation of any area.

C. Verify that cleared and grubbed debris are stockpiled separately from excavated material in accordance with the requirements set forth in Part 3.05 of this Section.

3.03 REFUSE EXCAVATION AND RELOCATION

A. Verify that refuse beneath the existing power lines is excavated to the lines, grades and dimensions shown on the Plans.

B. Verify that the excavated refuse is relocated to the designated refuse relocation area shown on the Plans.

C. Verify that the relocated refuse placed within the designated refuse relocation area is spread in uniform lifts not exceeding 2 feet in thickness and the each lift is compacted with a minimum of four (4) passes using a dozer.

D. Verify that the relocated refuse lifts is covered with a minimum of 6 inches of soil at the end of each working day to minimize vector hazards and odor nuisance.

E. Verify that within five (5) working days of completing the refuse excavation work beneath the existing power lines, the refuse relocation area is completely covered with a minimum of 12 inches of prepared and compacted foundation layer material in accordance with Section 02240 (Foundation Layer) of these Technical Specifications.

3.04 INCIDENTAL REFUSE EXCAVATION AND DISPOSAL

A. Verify that refuse is excavated at the locations and to the details shown on the Plans to accommodate the installation of drainage, LFG collection system, and condensate drain/discharge components.

B. Verify that excavated refuse is handled and managed in accordance with the procedures outlined in Section 02222 (Excavation) of the Technical Specifications, including placement of refuse in roll-off bins or dump trucks, covering of roll-off bins or dump trucks containing refuse at the end of each working day, and the removal of refuse from the site within 48 hours of being excavated.

C. Verify that the Contractor does not mix excess, surplus, or waste materials from other general construction activities with the refuse derived from the excavation work described in this Section.

3.05 SOIL EXCAVATION

A. Verify that excavation of swales for drainage and erosion control structures conforms to Section 19-4.01 of the Standard Specifications.

3.06 GRADING

A. Verify that the excavations for the on-site borrow area, drainage swales, sedimentation basins and leachate UST are constructed in conformance with the lines, grades, and dimensions shown on the Plans.

B. Verify that unsuitable materials, as determined by the Design Engineer, encountered at the subgrade elevation are removed and stockpiled separately from excavated material or disposed of in accordance with Section 02222 (Excavation) of the Technical Specifications.

C. Verify that where excavation is inadvertently carried below subgrade elevations, suitable provision is made by the Contractor for adjustment of same as determined by the Design Engineer to meet requirements incurred by the deeper excavation; also, verify that inadvertent over-excavation in such locations is rectified by backfilling with engineered fill and compacting to provide a firm and unyielding subgrade in accordance with the requirements of the Technical Specifications.

3.07 HAUL ROAD CONSTRUCTION

A. Verify that haul road locations have been approved by the Design Engineer.

3.08 DUST CONTROL

A. Verify that dust control measures are implemented by the Contractor in accordance with the approved Dust Control Plan and are effective in preventing and controlling the generation of dust in construction zones, along haul roads, in equipment parking areas, and in other locations as may be required due to operations related to performing the Work, and as required by the Design Engineer.

3.09 EROSION CONTROL

A. Verify that erosion and sediment control measures are implemented by the Contractor in accordance with the approved SWPPP, and as directed by the Design Engineer for all excavation work areas including on-site borrow area, sedimentation basins, leachate UST, stockpile areas, adjacent areas which have been disturbed, or any other affected areas.

3.10 DRAINAGE CONTROL

A. Verify that the Contractor provides ample means and devices with which to promptly remove and dispose of all water from any source entering the stockpile area(s) and any other active Work areas, and maintains these at all times until authorization for their removal is issued by the Design Engineer.

3.11 CORRECTIVE ACTIONS

A. If any portion(s) of the excavation work does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02222
EXCAVATION

CQA SECTION 02224
ENGINEERED FILL

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that engineered fill materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 ENGINEERED FILL

A. Verify that the engineered fill materials meets the applicable product requirements of Section 02224 (Engineered Fill) of the Technical Specifications.

2.02 CONFORMANCE TESTING

A. Verify that engineered fill is obtained from one of the approved on-site borrow sources.

B. If engineered fill placement operations are being performed concurrently and from the same borrow source area as the foundation layer or erosion-resistant layer construction, use results from the foundation/erosion-resistant layer conformance testing to determine moisture-density relationship for compaction. If not, sample the actual engineered fill material to be used and send the samples to the Soils Testing Laboratory to perform the following test per the stated frequency of material to be placed or a minimum of two (2) tests, whichever results in the greater number of tests:

1. Moisture-Density Relationship Curve (ASTM D 1557) per every 5,000 cubic yards.

C. If engineered fill material appearance or properties are different from those identified from borrow source characterization or change within the same location at the on-site borrow source, based on visual observation, perform additional borrow source characterization tests in accordance with the aforementioned conformance testing program.

D. Notify the Design Engineer of a change in materials and receive approval from the Design Engineer for use of the material as engineered fill prior to excavating additional material from that location within the on-site borrow source.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to engineered fill placement operations, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Convey to the Contractor that the nuclear testing gauge shall be calibrated on a daily basis using the methods and materials recommended by the gauge manufacturer. The nuclear gauge serial number and the name of the soil technician performing the soil density testing shall be noted to demonstrate that both the technician and the nuclear gauge are certified.

3.02 PLACEMENT

A. Verify that prior to placement of engineered fill on native ground, the subgrade is scarified to a depth of approximately 6 inches, moisture conditioned to within 1 to 3 percentage points of optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557.

B. Verify that engineered fill material is spread in uniform loose lifts not exceeding 8 inches in thickness.

C. Verify that each loose lift is moisture conditioned and thoroughly mixed to ensure a uniformly distributed moisture content.

3.03 COMPACTION

A. Verify that the final thickness of compacted lifts does not exceed 6 inches.

B. Perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least four samples (4) per 1,000 cubic yards of material placed or four samples per day.
   a. For sedimentation basin improvements and former leachate pond backfill, perform at least one (1) test per every 5,000 cubic yards
2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

C. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the engineered fill does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02224
ENGINEERED FILL

CQA SECTION 02225
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that all trenching and backfilling work associated with the various construction tasks are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.02 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.03 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the pipe bedding and engineered fill as determined under CQA Section 02207 (Aggregate Materials) and CQA Section 02224 (Engineered Fill), respectively, of this CQA Plan.

PART 3 EXECUTION

3.01 TRENCH PREPARATION

A. Verify that the required points of connection, lines, levels, contours, and datum locations have been identified by the Contractor.

B. Verify that the Contractor has located all utilities to avoid mechanical and structural interference.

3.02 TRENCH EXCAVATION

A. Verify that trenches are excavated to the lines and grades as shown on the Plans.

B. Verify that any water or materials that interfere with the work is removed.

C. Verify that soft areas of trench subgrades not capable of compaction in place are cut out.

D. Verify that trench bottoms are firm, continuous, relatively smooth and free of rocks and/or unsuitable material prior to the installation of pipe bedding or trench backfill material.

3.03 SHORING, SHEETING, AND BRACING OF TRENCH

A. Verify that the Contractor has secured a trench permit from the California Division of Industrial Safety prior to excavating any trench over 5 feet in depth.

B. Verify that shoring and sheeting is removed as the backfill is completed in a manner that will not damage the pipe or permit voids in the backfill.

3.04 PIPE/CONDUIT TRENCH BACKFILLING

A. Verify that trenches are backfilled to the lines and grades as shown on the Plans.

B. Verify that the placement methods employed do not disturb or damage buried drainage pipes and conduits in the trench.

C. Verify that pipe bedding material is placed at trench bottom in one continuous level layer not exceeding 6 inches in compacted depth.

D. Verify that pipe bedding is placed around the sides and to the top of the pipe/conduit, tamped in place, and compacted.

E. Verify that optimum moisture content of pipe bedding material is maintained to attain required compaction density.

F. Perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift or at a change in material.
2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

G. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

H. Verify that trenches are not jetted, unless allowed by the Design Engineer.

I. For buried pipe that does not require pipe bedding or engineered fill (condensate drain pipe), verify that the trench backfill is placed in a manner that will not damage the pipe and that the backfill is compacted to a firm consistency consistent with surrounding erosion-resistant layer material.

3.05 ANCHOR TRENCH BACKFILLING

A. Verify that the placement method employed does not damage the geomembrane/engineered turf in the trench.

B. Verify that the portion of the trench above the geomembrane/engineered turf is backfilled with engineered fill and field tested consistent with the procedures described in Part 3.04 of this Section.

C. Verify that trenches are not jetted, unless allowed by the Design Engineer.

D. Verify that the trenches are backfilled to the lines and grades as shown on the Plans.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the trenching and/or backfilling does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02225
TRENCHING AND BACKFILLING

CQA SECTION 02240
FOUNDATION LAYER

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the foundation layer materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 FOUNDATION LAYER MATERIAL

A. Verify that the foundation layer materials meet the applicable product requirements of Section 02240 (Foundation Layer) of the Technical Specifications.

2.02 CONFORMANCE TESTING

A. Following clearing and grubbing of landfill surface but prior to fine grading and scarification operations, sample existing interim cover material to be incorporated into the foundation layer and send the samples to the Soils Testing Laboratory to perform at least one (1) of each of the following tests as specified:
   1. Particle Size Analysis (ASTM D 422) per every 5,000 cubic yards.
   2. Unified Soil Classification (ASTM D 2487) per every 5,000 cubic yards.
   3. Moisture-Density Relationship Curve (ASTM D 1557) per every 5,000 cubic yards.

B. Prior to new foundation layer placement operations, sample the actual foundation layer material to be used at the Work site and send the samples to the Soils Testing Laboratory to perform at least one (1) of each of the following tests as specified:
   1. Particle Size Analysis (ASTM D 422) per every 5,000 cubic yards.
   2. Unified Soil Classification (ASTM D 2487) per every 5,000 cubic yards.
   3. Moisture-Density Relationship Curve (ASTM D 1557) per every 5,000 cubic yards.

C. Verify that foundation layer material is obtained from the approved on-site borrow source as determined from the aforementioned conformance testing.

D. If foundation layer material appearance or properties are different from those identified from borrow source characterization or change within the same location at the on-site borrow source, based on visual observation, perform additional borrow source characterization tests in accordance with the aforementioned conformance testing program.

E. Notify the Design Engineer of a change in materials and receive approval from the Design Engineer for use of the material for foundation layer construction prior to excavating additional material from that location within the on-site borrow source.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to foundation layer placement operations, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Convey to the Contractor that the nuclear testing gauge shall be calibrated on a daily basis using the methods and materials recommended by the gauge manufacturer. The nuclear gauge serial number and the name of the soil technician performing the soil density testing shall be noted to demonstrate that both the technician and the nuclear gauge are certified.

3.02 PREPARATION OF EXISTING INTERIM COVER SOIL TO BE INCORPORATED INTO THE FOUNDATION LAYER

A. Perform visual soil classification of the interim cover soils per the following test method and frequency:
   1. *Visual Soil Classification (ASTM D 2488)*; at least one (1) test per every acre.

B. Verify that existing interim cover soils are scarified to a minimum depth of 12 inches.

C. Following scarification, verify that existing interim cover soils are moisture conditioned and thoroughly mixed to ensure a uniformly distributed moisture content to within 1 to 3 percentage points of the optimum moisture content.

D. Perform the following field tests at the frequency shown to verify that the compacted interim cover soils have a minimum dry density of 90 percent of the maximum dry density and within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:
   1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*. Soil shall be sampled and tested at a frequency of four samples per 1,000 cubic yards (3/AC/lift) of material placed or four samples per day, whichever frequency results in the greatest number of tests.
   2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

3.03 PLACEMENT AND COMPACTION OF NEW FOUNDATION LAYER MATERIAL

A. Verify that foundation layer material is moisture conditioned and thoroughly mixed in the on-site borrow area to ensure an uniformly distributed moisture content. At time of placement, perform the following field test at the frequency shown to verify that the foundation layer material meets the soil classification requirements:
   1. *Soil Classification (ASTM D 2488)*; one (1) sample per three (3) acres per lift (2,400 cubic yards) of material placed or change in material, whichever results in the greater number of tests.

B. Record corresponding soil classification results on the Test Data form.

C. Continuously observe all placement operations to verify that the foundation layer material is consistent and has no oversized particles, overly wet or dry areas, or organic, deleterious, or other unsuitable matter.

D. Verify that foundation layer material is spread in uniform loose lifts not exceeding 8 or 12 inches in thickness.

E. Verify that each loose lift is moisture conditioned and thoroughly mixed to ensure a uniformly distributed moisture content.

F. Verify that the final thickness of compacted lifts for new foundation layer material does not exceed 6 inches.

G. Perform the following field tests on each 6-inch lift at the frequency shown to verify that the foundation layer has been compacted to 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*. Soil shall be sampled and tested at a frequency of four samples per 1,000 cubic yards (3/AC/lift) of material placed or four samples per day, whichever frequency results in the greatest number of tests.
2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

H. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 FINAL SURFACE PREPARATION

A. Verify that the completed foundation layer surface is free of individual particles or protrusions greater than 0.50 inches in diameter.

B. Verify that ruts and ridges on the completed foundation layer surface are limited to a maximum depth or height of 1.0 inch.

3.05 CONFORMANCE VERIFICATION

A. Verify by auger or survey that the completed foundation layer has a minimum thickness of 12 inches. Measurements by either method shall be conducted using a grid pattern with 100-foot centers.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the foundation layer does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02240
FOUNDATION LAYER

CQA SECTION 02310
ACCESS ROADS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the access road materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (Not Used)

PART 2 PRODUCTS

2.01 REINFORCEMENT GEOTEXTILE

A. Verify reinforcement geotextile conformance under CQA Section 02771 (Reinforcement Geotextile) of this CQA Plan.

2.02 AGGREGATE BASE

A. Verify aggregate base conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the aggregate base as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

PART 3 EXECUTION

3.01 SUBGRADE

A. Verify that subgrade is scarified a minimum of 6 inches, uniformly moisture conditioned to within 1 to 3 percentages points of optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

3.02 REINFORCEMENT GEOTEXTILE

A. Verify that reinforcement geotextile is installed, including examination of subgrade surface, in accordance with the requirements for geotextile as set forth in Section 02771 (Geotextile) of this CQA Plan.

3.03 AGGREGATE BASE

A. Verify the stability of the subgrade by proof rolling with a roller or loaded water truck. Verify that any areas determined not to be suitable are allowed to air dry until stable or over-excavated and backfilled with aggregate base.

B. Verify that trucks do not back-dump aggregate base onto the reinforcement geotextile and that they only drive on previously dumped aggregate base to progress.

C. Verify that aggregate base material is spread in uniform loose lifts not exceeding 8 inches in thickness.

D. Perform the following field tests at the frequency shown to verify that the compacted aggregate base material has a minimum dry density of 95 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

E. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

F. Verify that access roads are "proof rolled" with a heavy wheel-load vehicle, such as a loaded water truck, to identify weak areas, and verify that any weak areas are reworked to the Design Engineer's satisfaction.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the access roads does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02310
ACCESS ROADS

CQA SECTION 02722
DRAINAGE AND EROSION CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the drainage and erosion control materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 DRAINAGE AND EROSION CONTROL COMPONENTS

A. Verify that the following drainage and erosion control components meet the applicable product requirements of Section 02722 (Drainage and Erosion Controls) of the Technical Specifications:

1. Corrugated metal pipe (CMP), couplings and fabricated fittings.
2. High density polyethylene (HDPE) pipe, couplings and fabricated fittings.
3. CMP anchor assembly stakes and hardware.
4. Turf reinforcement mat (TRM).
5. TRM anchorage stakes.
6. Erosion control netting.
7. Erosion control netting anchors.

2.02 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 BACKFILL

A. Verify that backfill placed above pipe bedding consists of material excavated from the trench/excavation unless specified otherwise by the Design Engineer.

B. Review moisture-density relationship conformance test results for the erosion-resistant layer as determined under CQA Section 02250 (Erosion-Resistant Layer) of this CQA Plan.

2.04 ROCK RIPRAP

A. Verify rock riprap conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.05 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning construction of any drainage and erosion control structure, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

3.02 STOCKPILING

A. Verify that the Contractor places all drainage and erosion control materials in an area(s) approved by the Design Engineer.

3.03 EXCAVATION

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

3.04 DRAIN INLETS AND DRAIN PIPE

A. Verify trenching conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

B. Verify that drain inlets/buried drain pipe and associated bedding and backfill material are placed in conformance with Section 66-1 of the Standard Specifications and the Technical Specifications.

C. Verify that above ground drain pipes are placed and anchored in conformance with Section 66 of the Standard Specifications and as shown on the Plans.

3.05 SEDIMENTATION BASIN DRAINAGE RISERS

A. Verify that vertical slots are cut in the sedimentation basin drainage risers to the dimensions, orientation and frequency as shown on the Plans.

B. Verify trenching conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

C. Verify that minor concrete installed for the drainage riser foundations is as shown on the Plans.

D. Verify concrete placement conformance under CQA Section 03300 (Concrete) of this CQA Plan.

E. Verify that bedding and backfill material are placed in conformance with Section 66-1 of the Standard Specifications and the Technical Specifications.

3.06 EARTHEN SWALES

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

3.07 EROSION MAT LINED SWALES

A. Verify that the TRM is installed as shown on the Plans and per manufacturer's recommendations.

B. Verify that trenches for terminal and check slots (anchorage) are excavated into the erosion-resistant layer as shown on the Plans.

C. Verify trench backfill conformance under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the trench backfill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

D. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

E. Verify that TRM placed at the top of swale (finish surface) is at or below the final grade so surface drainage can flow freely into the swale.

F. Verify that all splices are shingled downstream.

G. Verify that anchorage stakes are installed as shown on the Plans and per manufacturer's recommendations.

3.08 LOOSE ROCK RIPRAP LINED SWALES

A. Verify that rock riprap is placed to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

B. Verify that rock riprap is not be placed by dumping.

C. Verify that individual riprap stones are moved and placed as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire length of the swale.

D. Verify that the placed rock riprap is free of pockets of small stones or clusters of larger stones.

3.09 GROUTED ROCK RIPRAP OUTFALLS

A. Verify that the footprint of the outfall is excavated to the dimensions as shown on the Plans.

B. Verify that rock riprap is placed within the excavated footprint to the average thickness shown on the Plans with a maximum thickness deviation of 4 inches at any location.

C. Verify that rock riprap is not be placed by dumping.

D. Verify that individual riprap stones are moved and placed as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution over the entire footprint of the outfall.

E. Verify that the placed rock riprap is free of pockets of small stones or clusters of larger stones.

F. Verify concrete placement conformance under CQA Section 03300 (Concrete) of this CQA Plan.

3.10 EROSION CONTROL

A. Verify that the finish surface has been track walked prior to placement of seeding, fertilizer and straw.

B. Verify that the straw is placed onto landfill surface slopes that are steeper than 10 percent.

C. Verify that the blown straw applied to the landfill surface slopes has a minimum thickness of 1.5 inches in place.

D. Verify that erosion control netting is placed over the applied straw and that the netting is secured with anchors at a frequency of 1 foot on center along the edges, and one (1) every 35 square feet for interior areas. Verify that butt joints are spaced 1 foot apart.

3.11 CONFORMANCE VERIFICATION

A. After construction of any portion of drainage and erosion control measures, verify all grades and dimensions of completed work by either field survey or physical measurement.

3.12 CORRECTIVE ACTIONS

A. If any portion(s) of the drainage and erosion control provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02722
DRAINAGE AND EROSION CONTROL

CQA SECTION 02771
REINFORCEMENT GEOTEXTILE

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that reinforcement geotextile materials and installation are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal listed in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

1.03 TRANSPORT AND STORAGE

A. Upon delivery of the reinforcement geotextile rolls to the Work site, verify that the rolls have been transported with opaque protective coverings and within a closed trailer.

B. During unloading of the reinforcement geotextile rolls at the Work site, perform the following procedure:
   1. Obtain a copy of the packing list.
   2. Complete the Geotextile Delivery and Control Log for each shipment and attach a copy of the packing list. The Geotextile Delivery and Control Log documents the following:
      a. Delivery date.
      b. Roll numbers.
      c. Batch/lot numbers or production dates.
      d. Roll dimensions.
      e. Receipt of MQC test reports.
      f. CQA conformance test sampling.
      g. Receipt of CQA conformance test results.
      h. Manufacturer and Product Name or Designation.
      i. Name of CQA monitor observing delivery and storage.
      j. Total quantity delivered with each shipment and the cumulative total quantity delivered to date.
      k. Additional notes including rejection of materials, condition of delivered materials, and other materials included with the shipments.
   3. Obtain written certification from the Supplier that unloading and storage of the reinforcement geotextile rolls has been done in accordance with the Manufacturer's recommended procedures.
   4. Verify that reinforcement geotextile rolls are transported, unloaded, handled, and stored in a manner that does not damage the reinforcement geotextile rolls or their

protective coverings in accordance with the Manufacturer's recommended procedures and the following requirements:

a. Nylon or other cloth straps were used to unload and handle the reinforcement geotextile rolls to protect the rolls and their protective coverings from damage.

b. The reinforcement geotextile rolls were stacked no more than five rolls high and with a 3-foot wide access path between the stacked rows.

5. Verify that damaged protective coverings are repaired or replaced.

6. Identify and separate damaged or rejected reinforcement geotextile rolls.

PART 2 PRODUCTS

2.01 REINFORCEMENT GEOTEXTILE COMPONENTS

A. Verify that the following reinforcement geotextile components meet the applicable product requirements of Section 02771 (Reinforcement Geotextile) of the Technical Specifications:

1. Reinforcement geotextile.
2. Sewing thread.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. Prior to reinforcement geotextile installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Prior to reinforcement geotextile installation, verify that all underlying material installation and construction has been completed in accordance with the Technical Specifications.

3.02 INSTALLATION

A. Verify that the reinforcement geotextile is installed in accordance with Manufacturer's instructions for deployment, seaming, and exposure.

B. Verify that the reinforcement geotextile is installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

D. Verify that the reinforcement geotextile panels are overlapped with sufficient material to create a prayer fold for sewing operations.

E. Verify that the reinforcement geotextile is adequately ballasted during installation and until geotextile is covered with the overlying material.

F. Verify that the reinforcement geotextile is permanently anchored as shown on the Plans when installation is complete.

G. Verify that reinforcement geotextile damaged during installation is removed and/or repaired with a sewn patch.

H. Verify that terminal ends of reinforcement geotextile, where the type and purpose of the geotextile changes as shown on the Plans, are overlapped a minimum of 4 feet.

I. Verify that when cutting any reinforcement geotextile above other geosynthetics, the Installer uses a knife with a hooked blade.

J. Verify that the underlying soil subgrade or installed geosynthetics are not damaged by reinforcement geotextile installation equipment or methods and that any damaged soil subgrade or installed geosynthetics are completely repaired in accordance with the requirements of the applicable parts of Section 02771 (Reinforcement Geotextile) of the Technical Specifications.

K. Verify that rocks, excessive dust, excessive moisture or other matter that could cause damage, hamper sewing operations, or clog the reinforcement geotextile are not trapped under the reinforcement geotextile or within the overlap.

3.03 SEAMING AND REPAIR

A. Verify that all seams are sewn unless an alternate seaming method is allowed by the Design Engineer based on the Installer's demonstration of the alternative acceptability.

B. Verify that overlaps are clean and free of soil materials which could adversely affect sewing operations.

C. Verify that a prayer fold is made within the overlap prior to sewing.

D. Verify that a continuous 401 two-thread chain stitch is used to sew the prayer fold.

E. Verify that damaged reinforcement geotextile is removed entirely and replaced or repaired in accordance with the following guidelines:
   1. Repair (patching) material shall be of the same type as the damaged reinforcement geotextile.
   2. Patches shall extend a minimum of 12 inches in all directions beyond the damaged area with the machine direction of the patch aligned with the machine direction of the damaged reinforcement geotextile.
   3. Patches shall be seamed using the same method used for seaming the damaged reinforcement geotextile.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the reinforcement geotextile provisions do not meet the requirements of the Plans and Technical Specifications, based on either observations and/or physical measurement, verify that that portion(s) is repaired or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02771
REINFORCEMENT GEOTEXTILE

CQA SECTION 02772
GEOMEMBRANE

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that geomembrane liner materials and installation are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three copies of each submittal listed in the Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

1.03 TRANSPORT AND STORAGE

A. During unloading of the gemoembrane rolls at the site, perform the following procedure:
   1. Obtain a copy of the packing list.
   2. Complete the Geomembrane Delivery and Control Log for each shipment and attach a copy of the packing list. The Geomembrane Delivery and Control Log documents the following:
      a. Delivery date;
      b. Roll numbers;
      c. Batch/lot numbers or production dates;
      d. Roll dimensions;
      e. Receipt of MQC test reports;
      f. Manufacturer and Product Name or Designation;
      g. Name of CQA monitor observing delivery and storage;
      h. Total quantity delivered with each shipment and the a cumulative total quantity delivered to date; and
      i. Additional notes including rejection of materials, condition of delivered materials, and other materials included with the shipments.
   3. Obtain written certification from the Supplier that unloading and storage of the geomembrane rolls has been done in accordance with the Manufacturer's recommended procedures.
   4. Verify that geomembrane rolls are transported, unloaded, handled, and stored in a manner that does not damage the geomembrane rolls in accordance with the Manufacturer's recommended procedures and the following requirements:
      a. Stinger or straps (nylon or other cloth) shall be used to unload and handle the geomembrane rolls to protect the rolls from damage.
      b. The geomembrane rolls shall be stacked no more than three rolls high and with a 3-foot wide access path between the stacked rows.
   5. Identify and separate damaged or rejected geomembrane rolls.

PART 2 PRODUCTS

2.01 GEOMEMBRANE

A. Verify that geomembrane material consists of a compounded Linear Low-density polyethylene (LLDPE) meeting the product requirements of the Technical Specifications.

2.02 EXTRUDATE ROD

A. Verify that extrudate rod is made from the same resin as the geomembrane.

2.03 FIELD TESTING EQUIPMENT

A. Verify that the Installer provides and uses a field tensiometer for seam testing that has been calibrated within the last year and is accurate to within 2 pounds.

B. Verify that the Installer provides and uses a 1-inch (width) by 6-inch (length) cutting die for cutting seam test specimens.

2.04 CONFORMANCE TESTING

A. Conduct sampling for CQA conformance testing at the site upon delivery or at the manufacturing plant prior to shipment and delivery to the site.

B. For every 100,000 square feet of material delivered to the site, select at least one geomembrane roll to sample for CQA conformance testing.

C. Sample the selected geomembrane rolls for CQA conformance testing using the following procedure:
   1. Cut and discard the first three feet of geomembrane material from across the entire width of the roll.
   2. Cut the next 12 inches of material from across the entire width of the roll; this section of material is the CQA conformance testing sample.
   3. Assign a CQA test number to the sample and mark the following information directly on the sample with a paint marker:
      a. Machine direction of the sample.
      b. Manufacturer's roll number.
      c. CQA test number.
   4. Complete the geomembrane Test Request and Sample Custody Log and ship samples to the Geosynthetics Testing Laboratory via overnight delivery.

D. The following CQA conformance tests will be performed by the Geosynthetics Testing Laboratory to verify compliance with the product requirements of the Specifications:
   1. Tensile Properties (ASTM D638).
   2. Density (ASTM D 1505).
   3. Carbon Black Content (ASTM D 1603).
   4. Carbon Black Dispersion (ASTM D 5596).
   5. Sheet Thickness (ASTM D 5994).

E. Upon completion of CQA conformance testing and receipt of the results, review all results for compliance with the Specifications and report any test results which are not in compliance

with the Specifications to the Engineer.

F. Additional CQA conformance testing or corrective action to be performed in the event of test results which are not in compliance with the Specifications will be determined by the Engineer.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. Prior to geomembrane installation, hold a preparatory meeting in accordance with Section 01039 (Progress Meetings) of this CQA Plan.

B. Prior to geomembrane installation, verify that all underlying material installation and construction has been completed in accordance with the Technical Specifications.

C. Verify that prior to and at the middle of each geomembrane welding work shift and whenever adjustments are made to the welding machines, the Installer prepares and tests trial welds for each welding machine that is being used or will be used during that work shift.

D. Verify that trial welds are prepared for both fusion and extrusion welding machines and sampled using the following guidelines:
   1. Trial weld samples for fusion welding machines should be a minimum of 6 feet in length.
   2. Trial weld samples for extrusion welding machines should be a minimum of 3 feet in length.
   3. The trial weld should be centered along and run the entire length of the sample.

E. Verify that trial welds are tested as follows:
   1. Trial welds should be allowed to cool to ambient conditions prior to testing.
   2. After cooling, excessive material should be cut from the beginning and the end of the trial weld sample (approximately 4-inches from each end).
   3. Using the cutting die, four 1-inch specimens should be cut at an even spacing along the length of the trial weld.
   4. Using the field tenisometer with a rate of separation of 2 inches per minute, two non-adjacent specimens shall be tested for peel adhesion (peel) and two for bonded seam strength (shear); both sides of fusion welds shall be tested for peel.

F. Record peel and shear test results for trial welds on the Geomembrane Deployment/Welding Log using the following criteria:
   1. Peel test specimens:
      a. The break is either a film tear bond (FTB-passing) or a non-film tear bond (NFTB-failing).
      b. Percent of peel penetration into the weld (maximum of 10%).
      c. Quantitative value for peel strength (minimum of 75 ppi).
   2. Shear test specimens:
      a. The break is either a film tear bond (FTB-passing) or a non-film tear bond (NFTB-failing).
      b. Elongation of shear specimen (minimum of 2 inches).
      c. Quantitative value for bonded seam strength (minimum of 120 ppi).

G. If any of the four test specimens do not meet the peel or shear criteria, reject the entire trial weld and verify that the welding machine is not used for installation of the geomembrane until passing a retest consisting of repeating the entire trial weld sampling and testing procedure on a new weld performed with the failing machine.

H. If the retested trial weld fails, verify that the welding machine is not used for installation of the geomembrane until proper adjustments or repairs are made and passing a retest; if the welding machine continually fails field trial weld testing, verify that the welding machine is tagged and completely removed from work area.

3.02 INSTALLATION

A. Verify that geomembrane panels are deployed parallel to the slope by unrolling down the entire length of the slope and that corrections or adjustments are made to panels which become askew to the parallel line of the slope.

B. Verify that adjacent geomembrane panel edges are overlapped a minimum of 4-inches for fusion welding and alignment of the overlap is kept consistent by marking overlap indicator points.

C. Verify that geomembrane damaged during handling, transport, or deployment is removed or repaired.

D. Verify that the underlying the soil subgrade or installed geosynthetics are not damaged by geomembrane installation equipment or methods and that any damaged soil subgrade or installed geosynthetics are completely repaired in accordance with the requirements of the applicable section of the Specifications.

E. Verify that the Installer only deploys the quantity of geomembrane which can be completely welded and anchored by the end of the work shift or day.

F. Verify that the Installer prepares an adequate number of sandbags to ballast the geomembrane during deployment in accordance with the following guidelines:
   1. Only plastic ties should be used to close sandbags; no metal or wire ties are allowed.
   2. Sandbags should be removed prior to deploying overlying materials and after completion of permanent geomembrane anchorage.
   3. Sandbag fill should not be disposed of within the limits of work unless the fill consists of material which meets the Specification for the material it is disposed upon.
   4. Geomembrane rolls may also be used for ballast provided that no damage to the deployed geomembrane occurs.

G. Verify that the Installer deploys and seams the geomembrane in a manner which minimizes wrinkles and provides the proper amount of slack in the installed geomembrane to compensate for contraction due to local temperature extremes prior to covering; no stress-bridging or "fishmouths" are allowed.

H. Verify that immediately after geomembrane panels running through ditch flow lines or at toes of slopes are welded, sandbags are placed end-to-end along the entire length of the flow or toe line to prevent stress-bridging at those locations; alternatively, to reduce the number of sandbags required and to further prevent stress-bridging, the Installer may anchor the

geomembrane near the toes of slopes within a backfilled anchor trench constructed in accordance with the Specifications.

I. Verify that geomembrane panels are not overlapped or seamed perpendicular to the slope on slopes with a gradient of more than 10 percent, within 20 feet of the top of any slope, and unless the geomembrane is anchored within a backfilled anchor trench constructed in accordance with the Specifications.

J. Verify that when cutting any geomembrane above another geomembrane, the Installer uses a knife with a hooked blade.

K. Record the following information on the Geomembrane Deployment/Welding Log:
Note: The abbreviations in parenthesis following each verification procedure are used on the Geomembrane Deployment/Welding Log.

1. Temperature (T). Ambient and geomembrane surface temperatures with a description of the current weather conditions. Record every two hours and document dramatic changes in temperature and weather conditions.
2. Trial Welds (TW). Time of trial weld, type of welding equipment, welding equipment number, welding operator, and results of field peel and shear testing of trial welds.
3. Panel (P). Assigned panel number, geomembrane roll number, panel dimensions, and area of panel.

L. Using a graph computation sheet, field sketch a panel layout drawing of the geomembrane panels deployed during the day and attach this field sketch to the completed Geomembrane Deployment/Welding Log; the daily field sketches will be transposed to the master panel layout drawing.

3.03 FUSION WELDING

A. Verify that fusion welding operations only take place when the ambient temperature is between 40°F and 110°F unless the special weather welding plans have been submitted by the Installer and approved by Engineer to weld outside this range; measure ambient temperature 6-inches above the in-place geomembrane and record readings every two hours on the Geomembrane Deployment/Welding Log.

B. Verify that all geomembrane seams are fusion welded by the double-track method leaving an air gap for leak testing; extrusion welding can only be used for repairs, patches, fabrications, and inaccessible areas.

C. Prior to welding, verify that all fusion welding machines have performed trial welds and passed field trial weld testing.

D. Verify that the Installer's power source is capable of producing sufficient and constant voltage under the combined line load of multiple welders and other equipment.

E. Verify that surfaces to be welded are thoroughly cleaned.

F. Verify that seams are welded at the same speed, temperature, roller pressure, and gauge settings used to prepare the trial weld and that the welding operators record welding machine numbers, operators, machine settings, times, and dates on each seam welded.

G. Closely observe each fusion welding machine to verify that the machine is not adversely affecting or damaging the parent geomembrane material outside the welding area.

H. Record the following information on the Geomembrane Deployment/Welding Log:
Note: The abbreviations in parenthesis following each verification procedure are used on the Geomembrane Deployment/Welding Log.

1. Seam (S). Assigned seam number, welding equipment number that welded the seam, welding operator, and length of the welded seam.
2. End of Seam Test. (EST). If the Installer's quality control program requires that specimens be taken from the end of each welded seam and tested for peel adhesion, record these results using the same criteria as for trial welds. If the Installer records these results, request a copy of the results and this information can be omitted from the Geomembrane Deployment/Welding Log.
3. Seam Test Sample (STS). Assigned sample number, seam number sample is located on, location of sample within the seam, welding machine number, welding operator, and results of field seam testing.

3.04 EXTRUSION WELDING

A. Verify that extrusion welding is used only for repairs, patches, fabrications, and inaccessible areas.

B. Prior to welding, verify that all extrusion welding machines have performed trial welds and passed field trial weld testing.

C. Verify that geomembrane patches overlap the underlying geomembrane panel a minimum of 4 inches.

D. Verify that geomembrane patches are cut square with rounded corners and are large enough to extend a minimum of 4 inches in all directions over the repair area.

E. Verify that geomembrane patches are tack-welded to the underlying geomembrane panel to prevent movement during grinding and extrusion welding operations.

F. Verify that the outer edge of repair patches and the adjacent underlying geomembrane are disc-ground to remove surface debris and oxidation and that grinding is not parallel to seam.

G. Verify that the nozzles of extrusion guns are purged before each use to remove solidified extrudate.

H. Verify that the extrusion weld completely covers the entire width of the grind area and that extrusion safety welds extend 4 inches up any intersecting fusion weld.

I. Verify that a cap strip patch is extrusion welded at all fusion welded seam intersections of three or more geomembrane panels.

3.05 QUALITY CONTROL

A. Verify that quality control procedures are performed by the Installer in accordance with the Installer's Geomembrane Installation Quality Control Manual except where amended or modified by the Engineer or the Specifications.

B. Verify that the Installer maintains the following quality control documentation during the geomembrane installation in accordance with the Specifications:
   1. An accurate geomembrane panel layout drawing which includes; 1) roll and panel numbers; 2) seam numbers; 3) geomembrane limits; 4) anchor trench locations; and 5) seam test sample locations.
   2. Daily deployment logs and panel layout drawings to be submitted to the CQA Officer daily which include; 1) panel and seam numbers; 2) panel dimensions; and 3) deployment quantities.
   3. Daily welding logs to be submitted to the CQA Officer daily which include; 1) welding machine numbers; 2) operators; 3) machine settings; and 4) times and dates for each seam welded.

C. Verify that the entire length of each fusion welded seam is air-pressure tested by the Installer, with an air pump capable of generating and maintaining 40 psi of pressure and equipped with a regulator and pressure gauge and pressure feed needles having pressure gauges accurate to 1 psi, in accordance with the following procedure:
   1. Seal both ends of the fusion welded seam with vise-grip plate clamps or an extrusion weld; heat may be applied to the seam ends to aid in sealing the seam in conjunction with the clamps but due to the potential hazard of igniting landfill gas, propane torches or any other flame producing device are not allowed.
   2. At one end of the seam, insert air pressure needle into the fusion weld channel.
   3. Pressurize the channel to 30-35 psi and maintain pressure for 5 minutes.
   4. Release air from the opposite end of the seam to verify that the entire length of the fusion weld channel was pressurized.
   5. If channel pressure is not maintained with a maximum allowable pressure loss of 2 psi over the 5-minute test period or does not stabilize at all, locate the defective area, isolate it, and repeat air pressure test procedures in each direction from the defective area.

D. Verify that the Installer maintains air-pressure test logs on which are recorded seam numbers, beginning and ending air pressures, beginning and ending test times, lengths of tested seam, defective areas found, and confirmation of repair.

E. Record the following air-pressure testing information on the Geomembrane Deployment/Welding Log:
   Note: The abbreviations in parenthesis following each verification procedure are used on the Geomembrane Deployment/Welding Log.
   1. Air-Pressure Test (AP). Seam number tested, start time of the air pressure test and initial air pressure (psi), termination time of the air pressure test and ending air pressure (psi), and length of seam or portion of seam successfully tested.

F. Verify that the entire length of each extrusion welded seam and repair is vacuum tested by the Installer in accordance with the following procedures, with a vacuum pump capable of generating and maintaining 30 inches of mercury and equipped with a clean view window, regulator, and vacuum gauge accurate to 1 psi:
   1. Saturate the extrusion weld with a soap and water solution.

2. Place view box over the saturated weld, create an air tight seal, and apply vacuum in the box.
3. Maintain the vacuum for 10 seconds and examine weld for forming bubbles which indicate leaks; mark detected leaks for follow-up extrusion weld repair and retest detected leaks after repair to verify that the leaks were successfully repaired.

G. Verify that the Installer maintains vacuum test logs on which are recorded repair numbers, vacuum test dates, and vacuum test results.

H. Record the following vacuum testing information on the Geomembrane Repair Log.
1. Assigned repair number, location and description of repair, vacuum test dates, and vacuum test results.

3.06 SEAM TEST SAMPLING

A. Determine seam analysis sample locations by the *stratified random sampling method.* The stratified random sampling method allows random selection of a single sewn analysis sample location anywhere within the required 500-lineal feet sampling interval required in the technical specifications. Have the Installer perform the following seam analysis sampling procedures.
1. Seam analysis samples will be 12-inches wide by 36-inches long with the weld centered down the length of the sample. Samples sizes may be modified at the request of the Installer or CQA Officer. Cut one 1-inch specimen from each end of the sample, and field test specimens for peel adhesion in accordance with the Technical specifications. If these specimens pass the field peel test, submit sample for laboratory seam analysis. If either of the specimens fail the field peel test, perform Faded Seam Analysis Procedures in accordance with Section 3.08 of this Section.
2. Divide the sample into equal two sections, submit one Section for seam analysis and archive storage the second section.
3. Installer may obtain and test any seam analysis sample at its option.
4. Repair sample holes and vacuum test repair in accordance with Section 3.04 of this Section.

B. Based on the seam analysis *sampling method of attributes,* the CQA Officer may decrease or increase the 500-foot sampling interval based on the following control chart of passing percentages of seam analysis results.

Percent Of Passing Seam Analysis	Sampling Modifications
100	Decrease sampling interval to 1000 lf.
90 – 100	Decrease sampling interval to 750 lf.
60 – 90	Maintain sampling interval at 500 lf.
30 - 60	Increase sampling interval to 250 lf.

Note: Sampling modifications will be considered only after 20 percent of seam analysis is completed.

3.07 LABORATORY TESTING

A. Laboratory seam analysis will be performed at the Geosynthetics Testing Laboratory, which is independent of the geomembrane Manufacturer and Installer, and will be performed in accordance with the following procedures.
   1. Seam analysis will include peel adhesion and bonded seam strength (ASTM D 6392). Five specimens will be tested for each method.
   2. Both sides of fusion welded seams will be tested for peel adhesion.
   3. All five of the specimens must meet the Fail Criteria specified in the technical specifications.

B. Acceptance of the welded geomembrane seams will be based on the results of laboratory seam analysis.

3.08 FAILED SEAM ANALYSIS PROCEDURES

A. In coordination with the Installer, perform the following quality assurance verification procedures in the event of a seam analysis sample failure determined by either field testing or laboratory seam analysis.
   1. Track the welded seam 10 feet in both directions away from the failed seam analysis sample location. Cut a small 12-inch wide by 12-inch long sample from each location. Cut one 1-inch specimen from each end of the sample, and field test specimens for peel adhesion in accordance with Part 3.01 of this Section. If these specimens pass the field peel test, submit a 12-inch wide by 18-inch long re-test sample from both locations for laboratory seam analysis. If either of the specimens fail the field peel test at either location, continue tracking the welded seam at 10-foot intervals until specimens successfully pass the field peel tests and a sample can be submitted for laboratory seam analysis. If specimens continually fail field peel tests at 10-foot intervals, the entire seam or portion of the welded seam will be repaired at the discretion of the CQA Officer.
   2. Verify that the failed length of seam is repaired with an 18-inch wide extrusion welded cap strip. Tack and extrusion welding the leading flap of the fusion welded seam is not permitted. Verify that the extrusion welded cap strip is vacuum tested in accordance with the technical specifications.
   3. If the re-test sample fails laboratory seam analysis, repeat the above procedures.

B. Sample extrusion welded cap strips exceeding 100 feet in length for seam analysis.

END OF CQA SECTION 02772
GEOMEMBRANE

CQA SECTION 02773
ENGINEERED TURF

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that geonet composite material and installation are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal listed in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 of this CQA Plan.

1.03 TRANSPORT AND STORAGE

A. Upon delivery of the engineered turf rolls to the Work site, verify that the rolls have been transported with opaque protective coverings and within a closed trailer or covered open trailer.

B. During unloading of the geonet composite rolls at the Work site, perform the following procedure:

1. Obtain a copy of the packing list.
2. Complete the Engineered Turf Delivery and Control Log for each shipment and attach a copy of the packing list. The Engineered Turf Delivery and Control Log documents the following:
    a. Delivery date.
    b. Roll numbers.
    c. Batch/lot numbers or production dates.
    d. Roll dimensions.
    e. Manufacturer and Product Name or Designation.
    f. Name of CQA monitor observing delivery and storage.
    g. Total quantity delivered with each shipment.
    h. Additional notes including rejection of materials, condition of delivered materials, and other materials included with the shipments.
3. Verify unloading and storage of the engineered turf rolls has been done in accordance with the Manufacturer's recommended procedures.
4. Verify that engineered turf rolls are transported, unloaded, handled, and stored in a manner that does not damage the engineered turf rolls or their protective coverings in accordance with the Manufacturer's recommended procedures and the following requirements:
    a. Nylon or other cloth straps are used to unload and handle the geonet composite rolls to protect the rolls and their protective coverings from damage.

b. The engineered turf rolls are stacked no more than five (5) rolls high and with a 3-foot wide access path between the stacked rows.

5. Identify and separate damaged or rejected engineered turf rolls.
6. Verify that damaged protective coverings are repaired or replaced.
7. If CQA conformance test sampling, in accordance with Part 2.03C of this Section, is to be performed during delivery to the Work site, determine which geonet composite rolls will be sampled by either individual roll numbers, batch/lot numbers, or production dates, and position the rolls for convenient sampling.

PART 2 PRODUCTS

2.01 ENGINEERED TURF COMPONENTS

A. Verify that the following engineered turf components meet the applicable product requirements of Section 02773 (Engineered Turf) of the Technical Specifications:
   1. Engineered turf geotextiles.
   2. Engineered turf polyethylene yarns (grass blades).
   3. Sewing thread.
   4. Sand ballast infill.
   5. Hydrobinder.

2.02 CONFORMANCE TESTING

A. Conduct sampling for CQA conformance testing at the Work site upon delivery or at the manufacturing plant prior to shipment and delivery to the Work site.

B. For every 100,000 square feet of material delivered to the Work site, select at least one (1) engineered turf roll to sample for CQA conformance testing.

C. Sample the selected engineered turf rolls for CQA conformance testing using the following procedure:
   1. Cut and discard the first 3 feet of engineered turf material from across the entire width of the roll.
   2. Cut the next 18 inches of material from across the entire width of the roll; this section of material is the CQA conformance testing sample.
   3. Mark the sample with the following information directly on the sample with a paint marker:
      a. Machine direction of the sample.
      b. Manufacturer's roll number.
      c. CQA test number.
   4. Immediately re-wrap the sampled engineered turf roll with its protective covering; use additional opaque plastic sheeting, if needed, to completely cover the roll.
   5. Complete the Engineered Turf Test Request and Sample Custody Log and ship samples to the Geosynthetics Testing Laboratory.

D. The following CQA conformance tests will be performed by the Geosynthetics Testing Laboratory to verify compliance with the product requirements of the Technical Specifications at the following frequencies:

One (1) per every 100,000 square feet of Engineered Turf material components to be installed:

1. CBR Puncture (ASTM D6241).
2. Tensile Properties (ASTM D4595).
3. Rainfall Induced Erosion (ASTM D96459).
4. Fiber UV Stability (ASTM G147).
5. Backing System UV Stability, Exposed (ASTM G1545 Modified Cycle 1.UVA340).
6. Steady State Hydraulic Overtopping, Turf with HydroBinder (ASTM D7277/D7276).
7. Transmissivity with underlying structure geomembrane (ASTM D4716).
8. Internal Friction of combined components (ASTM D5321).
9. Sand Infill Gradation and Ballast (ASTM D6913).
10. Yarn Weight (ASTM D5261).
11. Tensile Strength of Yarn (ASTM D2256).

E. Upon completion of CQA conformance testing and receipt of the results, review all results for compliance with the Technical Specifications and report any test results which are not in compliance with the Technical Specifications to the Design Engineer.

F. Additional CQA conformance testing or corrective action to be performed in the event of test results which are not in compliance with the Technical Specifications will be determined by the Design Engineer.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

A. Prior to engineered turf installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 of this CQA Plan.

B. Prior to engineered turf installation, verify that all underlying material installation and construction has been completed in accordance with the Technical Specifications.

3.02 INSTALLATION

A. Verify that engineered turf is installed in accordance with the Manufacturer's instructions.

B. Verify that engineered turf is installed with the machine (lengthwise) direction of the roll oriented down the slope.

C. Verify that the engineered turf panels are deployed from the top of the slope in a way that the engineered turf is laid substantially smooth and filaments are pointing upslope after deployment is complete.

D. Verify that the first engineered turf panel deployed has the turf filaments facing upward. Verify that subsequent panels are deployed turf side down, and on top of the previously installed panel. Verify that after seaming each panel, the panel is flipped onto the geomembrane component with care to avoid pulling of tufts in the drainage studs.

E. Verify that end-to-end panel overlaps only occur on benches, unless the length of a slope

between benches exceeds the total length of a full engineered turf roll.

F. Verify that the engineered turf is installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.

G. Verify that a single stitch prayer type seam is constructed using a Nulong sewing machine or equivalent. Verify that sewing thread is 207 Polyester or equivalent and that sewing occurs between the 1st and 2nd row of engineered turf stitches.

H. Verify that the engineered turf is ballasted during installation and until the engineered turf is covered with the sand ballast infill material.

I. Verify that on slopes exceeding 15%, no equipment is allowed on the partially constructed turf cap system until after the completed installation of the sand ballast infill. Verify that on slopes less than 15%, ATV type vehicles are allowed prior to infill placement if the tire /track pressure is less than 5 psi.

J. Verify that following full specified sand ballast infill thickness installation, traffic be limited to light duty vehicles with drivability tire/track pressures of less than 35 psi.

K. Verify that engineered turf damaged during installation is removed and/or repaired with a sewn or fastened patch at the direction of the Design Engineer.

L. Verify that portions of the engineered turf wasted by the Installer, and rendered unusable, as determined by the Design Engineer, are transported by the Contractor and disposed of off-site at a permitted transfer station or solid waste disposal facility.

3.03 SAND BALLAST INFILL PLACEMENT

A. Verify that sand ballast infill is placed between the tufts of the engineered turf and:
   1. Is per plan either 5/8 inch thick or 2 1/8 inch thick, with a thickness tolerance of +/- 1/8 inch.
   2. Consists wholly of sand meeting ASTM C-33-03 for fine aggregates.
   3. Turf areas that are to receive sand ballast infill are accepted by the CQA Officer before placement of sand ballast infill takes place

B. Verify that sand ballast infill is worked into the engineered turf between the synthetic yarn blades.

C. Verify that conveyor systems and/or Express Blowers are used to spread and place the sand ballast infill.

D. Verify that the Contractor has explained with detail in the Preparatory Meeting the method of sand infill deployment to be used.

E. Verify that previously installed components are not displaced or damaged as a result of the sand ballast infill component installation.

F. Verify that a standard washer is utilized as a plate for the point of entry into the sand ballast infill for consistent depth control.

3.04 INFILL – HYDROBINDER® PLACEMENT

A. Verify that the HydroBinder® infill layer is placed using appropriate equipment capable of completing the work.

B. Verify that the Contractor has explained in detail during the Preparatory Meeting the method of HydroBinder® infill deployment.

C. Verify that installation of HydroBinder® infill is only be performed by a Manufacture's approved installer using techniques and equipment approved by the Manufacture.

D. Verify that the HydroBinder® is installed into the turf while it is in a dry state and that the HydroBinder® is worked into the tufts so the tufts are in an upright position.

E. Verify that the HydroBinder® infill is placed dry to a thickness of 7/8 inch with a tolerance of +/- 1/8 inch.

F. Verify that the hydration process occurs on the same day as the HydroBinder® infill placement and that the required HydroBinder® infill thickness is achieved prior to the hydration process.

G. Verify that the cemented infill is hydrated thoroughly and that care is taken to avoid displacement of the non-hydrated infill.

H. Verify that once hydration is completed as described, backfill and compaction of the vertical anchor trenches (if applicable) take place.

I. Verify that the HydroBinder® is at minimum performance levels within 24 hours.

3.05 DOCUMENTATION

A. Document daily observations of the deployment and seaming operations.

3.06 REPAIRS

A. Verify that all damaged areas or holes are repaired with a patch that extends 2 feet beyond the edge of the damaged area or hole.

3.07 CORRECTIVE ACTIONS

A. If any portion(s) of the engineered turf components do not meet the requirements of the Plans and Technical Specifications, based on either observations and/or physical measurement, verify that that portion(s) is repaired or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02773
ENGINEERED TURF

CQA SECTION 02900
SEEDING AND FERTILIZING

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that revegetation materials and placement methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 REVEGETATION MATERIALS

A. Verify that the following revegetation materials meet the applicable product requirements of Section 02900 (Seeding and Fertilizing) of the Technical Specifications:
1. Seed.
2. Fertilizer.
3. Tackifier.
4. Fiber.

B. Verify that fertilizer conforms to Section 20-2.02 of the Standard Specifications.

C. Verify that seed conforms to Section 20-2.10 of the Standard Specifications.

D. Verify that fiber and/or stabilizing emulsion, if used, conforms to Sections 20-2.07 and 20-2.11, respectively, of the Standard Specifications.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning of revegetation activities, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the method and equipment to be used to spread the seed, fertilizer and mulch has been approved by the Design Engineer.

C. Verify that the access roads, drainage structures, and erosion-resistant layer have been placed

to grade before seed, fertilizer and mulch is applied and verify with the Contractor that revegetation shall not occur on the access roads, lined drainage swales, and sedimentation basins.

3.02 APPLICATION

A. Verify that seed and fertilizer (including fiber and/or stabilizing emulsion, if applicable) are applied to the areas designated on the Plans.

B. Verify that all products are spread uniformly over all areas subject to revegetation.

3.03 CONFORMANCE VERIFICATION

A. Verify application rates on a daily basis for the respective materials by comparing the amount used (as determined from weight tags) to the total acreage covered.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the seeding and fertilizing provisions do not meet the requirements of the Plans and Technical Specifications, based on either observations and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02900
SEEDING AND FERTILIZING

CQA SECTION 02960
TEMPORARY EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the temporary erosion and sediment control materials and installation methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS (NOT USED)

PART 2 PRODUCTS

2.01 EROSION AND SEDIMENT CONTROL COMPONENTS

A. Verify that the following erosion and sediment control components meet the applicable product requirements of Section 02960 (Temporary Erosion and Sediment Controls) of the Technical Specifications:
   1. Straw bales.
   2. Straw wattles.
   3. Silt fencing.

2.02 ROCK FOR CONSTRUCTION ENTRANCE

A. Verify rock conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION AND SCHEDULE

A. Prior to beginning installation of any temporary erosion and sediment control components, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the Storm Water Pollution Prevention Plan (SWPPP) has been prepared by a Qualified SWPPP Developer (QSD), been submitted to the State Water Resources Control Board, and that a WDID number has been received for the project.

C. Verify that temporary erosion and sediment control measures are implemented year round during the course of the Project, and that temporary erosion control features are installed and maintained between October 15 and May 15 of each year.

3.02 PROTECTION

A. Verify that temporary erosion and sediment control measures are implemented in all areas of exposed earth created by the Contractor beyond what is shown on the Plans and referred to in

the Technical Specifications and areas cleared and grubbed prior to excavation or embankment operations which are subject to wind erosion and runoff.

3.03 TEMPORARY EROSION CONTROL FACILITIES

A. Verify that the Contractor conducts his operations in such a manner that storm water runoff is contained within the Work site or channeled into the storm drain system which serves the runoff area.

B. Verify that storm water runoff from one area is not diverted to another runoff area.

C. Verify that temporary down drains, drainage structures, and other devices are provided to channel storm water runoff water into the respective permanent storm drain systems during construction. Also verify that permanent drainage structures, not fully completed, are modified as required to accept de-silted runoff.

D. Verify that fill areas, while being brought to grade and during periods of completion prior to final construction, are protected by various measures to eliminate erosion and the siltation of downstream facilities and adjacent areas.

E. Verify that contour graded areas are protected against erosion and the resulting siltation of downstream facilities and adjacent areas during grading operations.

F. Verify that incorporation of culvert pipe used in conjunction with temporary erosion control measures for final construction improvements has been approved by the Design Engineer.

3.04 CORRECTIVE ACTIONS

A. If any portion(s) of the temporary erosion and sediment controls does not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Plans and Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 02960
TEMPORARY EROSION AND SEDIMENT CONTROLS

CQA SECTION 03300
CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the concrete materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 CONCRETE COMPONENTS

A. Verify that the following concrete components meet the applicable product requirements of Section 03300 (Concrete) of the Technical Specifications:
1. Concrete.
2. Reinforcement.
3. Forms.
4. Epoxy.

2.02 AGGREGATE BASE

A. Verify aggregate base conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.04 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the aggregate base as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

B. Verify that concrete and aggregate base materials are obtained from the approved sources throughout the Work.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to beginning construction of any drainage and erosion control structure, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the locations and dimensions of the concrete pads are as shown on the Plans or as staked by the Design Engineer.

C. Verify that the footprint areas for the flare station concrete pads as shown on the Plans are properly cleared and grubbed and that the underlying subgrade conforms to the engineered fill requirements per CQA Section 02224 (Engineered Fill) of this CQA Plan.

D. Verify that aggregate base for the flare station concrete pad is spread in a uniform loose lift not exceeding 8 inches in thickness.

E. Perform the following field tests at the frequency shown to verify that the compacted aggregate base material has a minimum dry density of 95 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one test beneath each concrete pad.
2. *Moisture Content (ASTM D 4959)*; at least one (1) test per every ten (10) nuclear gauge tests.

F. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.02 REINFORCEMENT

A. Verify that all reinforcement is installed in conformance with Concrete Reinforcing Steel Institute's (CRSI's) "Manual of Standard Practice".

B. Verify that all reinforcement is free from rust, oil, dirt, or any other coating.

C. Verify that continuous reinforcing bars are lapped at splices at a minimum of 32 diameters.

D. Verify that reinforcement has a minimum concrete cover of 3 inches (unless otherwise noted).

E. Verify that reinforcement is not damaged and is securely supported and anchored to avoid movement during placement of concrete.

3.03 FORMWORK

A. Verify that the strength of concrete formwork is sufficient to hold the concrete with minimal or no leakage and that shoring and bracing is provided to ensure stability of formwork.

B. Verify that 3/4-inch chamfer strips are used at exposed corners.

3.04 CONCRETE SLAB AND DRAIN INLET PLACEMENT

A. Verify that the subgrade and forms are moistened prior to placing concrete.

B. Verify that care is taken to not damage or displace the reinforcing steel components.

C. Verify that concrete is placed in a continuous operation and thoroughly vibrated to ensure consolidation around reinforcement.

D. Collect samples of the concrete to be used at the Work site and perform the following tests to verify that the concrete has the slump and compressive strength characteristics specified in the Technical Specifications:
   1. *Slump (ASTM C 143)*; one test per each concrete pour.
   2. *Compressive Strength (ASTM C 31 and ASTM C 39)*; one test per each concrete pour.

E. Verify that the final surfaces of the concrete slabs have a non-slip broom finish.

F. Verify that all significant cracks, spalls and irregularities in formed or finished surfaces or other defects are properly repaired or patched.

3.05 MINOR CONCRETE PLACEMENT

A. Verify that minor concrete for post footings and the sedimentation basin's drainage riser foundation are installed as shown on the Plans and in conformance with Sections 51 and 90-10 of the Standard Specifications, as applicable.

B. Verify that minor concrete for the grouted rock riprap is placed in conformance with Section 72-5.04 of the Standard Specifications.

3.06 EPOXY SECURED DOWELS OR ANCHORS

A. Verify that the diameter and depth of the drill hole is as indicated. If not included, verify that the hole is drilled 1/8-inch larger and ten (10) times deeper than the diameter of the dowel or anchor.

B. Verify that the hole is thoroughly cleaned by blowing it out with compressed air and by using a wire brush.

C. Verify that placement of epoxy in the hole is performed using a dispensing tool provided by, or recommended by the manufacturer and that the hole shall is completely filled with epoxy.

D. Verify that the dowel or anchor is placed in the hole and the epoxy allowed sufficient time to completely cure before disturbing the dowel or anchor.

3.07 CONFORMANCE VERIFICATION

A. After construction, verify by survey that the flare station concrete pads are completed at the elevations shown on the plans.

3.08 CORRECTIVE ACTIONS

A. If any portion(s) of the concrete provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 03300
CONCRETE

CQA SECTION 15100
LANDFILL GAS (LFG) EXTRACTION WELLS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the LFG extraction well materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 LFG EXTRACTION WELL COMPONENTS

A. Verify that the following LFG extraction well components meet the applicable product requirements of Section 15100 (Landfill Gas [LFG] Extraction Wells) of the Technical Specifications:
1. PVC well casing and fittings.
2. Bentonite Seal.
3. PVC well bore seal.
4. Prefabricated well head assemblies.

2.02 GRAVEL PACK

A. Verify gravel pack conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 SOIL BACKFILL

A. Verify soil backfill conformance under CQA Section 02250 (Erosion-Resistant Layer) of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to LFG extraction well drilling and installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that the LFG extraction well locations conform to the locations staked by the Design Engineer.

C. Verify that a drilling permit(s), if required, has been obtained by the Contractor.

D. Verify that drilling contractor is licensed (Class C-57) in the State of California.

E. Verify that the Contractor understands that individual LFG extraction wells must be drilled and installed in a single day so as to minimize the potential for LFG emissions from the borehole. In the event of equipment breakdown or other unforeseen circumstance that prohibits complete installation of the LFG extraction well within the same working day, verify that provisions are made to cover and seal the exposed borehole at the surface to prevent LFG emissions.

3.02 DRILLING

A. Verify that the boreholes for the LFG extraction wells are drilled using a bucket auger drill rig capable of drilling 24-inch diameter boreholes.

B. Verify that a safety screen is placed over the top of the borehole as soon as drilling is completed and that the screen is kept in place until backfilling is within 4 feet of the surface. Verify that the safety screen size is large enough to accommodate all backfill materials and activities yet not large enough for any human to accidentally fall through.

C. Verify that the borehole is straight and the well casing is installed in the center of the borehole. Verify that the Contractor takes all tension off of the pipe by mechanical means and centers the well casing in the middle of the borehole before starting to backfill.

D. Verify that PVC well casing joints are solvent cemented and secured with 3/8-inch long Type 316 stainless steel lag screws.

E. Verify that the completion height of the well casing above ground surface is such that the final height of the installed prefabricated well head assembly is 5 feet above final grade.

F. Verify that the top of the casing is capped until installation of the prefabricated well head assembly.

G. Verify that spoils generated as part of the drilling process are handle and managed in conformance with CQA Section 02222 (Excavation) of this CQA Plan.

H. In the event obstructions and/or saturated conditions are encountered during drilling, verify that the Contractor makes a reasonable effort to drill through obstructions and saturated conditions and that abandonment of the borehole is not performed without written approval obtained from the Design Engineer.

3.03 BACKFILLING

A. Verify that the strength of concrete formwork is sufficient to hold the concrete with minimal or no leakage and that shoring and bracing is provided to ensure stability of formwork.

B. Verify that 3/4-inch chamfer strips are used at exposed corners.

3.04 CONCRETE SLAB AND DRAIN INLET PLACEMENT

A. Verify that backfilling operations commence immediately after well drilling is completed and the well casing has been installed in the borehole. Verify that backfill materials are installed as shown on the Plans and as directed by the Design Engineer.

B. Verify that the gravel pack is poured or scooped through the safety screen at a rate that will not endanger the integrity of the well casing.

C. Verify that the upper and lower bentonite seals are formed by evenly distributing the bentonite material around the annulus of the well casing and that fresh water is added in a manner that will allow for a thorough saturation of the bentonite. Verify that the proportion of water added versus bentonite material is in accordance with the bentonite manufacturer's recommendations.

D. Verify that soil backfill is placed from the top of the lower bentonite seal to the bottom of the upper bentonite seal in a manner that will promote self compaction and avoid bridging of the soil backfill material.

E. Verify that the PVC well bore seal is installed in accordance with the manufacturer's recommendations around the well casing and placed at the location shown on the Plans.

F. Verify that the boot portion of the well bore seal is secured around the well casing with stainless steel straps to provide an air-tight connection. Following placement of erosion-resistant layer material, verify that the boot is installed in a collapsed position above the final grade to accommodate potential settlement.

G. Verify that the PVC well bore seal is covered with the overlying GCL material or soil (temporary) if the PVC well bore seal is going to be exposed for more than three (3) working days.

3.05 INSTALLATION OF PREFABRICATED WELL HEAD ASSEMBLY

A. Verify that the prefabricated well head assemblies are handled and installed in accordance with the manufacturer's recommendations and as shown on the Plans.

B. Verify that the well head is installed such that the interior extension tube assembly is concentric within the well casing.

C. Verify that the final completion height of the well head assembly is 5 feet above final grade as shown on the Plans.

D. Verify that the PVC flexible hose connection between the well head and LFG collection system piping is installed with sufficient slack (6 to 8 inches) to accommodate expansion and contraction. Verify that "IPS Weld-On 795" plastic pipe cement, or approved equivalent, is used for flexible hose connections to the well head and LFG collection system piping.

3.06 ABANDONMENT OF LFG EXTRACTION WELL BOREHOLE (IF REQUIRED)

A. Verify that boreholes approved by the Design Engineer for abandonment are backfilled with refuse and/or soil to the final grade and compacted. If refuse is used, verify that the refuse is

mechanically compacted within the borehole using the bucket auger to eliminate potential voids.

B. Upon completion of borehole abandonment activities, verify that the area around the borehole is restored to meet the surrounding grades as shown on the Plans.

3.07 PERFORMANCE TESTING

A. Verify that performance testing of the prefabricated well head assemblies is performed in conformance with Section 15100 (Landfill Gas [LFG] Extraction Wells) of the Technical Specifications.

3.08 CORRECTIVE ACTIONS

A. If any portion(s) of the LFG extraction well provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15100
LANDFILL GAS (LFG) EXTRACTION WELLS

CQA SECTION 15200
LFG COLLECTION SYSTEM COMPONENTS

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the LFG collection system component materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 LFG COLLECTION SYSTEM COMPONENTS

A. Verify that the following LFG collection system components meet the applicable product requirements of Section 15200 (LFG Collection System Components) of the Technical Specifications:

1. PVC pipe and fittings.
2. PVC butterfly valves (isolation valves).
3. PVC ball valves.
4. PVC cement.
5. Vacuum test ports.
6. HDPE pipe and fittings.
7. PVC-HDPE transition coupling.
8. Flexible couplings.
9. Staked pipe supports and anchors.
10. Metal frame pipe supports.
11. Block type pipe supports.
12. CMP.

2.02 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

2.03 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.04 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.05 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the pipe bedding and engineered fill as determined under CQA Section 02207 (Aggregate Materials) and CQA Section 02224 (Engineered Fill), respectively, of this CQA Plan.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to LFG collection system construction, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

3.02 LFG COLLECTION SYSTEM PIPING

A. Verify that the LFG collection system piping, including flexible couplings, isolation valves and condensate drop-out points are installed as shown on the Plans.

B. Verify that all PVC pipe, fittings and valves are inspected for cuts, scratches, or other damages prior to painting and installation.

C. Verify that prior to installation, all PVC pipe and fittings to be left exposed are steam cleaned and allowed to dry, then painted in conformance with Section 15200 (LFG Collection System Components) of the Technical Specifications.

D. Verify that PVC pipe, fittings and valves are joined with socket and solvent cement welding in accordance with ASTM D 2855 and that the joining of PVC pipe, fittings and valves are in accordance with the pipe manufacturer's recommendations and the Technical Specifications.

E. Verify that PVC pipe cuts are square and perpendicular to the centerline of the pipe and that PVC pipe ends are beveled prior to applying primer and solvent cement so that the primer or cement are not wiped off during insertion into the fitting socket.

F. Verify that all burrs, chips, etc. generated as a result of cutting operations are removed from the pipe interior and exterior and that the inside of the piping is kept clean of dirt and debris. Also verify that any piping left overnight is capped.

G. Verify that a coating of CPS primer as recommended by the PVC pipe supplier is applied to the entire interior surface of the fitting socket, and to an equivalent area on the exterior of the pipe prior to applying solvent cement.

H. Verify that the solvent cement used complies with the requirements of ASTM D 2564 and is applied in strict accordance with manufacturer's specifications.

I. Verify that PVC pipe, fittings and valves are not primed or solvent welded when it is raining or when ambient temperature is below 40°F or above 100°F.

J. Verify that after solvent welding, the PVC pipe, fittings and valves are allowed to remain undisturbed until cement has thoroughly set.

K. Verify that flexible couplings are installed at the locations shown on the Plans and that the flexible couplings are installed per the pipe separation criteria specified in the Plans based on the ambient temperature at the time of installation. Also verify that stainless steel band clamps are secured around the ends of the flexible coupling in such a manner as to provide an air-tight joint.

L. Verify that vacuum test ports are installed at the locations and orientations shown on the Plans and in accordance with the procedures described in Section 15200 (LFG Collection System Components) of the Technical Specifications.

M. Verify that staked pipe supports are installed under the selected pipe segments as specified on the Plans and that they are spaced at 10 feet on-center along the full length of the pipe segments. Also verify that the height of the pipe supports are adjusted as appropriate to ensure positive slope of LFG collection system piping and that the stakes are driven no less than 12 inches and no more than 18 inches below final surface grades.

N. Verify that block tyupe pipe anchors are installed at the intervals indicated on the Plans, as well as at the locations of all tee, elbow and wye fittings (both ends, but not on the fittings themselves) and at flexible couplings located on slopes as shown on the Plans and that the pipe clamps are secured around the LFG header system pipe to ensure that the pipe does not move.

O. Verify that metal frame pipe supports are installed at the locations shown on the Plans and that the height of cross-bar pipe supports are adjusted as appropriate to ensure positive slope of LFG collection system piping. Verify concrete placement conformance under CQA Section 03300 (Concrete) of this CQA Plan.

3.03 BURIED HEADER CROSSINGS

A. Verify that trenching across bench sections are to the depth and dimensions shown on the Plans.

B. Verify that LFG collection system piping is sloped at a minimum of 3 percent to maintain proper condensate drainage capabilities.

C. Verify backfill conformance under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

D. Record corresponding dry density and moisture content results on the Nuclear

Density/Moisture Test Data form.

3.04 ROAD CROSSINGS

A. Verify that CMP pipe supports and protective sleeves are installed in the orientations shown on the Plans and that the CMP pipe supports aligned with the center line of the drainage swale.

B. Verify that reinforcement geotextile is wrapped around the CMP protective sleeve where it will be in direct contact with the underlying CMP pipe support.

C. Verify that LFG collection system piping is inserted through the CMP protective sleeves in a manner that does not damage or compromise the LFG collection system piping.

D. Verify engineered fill placement conformance under CQA Section 02224 (Engineered Fill) and perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

E. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.05 CONDENSATE DRAIN PIPE AND FITTINGS

A. Prior to installation, verify that all HDPE pipe and fittings are inspected for cuts, scratches, or other damages and that pipe and/or fittings with imperfections are not used.

B. Verify that trench excavation and backfill for buried HDPE pipe and fittings are as shown on the Plans.

C. Verify that HDPE pipe connection ends and fittings are joined by butt fusion procedures in accordance with the HDPE pipe and fitting manufacturer's recommended procedures.

D. Verify during construction that the HDPE pipe is not bent to a degree greater than the minimum radius recommended by the manufacturer and that the HDPE pipe is not subjected to strains that will overstress or buckle piping or impose excessive stress on joints.

E. Verify that open ends of fused HDPE pipe are covered or capped at the end of each working day to prevent entry by animals or debris.

F. Verify that sufficient slack is provided for segments completed above ground to allow for thermal expansion and contraction so as to not promote excessive stress on the piping following installation.

G. Verify that allowance is provided for thermal expansion or contraction of buried HDPE pipe within trenches and is coordinated with the pipe backfill operations to avoid buildup of thermal stresses.

H. Verify that sufficient time (per manufacturer's recommendations) is provided following placement of HDPE pipe to allow the pipe to adjust to trench temperature prior to testing, segment tie-ins, or backfilling activities.

3.06 CONDENSATE DROP-OUTS

A. Verify that the condensate drop-outs, including u-trap assemblies, are installed at the locations and to the dimensions shown on the Plans.

B. Verify that excavations are not deeper than necessary to maintain adequate buffer above the underlying GCL.

C. Verify that the transition from PVC to HDPE is conducted at the flange connection as shown on the Plans.

D. Verify PVC and HDPE pipe, fittings and valves installation conformance under Parts 3.01 and 3.05 of this Section.

E. Verify installation of staked pipe anchors at various points on the u-trap piping as shown on the Plans.

F. Verify that the u-trap assemblies are filled with clean water following construction and prior to start of LFG collection system operations.

3.07 CONDENSATE DISCHARGE POINTS

A. Verify that the Condensate discharge points are installed at the locations and to the dimensions shown on the Plans.

B. Verify soil and/or refuse excavation and handling conformance under CQA Section 02222 (Excavation) of this CQA Plan.

C. Verify PVC and HDPE pipe and fittings installation conformance under Parts 3.01 and 3.05 of this Section.

D. For condensate discharge points located within the limits of the final cover system, verify placement conformance of the engineered fill and respective final cover system components above the condensate discharge points per the applicable sections of this CQA Plan.

E. For condensate discharge points located outside the limits of the final cover system, verify engineered fill placement conformance under CQA Section 02224 (Engineered Fill) and perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content - Nuclear (ASTM D 2922 and D 3017)*; at least one (1) test per 100 linear feet per lift.

2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

F. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.08 PERFORMANCE TESTING

A. Verify that performance testing of the PVC LFG collection system pipe, HDPE condensate drain pipe, and condensate discharge points is performed in conformance with Section 15200 (LFG Collection System Components) of the Technical Specifications.

3.09 CORRECTIVE ACTIONS

A. If any portion(s) of the LFG collection system components provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15200
LFG COLLECTION SYSTEM COMPONENTS

CQA SECTION 15300
FLARE STATION

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the flare station materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 FLARE STATION COMPONENTS

A. Verify that the following flare station components meet the applicable product requirements of Section 15300 (Flare Station) of the Technical Specifications:
1. Skid-mounted packaged combustion system.
2. Electrical conduit, wire and fittings.
3. Chain link fence.

2.02 PVC PIPE, FITTINGS AND BALL VALVE

A. Verify PVC pipe, fittings and ball valve conformance under CQA Section 15200 (LFG Collection System Components) of this CQA Plan.

2.03 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.04 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.05 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

2.06 AGGREGATE BASE

A. Verify aggregate base conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.07 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the aggregate base as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

PART 3 EXECUTION

3.01 FLARE STATION ASSEMBLY

A. Prior to flare station assembly activities, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that Contractor has obtained all required building permits.

C. Verify that Contractor's laborers are skilled and experienced in the installation of similar equipment.

D. Verify that the skid-mounted packaged combustion system is installed in strict accordance with the manufacturer's specifications.

3.02 CONDENSATE DRAINAGE LINE

A. Verify that the condensate drain line between the flare station and leachate wet well is installed as shown on the Plans.

B. Verify trenching and pipe bedding conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

C. Verify PVC pipe, fittings and ball valve installation conformance under CQA Section 15200 (LFG Collection System Components) of this CQA Plan.

D. Verify that the condensate drainage line is installed at a minimum slope of 1 percent in the direction of the leachate wet well.

E. Verify that the condensate drainage line penetrates the wall of the leachate wet well at the appropriate depth and that the annular space between the condensate drainage line and the wall of the leachate wet well is sealed using non-shrink grout.

F. Verify engineered fill placement conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

3.03 SECURITY FENCE

A. Verify that the chain link fence and gates are installed as shown on the Plans and in accordance with the requirements of Section 80-4.02 of the Standard Specifications.

B. Verify that all line, corner, and gate post assemblies are constructed with concrete post footings.

C. Verify that soil between fence posts is leveled to create a 2-inch clearance under the fence fabric.

3.04 FLARE STATION AGGREGATE BASE

A. Verify that the aggregate base within and around the flare station is placed to the dimensions shown on the Plans.

B. Verify that the aggregate base is spread in uniform loose lifts not exceeding 8 inches in thickness.

C. Perform the following field tests at the frequency shown to verify that the compacted aggregate base material has a minimum dry density of 95 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at one test per every 1,200 square feet.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

D. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

E. Verify that the final compacted thickness is a minimum of 6 inches.

3.05 PERFORMANCE TESTING

A. Verify that performance testing of the skid-mounted packaged combustion system and condensate drainage line is performed in conformance with Section 15300 (Flare Station) of the Technical Specifications.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the flare station provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15300
FLARE STATION

CQA SECTION 15400
FLARE STATION ELECTRICAL AND TELEPHONE FEED

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the flare station electrical and telephone feed materials and installation methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 ELECTRICAL AND TELEPHONE FEED COMPONENTS

A. Verify that the following electrical and telephone feed components meet the applicable product requirements of Section 15400 (Flare Station Electrical and Telephone Feed) of the Technical Specifications:
1. Wire.
2. Conduit and fittings.
3. Meter socket.
4. Junction and outlet boxes.
5. Warning tape.

2.02 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.04 CONCRETE

A. Verify concrete conformance under CQA Section 03300 (Concrete) of this CQA Plan.

2.05 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for pipe bedding and the engineered fill used for backfilling the former leachate pond as determined under CQA Section 02207 (Aggregate Base) and CQA Section 02224 (Engineered Fill), respectively, of this CQA Plan.

PART 3 EXECUTION

3.01 GENERAL

A. Prior to electrical and telephone feed installation, hold a preparatory meeting in accordance with Part 1.04 of Section 01039 (Project Meetings) of this CQA Plan.

B. Verify that Contractor has obtained all required electrical permits.

C. Verify that Contractor has furnished and installed all temporary power and lighting systems needed for construction and their subsequent removal after construction is completed.

D. Verify that Contractor has verified that the wire and conduit sizes for the main power supply and automatic telephone dialer system are appropriate for the intended use.

E. Verify that all electrical components are in accordance with the National Electric Code (NEC), National Fire Protection Association (NFPA) and local codes and regulations for installation in a Class 1, Division 1 or Class 1, Division 2 classified locations.

F. Verify that electrical and telephone feed installations are performed in accordance with the local electrical and telephone company rules and regulations.

G. Verify that the electrical and telephone feed from the existing service points to the flare station control panel is completed below grade as shown on the Plans.

H. Verify that Contractor has confirmed service and panel locations and all other service requirements prior to starting Work.

3.02 PREPARATION

A. Verify that all materials are inspected for damage and imperfections prior to installation and that damaged materials or materials with imperfections are not used.

3.03 TRENCHING AND BACKFILLING

A. Verify trenching and pipe bedding placement conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

B. Perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at least one (1) test per 100 linear feet per lift or at a change in material.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

C. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 INSTALLATION

A. Verify that all equipment, motors, conduit and outlets, as applicable, are permanently and effectively grounded in accordance with NEC, California Administrative Code (CAC) - Title 24 and local codes.

B. Verify that all conduits are sloped towards pull boxes and run in straight lines except where a change in direction is necessary. Also verify that couplings are staggered for maximum duct line strength.

C. Verify that the ends of buried conduit are kept closed with approved conduit seals during construction and that immediately prior to pulling wire or cable, a swab is drawn through all conduits to force out water and foreign materials.

D. Verify that junction boxes are installed in an accessible location as required for splicing, connections and pulling of wire.

E. Verify that all above ground conduit is properly secured on pipe supports or concrete slabs.

F. Verify that the meter socket installed at the existing service pole complies with the height and fastening specifications outlined in the local electric company rules and regulations.

3.05 CLEAN-UP

A. Verify that all exposed portions of electrical installation are thoroughly cleaned, including the removal of all traces of soil, labels, grease, oil, and other foreign matter.

3.06 CORRECTIVE ACTIONS

A. If any portion(s) of the flare station electrical and telephone feed provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15400
FLARE STATION ELECTRICAL AND TELEPHONE FEED

CQA SECTION 15500
LEACHATE OVERFLOW COLLECTION AND STORAGE SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. The CQA Officer shall perform CQA procedures as outlined in this Section and follow guidelines for monitoring and testing to verify and document that the leachate overflow collection and storage system materials and construction methods are in compliance with the Plans and Technical Specifications.

1.02 SUBMITTALS

A. Collect three (3) copies of each submittal required in the Technical Specifications.

B. Verify compliance with the submittal schedule and update Submittal Log.

C. Perform submittal review and approval procedures in Part 1.03 of Section 01300 (Submittals) of this CQA Plan.

PART 2 PRODUCTS

2.01 COLLECTION AND STORAGE SYSTEM COMPONENTS

A. Verify that the following leachate overflow collection and storage system components meet the applicable product requirements of Section 15500 (Leachate Overflow Collection and Storage System) of the Technical Specifications:
1. Pipe materials.
2. Pipe accessories.
3. Concrete junction boxes.
4. Lining material for leachate sediment chamber/wet well.
5. Leachate UST and accessories.

2.02 PIPE BEDDING

A. Verify pipe bedding conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.03 TANK BEDDING AND BACKFILL

A. Verify tank bedding and backfill conformance under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

2.04 ENGINEERED FILL

A. Verify engineered fill conformance under CQA Section 02224 (Engineered Fill) of this CQA Plan.

2.05 CONFORMANCE TESTING

A. Review moisture-density relationship conformance test results for the pipe bedding and tank bedding and backfill as determined under CQA Section 02207 (Aggregate Materials) of this CQA Plan.

B. Review moisture-density relationship conformance test results for the engineered fill as determined under CQA Section 02224 (Engineered Fill) of this CQA Plan.

PART 3 EXECUTION

3.01 BRACING AND SHORING

A. Verify that Bracing and shoring complies with Section 5-1.02A and 7-1.01E of the Standard Specifications.

3.02 GENERAL PIPE INSTALLATION

A. Verify that Contractor confirms the location of point of connection (POC) at the existing leachate collection piping as shown the Plans by potholing to determine the location and depth (elevation).

B. Verify that the trench subgrade for the gravity drain pipe provides uniform support at a uniform slope along full length of pipe.

3.03 PIPE INSTALLATION

A. Verify trench conformance under CQA Section 02225 (Trenching and Backfilling) of this CQA Plan.

B. Verify that the bottom of the trench is graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

C. Verify that pipe, fittings, and accessories are installed in accordance with manufacturer's instructions and that the sealed joints are watertight.

D. Verify that pipe is placed to the lines and grades as shown on the Plans.

E. Verify that the pipe is laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe.

F. Verify that the horizontal alignment of the pipe is laid such that no points vary more than 0.10 feet from the design alignment established and shown on the Plans.

G. Verify backfill conformance under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the compacted pipe bedding and engineered fill have a minimum dry density of 90 percent of the maximum dry density and is at a moisture content within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at least one (1) test per 100 linear feet per lift or at a change in material.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

H. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.04 CONCRETE JUNCTION BOXES

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

B. Verify that concrete junction boxes are installed in accordance with manufacturer's instructions and that their placement into the excavation is performed in a manner that will not induce damage or compromise future stability.

C. Verify that backfilling operations conform to the provisions in Section 19-3 of the Standard Specifications.

3.05 LEACHATE SEDIMENT CHAMBER/WET WELL LINING

C. Prior to start of Work, verify that provisions have been made to divert leachate from the existing leachate drain from discharging into the leachate sediment chamber and document how the leachate is being diverted and managed.

D. Verify that all leachate is pumped from the leachate sediment chamber and wet well and document where the leachate is pumped and managed.

E. Verify that any sediment present at the base of the leachate sediment chamber and/or wet well is removed and document how the sediment is removed and managed.

F. Verify that existing pumps and any other equipment/features that may inhibit application product are removed and stored in a dry and secure location.

G. Verify that the interior walls and base of the sediment chamber and wet well are steam cleaned to remove residual grime and residues. Also verify that residual rinseate generated by the steam cleaning operations is removed and document how the removed rinseate is managed.

H. Verify that sufficient time is provided to allow the surfaces of the interior walls and base to dry and document the nature of any mechanical means employed to expedite the drying time, as applicable.

I. Verify that the lining product is applied to provide full and sufficient coverage of all interior walls and base and that the application is performed in strict accordance with recommended manufacturer's procedures.

J. Verify that pumps and any other equipment/features that were removed are re-installed and verify that normal operation of the leachate sediment chamber/wet well is restored per pre-existing conditions.

3.06 TANK HOLDING

A. Verify that the tank is not dropped, rolled or impacted during unloaded and that the tank is set on smooth ground, free of rocks and foreign objects, and chock tanks to prevent movement.

3.07 TANK INSTALLATION

A. Verify excavation conformance under CQA Section 02222 (Excavation) of this CQA Plan.

B. Verify that the tank excavation is large enough to provide 2 feet of clearance between the tank sides and ends and the excavation walls in stable soil and 12 inches of bedding under the tank.

C. Verify that the tank and all related piping and accessories are installed as per manufacturer's printed instructions.

D. Verify that the tank bedding and backfill is placed in accordance with the sequence and procedures outlined in Section 15500 (Leachate Overflow Collection and Storage System) of the Technical Specifications.

E. Following placement of the tank bedding and backfill, verify backfill conformance for the remainder of the excavation under CQA Section 02225 (Trenching and Backfilling) and perform the following field tests at the frequency shown to verify that the compacted engineered fill has a minimum dry density of 90 percent of the maximum dry density and is within 1 to 3 percentage points of the optimum moisture content as determined from ASTM D 1557:

1. *Dry Density and Moisture Content – Nuclear (ASTM D 2922 and D 3017);* at one test per every 1,200 square feet.
2. *Moisture Content (ASTM D 4959);* at least one (1) test per every ten (10) nuclear gauge tests.

F. Record corresponding dry density and moisture content results on the Nuclear Density/Moisture Test Data form.

3.08 PERFORMANCE TESTING

A. Verify that performance testing of the leachate sediment chamber/wet well and leachate UST is performed in conformance with Section 15500 (Leachate Overflow Collection and Storage System) of the Technical Specifications.

3.09 CORRECTIVE ACTIONS

A. If any portion(s) of the leachate overflow connection and storage system provisions do not meet the requirements of the Plans and Technical Specifications, based on either field test results, observations, field survey, and/or physical measurement, verify that that portion(s) is reworked or removed and replaced to meet the requirements of the Technical Specifications and that the corrective actions implemented by the Contractor are in conformance with methods approved by the Design Engineer and the applicable Standard Specifications.

END OF CQA SECTION 15500

APPENDIX A

PROJECT DOCUMENT FORMS

DAILY SUMMARY REPORT

Project: **Date:**

Day:

Owner: **Document Control No.:**

Contractor: **Weather:** AM
PM

Construction Activity Summary

Construction Unit/Area:

Equipment:

Personnel:

Subcontractors:

CQA Monitoring/Testing Summary

(Attach Inspection Data Sheets or Daily Field Logs)

Non-Conformance/Corrective Action

(Attach Non-conformance/Corrective Action Form)

Materials Received/Submittal Status

Meetings

Other Information

Signature: _____

NON-CONFORMANCE/CORRECTIVE ACTION FORM

Project: **Date:**

Day:

Owner: **Document Control No.:**

Contractor:

Non-conformance Summary

Description:

Specification or Drawing Reference:

Corrective Action

Description:

Specification Variance or Drawing Revision:

(Record any Drawing Revision on the Site As-built Record Drawings)

Signature: _____

ACCEPTANCE REPORT

Project: **Date:**

Day:

Owner: **Document Control No.:**

Contractor:

Acceptance Statement

All materials and construction processes for the Construction Unit stated below comply with the Design Plans and Specifications.

Construction Unit (Section No.)

Daily Summary Reports Referenced

(List Document Control Nos.)

Non-Conformance/Corrective Action Forms Referenced

(List Document Control Nos.)

Signature: _____

MEETING/DISCUSSION SUMMARY REPORT

Project: **Date:**

Time:

Owner: **Document Control No.:**

Contractor: **Location:**

Meeting Name or Subject Matter

Attendees

Minutes (if scheduled meeting) or Synopsis

Items for Resolution

Signature: _____

PHOTOGRAPH LOG

Project: **Date(s):**

Roll No.:

Owner:

Contractor:

DATE TIME	PICTURE NO.	SUBJECT MATTER

Signature: _____

SUBGRADE SOIL SURFACE ACCEPTANCE

Project: **Date:**
Day:

Owner:
CQA Monitor: **Document Control No.:**
Contractor:
Material Description: **Cell No.:**

Description of Soil Surface to be Lined:

I hereby certify that the above surface area is suitable for the installation of geosynthetics, and that (Contractor and Installer) shall be responsible for its integrity and suitability in accordance with the Specifications from this date to the completion of the installation

Installer Representative:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

Subgrade Contractor:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

Witness:

CQA Monitor:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

Owner Representative:
Signature: _____
Name: _____
Date: _____
Title: _____
Representing: _____

APPENDIX B

SOILS MONITORING FORMS

NUCLEAR DENSITY / MOISTURE TEST DATA

Project:
Project No.:

Test No.									Test Notes
Soil Type									
Northing									
Easting									
Elevation (ft)									
Test Depth (in)									
Density Count									
Wet Density (pcf)									
Moisture Count									
Moisture (pcf)									
Dry Density (pcf)									
Moisture Content (%)									
Reference Curve (pcf)									
Reference OMC (%)									
Oven Moisture Content (%)									
Dry Density Correction (pcf)									
Relative Compaction (%)									

Standard Count Density:	Nuclear Gauge No.:	Additional Notes:
Standard Count Moisture:	CQA Monitor:	
Date:	Reviewer:	Sheet No.: of

SOILS TEST REQUEST
SAMPLE CUSTODY LOG

Project:
Project No.:

Sample No.	Atterberg Limits	Unified Soil Classification	Moisture Density Relationship	Particle Size Analysis	Moisture Content	Sample Instructions
ASTM	D 4318	D 2487	D 1557	D 422	D 2216	

Laboratory:	**Shipped by:**	**Special Instructions:**
Request Date:	**Shipped Via:**	
Results Date:	**Received by:**	

APPENDIX C

GEOSYNTHETICS MONITORING FORMS

GEOMEMBRANE DELIVERY AND CONTROL LOG

(Attach packing list)

Project:

Project No.:

Roll No.	Lot No.	Length (ft)	Width (ft)	Area (ft^2)	QC Test Report	QAVT Sample	QAVT Results	Condition Notes

Manufacturer:	CQA Monitor:	Additional Notes:
Material:	Shipment Quanity (ft^2):	
Date:	Accumulated Quanity (ft^2):	Shipment No.:

GEOMEMBRANE DEPLOYMENT/SEAMING LOG

(Attach field sketch of daily panel layout)

Project:
Project No.:

Abbreviations: Panel(P), Roll(R), Seam(S), Cross-seam(CS), Air Pressure(AP), Vacuum Test(VT), Seam Analysis Sample(SAS) End of Seam Test(EST), Trial Weld(TW), Subgrade Acceptance(SA), Temperature(T), Note(N).

Date: CQA Monitor: Sheet No.: of

GEOMEMBRANE REPAIR LOG

Project No.:

Repair No.	Repair Description	Repair Location	Repair Date	VT Date	VT Result

Abbreviations: Panel(P), Seam(S), Cross-seam(CS), Air Pressure(AP), Anchor Trench(AT), Seam Analysis Sample(SAS), End of Seam Test(EST), Safety Patch(SP), Vacuum Test(VT), North(N), South(S), East(E), West(W).

Date:	CQA Monitor:	Sheet No.: of

APPENDIX D

SUBMITTAL CONTROL LOG

SUBMITTAL CONTROL LOG

Project: Final Closure Construction, City of Ukiah Landfill
Project No.: 02-907
Owner: City of Ukiah, Department of Public Works
CQA Certifying Engineer: EBA Engineering

Contractor: _____
Installer: _____
Geosynthetics Supplier: _____

Submittal No.	Specification Section	Submittal Description	Submitted By	When Required	Date Received	Reviewer	Action Taken/Determination	Date Returned
DIVISION 1	**GENERAL PROJECT REQUIREMENTS**							
GPR-1	01060-3.03	Surveying and Field Engineering (Name and Qualifications)		Prior to Commencement of Work				
GPR-2	01310-1.01(A)	Project Schedule		Prior to Commencement of Work				
GPR-3	01500-1.03(A)	Dust Control Plan		Prior to Commencement of Work				
GPR-4	01550-1.07(A)	Storm Water Pollution Prevention Plan (SWPPP)		14 Days of Authorization to Proceed				
GPR-5	01550-1.07(F)	Storm Water Inspection Training Records		5 Days Prior to Commencement of Work				
GPR-6	01800-3.02(A, C)	Health and Safety Plan with Emergency Contact List		Prior to Commencement of Work				
DIVISION 2	**SITE WORK**							
SW-1	02200-1.03(A)	Materials used for replacement or adjustment of existing facilities		14 Days Prior to Delivery				
SW-2	02207-1.04(A)	Name & Location of source and laboratory test results for aggregate base		15 Days Prior to Delivery				
SW-3	02722-1.04(A)	Riprap Stone (Sources, Lab Test Results, Product Data Sheets)		14 Days Prior to Construction				
SW-4	02722-1.05(B)	Concrete (Sources, Lab Test Results, Mix Design)		14 Days Prior to Construction				
SW-5	02722-1.05(C)	Erosion Control (Samples, Product Data Sheets, Installation Guidelines)		14 Days Prior to Delivery				
SW-6	02722-2.01	Drain Inlets		14 Days Prior to Delivery				
SW-7	02722-2.02	Drain Pipe		14 Days Prior to Delivery				
SW-8	02771-1.04(A)(1)	Geotextile Reinforcement (Samples & Product Data Sheets)		14 Days Prior to Delivery				
SW-9	02771-1.04(A)(2)	Geotextile Reinforcement (MQC Test Results)		14 Days Prior to Delivery				
SW-10	02771-1.04(A)(3)	Geotextile Reinforcement (Manufacture's Recommended Procedures)		14 Days Prior to Delivery				
SW-11	02771-1.04(A)(4)	Geotextile Sewing Thread (Samples & Product Data Sheets)		14 Days Prior to Delivery				
SW-12	02772-1.03(A)(1)	Geomembrane Resin (Single Source Compliance Certificate)		14 Days before Delivery				
SW-13	02772-1.03(A)(2)	Geomembrane Base Resin (MQC Test Results)		14 Days before Delivery				
SW-14	02772-1.03(A)(3)	Geomembrane (Samples & Product Data Sheets)		14 Days before Delivery				
SW-15	02772-1.03(A)(4)	Geomembrane (2-foot by 2-foot Sample Geomembrane specimen)		14 Days before Delivery				
SW-16	02772-1.03(A)(5)	Geomembrane (MQC Test Results)		14 Days before Delivery				
SW-17	02772-1.03(A)(6)	Geomembrane (Manufacture's Recommended Procedures)		14 Days before Delivery				
SW-18	02772-1.03(A)(7)	Geomembrane (Certificate of Compliance for Extrudate Rod Material)		14 Days before Delivery				
SW-19	02772-1.03(B)(1)	Geomembrane (Quality Control Plan)		14 Days prior to Installation				
SW-20	02772-1.03(B)(2)	Geomembrane (Installer's Qualifications)		14 Days prior to Installation				
SW-21	02772-1.04(C)(1)	Geomembrane (Installer's Warranty)		Upon Completion of the work				
SW-22	02773-1.03(A)(1)	Engineered Turf (Samples & Product Data Sheets)		14 Days before Delivery				
SW-23	02773-1.03(A)(2)	Engineered Turf (MQC Test Results)		14 Days before Delivery				
SW-24	02773-1.03(A)(3)(a)	Engineered Turf Resin (Single Source Compliance Certificate)		14 Days before Delivery				
SW-25	02773-1.03(A)(3)(b)	Engineered Turf Base Resin (MQC Test Results)		14 Days before Delivery				
SW-26	02773-1.03(A)(4)	Engineered Turf (Manufacture's Recommended Procedures)		14 Days before Delivery				
SW-27	02773-1.03(A)(5)	Plastic Fasteners (ties) (Samples/Product Data Sheets)		14 Days before Delivery				
SW-28	02773-1.03(A)(6)	Engineered Turf Panel Layout Drawing		14 Days before Delivery				
SW-29	02900-1.03(A)	Seeding (Sources, Lab Test Results, Product Data Sheets)		Prior to Seeding				
SW-30	02900-1.03(B)	Seeding (Certified Tags from Seed Bags)		After Seeding				
SW-31	02960-1.03(A)	Storm Water Pollution Prevention Plan (SWPPP)		14 Days of Authorization to Proceed				

SUBMITTAL CONTROL LOG

Project: Final Closure Construction, City of Ukiah Landfill
Project No.: 02-907
Owner: City of Ukiah, Department of Public Works
CQA Certifying Engineer: EBA Engineering

Contractor: _____
Installer: _____
Geosynthetics Supplier: _____

Submittal No.	Specification Section	Submittal Description	Submitted By	When Required	Date Received	Reviewer	Action Taken/Determination	Date Returned
SW-32	03300-1.04(A)	Concrete (Sources, Lab Test Results, Mix Design)		14 Days before Delivery				
SW-33	15100-1.03(A)(1)	Drilling Subcontractor Information		14 Days Prior to Drilling				
SW-34	15100-1.03(A)(2)	Name & Location of source and laboratory test results for LFG well components		14 Days Prior to Drilling				
SW-35	15100-1.03(A)(3)	Well head assembly manufacturer's recommended installation procedure		14 Days Prior to Drilling				
SW-36	15200-1.02(A)(1)	Manufacturer's Product Data Sheets (HDPE and PVC pipe, fitting, and valves)		14 Days before Delivery				
SW-37	15200-1.02(A)(1)	Manufacturer's Product Data Sheets (Valve boxes)		14 Days before Delivery				
SW-38	15200-1.02(A)(2)	Manufacturer's Recommended Procedures for HDPE pipe, fittings and valves		14 Days before Delivery				
SW-39	15200-3.08	Proposed Procedures - Vacuum Pressure Test of LFG Collection Pipe		14 Days Prior to Construction				
SW-40	15400-3.08	Test Results - LFG Collection Pipe, Well head Assemblies		14 Days After Completion of Performance Testing				
SW-41	15300-1.04(A)	Flare Station Assembly Building Permit		14 Days Prior to Construction				
SW-42	15300-1.04(B)	Flare Station Assembly Building Inspection Reports		14 Days Prior to Completion				
SW-43	15300-1.04(C)	Flare Station procedures for combustion system and pressure testing		14 Days Prior to Testing				
SW-44	15300-1.04(D)	Flare Station Test Results		14 Days of Completion of Testing				
SW-45	15400-1.03(A)	Electrical Manufacturer's Product Data Sheets (Wire, conduit, boxes, etc.)		14 Days before Delivery				
SW-46	15400-1.03(B)	Electrical Permits		14 Days Prior to Construction				
SW-47	15400-1.03©	Electrical Permit Inspection Reports		14 Days Prior to Completion				
SW-48	15500-1.04(A)	Leachate Collection System Manufacturere's Product Data (UST, pipe, boxes)		14 Days before Delivery				
SW-49	15500-1.04(B)	Leachate UST Field Test Report		14 Days After Completion of Testing				
SW-50	15500-1.0(C)	Leacheat Sediment Chamber and Well Lining Procedures		14 Days Prior to Construction				

ATTACHMENT 8

CONSTRUCTION DRAWINGS
FINAL CLOSURE CONSTRUCTION

CONSTRUCTION DRAWINGS

FOR

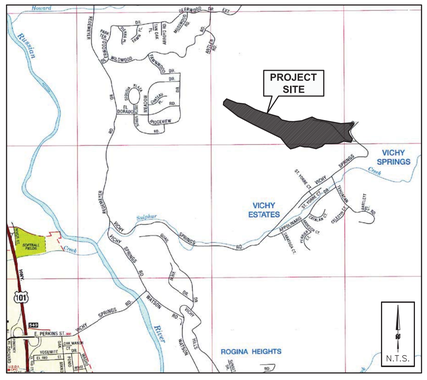
CITY OF UKIAH LANDFILL
FINAL CLOSURE CONSTRUCTION

APN 178-130-01

3100 VICHY SPRINGS ROAD

UKIAH, CALIFORNIA

LOCATION MAP



SITE MAP



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001	NOTES, LEGEND AND ABBREVIATIONS
100	SITE MAP (EXISTING CONDITIONS)
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201	LANDFILL COVER PLAN
202	LANDFILL COVER PLAN
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301	FINISHED GRADE (LANDFILL)
302	FINISHED GRADE (LAND FILL)
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700	LFG COLLECTION SYSTEM DETAILS
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702	LFG COLLECTION SYSTEM DETAILS
703	LFG COLLECTION SYSTEM DETAILS
704	LFG COLLECTION SYSTEM DETAILS
705	LFG COLLECTION SYSTEM DETAILS

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CIVIL
STATE OF CALIFORNIA

TITLE SHEET

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No: 02-907
Drawn By: SGH/ DTM
Checked By: DS
Date: 2015-08-14

Sheet Number

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Xrefs: X-Ref - C2 - 203.dwg,X-Ref - Submittal.dwg
Plot By: LISA(LAP)\AutoCAD\Projects\02-907\dwg Plot Date: Aug 13, 2015 at 14:54

GENERAL NOTES

1. ALL CONSTRUCTION MATERIALS AND METHODS SHALL CONFORM TO THE REQUIREMENTS OF THE COUNTY OF MENDOCINO. ALL REFERENCES TO STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS SHALL REFER TO THE MAY, 2006 EDITION OF THE STANDARD SPECIFICATIONS. ATTENTION IS ALSO DIRECTED TO THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD PLANS (MAY 6, 2006) WHICH, WHEN APPLICABLE, ARE INCLUDED IN THESE DRAWINGS AND REFERENCED BY STANDARD PLAN NUMBER.

2. PUBLIC SAFETY AND TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH COUNTY REQUIREMENTS AND AS DIRECTED BY THE ENGINEER. SAFE VEHICULAR AND PEDESTRIAN ACCESS SHALL BE PROVIDED AT ALL TIMES DURING CONSTRUCTION.

3. A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR SHALL DO ALL FIELD STAKING AT THE EXPENSE OF THE CONTRACTOR.

4. ANY DISCREPANCY DISCOVERED BY THE CONTRACTOR IN THESE PLANS OR ANY FIELD CONDITIONS DISCOVERED BY THE CONTRACTOR THAT MAY DELAY OR OBSTRUCT THE PROPER COMPLETION OF THE WORK PER THESE PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY UPON DISCOVERY. SAID NOTIFICATION SHALL BE IN WRITING.

5. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, GENERAL CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

6. CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING MONUMENTS AND OTHER SURVEY MARKERS. MONUMENTS, SURVEY MARKERS, GAS, WATER AND MONITORING DEVICES DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

7. CONTRACTOR SHALL MAINTAIN ADEQUATE DUST CONTROL PER SECTION 10, CALTRANS STANDARD SPECIFICATIONS.

8. DURING CONSTRUCTION , THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING NOISE, ODORS, DUST, AND DEBRIS TO MINIMIZE IMPACTS ON SURROUNDING PROPERTIES AND ROADWAYS. CONTRACTOR SHALL BE RESPONSIBLE THAT ALL CONSTRUCTION EQUIPMENT IS EQUIPPED WITH MANUFACTURER'S APPROVED MUFFLER BAFFLES. FAILURE TO DO SO MAY RESULT IN THE ISSUANCE OF AN ORDER TO STOP WORK.

9. CONTRACTOR SHALL INDEPENDENTLY REVIEW GROUND, TOPOGRAPHY, AND EXISTING CONDITIONS THROUGHOUT THE LIMITS OF WORK, AND ASSUME WHOLLY AND UNCONDITIONALLY THE RISK OF COMPLETING THE WORK SET OUT ON THESE PLANS, REGARDLESS OF ROCK, WATER TABLE, OR OTHER CONDITIONS WHICH THE CONTRACTOR MAY ENCOUNTER IN THE COURSE OF THE WORK.

10. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS BEFORE LAYING OUT THE WORK AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE STARTING WORK. HE SHALL BE RESPONSIBLE FOR ANY ERRORS RESULTING FROM HIS FAILURE TO DO SO.

11. DIMENSION TAKE PRECEDENCE OVER SCALE.

12. ALL WORK TO BE COMPLETED IS ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

EROSION CONTROL NOTES

GENERAL

1. PERFORM EROSION PREVENTION AND SEDIMENT CONTROL IN ACCORDANCE WITH THE COUNTY OF MENDOCINO STANDARDS, CALIFORNIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND THE PROJECT CONSTRUCTION DOCUMENTS.

2. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING STORM WATER POLLUTION GENERATED FROM THE CONSTRUCTION SITE YEAR ROUND. WORK SITES WITH INADEQUATE EROSION AND SEDIMENT CONTROL MAY BE SUBJECT TO A STOP WORK ORDER.

3. IF DISCREPANCIES OCCUR BETWEEN THESE NOTES, MATERIAL REFERENCED HEREIN OR MANUFACTURER'S RECOMMENDATIONS, THEN THE MOST PROTECTIVE SHALL APPLY.

4. AT ALL TIMES THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND COMPLYING WITH THE STATE OF CALIFORNIA NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION ACTIVITY. CONSTRUCTION ACTIVITIES INCLUDE BUT ARE NOT LIMITED TO CLEARING, GRADING, EXCAVATION, STOCKPILING, AND RECONSTRUCTION OF EXISTING FACILITIES INVOLVING REMOVAL AND REPLACEMENT.

RAINY SEASON OPERATIONS

1. THE CONTRACTOR MUST IMPLEMENT AN EFFECTIVE COMBINATION OF EROSION PREVENTION AND SEDIMENT CONTROL ON ALL DISTURBED AREAS DURING THE RAINY SEASON (OCTOBER 15 - APRIL 15). CONSTRUCTION GRADING AND DRAINAGE IMPROVEMENT SHALL BE PERMITTED DURING THE RAINY SEASON ONLY WHEN ON-SITE SOIL CONDITIONS PERMIT THE WORK TO BE PERFORMED. STORM WATER BMPS REFERENCED OR DETAILED IN THE PERMIT AUTHORITY'S BEST MANAGEMENT PRACTICES GUIDE SHALL BE IMPLEMENTED AND FUNCTIONAL ON THE SITE AT ALL TIMES.

YEAR ROUND REQUIREMENTS

1. DURING THE NON-RAINY SEASON, ON ANY DAY WHEN THE NATIONAL WEATHER SERVICE FORECAST IS A CHANCE OF RAIN OF 30% OR GREATER WITHIN THE NEXT 24 HOURS, STORM WATER BMPS REFERENCED OR DETAILED IN PRMD'S BEST MANAGEMENT PRACTICES GUIDE SHALL BE IMPLEMENTED, INSTALLED, AND FUNCTIONAL ON THE SITE TO PREVENT SOIL AND OTHER POLLUTANT DISCHARGES. AT ALL OTHER TIMES, BMPS SHOULD BE STORED ON SITE IN PREPARATION FOR INSTALLATION PRIOR TO RAIN EVENTS.

2. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED BY THE CONTRACTOR BEFORE FORECASTED STORM EVENTS AND AFTER STORM EVENTS TO ENSURE MEASURES ARE FUNCTIONING PROPERLY. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES THAT HAVE FAILED OR ARE NO LONGER EFFECTIVE SHALL BE PROMPTLY REPLACED. EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED.

3. THE LIMITS OF GRADING SHALL BE DEFINED AND MARKED ON SITE TO PREVENT DAMAGE TO SURROUNDING VEGETATION. PRESERVATION OF EXISTING VEGETATION SHALL OCCUR TO THE MAXIMUM EXTENT PRACTICABLE. ANY EXISTING VEGETATION WITHIN THE LIMITS OF GRADING THAT IS TO REMAIN UNDISTURBED BY THE WORK SHALL BE IDENTIFIED AND PROTECTED FROM DAMAGE BY MARKING, FENCING, OR OTHER MEASURES.

4. CHANGES TO THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN MAY BE MADE TO RESPOND TO FIELD CONDITIONS AND SHALL BE NOTED ON THE PLAN.

5. DISCHARGES OF POTENTIAL POLLUTANTS FROM CONSTRUCTION SITES SHALL BE PREVENTED USING SOURCE CONTROLS TO THE MAXIMUM EXTENT PRACTICABLE. POTENTIAL POLLUTANTS INCLUDE BUT ARE NOT LIMITED TO: SEDIMENT, TRASH, NUTRIENTS, PATHOGENS, PETROLEUM HYDROCARBONS, METALS, CONCRETE, CEMENT, ASPHALT, LIME, PAINT, STAINS, GLUES, WOOD PRODUCTS, PESTICIDES, HERBICIDES, CHEMICALS, HAZARDOUS WASTE, SANITARY WASTE, VEHICLE OR EQUIPMENT WASH WATER, AND CHLORINATED WATER.

6. ENTRANCE(S) TO THE CONSTRUCTION SITE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF POTENTIAL POLLUTANTS OFFSITE. POTENTIAL POLLUTANTS DEPOSITED ON PAVED AREAS WITHIN THE COUNTY RIGHT-OF-WAY, SUCH AS ROADWAYS AND SIDEWALKS, SHALL BE PROPERLY DISPOSED OF AT THE END OF EACH WORKING DAY OR MORE FREQUENTLY AS NECESSARY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING CONSTRUCTION VEHICLES LEAVING THE SITE ON A DAILY BASIS TO PREVENT DUST, SILT, AND DIRT FROM BEING RELEASED OR TRACKED OFFSITE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AT THE END OF EACH WORKING DAY OR MORE OFTEN AS NECESSARY.

7. ALL DISTURBED AREAS SHALL BE PROTECTED BY USING EROSION PREVENTION MEASURES TO THE MAXIMUM EXTENT PRACTICABLE, SUCH AS ESTABLISHING VEGETATION COVERAGE, HYDROSEEDING, STRAW MULCH, BLANKETS OR MATS. TEMPORARY OR PERMANENT REVEGETATION SHALL BE INSTALLED AS SOON AS PRACTICAL AFTER VEGETATION REMOVAL BUT IN ALL CASES PRIOR TO OCTOBER 15. PRIOR TO FINAL INSPECTION, ALL DISTURBED AREAS SHALL BE REVEGETATED OR LANDSCAPING SHALL BE INSTALLED.

8. WHENEVER IT IS NOT POSSIBLE TO USE EROSION PREVENTION MEASURES ON EXPOSED SLOPES, SEDIMENT CONTROL DEVICES SUCH AS FIBER ROLLS AND SILT FENCES SHALL BE INSTALLED TO PREVENT SEDIMENT MIGRATION. FIBER ROLLS AND SILT FENCES SHALL BE TRENCHED AND KEYED INTO THE SOIL AND INSTALLED ON CONTOUR. SILT FENCES SHALL BE INSTALLED APPROXIMATELY 2 TO 5 FEET FROM TOE OF SLOPE.

9. HYDROSEEDING SHALL BE CONDUCTED IN A THREE STEP PROCESS. FIRST, EVENLY APPLY SEED MIX AND FERTILIZER TO THE EXPOSED SLOPE. SECOND, EVENLY APPLY MULCH OVER THE SEED AND FERTILIZER. THIRD, STABILIZE THE MULCH IN PLACE. AN EQUIVALENT SINGLE STEP PROCESS, WITH SEED, FERTILIZER, WATER, AND BONDED FIBERS IS ACCEPTABLE.

   APPLICATIONS SHALL BE BROADCASTED MECHANICALLY OR MANUALLY AT THE RATES SPECIFIED IN THE PROJECT CONSTRUCTION DOCUMENTS.

10. DUST CONTROL SHALL BE PROVIDED BY CONTRACTOR DURING ALL PHASES OF CONSTRUCTION.

11. STORM DRAIN INLETS SHALL BE PROTECTED FROM POTENTIAL POLLUTANTS UNTIL DRAINAGE CONVEYANCE SYSTEMS ARE FUNCTIONAL AND CONSTRUCTION HAS BEEN COMPLETED.

12. ENERGY DISSIPATERS SHALL BE INSTALLED AT STORM DRAIN OUTLETS WHICH MAY CONVEY EROSIVE STORM WATER FLOW.

13. SOIL AND MATERIAL STOCKPILES SHALL BE PROPERLY PROTECTED TO MINIMIZE SEDIMENT AND POLLUTANT TRANSPORT FROM THE CONSTRUCTION SITE.

14. SOLID WASTE, SUCH AS TRASH, DISCARDED BUILDING MATERIALS AND DEBRIS, SHALL BE PLACED IN DESIGNATED COLLECTION AREAS OR CONTAINERS. THE CONSTRUCTION SITE SHALL BE CLEARED OF SOLID WASTE DAILY OR AS NECESSARY. REGULAR REMOVAL AND PROPER DISPOSAL SHALL BE COORDINATED BY THE CONTRACTOR.

15. A CONCRETE WASHOUT AREA, SUCH AS A TEMPORARY PIT, SHALL BE DESIGNATED TO CLEAN CONCRETE TRUCKS AND TOOLS. AT NO TIME SHALL CONCRETE PRODUCTS AND WASTE BE ALLOWED TO ENTER COUNTY WATERWAYS SUCH AS CREEKS OR STORM DRAINS. NO WASHOUT OF CONCRETE, MORTAR MIXERS, OR TRUCKS SHALL BE ALLOWED ON SOIL.

16. PROPER APPLICATION, CLEANING, AND STORAGE OF POTENTIALLY HAZARDOUS MATERIALS, SUCH AS PAINTS AND CHEMICALS, SHALL BE CONDUCTED TO PREVENT THE DISCHARGE OF POLLUTANTS.

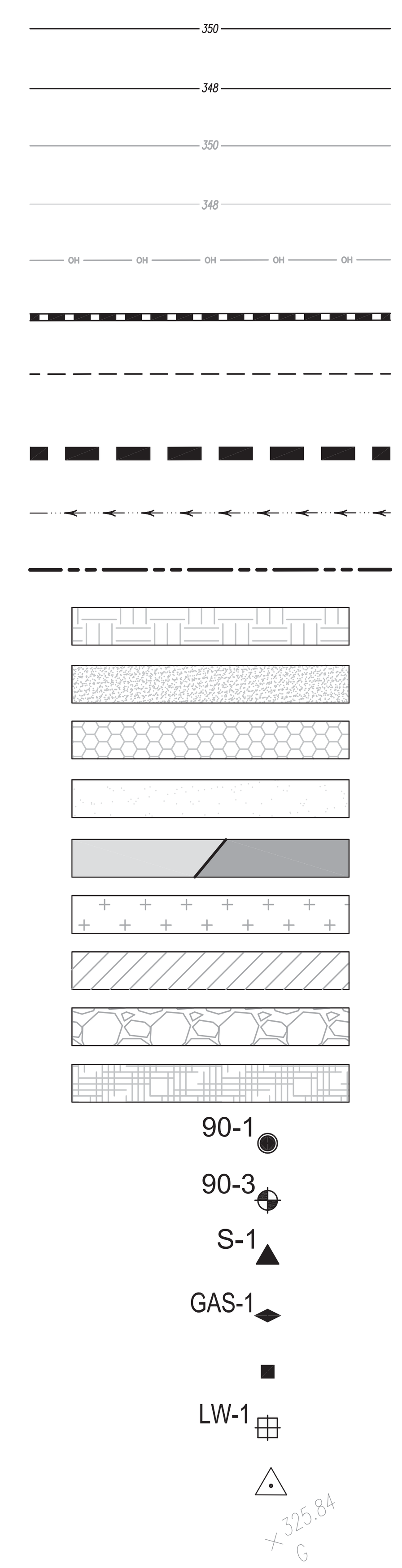
17. TEMPORARY RESTROOMS AND SANITARY FACILITIES SHALL BE LOCATED AND MAINTAINED DURING CONSTRUCTION ACTIVITIES TO PREVENT THE DISCHARGE OF POLLUTANTS.

18. APPROPRIATE VEHICLE STORAGE, FUELING, MAINTENANCE, AND CLEANING AREAS SHALL BE DESIGNATED AND MAINTAINED TO PREVENT DISCHARGE OF POLLUTANTS.

ABBREVIATIONS

AGG	AGGREGATE	LF	LINEAL FEET
BC	BEGIN OF CURVE	MIN	MINIMUM
CDF	CONTROL DENSITY FILL	MAX	MAXIMUM
CO	CLEAN-OUT	MFR	MANUFACTURER
CONC	CONCRETE	(N)	NEW
CL	CENTER LINE	NO.	NUMBER
CMP	CORRUGATED METAL PIPE	O.C.	OFF CENTER
CMU	CONCRETE MASONRY UNIT	POC	POINT OF CONCENTRATION
CT	CLOSURE TURF	PVC	POLY VINYL CHLORIDE
DIA	DIAMETER	PVI	POINT OF VERTICAL INDEX
(E)	EXISTING	PT	POINT
EA	EACH	R.C.	RELATIVE COMPACTION
EG	EXISTING GROUND	REIN	REINFORCED
EC	END OF CURVE	S	SLOPE
EOR	EDGE OF ROAD	SCH	SCHEDULE
ET	EVAPOTRANSPIRATIVE FINAL COVER	SO	SIDE OPENING
FL	FLOW LINE	SS	STAINLESS STEEL
FG	FINISH GRADE	TOB	TOP OF BANK
GB	GRADE BREAK	TW	TOP OF WALL
HDPE	HIGH DENSITY POLYETHYLENE	TYP	TYPICAL
INV	INVERT ELEVATION	W/	WITH
LCS	LEACHATE COLLECTION SYSTEM	WMU	WASTE MANAGEMENT UNIT
LCRS	LEACHATE COLLECTION & REMOVAL SYSTEM	WWF	WELDED WIRE FABRIC
LDS	LEAK DETECTION SYSTEM		

LEGEND



DESIGN CONTOUR (MAJOR)
DESIGN CONTOUR (MINOR)
EXISTING CONTOUR (MAJOR)
EXISTING CONTOUR (MINOR)
OVERHEAD ELECTRIC
PROPOSED STORM DRAIN
PROPOSED GRADE BREAK, TOE OF SLOPE OR GRADING LIMITS
EXISTING LIMITS OF REFUSE
PROPOSED DITCH AND FLOW LINE
PROPERTY LINE (APPROXIMATE)
FILL
GAS RELIEF LAYER
REFUSE
ACCESS ROAD OR PAD CLASS II AGGREGATE BASE
CLOSURE TURF/ HYDROBINDER TURF INFILL (SEE SHEETS 200-202)
SAND INFILL WITH CHIPPED SHALE (SEE SHEETS 200-202)
CLASS II AGGREGATE BASE ROCK
ROCK RIPRAP (GROUTED OR LOOSE)
TURF REINFORCEMENT MATTING
DETECTION GROUNDWATER MONITORING WELL
CORRECTIVE ACTION GROUNDWATER MONITORING WELL
SURFACE WATER SAMPLING STATION
PERIMETER LANDFILL GAS MONITORING POINT
PERIMETER LANDFILL GAS EXTRACTION POINT
LEACHATE WELL
CONTROL POINT
SPOT ELEVATION (EXISTING GROUND)

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NOTES, LEGEND AND ABBREVIATIONS

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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Job No: 02-907
Drawn By: SGH/ DTM
Checked By: DS
Date: 2015-08-14

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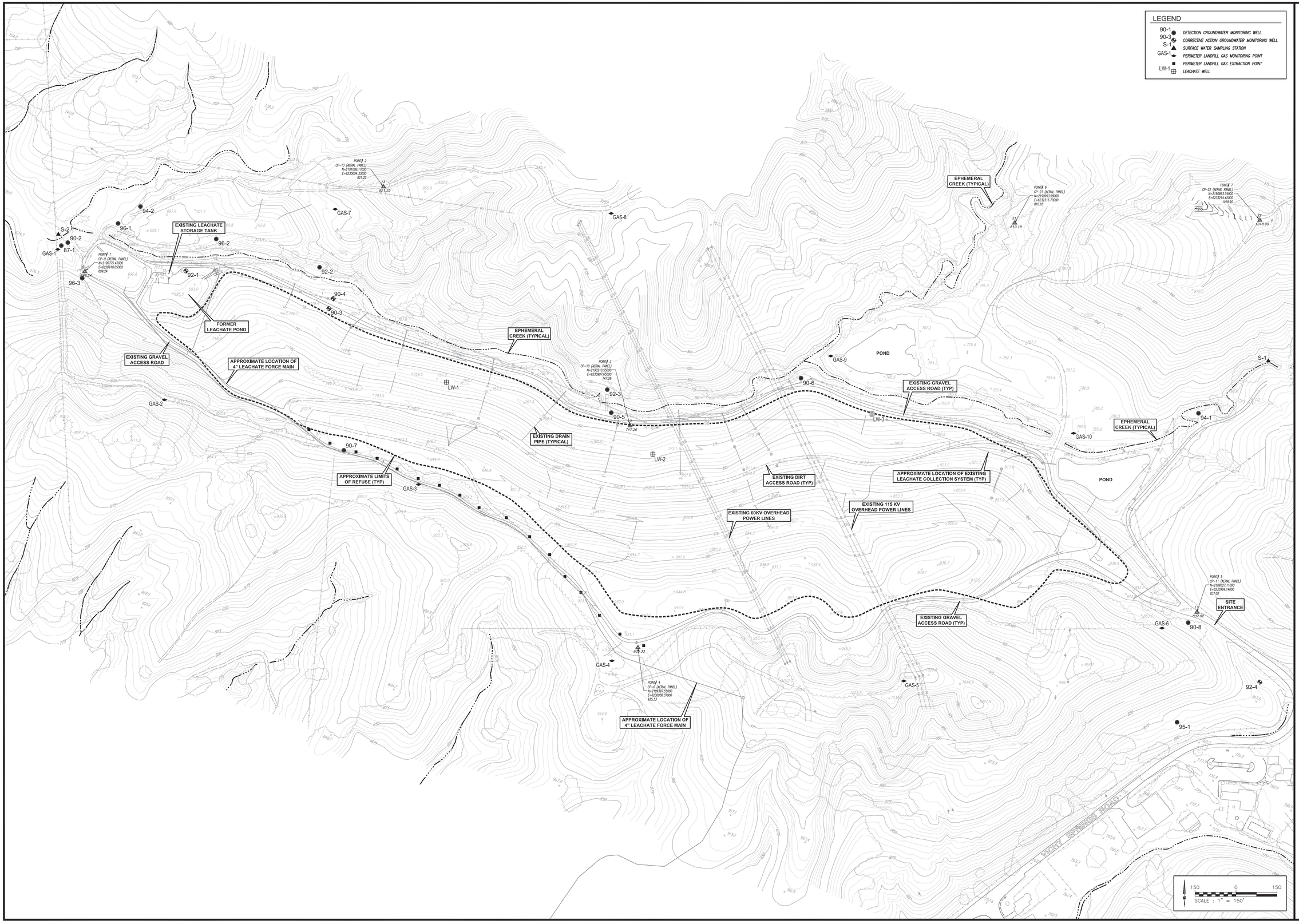

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SITE MAP (EXISTING CONDITIONS)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

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Job No:	02-907
Drawn By:	SGH/ DTM
Checked By:	DS
Date:	2015-08-14

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Xrefs: X-Ref - CC - 2015.dwg X-Ref - Submittal.dwg X-Ref - Finished Grade - Design.dwg X-Ref - Finished Grade - Hatching.dwg X-Ref - Excavation Layer - Design.dwg
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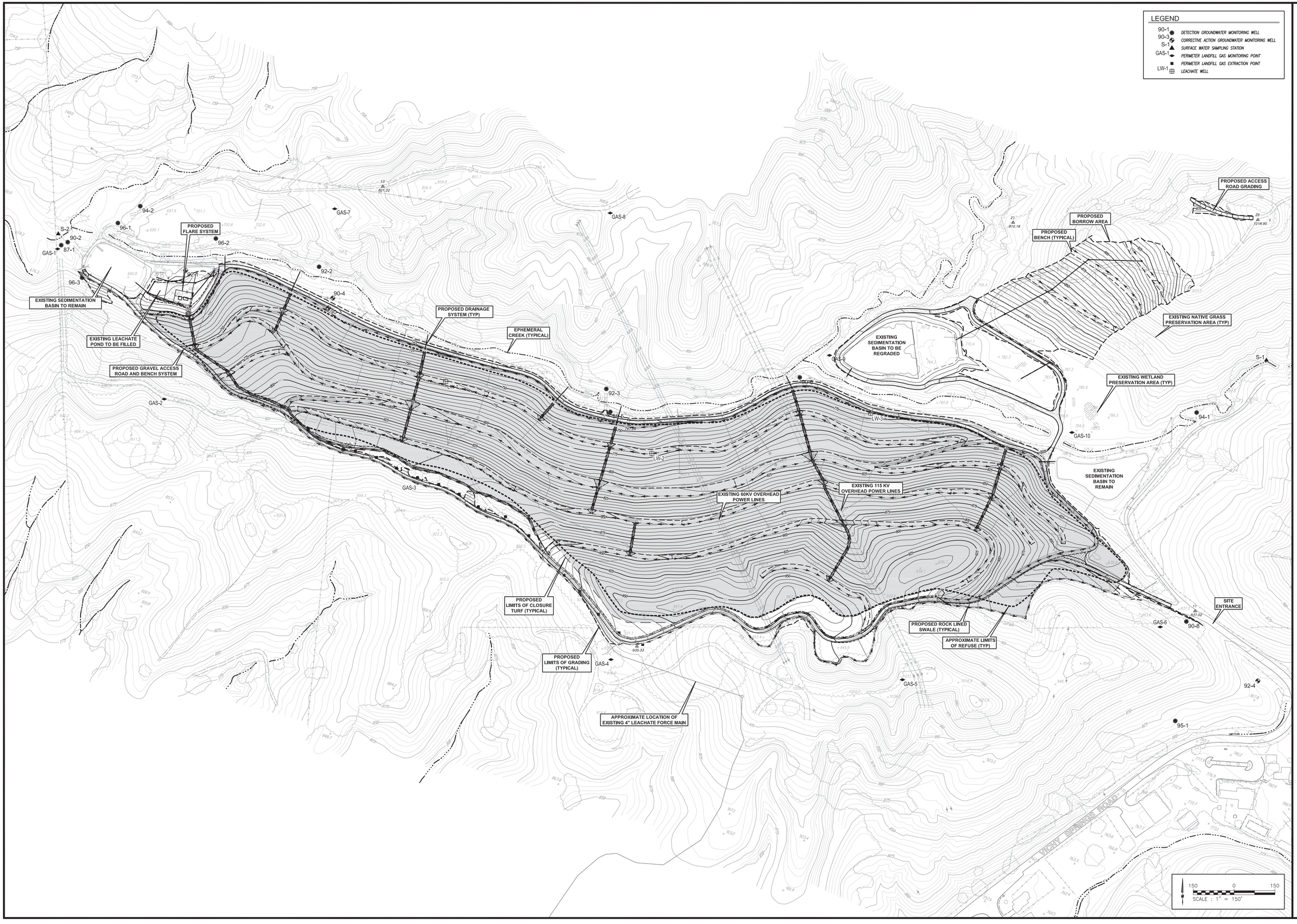

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SITE MAP (FINISHED GRADE)

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:	
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Job No:	02-907
Drawn By:	SGH/ DTM
Checked By:	DS
Date:	2015-08-14

Sheet Number
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LEGEND

- 90-1 ● DETECTION GROUNDWATER MONITORING WELL
- 90-3 ⊕ CORRECTIVE ACTION GROUNDWATER MONITORING WELL
- S-1 ▲ SURFACE WATER SAMPLING STATION
- GAS-1 ◆ PERIMETER LANDFILL GAS MONITORING POINT
- ■ PERIMETER LANDFILL GAS EXTRACTION POINT
- LW-1 ⊞ LEACHATE WELL

EPHEMERAL CREEK (TYPICAL)

CAUTION EXISTING 60 KV OVERHEAD POWER LINES

CAUTION EXISTING 115 KV OVERHEAD POWER LINES

REFUSE EXCAVATION AREA

REFUSE RELOCATION AREA

APPROXIMATE LIMITS OF REFUSE

SITE ENTRANCE

S-1 S-2 94-1 94-2 96-1 96-2 96-3 87-1 90-1 90-2 90-3 90-4 90-5 90-6 90-7 90-8 92-1 92-2 92-3 92-4 95-1 GAS-1 GAS-2 GAS-3 GAS-4 GAS-5 GAS-6 GAS-7 GAS-8 GAS-9 GAS-10 LW-1 LW-2 LW-3

SOME EXCAVATION OF REFUSE MAY BE REQUIRED FOR THE INSTALLATION OF STORM DRAIN AND GAS SYSTEM PIPING TO ASSURE PROPER SECTION PER CONTRACTOR TO COORDINATE LOCATIONS AND MAKE ADJUSTEMENTS TO FINISHED GRADES. (A / 500)

VICHY SPRINGS ROAD

150 0 150
SCALE : 1" = 150'

EBA ENGINEERING
825 SONOMA AVENUE
SUITE C
SANTA ROSA, CA 95404
TEL: (707) 544-0784

REGISTERED PROFESSIONAL ENGINEER
DALE S. SOLJEM
No. 30888
EXP. 3-31-14
CIVIL
STATE OF CALIFORNIA

EXCAVATION AREA

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:

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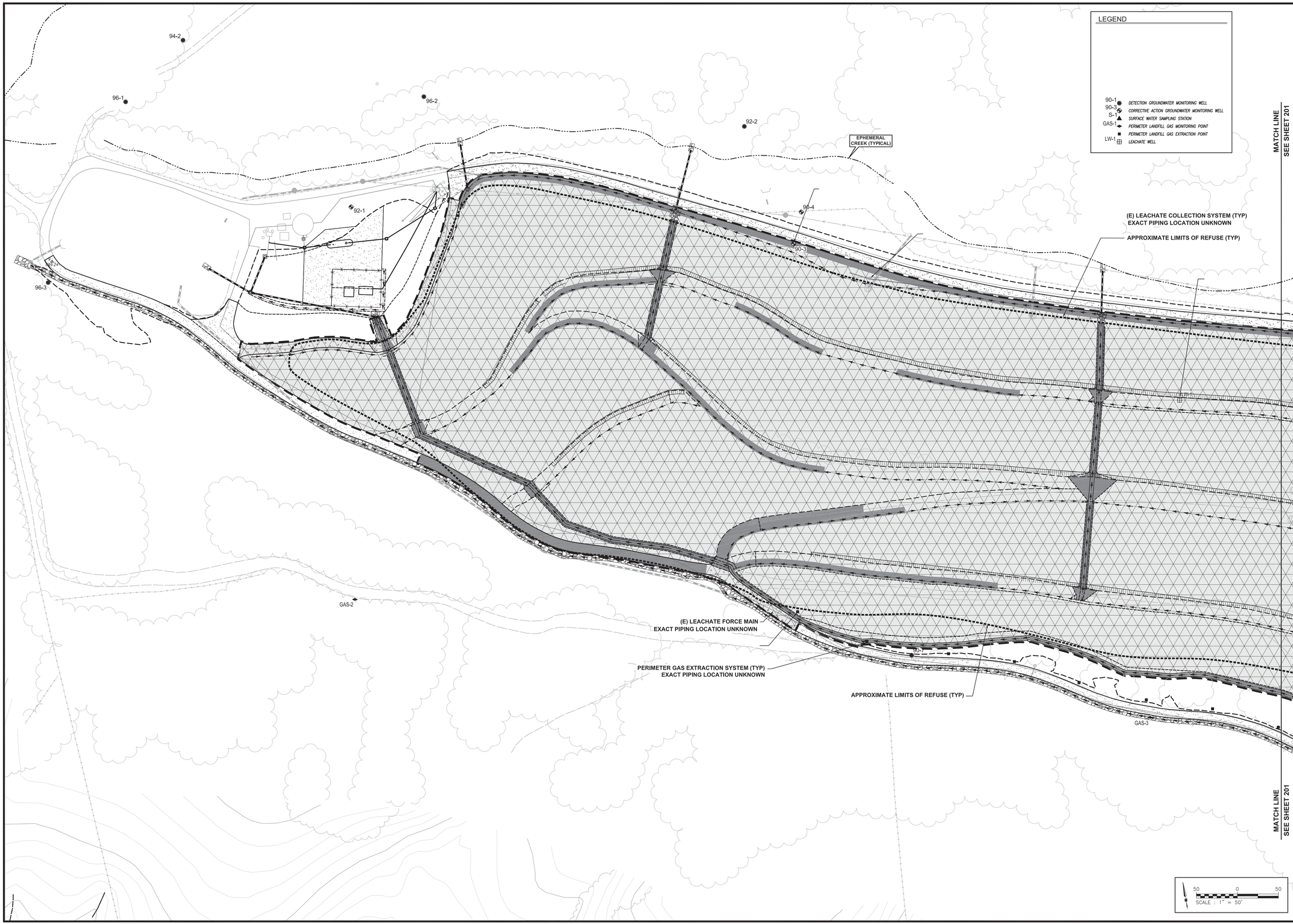
Job No:	02-907
Drawn By:	SGH/ DTM
Checked By:	DS
Date:	2015-08-14

Sheet Number
102
5 of 31

Xrefs: S:\Ref - GI - 2013\eng-f-Ref - Submittal.dwg-f-Ref - Finished Grade - Design.dwg-f-Ref - Finished Grade - Hatching.dwg-f-Ref - Excavation Layer - Design.dwg-f-Ref - Turf - Hatching.dwg
Plotted: 8/10/2015 12:18:57 PM by DTM (A1.5b)



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STATE OF CALIFORNIA

LAND FILL COVER MATERIALS PLAN

CITY OF UKIAH LANDFILL FINAL CLOSURE CONSTRUCTION
3100 VICHY SPRINGS ROAD
UKIAH, CALIFORNIA

Submittal / Revision:	
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Job No:	02-907
Drawn By:	SGH/ DTM
Checked By:	DS
Date:	2015-08-14

Sheet Number
200
6 of 31

Xrefs: X-Ref - C2 - 2013.dwg|X-Ref - 2C - Submittal.dwg|X-Ref - Finished Grade - Design.dwg|X-Ref - Finished Grade - Hatching.dwg|X-Ref - Excavation Layer - Design.dwg|X-Ref - Foundation Layer - Grade Breaks .dwg|X-Ref - Foundation Layer - Hatching.dwg|X-Ref - Turf - Hatching.dwg|Sheets - 600 - (Rev1).dwg
Plot Date: Aug 12, 2014 8:13:08
Plotted: Answer.dwg - 200 - (Plot).dwg
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Appendix C

Examples of Artificial Synthetic Turf Used at Landfills

ISSUE 1 • 2019

ASH at work

Applications, Science, and Sustainability of Coal Ash

CCP Beneficial Use—The Next 50 Years

Future Trends in Ash Harvesting, Demand, Testing, and Research



Special Section:
WOCA Preview

PLUS:
In and Around ACAA
ASH Classics
Beneficial Use Case Studies
And much more…

Geosynthetic Solutions for Final Closure: A Decade of Performance

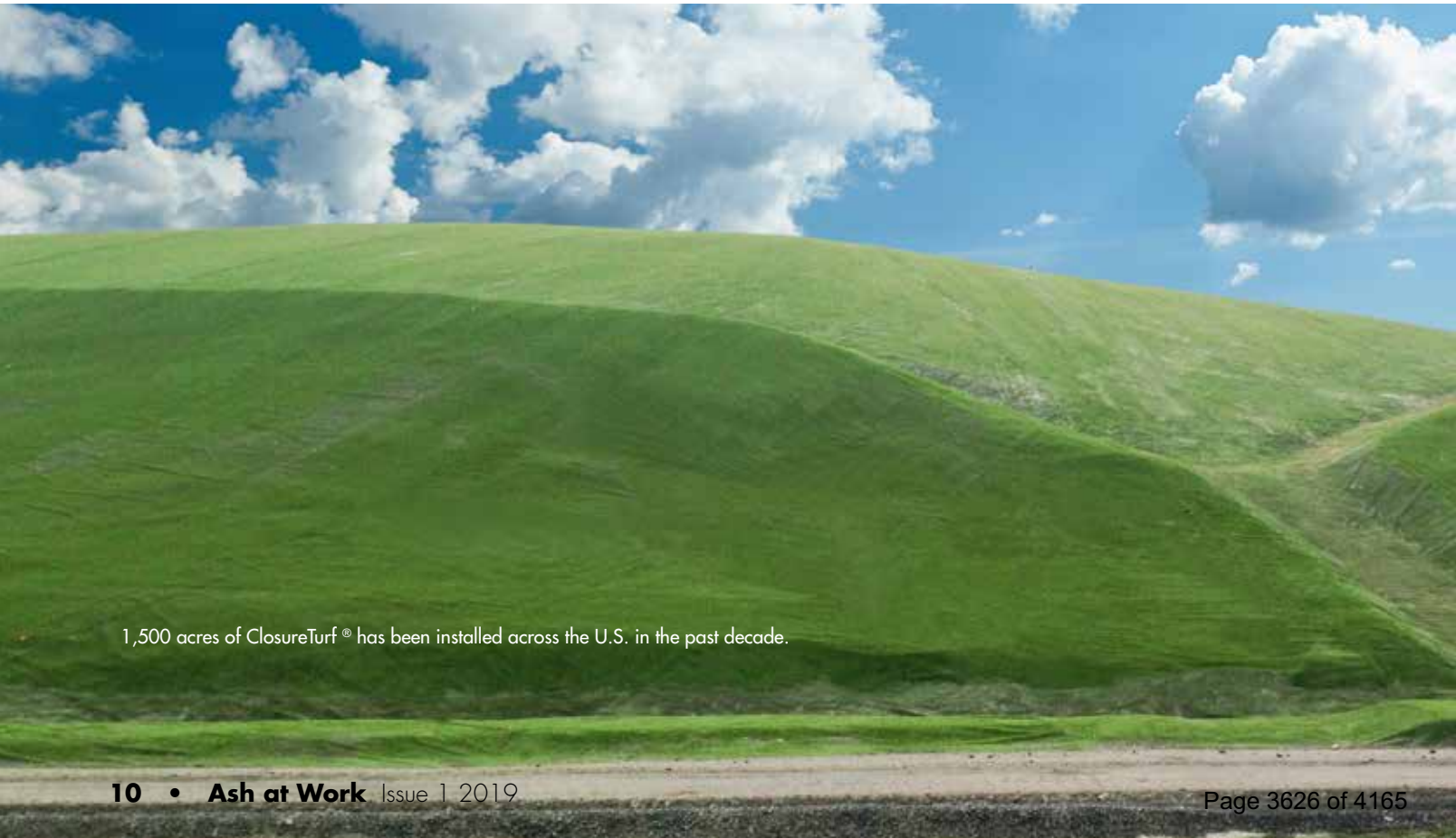
By Mike Ayers

Coal ash is the second-largest industrial waste stream in the United States, with approximately 130 million tons produced annually. Over the last several years, new technologies for final ash storage have been successfully implemented and are outperforming traditional vegetated closures in numerous categories. This year, Watershed Geo celebrates the 10-year anniversary of its first ClosureTurf® landfill installation and reflects on a decade of progress, noting the value of geosynthetics as a viable final closure solution for coal combustion residuals (CCRs).

ClosureTurf® is a final landfill closure system designed to address the environmental and performance failures of traditional soil/vegetated caps. To date, the engineered synthetic turf system spans approximately 1,500 acres of closure, safely and effectively reducing environmental and operational impacts of landfills, including ash impoundments, across the United States. It has also provided an innovative and stable solution for solar generation.

CCR Regulations and Challenges

In 2015, the U.S. Environmental Protection Agency (EPA) published its final rule governing disposal of CCRs produced by electric utilities. The rule requires facilities to meet detailed location, design, operation, closure, and 30-year post-closure care requirements, including the maintenance of and repairs to final covers and other unit components, as well as the semiannual detection and assessment monitoring of groundwater.



1,500 acres of ClosureTurf ® has been installed across the U.S. in the past decade.

The federal CCR rule and individual state efforts to regulate this non-hazardous solid waste are furthering interest in new and emerging technologies. Industrywide, approximately 10% of the coal burned to make electricity makes its way into a CCR waste stream. Beneficial reuse is part of the solution, but the industry needs a long-term answer for CCR that is both cost effective and environmentally responsible. Final landfill closure solutions that include state-of-the-art engineered turf systems require less operation and maintenance expense over the life of the project and are environmentally friendly options that offer utilities more flexibility to meet the growing regulatory framework faced by utilities. Additionally, utilities are facing renewable energy mandates issued by individual states that vary widely, prompting the consideration of geosynthetic turf closures as an ideal surface on which to deploy and maximize the use of solar panels.

Designed to address the stringent requirements of CCR closure regulations, the synthetic turf system is proving to be an effective solution for utilities and industrial sites facing aggressive mandates. Currently being used on multiple large-scale CCR disposal projects, this innovative solution is fully compliant with the requirements of Subtitle D of the Resource Conservation and Recovery Act and offers meaningful advantages specific to CCR disposal challenges.

Traditional Closure Design vs. Geosynthetic Closure

Prescriptive final cover designs for landfills have historically included a compacted soil liner, geomembrane liner, a drainage layer, and a vegetative soil cover. These traditional capping options involve large volumes of soil that many coal-fueled plants may not have available.



Because of challenges associated with prescriptive designs, and specifically the unique requirements for CCR surface impoundments and landfills, an engineered synthetic turf system was created as an alternative Subtitle D capping option and now has a decade of installed performance. In addition to eliminating the need for the intermediate soil cover and vegetative layer, these turf systems have many advantages over their traditional counterparts, including faster installation times, safer construction methods, improved storm water quality, and significantly reduced maintenance and post-closure costs. For surface impoundments, using an alternative capping design can also greatly reduce the amount of disturbance of the existing CCR material within the impoundment.

An engineered synthetic turf system is a three-component system comprising a structured geomembrane, an engineered turf, and a specified infill. The structured geomembrane provides both drainage and high interface friction for stability. It serves as the barrier layer to minimize infiltration through the cover system into the CCR. The engineered turf is made of synthetic grass blades tufted into two layers of geotextile backing. It is the protective layer that covers and protects the underlying geomembrane from ultraviolet (UV) degradation and wind uplift. The specified infill provides additional UV protection and allows the system to withstand traffic loads.

Soil Construction Factors

Eliminating the need for a two-foot soil and vegetative cover layer improves safety while reducing the carbon footprint of the closure, as there is no need to transport soil to the site (see Figure 1). This means the removal of thousands of trucks from local roads, as geosynthetic turf closures eliminate the need for approximately 550 truck trips (275 round trips) per acre that would otherwise be needed to transport soil to and from a borrow site. Less equipment also means reducing the carbon footprint of the closure by approximately 80% compared to traditional soil/vegetative covers. The reduction in size, number, and duration of equipment further contributes to an overall increase in safety on both the project site and local roads, as well as the reduction of dust at the site, mud on the roads, and noise impacts to the surrounding community. Most traditional closures also require destruction of land for project soil sources, resulting in additional environmental impact and loss of future land use.

A geosynthetic turf system installs two to three times faster than a traditional soil cover and uses fewer and lighter pieces of equipment. The increase in project-completion efficiency means that owners, operators, and their design and construction teams can effectively cover more acreage per day. Additionally, the standardization of engineering and construction details associated with engineered turf systems reduces the burden on the regulatory review and approval process. The use of this system also makes it easy to install in smaller, incremental closures. The sooner full cells can be capped, the sooner leachate is reduced, providing significant savings for the owner.

Geosynthetics are lighter and improve the stability of CCR closures by eliminating the weight of the traditional soil and vegetative cover. This reduces the static load surcharge on the impoundment or landfill and the dewatering needed to stabilize

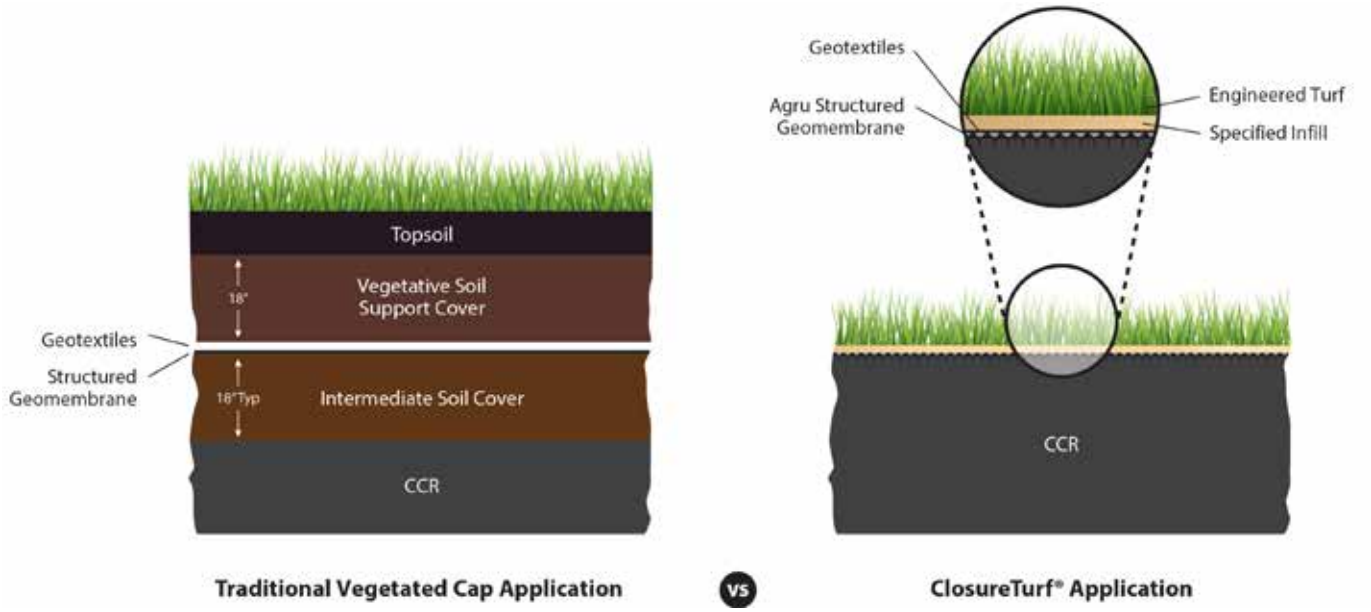


Figure 1. A comparison of a traditional vegetated system and geosynthetic turf system demonstrates the two-foot elimination of soil.



Engineered turf systems install at least 50% faster than traditional soil caps.

a CCR impoundment for final closure, which in turn can shorten the construction schedule. In the event that future access to the ash is needed, the geosynthetic system can be easily cut and resealed back together. A vegetated soil cap, in this instance, would require excavation, management of sediment runoff, and then complete reconstruction.

Shear Strength and Slope Stability

Traditional soil covers are subject to veneer-type slope failure due to insufficient interface shear strength and the possibility of excess hydraulic head in the soil cover. By removing the burden of the heavy soil layers, final cover slope stability is significantly improved due to the highly durable interfaces of engineered turf. In fact, there are two interfaces in ClosureTurf®—the interface between the engineered turf and the structured geomembrane, and the interface between the structured geomembrane and the subgrade soil or waste.

Landfills settle as a result of CCR compression and the consolidation of foundation soils. The dewatering and consolidation of sludge, as well as differential settlement, can create depressions in the final cover, causing traditional soil covers to crack and ponding to occur on the cover surface. Engineered turf systems will tolerate a much larger differential settlement than soil covers due to the elongation of the geomembrane. The flexibility of the system conforms to the surface depressions without damaging the cover.

With the low load-bearing capacity of saturated ash, there are concerns that the additional geotechnical loading of a soil or clay cap and vegetated soil cover could produce excessive surcharge stresses, creating the geotechnical instability (i.e., sloughing) conditions often associated with very low California Bearing Ratio test value subgrades. What we have found through the successful deployment of geosynthetics is that it eliminates the possibility that these settlements will result in reversing the final grades of the cover due to the additional surcharge-type loading after the geomembrane installation.

Design Life

If properly maintained, the engineered synthetic turf layer will have a 100+- year functional longevity. The results of 10 years of independent weathering data for the synthetic turf yarns tell us that the projected half-life of the engineered turf layer far exceeds 176 years. This longevity has been independently evaluated by multiple organizations that are experienced in the longevity performance of geosynthetics. The underlying geomembrane will last much longer because the engineered synthetic turf layer provides protection of the structured geomembrane so that it is not exposed to the environment. In fact, studies by the Geosynthetic Institute show that the geomembrane can last more than 400 years under covered conditions.

Wind tunnel testing was conducted at Georgia Tech Research Institute to evaluate the wind uplift of engineered turf. Wind actually created a downward force on the turf, and it resisted a hurricane-force wind of 120 mph without being lifted. Several project installations have experienced significant, if not historic, weather events, including hurricane-force winds and record-setting rainfall. A closure project in South Carolina endured a 1,000-year rain event when a hurricane swept through the area, and a Florida Panhandle project experienced a historic 500-year storm event in which 5.68 inches fell in a single hour (26 inches total in a 24-hour period). No damage to the system was incurred. Additionally, northern installations with an engineered turf system have provided opportunities to evaluate its performance in areas that encounter cold, high wind, and snowy conditions. Geosynthetics perform exceptionally well in each of these extreme-weather scenarios.

Reduced Environmental Impacts

When considering a final cover system for a landfill or impoundment, it is important not only to keep water out of the waste, but also to ensure that nothing detrimental comes off the surface and lands in the water carried offsite. Considering the average size of CCR impoundments and landfills, opportunity exists for significant sediment pollution through erosion that is often an inherent part of traditional soil covers. Geosynthetic turf systems provide clean runoff with very low turbidity because they do not have a soil layer, except for the thin (0.5-inch thick) layer of sand infill. The sand acts as a natural filter as the water moves down the slope and channeling areas. As a result, sites have experienced a 90% reduction in turbidity, resulting in cleaner water. These systems also significantly reduce sediment loading to surrounding channels and sedimentation detention basins either onsite or offsite. This produces a positive impact on overall storm water quality, allowing effluent levels to meet (or be well below) the regulatory turbidity limits. Most importantly, they consistently provide repeatable water-quality results for every design storm event.

In areas of channelized flow (bench drains, down chutes, and perimeter channels), the geosynthetic turf system can be infilled with a fiber-reinforced, high-strength concrete matrix instead of sand. This specialized pozzolanic infill created specifically for storm water applications will flex and move with typical differential settlements that occur on permanent covers. It provides superior hydraulic performance capable of



Geosynthetics withstand erosive forces from extreme weather conditions.



Geosynthetics allow the direct attachment of new solar technology, maximizing the beneficial use of closed landfills.

handling high shear stress and large flows, resulting in very high velocities.

Geosynthetic systems also require very low post-closure maintenance compared to alternative soil systems. The cost of maintenance is estimated to be as much as 90% less as a result of reduction in maintenance activities, including the vegetation, mowing, fertilization, irrigation, re-vegetation, erosion repairs, and storm water pond cleaning associated with traditional soil covers. Common erosion, storm water, and siltation problems are prevented—even during severe weather events such as intense rainfall, hurricane force winds, and earthquakes. Further, they protect against driving forces and severe weather conditions such as drought and heat.

Post-Closure Beneficial Use: Renewable Energy

With recent federal regulations likely forcing the closure of many power plants' coal ash impoundments, an engineered synthetic system provides an ideal foundation for utilities to deploy solar generation alongside active or retired coal-fueled plants. One of the biggest hurdles to utility-scale solar is finding suitable sites with grid infrastructure for interconnection. By nature, this problem is alleviated when solar is sited at an existing or retired power plant and the impoundments have been capped with engineered synthetic turf systems. Challenges to deploying solar panels on vegetated caps include fugitive dust, grass clippings, and potential damage from mowing equipment. Additionally, panel systems might move or break due to settling caused by erosion impacts to a vegetated cap.

Upright solar panels have been successfully deployed on numerous synthetic cap closure sites across the U.S. Recently, Watershed Geo demonstrated a unique approach to maximizing solar collection at landfills and impoundments. The solar system combines the most advanced, proven panel technology with a rackless, direct surface attachment system that can be used on the top decks and side slopes of a geosynthetic turf foundation. This new slope panel technology system increases the power output by as much as three times per unit area compared to traditional arrays.

Looking Ahead

An engineered synthetic turf system is a proven technology that solves problems that have been plaguing the industry for decades. It addresses landfill stability and erosion problems by providing a long-lasting, geotechnically stable, and environmentally friendly final cover system that significantly reduces construction time and maintenance costs while providing an ideal foundation for solar panel deployment.

The volume of existing CCRs, in both landfills and impoundments, represents a staggering volume that will need to be closed, in some cases on very aggressive schedules. According to the EPA, there are over 310 active CCR landfills, with an average size of approximately 120 acres, and 735 active CCR surface impoundments, with an average size of roughly 50 acres.

The amount of coal ash likely destined for future disposal is expected to remain significant for years to come, leaving an ongoing disposal challenge that can greatly benefit from the use of new and emerging technologies such as geosynthetics.

Mike Ayers is Chief Executive Officer of Watershed Geosynthetics LLC. He has over 25 years of professional experience in the design and development of heavy civil engineering projects, including the execution of all phases of land development, geotechnical evaluation, hydrology assessments, site selection, and management of the permitting process with state and federal agencies. A licensed professional engineer and general contractor in multiple states, Ayers has over 20 years of design experience using a variety of geosynthetics for stability, erosion control, and containment. He is actively involved in the Industrial Fabrics Association, Solid Waste Association of North America, and the International Geosynthetics Association.



ClosureTurf®

Location
Moncks Corner, SC

Owner
Berkeley County

Project Type
Municipal Solid Waste

Year Completed
2013

Size
12 acres

Berkeley County's Landfill showcases the multiple benefits of ClosureTurf® for eliminating soil layers and erosion, reducing post-closure care, withstanding major weather events, and improving storm water quality over a traditional Subtitle D vegetative cap.

The Berkeley County MSW Landfill in Moncks Corner, South Carolina is owned and operated by Berkeley County Water & Sanitation (BCWS), and has been in operation since 1999. It's eight cells encompass approximately 40 acres with an estimated in-place waste volume of 1.1 million cubic yards. When the first four cells totaling 10 acres were at capacity and ready to close, Berkeley officials turned to ClosureTurf, an EPA Subtitle D compliant landfill closure system specifically designed to eliminate soil erosion, reduce post closure maintenance costs, increase slope integrity and enhance landfill gas (LFG) management. With major maintenance savings and the weathering of a major flood event, ClosureTurf has proved to be worth every penny of the county's investment.

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Overcoming Capacity Issues

Officials at the landfill had to address significant challenges with the closing of the site explained Mark Schlievert, Director of Solid Waste at BCWS. "The waste had been built too far out to the edge, leaving little room to place a two-foot traditional soil capping system. It would have required us to excavate excess waste and transport it to another location. In addition, the landfill is located in an earthquake zone and an area susceptible to hurricanes and high rainfall events. In the event of seismic activity or significant rainfall, the soil used in a traditional capping system would present a significant slide hazard."

Schlievert and the BCWS had a previous relationship with AGRU America, a manufacturer of geomembranes used as final caps on landfills. After discussing the site's issues, AGRU introduced a new Subtitle D method, called ClosureTurf®. Mike Ayers, CEO/President of Watershed Geo® and inventor of ClosureTurf, describes the system as a patented, three component system comprised of a structured geomembrane, an engineered synthetic turf, and a specialized sand infill. "The foundation of the system is an impermeable, highly transmissive structured geomembrane manufactured by AGRU. It provides for the highest interface friction values available in the market. The engineered turf component gives the system its natural look and feel of grass while protecting the geomembrane from extreme weather conditions for the long term. The specialized sand infill component is placed between the blades of the engineered turf and allows the system to be trafficked while also providing additional protection from weathering. When required, ClosureTurf's patented surficial gas system is included with the system to collect landfill gas emissions."

Addressing Permitting Concerns

To gain approval to implement ClosureTurf, which is considered an alternative long-term cover landfill system, Berkeley County landfill officials worked closely with the South Carolina Department of Health and Environmental Control (SCDHEC). Final cover design for the closure of Berkeley County Landfill went through a three-year approval with the SCDHEC prior to the start of construction.

Since ClosureTurf was a new technology to the state, the SCDHEC had several factors to consider for permitting; some of which included the longevity of the product, the cost benefit over a traditional system, water runoff conditions and accessibility to the areas of the cap. Schlievert, Watershed Geo and SCS Engineering, the consulting engineer, together made several presentations to members of the SCDHEC over the decision period to address the proposed concerns. Ayers addressed the ultimate goal of ClosureTurf, "As a response to numerous failures and poor performance of environmental closures at landfills, engineers and landfill owners have studied new approaches to establish a more physically stable and environmentally sound solution. Traditional landfills require large amounts of soil throughout their lifespan and are often lacking adequate soil to complete closure construction. Many of these landfills experience on-going erosion and sedimentation issues. Traditional covers are highly reliant on trucking soils, heavy civil construction equipment, on-going maintenance and repairs in order to maintain their integrity. ClosureTurf takes the soil out of the equation all together, therefore solving 90% of the issues with that alone."

"In the event of seismic activity or significant rainfall, the soil used in a traditional capping system would present a significant slide hazard."



A 'soiless technology', ClosureTurf® eliminates the risk of slope erosion.



ClosureTurf® applied in a traditional bench design.

ClosureTurf® Benefits Specific to Berkeley

The sliding of a soil cover along the steep slopes was a primary concern with the Berkeley landfill, particularly with the risk of a major weather event. With this concern in mind, Ayers addressed ClosureTurf's stability attributes. "During a rain event, the rainfall will penetrate quickly through the sand infill and drain directly in the geocomposite integrated drainage layer below, avoiding sand erosion and maintaining stability of the sand infill. The infill is also held in place by the unique structure of the synthetic grass that traps the sand to anchor and ballast the synthetic turf layer to the surface it covers. The resulting high interface friction serves to provide a resistance to sliding or veneer failures due to weather, steepness of final slopes and seismic conditions. In fact, the ClosureTurf system has an interface friction of 39 degrees between the engineered turf and geomembrane which equates to a safety factor greater than 2.0 for typical landfill slopes."

Ayers went on to explain, "There are other advantages that ClosureTurf provided to the site both during and after construction; one of which being accessibility for ease of construction and ongoing site inspection. The sand infill used in the ClosureTurf system not only acts as a ballast but also allows for access of a 60 psi tire pressure vehicle on the slopes and higher ground pressure vehicles in flatter areas without being susceptible to damage. This proves to be especially beneficial when gas system monitoring locations or wells in the landfill will have to be accessed by persons on foot or in vehicles. Typical soil closures would likely require all-weather roads for construction access and to get to monitoring locations."

ClosureTurf also provided a natural water filter for Berkeley. The engineered turf and sand aid in filtering runoff that is free of sediment, fertilizer and other contaminants. "This ensured that runoff from the site flowing into local water sources was clean and safe," explained Ayers.

ClosureTurf Receives Approval

Even with all of the obvious advantages, one of the looming questions of state officials focused on is the longevity of the ClosureTurf system. While the oldest real-world application of ClosureTurf was installed at the Lasalle-Grant Landfill in Jena, Louisana in 2009, independent, real-world weathering test performed at Atlas Material Testing Laboratories in New River, AZ, has shown ClosureTurf's engineered turf component to have a design life of 100+ years, certainly exceeding the typical 30-year Subtitle D requirement. With these confirmed results, the SCDHEC granted BCWS approval to use ClosureTurf as an alternative long-term cover system in early 2013.The county was assured that If ClosureTurf could pass inspection for two years and all requirements were met, the SCDHEC would approve the product as a final cover.

Construction on the site began in April and was completed in January 2014. The county saved an initial cost of $50,000 in construction and expects to save at least $720,000 over a 30-year period in future typical maintenance costs while reducing the environmental impact and improving safety and performance. The project marked the first large-scale implementation of this type of cover system in South Carolina.

While ClosureTurf solved several challenges for the county, Schlievert has been most excited about the economic advantages that Berkeley has benefited from in relation to post-closure care since completion. "The reduction in maintenance is our biggest gain. We're saving around $24,000 a year in maintenance. On average,



ClosureTurf® can be used for incremental closures as seen above in Berkeley's first four cells that met capacity.

"The reduction in maintenance is our biggest gain. We're saving around $24,000 a year in maintenance…We have absolutely zero eroded slopes to repair and we have eliminated mowing and grass upkeep."

total overall maintenance costs are typically reduced by approximately 90% with ClosureTurf compared with the traditional soil cover system. A Subtitle D prescribed cap typically requires ongoing vegetation and soil maintenance for the entire system to perform as designed consisting of frequent mowing, water, fertilizer, top soil replacement, erosion control, and sedimentation basin maintenance. We have absolutely zero eroded slopes to repair and we have eliminated mowing and grass upkeep. In addition, we are significantly reducing water contamination, dust and heavy equipment noise and pollution."



Rubber tired vehicles can be driven on ClosureTurf® without risk of damage.

Putting ClosureTurf to the Test

Schlievert and the SCDHEC were particularly impressed with ClosureTurf's performance during a recent flash flooding event in the South Carolina coastal area. "During the epic rain event, we received 26 inches of rain over a couple day period. Many areas in our community experienced severe flooding and many of the county's traditional soil-capped landfills were left with significant and costly erosion. With ClosureTurf, we experienced a small amount of sand migration to the bottom of the slope but there was enough coverage of sand that it did not have to be redistributed or replaced. It did its job and what it was designed to do."



ClosureTurf® was easily implemented into Berkeley's conventional gas system.

Recently, the final inspection of the two-year period that SCDHEC required was completed. Field Operations Manager for Watershed, Bob Buzzell, reported that, "Other than a few small synthetic turf repairs, the site has withstood environmental and weather conditions extremely well." Because ClosureTurf's top layer consists of a synthetic turf material and is not covered with a thick soil profile, it is easily inspected for damage, and if identified, may be easily and inexpensively repaired. Since the infilled turf serves as protection for the liner, there is no risk to the integrity of the overall system and its performance.

"When we designed ClosureTurf, we were very technical and practical in our approach to solving all landfill closure issues," said Ayers. "Today, it has been designed, permitted and installed all around the United States due to its superior performance. I think at this time we have over 33 projects completed with 25 million square feet of ClosureTurf installed. It's been thoroughly vetted and proven in many applications. We look forward to watching ClosureTurf exceed expectations at Berkeley. Our next step is to receive final approval from the state."

CLOSURETURF® is a U.S. registered trademark which designates a product from Watershed Geosynthetics, LLC. This product is the subject of issued U.S. and foreign patents and/or pending U.S. and foreign patent applications.



ClosureTurf®

Location
Portola, CA

Owner
City of Portola

Contractor/Engineer
Cal Valley Construction
D&E Construction

Project Type
Municipal Solid Waste Landfill

Year Completed
2014

Size
10 acres

The Portola Class III landfill is located approximately 1.5 miles northeast of the City of Portola. The landfill was an unlined landfill with highly erosive soils on site causing long-term maintenance issues and ground water contamination problems.

When the city began the closure process, they began looking at options outside of the traditional Subtitle D vegetative cap. When introduced to ClosureTurf®, one of the biggest benefits they considered was the major reduction of maintenance activities and cost.

"Prior to ClosureTurf becoming available we had looked at the traditional Subtitle D vegetative cap. However, one of the biggest advantages of ClosureTurf is the avoidance of long-term maintenance costs," stated the City of Portola's solid waste consultant, Tom Valentino P.E., President of the for TGV Solid Waste Inc. "Another one of the advantages of going with the ClosureTurf system was the ease of installation, as we were under a tight time schedule to get the project completed. Coincidentally enough, there was a storm the night the project was completed, and we got the project done on time. We went with a tan color to blend in with the surroundings. From a short-term stability and a long-term post closure maintenance cost, the ClosureTurf® system was the absolute right decision to make for the Portola Landfill."

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After a thorough process of approval from the City Council and public, ClosureTurf was submitted to the State of California for permit modification and approved. The scope of work included removing the interim cover, making drainage improvements, and installing the ClosureTurf system.

"From a quality construction assurance perspective, installation of a ClosureTurf cover system required less field personnel during construction than a traditional prescriptive cover system. This resulted in cost savings to the city," stated Jake Russell, P.E., of the City of Portola's CQA consulting firm Geo-Logic Associates. "The installation of the ClosureTurf cover was completed in significantly less time than other similarly sized perspective Subtitle D vegetative cap landfill cover systems with which I have been involved. By removing the soil components of the cover system, construction issues associated with the variability and availability of soil materials were eliminated."

With a residential neighborhood 1,500 feet South West of the landfill, contaminated water was also a concern. Many of the residents receive water through individual domestic supply wells. Because the sand and engineered turf act as a natural filter, ClosureTurf provides clean runoff with very low turbidity. In addition, no chemicals, fertilizers, or pesticides are required to maintain vegetation.



Clean groundwater post ClosureTurf installation.



Sand infill is brushed into the engineered turf.



Located in the Sierra Mountains, the Portola Landfill is often subjected to harsh climates.

CLOSURETURF® is a U.S. registered trademark which designates a product from Watershed Geosynthetics, LLC. This product is the subject of issued U.S. and foreign patents and/or pending U.S. and foreign patent applications.



ClosureTurf®

Location
Salinas, CA

Owner
Salinas Valley Solid Waste Authority

Engineer
Golder Associates

Project Type
Municipal Solid Waste Landfill

Year Completed
2013

Size
66 acres

The Crazy Horse Landfill (CHLF), owned and maintained by the Salinas Valley Solid Waste Authority (SVSWA), had been in service for 75 years, with final in-place waste volume estimated at 4.3 million cubic yards. In 2013, final cover design for the closure of the CHLF went through three iterations before the SVSWA settled on the ClosureTurf system. The project marks the first large-scale implementation of ClosureTurf in California.

The CHLF began operation in 1934 as a burn dump and continued that operation until 1966 when it was converted to a sanitary landfill operation. In 1990, it became a Superfund site and continued to receive non-hazardous residential, commercial, and industrial solid waste until December 2009, when the SVSWA ceased all fill operations and began the process of closure.

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Because of site conditions, the SVSWA's final cover system would have to meet five main criteria:

1. The system would have to withstand the environmental conditions present including wind erosion and uplift, rainfall erosion, concentrated flow erosion, ultraviolet light degradation, and traffic.
2. The system had to provide a static factor of safety of at least 1.5 and resist seismic deformation due to the San Andreas Fault zone located about five miles northeast of the site.
3. The final cover system had to provide excellent groundwater protection to halt continued impact to the local groundwater supply.
4. Due to an old cross-traffic style highway interchange, risk to motorists had to be avoided during construction.
5. The new system could not create additional nuisance conditions for nearby residents, many of whom had been concerned about the landfill site operations and impacts for years.



Installation of engineered turf and geomembrane before sand infill is added.

In addition, surface water that could be affected by the landfill would provide groundwater recharge, contact recreation (i.e. swimming), and wildlife habitat. Adjacent land uses near the site included cattle grazing and residences. Homeowners had often registered complaints with the SVSWA regarding dust, windblown litter, odors, and general site appearance.



The engineered turf and sand infill effectively filters surface water, providing clean runoff with very low turbidity.

The SVSWA evaluated several closure systems including an evapotranspirative cover system, a prescriptive cover utilizing a textured geomembrane, and a prescriptive cover utilizing a structured geomembrane. However, getting vegetative cover soil to the site proved financially prohibitive at an average of $13/cy. The SVSWA was then introduced to the ClosureTurf technology, which was relatively new at the time. The primary regulating agency and design engineer requested some additional testing such as wind erosion and uplift. They found surprising results in that the system became a downward force at higher wind speeds (up to 120 mph or Category 3 hurricane wind speeds. This was important because the design wind speed for the Pacific coast was 85 mph in 2010. With rainfall erosion also being a concern, ASTM testing confirmed that no sand loss occurred at 2.63in and 4.65 in of rainfall per hours. For concentrated flow areas, a cement infill called HydroBinder® was used to increase hydraulic shear resistance up to a measured 15psf) equivalent to a 12-in D50 riprap. In addition, tests were conducted on UV resistance and trafficability, all of which ClosureTurf performed well on.



ClosureTurf® easily integrated into the conventional gas col-lection system.

Ultimately, the SVSWA chose ClosureTurf due to the fact that it met all five criteria, and the cost fell within their budget of available closure funds. The annual post-closure maintenance was estimated at $46,000 per year. ClosureTurf reduced these annual costs by approximately 80%. The total savings over a nominal 30-year post-closure period is projected at $1.4 million.

In addition, ClosureTurf eliminated about 11,000 truck trips to import soil to the site. The project's carbon footprint was reduced by 80% due to the combined project size reductions of soil import elimination and reduced heavy equipment needs.

Most importantly, the closed landfill has had a positive impact on the local neighbors. The site is now barely discernible from the natural hillside, and aesthetic and odor complaints from neighbors have ceased. In fact, many have contacted the SVSWA to compliment the appearance of the site.



Because some of the side slopes measure 2H:1V, Agru's Super Gripnet® membrane was used to provide a high shear strength.



Confluence of drainage channels with HydroBinder® at the Crazy Horse Landfill outlet.

CLOSURETURF® is a U.S. registered trademark which designates a product from Watershed Geosynthetics, LLC. This product is the subject of issued U.S. and foreign patents and/or pending U.S. and foreign patent applications.



// What's New in Geo?

ADVANCES IN GEOSYNTHETIC SOLUTIONS FOR SUSTAINABLE LANDFILL DESIGN

Geosynthetics Really *Do* Last!

By Ming Zhu, PhD, PE, M.ASCE,
Marco Isola, PhD, PE, M.ASCE, and
Jorge Zornberg, PhD, PE, F.ASCE



Even though geosynthetics are now a well-established discipline within geotechnical engineering, ingenuity continues to play a significant role in projects involving their use. This is because it's possible to tailor the mechanical and hydraulic properties of geosynthetics to address design needs in almost all aspects of geotechnical engineering. Although the ability to achieve consistent geosynthetic properties has been a key consideration since their early use, concerns about their lifespan have subjected geosynthetics to careful scrutiny.

Engineered turf cover installed at Baldwin County Landfill, GA.



Figure 1. View of stacked geotextile tubes for containment of dredged sediments showing detail of multiple tube operation stages. (Photo courtesy of TenCate Geosynthetics.)

In recent years, however, there's been increasing confidence within the geotechnical profession regarding geosynthetics' performance and long-term durability. Why? It's because polymer formulations have continued to advance, phenomenal research has been (and continues to be) conducted to quantify the longevity of geosynthetics, and field evidence of good performance has been documented for geosynthetic structures that are more than a half-century old.

This article is not intended to document the important results of recent research on durability or add to an already healthy record of field performance of early geosynthetic structures. Instead, its objective is to illustrate how overcoming early concerns about durability has enabled innovative geosynthetic solutions in landfill design. Geosynthetics have been used in modern landfills in the U.S. for over four decades since the passage of the Resource Conservation and Recovery Act in 1976. Beyond the well-established use of geosynthetics in base liner systems, three relatively new applications are featured in this article that involve the use of geosynthetics as part of the waste disposal, slope stabilization, and final closure of landfills. These applications illustrate recent advances in geosynthetic solutions to overcome enduring challenges previously managed using traditional approaches.

Stacked Geotextile Tubes for Waste Disposal

The use of geotextile tubes combines dewatering and disposal of industrial wastes, such as sludges, dredged sediments, and sluiced coal combustion residuals (CCR), into one operation, significantly reducing the handling of saturated wastes. Geotextile tubes involve high-strength, permeable woven geotextiles sewn into a tube. When used for dewatering, the geotextile acts as a filter that allows water flow while retaining the solids in the tube. The dewatering process includes three main stages: hydraulic filling, free water drainage, and consolidation (Figure 1). Flocculants are usually added to fine-grained slurries to facilitate agglutination of solid particles. After dewatering is complete, geotextile tubes can be either transported for off-site disposal or capped in place for permanent disposal. Unlike traditional dewatering techniques, such as settling basins, geotextile tubes offer high dewatering efficiency and provide effective odor control by limiting exposure of waste to air.

A recent trend in geotextile tube applications involves stacking them in multiple layers to reduce the disposal area footprint in large environmental remediation projects. For example, as part of the Onondaga Lake Cleanup Project near Syracuse, NY, about 1.6 million m^3 of contaminated sediments dredged from the lake were dewatered and contained using approximately 1,000 geotextile tubes that were up to 91 m in length and 24-27 m in circumference. The geotextile tubes were stacked in six layers approximately 11 m high within the 22-hectare landfill footprint and permanently capped in place with a soil-geosynthetic final cover in 2017. Figure 1 shows an aerial photo of the stacked geotextile tubes during construction. The key design considerations when stacking geotextile tubes include internal stability of individual tubes, slope stability of stacked tubes, and settlement and bearing capacity of the foundation that supports stacked tubes.

Another trend is to utilize the waste encapsulated in the geotextile tubes as fill material to reduce the quantity of imported construction materials. A geotextile tube wall was constructed in 2016 during closure of an ash pond at a large Mid-Atlantic utility site. The wall separated the ash pond into a pool section that continued to serve as an operations area to receive sluiced CCR, and a construction section where preparation work for final closure grading was to be started. The geotextile tubes were stacked in two layers and formed an approximately 18- to 24-m-wide, 3.4-m-high, and 730-m-long

wall. Approximately 61,000 m^3 of in-situ fly ash were dredged and pumped into the geotextile tubes and used as the fill material to construct the wall. Figure 2 shows a section of the installed geotextile tube wall.

Durable Geosynthetic Reinforcements for Waste Containment Stabilization

While many design solutions have been adopted to maximize the available waste capacity within the defined footprint of landfills (e.g., dynamic compaction, bioreactor technology, and landfill mining), the use of geosynthetic-reinforced structures, such as mechanically stabilized earth berms, has been incorporated into landfill designs over approximately the last two decades. While the design of reinforced-soil structures generally requires granular backfill material, landfill owners have started using actual landfill waste as backfill material to optimize the site geometry and reduce construction costs.

The use of waste as backfill material introduces several challenges into the design of the reinforced-soil structures. Geotechnical properties of municipal solid waste are inhomogeneous and highly depend on the composition of the waste itself — in particular, the percentage of organic components that decompose over time. Furthermore, waste degradation involves complex fermentation phenomena, chemical alteration, creep, oxidation, and cementation that results in mineralization of the waste. The resulting waste often has an average temperature of 40° C, with peaks over 60° C



Figure 2. View of geotextile tube wall filled with re-used fly ash in an ash pond at a Mid-Atlantic utility site. (Photo courtesy of TenCate Geosynthetics.)

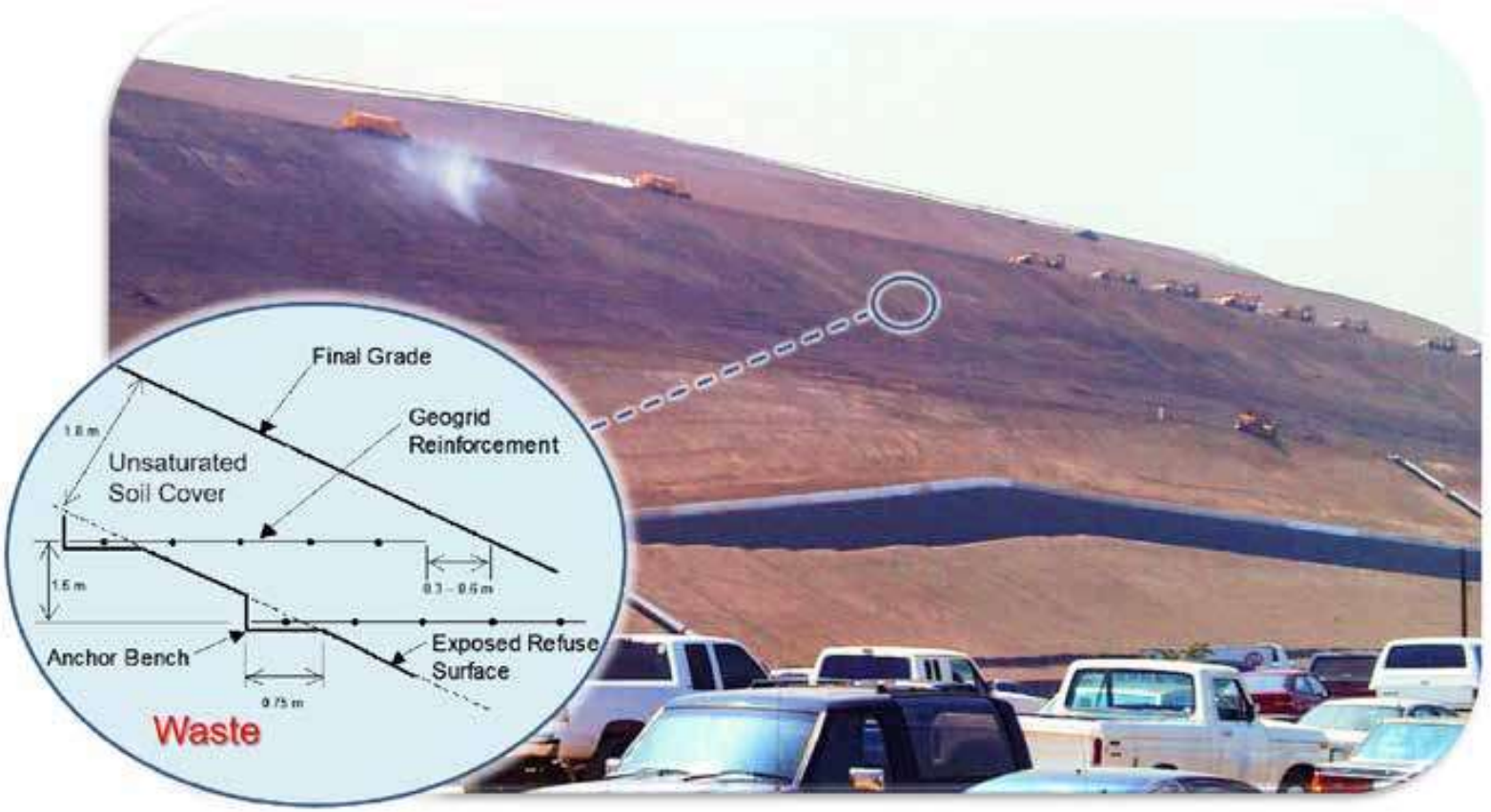

Figure 3. View of a geogrid-reinforced soil cover system on the North Slope of the OII Superfund Landfill. Note the detail of the geogrid reinforcements anchored into solid waste.

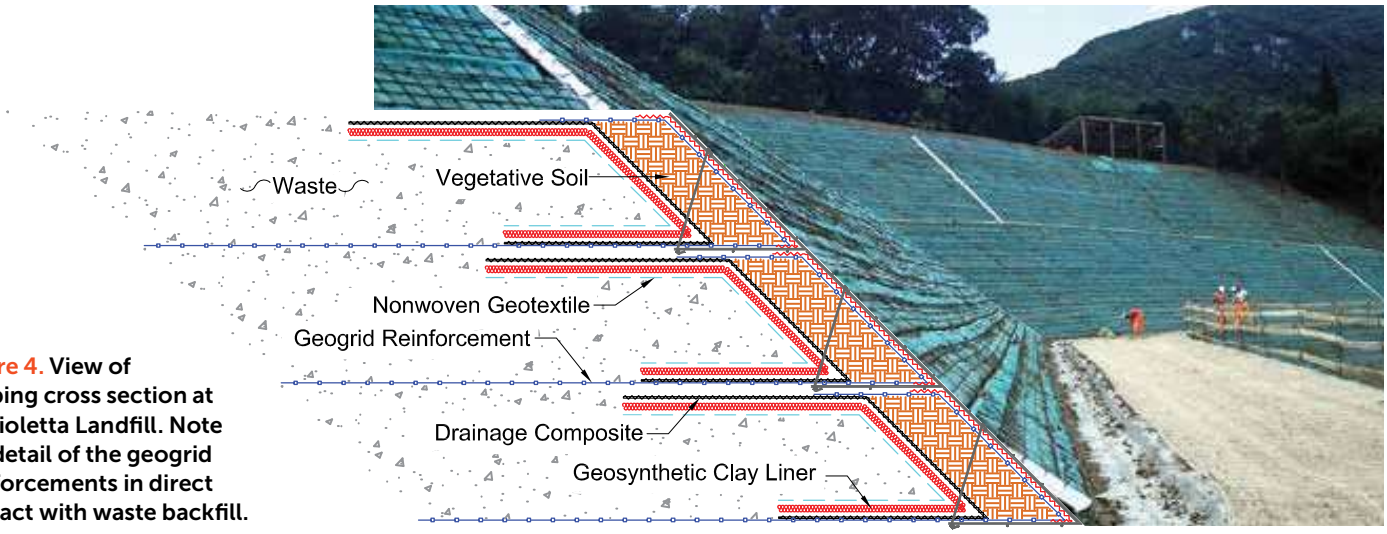

Figure 4. View of capping cross section at Niccioletta Landfill. Note the detail of the geogrid reinforcements in direct contact with waste backfill.

due to anaerobic digestion, and is often chemically aggressive. Key aspects to be considered when selecting geosynthetic reinforcements, such as geogrids, include their resistance to chemical degradation under a wide range of pH, creep performance, performance at high temperatures, and resistance to mechanical damage during waste compaction.

The final closure of the Operating Industries, Inc. (OII) Superfund Landfill located near Los Angeles, CA, is an early design example involving geosynthetic reinforcements in direct contact with solid waste. One of the most challenging design and construction features of that project is related to the stability of the landfill's North Slope. The North Slope is located immediately adjacent to the busy Pomona Freeway. It rises up to 65 m above the freeway and consists of slope segments separated by narrow benches that are as steep as 1.5H:1V and up to 30 m high. As illustrated in Figure 3, horizontally placed uniaxial geogrids anchored in the actual solid waste were selected as the most appropriate and cost-effective method for stabilizing the engineered soil cover constructed over the North Slope. The cover has performed well since its construction over 20 years ago, which demonstrates that the geosynthetic reinforcement solution has been both durable and successful.

In 2011, a landfill cell was constructed in Niccioleta, Tuscany, Italy, using waste as fill material for the reinforced side slope (Figure 4). A geogrid material was used to reinforce each layer of waste material, providing the tensile strength required to achieve internal stability. Additionally, two layers of drainage geocomposites and one layer of geosynthetic clay liner were wrapped around each layer of waste to form the landfill's final capping system. A layer of vegetative soil, retained by a turf-reinforcement mat, was subsequently placed in the slope face to provide a vegetated facia and an extra layer of protection for the capping system. As designed, the system allowed the construction of landfill cells having side slopes at angles much steeper than the typical 3H:1V slope, significantly increasing the overall landfill cell capacity.

Engineered Turf Cover for Final Closure

Closure of a landfill is required after reaching final grades to isolate the underlying waste and manage long-term environmental risks. Traditionally, landfills have been closed using soil covers with geosynthetic components. A traditional landfill cover, for example, consists of (from bottom to top) a geomembrane barrier layer, a geocomposite drainage layer, and a protective/vegetative soil layer that is at least 0.6 m thick. Two persistent, long-standing challenges associated with many traditional soil covers are soil erosion and cover slope failures.

The engineered turf cover is a relatively new landfill closure solution that uses engineered turf and a specified infill to replace the protective/vegetative soil layers used in traditional soil covers. The elimination of these soil layers removes soil erosion as a driving force behind cover slope failures. Because engineering turf is not susceptible to erosion, it's less affected by factors such as changing weather conditions and varying soil properties compared to traditional soil covers. Moreover, engineered turf covers require less post-closure maintenance because soil-erosion repairs, re-vegetation, fertilization, mowing, and stormwater pond cleaning are not needed.

The engineered turf component is made of high-density polyethylene (HDPE) synthetic grass blades tufted into a double-layer polypropylene, woven geotextile backing, which is placed directly on top of a HDPE or linear low-density polyethylene-structured geomembrane (Figure 5). The specified infill, either bonded or unbonded clean sand with a minimum layer thickness of 13 mm, is placed inside the synthetic grass blades. The engineered turf and infill function primarily to protect the geomembrane from ultraviolet (UV) exposure, wind uplift, and puncture by external forces, such as vehicular traffic, hail, and animals.

The first engineered turf cover was installed in 2009 at a four-hectare MSW landfill in Louisiana to solve recurrent soil-erosion problems. In 2013, installation of a 28-hectare engineered turf cover was completed at the Crazy Horse MSW Landfill in California; it was selected to meet the design

requirements of final cover stability for both static and seismic conditions for steep side slopes up to approximately 2H:1V. To date, engineered turf covers have been or are being installed at more than 40 sites in over 20 states in the U.S., covering a total area of more than 600 hectares. These sites include MSW landfills, industrial waste landfills, and CCR landfills and surface impoundments. Figure 5 shows the aerial photo of a 14-hectare engineered turf cover installed in 2014 at the Hartford Landfill in Connecticut.

Sustainability for landfill closures entails long-term performance and minimal environmental and social impacts. The design life of the engineered turf cover is projected to be over 100 years as a result of the enhanced UV stabilization of the synthetic turf fibers. The carbon footprint of engineered turf cover is smaller than that of traditional soil covers due to faster installation, fewer construction materials, fewer construction equipment operations, and less post-closure maintenance. In addition, land disturbance is avoided because borrow soils are not needed, which results in less impact on local communities as a result of less truck traffic on local roads.

Engineered turf covers also facilitate reuse of the large space at the top of landfills after closure, such as converting them into a solar farm because maintenance of grass within the array isn't needed. Figure 5 shows the 1-megawatt solar-electricity-generating facility installed atop the Hartford Landfill, which powers approximately 1,000 homes per day at peak capacity. The solar array is supported by a racking system ballasted with concrete blocks that sits directly on the engineered turf cover. This approach reduces maintenance, because the solar panels are not subject to potential damage from mowing equipment and the runoff from the drip edge of the solar panels does not induce soil erosion that would undermine the panel foundations. Additionally, the engineered turf cover provides a relatively dust-free environment that promotes efficient solar collection.

Looking Ahead

Advances in geosynthetics have made these materials a well-established technology within the portfolio of solutions available to geotechnical engineers. The old question, "How long will they last?" is being addressed through extensive research, sound engineering design, and innovative applications. This contributes to sustainable landfills by incorporating geosynthetics in the design of landfill components related to disposal operations, stabilization approaches, and final closure systems, as illustrated in the three applications presented in this article.

Innovative geosynthetic materials, products, and designs are expected to continue to emerge with the pursuit of sustainable designs. For example, according to data provided by the U.S. Environmental Protection Agency, there are more than 1,000 active CCR landfills and surface impoundments in the U.S. that require closures, creating opportunities for implementing new geosynthetic solutions. Overall, geosynthetics play an important role in geotechnical projects in general and landfill design in particular because of their versatility, cost-effectiveness, ease of installation, and good characterization of their mechanical and hydraulic properties. The creative use of geosynthetics in geotechnical practice will continue to expand as manufacturers continue to develop new and improved materials, and engineers come up with new design approaches and field applications. GS

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JORGE ZORNBERG, PhD, PE, F.ASCE, is a professor of geotechnical engineering at The University of Texas at Austin in Austin, TX. He was president of the International Geosynthetics Society (IGS) and currently chairs the G-I Technical Committee on Geosynthetics. He can be contacted at *zornberg@mail.utexas.edu*.



Figure 5. View of engineered turf cover installed at Hartford Landfill showing detail of the different components of the cover.



ClosureTurf®

Location
Port Angeles, WA

Owner
City of Port Angeles

Engineer
Herrera Environmental Consultants

Project Type
Municipal Solid Waste Landfill

Year Completed
2016

Size
19 acres

In 2014, the city of Port Angeles, Washington, underwent a $20+ million project to relocate their landfill from a giant hole on the side of a 135-foot high bluff overlooking the Strait of Juan de Fuca. Small landslides, erosion, and fear of coastal water contamination drove the city to proactively address the possibility of a failure.

As part of their Landfill Cell Stabilization Project, the city had 400,000 cubic yards of trash relocated to an area behind the bluff. A massive hole remains but the remaining refuse is now stabilized with an MSE retaining wall that has special targets installed to measure for movement of the area. Both the remaining slope and relocated landfill have been permanently closed with the ClosureTurf® system. Even with heavy rainfall and major storms, no erosion has occurred to date.

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The relocated landfill behind the bluff measures approximately 19 acres. It was permanently closed in 2016 with the ClosureTurf® system. Slopes are 2.5:1 with the longest slope length at an impressive 285 feet. The Agru Super Gripnet® geomembrane used as the foundation of the system provides greater stability on steeper grades and reduces the need to rebuild slopes.

Port Angeles receives 29 inches of rain per year on average and the 25-year storm event is 3.9 inches of rainfall in 24-hours. The 25-year flow in the perimeter ditches is over 6 cubic feet per second and the flow velocity is over 5 feet per second. The ditches were quarry spall lined to help increase roughness and attenuate flow velocities. The engineered synthetic turf and sand infill effectively filters surface water, providing clean runoff with very low turbidity. In addition, the system significantly reduces sediment loading to the surrounding channel and sedimentation/detention basins.

The ClosureTurf system also protects against other weather events such as hurricanes, typhoons and earthquakes. The area can experience high wind gusts annually from heavy windstorms and pacific typhoons. In 2016, Super Typhoon Songda hit the Pacific area with wind gusts over 60 mph. The site survived as designed with no erosion or maintenance required. Located in a seismically active area, it is prone to seismic hazards such as amplified seismic response and seismically induced landslide activity. The site lies approximately 4.5 miles north of the recently discovered Little River Fault, a shallow crustal tectonic structure that is considered active and is capable of producing earthquakes of magnitude 6.5 or greater. ClosureTurf protects against erosion that may occur with these events.

The system is designed for and proven to have a design life over 100 years of the infilled geosynthetic protective layer (engineered turf) with the underlying geomembrane lasting many more years beyond the long life of the engineered turf component.

The City's Solid Waste Division now services 7,000 residents and 850 commercial businesses and all refuse is collected at the onsite transfer station and transported to nearby landfills. The closed site serves as a natural habitat and is occupied by many different species of insects and animals, including bees, butterflies, bobcats, otters, elk, and deer.



Slopes are 2.5:1 with the longest slope length at an impressive 285 feet.



Port Angeles was easily able to integrate ClosureTurf® into their conventional gas collection system.



Deer play daily on the top deck and side slopes of the landfill.



Refuse still remains in one of the slide slopes on the bluff but is stabilized by a large MSE wall embedded with survey targets to track any kind of movement.

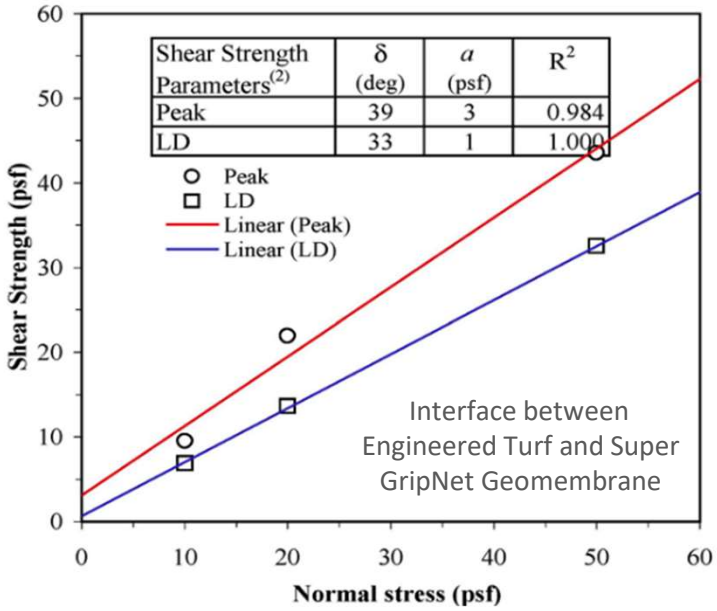


ClosureTurf® can be driven on without damage to the system.

CLOSURETURF® is a U.S. registered trademark which designates a product from Watershed Geosynthetics, LLC. This product is the subject of issued U.S. and foreign patents and/or pending U.S. and foreign patent applications.

Geotechnical Performance – Slope Stability

- Improved geotechnical stability due to removal of overburden soil layers: no soil cover veneer failure
- Two Interfaces in ClosureTurf:
  - Interface between the Engineered Turf and Structured Geomembrane



Slope Angle	Slope	Calculated Safety Factor
33	1.5H:1V	1.2
26	2.0H:1V	1.6
18	3.0H:1V	2.4
14	4.0H:1V	3.2

  - Interface between Structured Geomembrane and Subgrade Soil/Waste – Site-specific interface shear strength test should be performed.

Geotechnical Performance – Slope Stability

Owner: Salinas Valley Solid Waste Authority

Location: Salinas, CA

Completed: 2013

Closure Area: 68 acres

North side has ~2:1 Slopes

~5 miles from the San Andreas Fault



Benchless Designs

- Eliminates the need for diversion berms and down slope channels
- Allows for storm water to sheet flow for the maximum distance
- Channel flow does not occur until the water reaches the perimeter channels
- Saves in design, construction, and maintenance costs



Baldwin County Landfill, GA
3H:1V slopes up to 260-ft long

Benchless Designs



Port Angeles Landfill, WA
2.5H:1V slopes up to 285-ft long



Taylor County Landfill, GA
4H:1V slopes up to 650-ft long

Appendix D

Ukiah Landfill Monitoring Wells and Vichy Springs Resort

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CITY OF UKIAH

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COURT CLERK

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF MENDOCINO

GILBERT ASHOFF and MARJORIE ASHOFF, dba VICHY SPRINGS and VICHY SPRINGS RESORT, VICHY SPRINGS MINERAL WATER CORPORATION, Plaintiffs, v. CITY OF UKIAH, CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD (NORTH COAST REGION), COUNTY OF MENDOCINO, WEEKS DRILLING & PUMP COMPANY, DOES 1 TO 20, Defendants.	Case No. 70873 DECLARATION OF DAMON F. BROWN IN OPPOSITION TO PLAINTIFFS' APPLICATION FOR PRELIMINARY INJUNCTION DATE: December 19, 1994 TIME: 8:30 a.m. DEPT: 4

I, Damon F. Brown, declare:

1. I am employed as a Senior Geologist by EBA Wastechnologies, engineers and environmental consultants, which has contracted with the City of Ukiah (City) to conduct various geological and engineering studies and prepare various documents in connection with the operation of the City's landfill. I am submitting this declaration in opposition to the plaintiffs' motion for a preliminary injunction and could competently

testify to the contents of this declaration from personal knowledge or based on my professional opinions, if called as a witness herein.

2. I am a Registered Geologist and Certified Engineering Geologist in California and hold a Master of Science degree in Earth Resources from Colorado State University. I have fourteen years' experience in the fields of hydrogeology, engineering geology and environmental geology. A detailed resume, setting forth my professional experience and qualifications, is attached hereto as Exhibit A.

3. EBA Wastechnologies has been contracting with the City to provide engineering services in connection with operation of its landfill since 1986. I have been assigned to supervise this consulting work for EBA since November 1992. We have assisted the City in completing Solid Waste Assessment Tests (SWAT) for the landfill in February 1986 and again in 1988. In connection with preparing that assessment, EBA supervised the drilling of two monitoring wells located at 87-1 and 87-2. (A plat map showing the location of the various wells in relation to the landfill, Vichy Springs Road, and the Vichy Springs Resort is attached hereto as Exhibit B and incorporated herein by reference.) In response to this SWAT, the Regional Water Quality Control Board (RWQCB) ordered the City to drill additional monitoring wells in connection with supplementing its report of waste discharge pursuant to 23 CCR Section 2205. In addition, regulations adopted by the State Integrated Waste Management Board (Board) require the City to continually update a Report of Disposal Site Information (RDSI) which it files with the Local

Enforcement Agency (LEA) and the Board. (See 14 California Code of Regulations [CCR] Section 18222.) In 1989, EBA also contracted with the City to perform various geotechnical and hydrological services to comply with State regulations governing the operation of solid waste sites, like the Ukiah landfill. These services included drilling eight additional monitoring wells and six exploratory borings, geologic mapping, preparation of geologic cross sections, performing aquifer permeability analyses, and analysis of groundwater and surface water quality. EBA has developed several work plans for the City in connection with updating its RDSI and responding to requests from the RWQCB to identify discharges of leachate from the landfill and its effect on groundwater in the area.

4. In the course of supplementing its report of waste discharge, the City drilled a well which has been assigned number 90-8. Water from well 90-8 was tested and contained relatively high concentrations of benzene, which is classified as a hazardous or toxic substance. Benzene, at this level, had not been detected in any of the other monitoring wells that the City had drilled, including wells at the toe of the landfill or in samples of landfill leachate.

5. The RWQCB ordered the City to drill an additional well to determine whether benzene had moved further from the landfill in the direction of the City's property line. As a result of that order, the City drilled monitoring well 92-4, which is depicted on Exhibit B. Benzene, with similar concentrations, was detected in the water extracted from well 92-4.

6. The direction of groundwater flow is along the sloping

plane defined by the surface of the water table. As a result of previous tests conducted by the City, the City had determined the flow direction and gradient of the groundwater aquifer on the northwest side of the landfill, where the landfill toe is located. However, in comparing the waters extracted from the wells drilled at the toe of the landfill with waters extracted from wells 90-8 and 92-4, I determined that the waters came from different underground aquifers. Wells 90-8 and 92-4 are separated from the wells at the toe of the landfill by a ridge. Well 92-4 is approximately 980 feet from Vichy Spring. In order to determine the direction of flow (slope of the surface of the water table) in the aquifer to the southeast of the landfill, where wells 90-8 and 92-4 have been drilled, we require a third well to create a triangular pattern. The third well in the triangle will allow us to identify the plane of the aquifer and its gradient. The proposed monitoring well will be approximately 1,080 feet from Vichy Spring. From this information, we will be able to calculate the direction of flow (whether it is moving from the landfill or toward the landfill) and the groundwater gradient. This information is vital to developing a plan for cleaning up the contamination before it spreads and contaminates water used by the general public. Well 92-4 is close to Sulphur Creek. If the contamination effects groundwater on other property or the water in Sulphur Creek, the damages, although difficult to estimate, could be substantial, possibly in the hundreds of thousands of dollars. Until we drill the benzene well we cannot estimate how immediate this threat may be. Consequently, on November 17, 1993, the RWQCB directed the City

to drill this third monitoring well (the benzene well) to provide information to supplement its report of waste discharge. (A true and correct copy of the letter from Ray O'Connor to Sue Goodrick is attached hereto as Exhibit C and incorporated herein.)

7. In Exhibit C, the RWQCB directed the City to develop a work plan, including well construction specifications, and a site plan showing the proposed location of the benzene well.

8. In January 1994, I prepared the requested work plan and submitted it to the RWQCB on behalf of the City. (A true and correct copy of the work plan is attached hereto as Exhibit D and incorporated herein.) On February 1, 1994, the RWQCB approved the plan and authorized the City to proceed with the drilling. (A true and correct copy of the letter from the RWQCB is attached hereto as Exhibit E and incorporated herein.) On February 10, 1994, the City signed an agreement with EBA Wastechnologies, authorizing it to install the benzene well. (A true and correct copy of the agreement is attached hereto as Exhibit F and incorporated herein.)

9. The City instructed me to delay drilling the well, because the owners of the Vichy Springs Resort had expressed concerns that the well might adversely affect their springs.

10. In response to concerns expressed by Mrs. Marjorie Ashoff about a reduction in the temperature, but not the production of the springs, and the possible effect on a separate spring on their property called the Ardeche Spring, I commissioned additional stable isotope analysis at the University of California at Davis to determine whether the water in the test

wells (90-8 and 92-4) could possibly have come from an aquifer common with the waters produced by the Vichy and Ardeche Springs. This additional analysis took until late May 1994. The results of the additional analyses were consistent with previous tests, the waters from Vichy and Ardeche Springs are similar to each other but different from the water in 90-8 and 92-4. On May 23, 1994, the RWQCB notified the City to proceed with drilling additional wells, other than the benzene well. Because of stated concerns by the representatives of Vichy Springs Resort that the existing and any new monitoring wells might affect their water supply, the RWQCB requested that the City compile a summary of groundwater quality data and hydrological information in advance of a meeting with consultants for Vichy Springs, the Regional Board and the local Health Department. (A true and correct copy of the May 23, 1994, letter from the RWQCB to the City is attached hereto as Exhibit G and incorporated herein.) On August 1, 1994, the Regional Board requested the City to prepare a summary of information supporting my conclusion that the existing or future groundwater monitoring wells at the landfill would not adversely impact Vichy Springs. (A true and correct copy of the August 1, 1994 letter is attached hereto as Exhibit H and incorporated herein.)

11. On August 31, 1994, I prepared a summary report and submitted it to the RWQCB. (A true and correct copy of the summary report dated August 31, 1994, is attached hereto as Exhibit I and incorporated herein.) This report summarizes the data and the basis for my conclusion that the monitoring wells have not and will not impact the Resort springs. I had reached

this conclusion and communicated it to City officials in May 1994.

Based on a review of:

(1) the site geology,

(2) the effects experienced when the monitoring wells were drilled,

(3) an organic and inorganic hydrochemical analysis of the waters extracted from wells 90-8 and 94-2 and waters extracted from Vichy Springs,

(4) stable isotope analysis of those waters, and

(5) my personal experience and the experience of EBA with the geology and hydrogeology of the area, I concluded that monitoring wells 90-8 and 92-4 are not impacting Vichy Springs, because they are installed in a water-bearing zone significantly different from and not connected to, or intermixing with, the water-bearing zone of Vichy Springs.

I also concluded that the monitoring wells are not capable of influencing the hydrology or temperature of Vichy Spring and therefore, are not responsible for the heat loss and flow reduction reported to have occurred at Vichy Springs. Based on the data developed, it was and is my opinion that the likelihood of future landfill site monitoring wells impacting Vichy Springs is extremely improbable.

12. On October 14, 1994, I met with representatives of the City, Vichy Springs, the RWQCB, and Alisto Engineering in Walnut Creek to review all of the data complied to date and to receive any information that Vichy Springs could produce challenging my conclusions. Contrary to Mr. Ashoff's declaration, we had a

vigorous discussion with the engineering firm representing Mr. Ashoff about the hydrogeologic data and its significance. After that meeting, Mr. Ashoff supplied the City and myself with a letter dated October 13, 1994, prepared by Al Sevilla from Alisto engineering. This is the same letter that is attached to Mr. Sevilla's declaration as Exhibit 1.

13. After reviewing the letter and letters from Stanley Singer, I still believe my conclusions are correct. The RWQCB and the California State Water Resources Control Board, Division of Clean Water Programs, also reviewed these materials and have similarly concluded that the drilling of the monitoring wells have not been the cause of any observed changes in the Vichy Springs and are very unlikely to cause any such changes in the future. (See October 28, 1994, letter from Benjamin D. Kor, Executive Officer, Regional Water Quality Control Board, to Charles L. Rough, Ukiah City Manager, and Memorandum to Benjamin Kor from Harry M. Schueller, Chief, Division of Clean Water Programs, State Water Resources Control Board, dated October 31, 1994, attached hereto as Exhibit J and incorporated herein.)

14. In the October 13, 1994, letter from Alisto Engineering, and in the Declaration of Al Sevilla in support of plaintiffs' complaint and application for injunctive relief, Mr. Sevilla contends that the drilling of well 92-4 caused the decreased flow and temperature of Vichy Springs. He further believes that the drilling of the benzene well will cause further degradation of Vichy Springs. He bases this opinion on his view that no other event in the area other than the drilling of well 92-4 could account for the sudden decrease in the flow

and the temperature of the Vichy and Ardeche Springs. He speculates that well 92-4 punctured a "non-hydrostatic geologic zone" which allowed gases to escape that come from the Vichy Springs through faults and fissures in the ground. He and Stanley Singer contend that this reduced pressure caused the flow from the springs to decline and the temperature to drop.

He also criticizes my investigation in several respects. He maintains that the City did not follow standard well installation practices in drilling well 92-4 and that the reasons for locating the well are questionable. He claims drilling of the well did not follow standard practices, because I did not backfill and seal the well, when it did not fill with groundwater within twenty-four (24) hours after drilling. He questions the methodology, because he believes that a well should be drilled at the probable source of the benzene contamination, which, in his opinion, is the landfill, and not in the location I selected.

Finally, he contends that the existing wells should be sealed to see if the temperature and flow of the Vichy Springs increases. He believes this should be done before additional wells are drilled. He also believes that we should first prepare geologic cross-sections and mapping of the area before drilling additional wells.

15. I disagree with the arguments of Mr. Sevilla and Mr. Singer. I will state their contention followed by my response:

a. <u>There is no justification for drilling well 92-4, the two existing wells are not in a water-bearing zone and a third well will not provide valid data regarding gradient and flow direction</u>.

Contrary to Mr. Sevilla's assertion, it is not standard industry

practice to abandon a well if no water exists within a 24 hour period. When drilling monitoring wells in low permeability materials, it is common for wells to remain dry initially for many days or weeks. Regardless, we fully expected well 92-4 to take considerable time to fill with groundwater. This was based on our previous studies of the site geology and the behavior of the previous monitoring wells that we had drilled in this same geologic formation. In the past, we have had to wait several days or weeks after drilling a well before concluding whether it would provide useful data or not.

Wells 90-8 and 92-4 are installed in Continental Basin Deposits. As pointed out in my August 31, 1994, report, this is one of three major geologic units that exists in the vicinity of the landfill. These deposits are estimated to be in excess of 2,000 feet thick in the Ukiah Valley area and consists principally of highly consolidated silty and clayey soils with minor gravel lenses. Water percolates very slowly through these silty and clayey materials. The boring logs for monitoring wells 90-8 and 92-4 indicate that they were both drilled through continuous sections of clayey silt and silty sand of the Continental Basin deposits. No gravel layers, confining layers of clay, or bedrock from the Franciscan formation was encountered. Under these conditions, it is very difficult to obtain water from a monitoring well. Mr. Sevilla's statements about industry standards are simply incorrect.

The suggestion that the wells are not constructed in a water-bearing zone is surprising given that groundwater samples are routinely collected from them.

b. No geologic investigation supports the location of the benzene well.

The purpose of the benzene well is to determine the direction in which the groundwater is flowing in the area southeast of the landfill and the gradient of that flow. Even if we drilled a well directly into the landfill, as Mr. Sevilla suggests, and discovered leachate with similar concentrations of benzene, that would not help us in determining the extent of the benzene contamination in the groundwater, the direction in which the benzene contaminated groundwater is travelling or the gradient of the groundwater. The only way to obtain that information and to further characterize the extent of the benzene contamination in the area is to drill a third well creating a triangle in relation to the existing two wells.

Contrary to Mr. Sevilla's statement that we have made no effort to assess the impact of waste disposal on the underlying groundwater, we have performed an extensive assessment of the impact to groundwater from the landfill. Impacts to groundwater have been detected in a number of wells downgradient of the landfill. While the nature of the groundwater impact at the toe of the landfill is consistent with our experience at other leaking landfills (a wide variety of compounds at relatively low concentrations), it is significantly different from the contamination observed in wells 90-8 and 92-4 which consists primarily of very high concentrations of benzene along with low levels of toluene, xylene and ethylbenzene periodically detected. While these compounds are common constituents of gasoline, the contrast in concentration between benzene and the other three compounds is unusual for gasoline impacted groundwater.

Moreover, we have collected no objective data to date, suggesting that benzene is escaping from the landfill. No sample of leachate has detect benzene and only one well at the toe of the landfill has detected benzene. This well (90-5) consistently has concentrations that are orders of magnitude less than the concentrations identified in the test wells 90-8 and 92-4. While the landfill is the most obvious source, there is as much reason to suspect a source outside the landfill, at this point, as there is to suspect the landfill.

We have determined the direction of groundwater flow in the western area near the toe of the landfill. The groundwater encountered in the landfill toe wells is chemically different and separate from the benzene impacted groundwater found in wells 90-8 and 92-4. Drilling the benzene well will address all of the questions that the Regional Board has requested us to investigate. Drilling a well directly into the landfill would not answer most of the important questions that we need to answer at this point.

c. Wells 90-8 and 92-4 have penetrated either a non-hydrostatic pressure zone, two different geologic units, or a perched aquifer.

Our previous geologic investigation convinced us that the Vichy Springs water comes from the Franciscan formation, which is a separate and distinct geologic unit from the Continental Basin deposits in which wells 90-8 and 92-4 have been drilled. Rocks from the Franciscan formation are much older and deeper than the Continental Basin Deposits. The Franciscan formation consists of a mixture of various types of rock, including sandstone, metavolcanic rock, greenstone, and chert. The stable

isotope analysis of the water from the wells and the Vichy and Ardeche Springs clearly establish that they come from separate, disconnected aquifers. Moreover, the temperature of the water in the wells was significantly lower than the temperature in Vichy Springs. A review of the boring logs documenting the geologic materials encountered during the drilling of the wells demonstrates that two distinct geologic units were not penetrated.

Recognizing that the waters come from separate aquifers, Mr. Sevilla suggests that the test wells have tapped into the gases which drive Vichy Springs. This theory would explain how wells which have not tapped the same groundwater that supplies Vichy Springs could impact the flow or temperature of the springs.

He calls the zone that the wells penetrated a non-hydrostatic pressure zone. This means that the water pressure in this zone is created by active tectonic stresses rather than the pressure created by the water itself. In effect, he contends that the City's wells popped the balloon which contains the pressure which drives Vichy Springs. By releasing the pressure, the wells lowered the temperature and reduced the flow of the springs. He hypothesizes that the gases could have travelled from the Resort's geologic formation to the well sites through faults or cracks aligned between the two zones.

The occurrence of tectonic overpressure zones in the Coastal Ranges, such as the geothermal fields near Geyserville, California is well documented. However, I believe Mr. Sevilla's Hypothesis that the wells are responsible for the release of

gases that have migrated from the springs to the wells through faults and fractures is clearly flawed and not worth serious consideration.

I base this opinion on the following:

(1) A review of published fault maps and geologic maps of the area do not show any faults or fractures sets through the area of Vichy Springs resort and the area of wells 90-8 and 92-4. (California Division of Mines and Geology, 1982, *Alquist-Priolo Fault Map, Ukiah Quadrangle*. Clark, M.M., et al., 1984, *Slip-Rate Table and Map of Late-Quaternary Faults of California*: U.S. Geological Survey, Open-File Report 84-106. Jennings, C.W., 1975, *Fault Map of California with Locations of Volcanoes, Thermal Springs and Thermal Wells*: California Division Mines and Geology, Calif. Geol. Data Map Series, Map No. 1. Jennings and Strand, 1960, *Geologic Map of California, Ukiah Sheet:* California Division of Mines and Geology. Hart, et al., 1983, *Summary Report, Fault Evaluation Program, 1981-1982 Area (Northern Coast Ranges Region, California):* California Division of Mines and Geology, OFR 83-10. Smith, et al., 1982, *Fault Evaluation Report - Maacama Fault (Central and Northern segments):* FER Nos. 123, 124 & 125, California Division of Mines and Geology. Upp. R.R., 1982, *Holocene Activity on the Maacama Fault, Mendocino County, California:* PhD. Thesis, Stanford University.)

(2) On a number of occasions, I have reviewed numerous high altitude and low altitude aerial photographs or the area where the wells were drilled, and I have determined that there are no photo lineaments present in the Continental

Basin deposits which would indicate the presents of faults or fractures which could provide a pathway for the migration of these gases.

(3) Observations made during geologic field mapping of the area noted no evidence of faults, fractures or joint sets within the Continental Basin deposits in the vicinity of wells 90-8 and 92-4.

(4) Observations of the geologic material that we extracted from the well while it was being drilled, demonstrate we never encountered Franciscan formation bedrock or any evidence of a confining layer that would have trapped gas or allowed it to pressurize water.

(5) If we had penetrated such a confining layer, there would have been some evidence of a pressure release. Neither during the drilling nor after the drilling have we encountered evidence of significant changes in pressure within the well.

(6) Our experience with the migration of methane gas from the landfill through the Continental Basin deposits suggests that these geologic materials are not capable of holding gases under pressure.

Mr. Sevilla's suggestion that the water encountered in the wells may be from a perched aquifer does not support his conclusion that the wells have impacted Vichy Springs and while this suggestion may have implications for benzene migration, it is not relevant to the rest of his discussion.

d. Need further geologic investigation before drilling additional wells.

We have already completed all of the non-intrusive geologic investigations that would produce useful information in predicting the effect of drilling the monitoring wells on the Vichy and Ardeche Springs. The City could perform some additional geologic mapping of fractures within the Franciscan formation in the immediate area of Vichy Springs. This data would only supplement the informal observations I have already made during a tour of the resort given to me and RWQCB personnel by Mr. Ashoff. However, this would not provide the City with any additional information that would increase our understanding of the geology between the wells and Vichy Springs. Contrary to Mr. Sevilla's contention, we have developed cross-sections and mapping of the geologic zones. The structure and orientation of the geologic beds (strike and dip of bedding planes) has already been documented and is well known. Without additional subsurface boring data, a cross-section treading toward Vichy Springs would provide little benefit. It would simply show a thick (minimum 265 feet deep) zone of Continental Basin deposits with the Franciscan bedrock lying below at some unknown depth.

e. Wells 90-8 and 92-4 should be backfilled and sealed to see if the springs recover before drilling the benzene well.

There are two reasons why it is not necessary or advisable to backfill and seal wells 90-8 and 92-4.

First, it is not necessary. Both wells can be sealed pressure tight without backfilling. Above the screened bottom of the well casing that allows groundwater to enter, the borehole is sealed with bentonite and grouted to the surface and the top of the well casing is fitted with an airtight cap. The

benzene well will be constructed in the same way. Presently well 90-8 is fitted with water sampling equipment that does not provide an airtight seal, however, this equipment can be modified. Well 92-4 has continuously been equipped with an airtight cap. The well is only allowed to vent to the atmosphere for less than an hour every three months when collecting samples.

Second, the two existing wells may be useful or necessary to future remediation of the benzene contamination once a clean-up plan is developed. Backfilling and sealing the wells now may require re-drilling the wells during the implementation of a clean-up plan.

16. We also do not have reliable data on the degree to which the flow and temperature of Vichy Springs varies over time. In his declaration, Mr. Ashoff states that the flow of water from Vichy Springs was reduced from a normal rate of 65 gallons per minute (gpm) to below 40 gpm. He also states that the temperature when from ninety (90) degrees fahrenheit, which is the springs' normal temperature, to a low of around seventy-six (76) degrees. He attaches as Exhibit 1 to his declaration a list of gallon per minute and temperature figures for the Vichy and Ardeche Springs.

For example, Exhibit 1 shows that in 1979, Vichy Springs had a sixty-nine (69) gpm flow. However, according to a hydrological field test report supplied to the City by Gilbert Ashoff (attached hereto as Exhibit K are the excerpts from the 1979 report furnished by Mr. Ashoff), the Vichy Springs produced a natural flow in December 1979, of 3.4 liters per second. At that same time, the Ardeche Springs discharged one liter per

second. 3.4 liters per second converts to 53.89 gpm and 1 liter per second converts to 15.85 gpm. The combined output of both equals approximately 69 gpm. It appears that Mr. Ashoff may have improperly combined the two rates to report the 69 gpm flow rate that Exhibit 1 shows for Vichy Springs alone.

In addition, if the Ardeche Spring was flowing at 15.85 gpm in 1979, according to Exhibit 1, its flow had already dropped over 3 gpm between 1979 and March 20, 1993, which is just before well 92-4 was drilled. After the drilling of well 92-4, Mr. Ashoff reports that the Ardeche Spring went from 12.5 gpm to 9.5 gpm, which is roughly the same amount of reduction as occurred before the wells were drilled. In addition, if, as Mr. Ashoff's data suggest, the Vichy Spring was producing 53.9 gpm in 1979, it subsequently increased in production to 65.1 gpm in 1980; and then after the drilling of well 92-4, went down to 40.5 gpm.

According to a U.S. Geological Survey paper dated 1915 on file with the RWQCB, and also referred in the October 31 memorandum to the RWQCB from the State Water Resources Control Board, the Ardeche Spring discharged 8 gpm and the Vichy Spring about 16 gpm, as compared to a volume of 9.5 gpm and 39.3 gpm, respectively, reported by Mr. Ashoff for October 13, 1994. (A true and correct copy of the 1915 paper is attached hereto as Exhibit L.) This shows a substantial fluctuation in the output of Vichy Springs both before and after the drilling of the well.

The temperature fluctuations are equally inconclusive. According to his own figures, the Vichy Spring had a temperature of 93 degrees in 1989. By March 20, 1993, that temperature had gone down by 4 degrees. After April 7, 1993, the temperature

went down to 76 degrees and has since recovered to 86.5 degrees. This information suggests that the Vichy and Ardeche Springs have not maintained a consistent temperature or rate of flow over time as Mr. Ashoff asserts.

Further review of the literature show significant historic fluctuations in the flow and temperature of the Springs as shown in Exhibit M. As documented, this table compiles flow and temperature data for Vichy Spring from 1889, 1915, 1965 and 1979.

Based on my review of the literature, I believe that mineral springs frequently change temperature and output. These variations can be due to intermittent mixing of surface water with spring water, temporal variations such as seasonal changes or longer periods such as drought cycles, and seismic activity. Even very minor, otherwise undetectable tectonic shifts can influence both spring discharge and temperature. For example, Exhibit L reports that the Vichy Springs outlet moved 3-4 yards, apparently in response to a small local earthquake. Further, the great 1906 earthquake reportedly did not affect Vichy Springs.

Even if the flow and temperature of the springs changed significantly thirty days after drilling well no. 92-4, as the Ashoffs claim, that fact alone does not, in my professional opinion, establish any cause and effect relationship between the drilling of the well and the observed changes in the spring.

All of the objective hydrogeological evidence indicates that there is no interconnection between the well and the springs.

true and correct.

Executed this 9th day of December 1994, at Ukiah, California.



DAMON F. BROWN

DAMON F. BROWN, R.G., C.E.G.
SENIOR GEOLOGIST

REGISTRATION:

Registered Geologist, California
Certified Engineering Geologist, California
Registered Professional Geologist, Wyoming
Registered Environmental Assessor, California

CERTIFICATION:

OSHA 40 Hour Hazardous Waste Activities Training
OSHA 8 Hour Hazardous Waste Activities Management Training
Private Pilot

PROFESSIONAL AFFILIATIONS:

Association of Groundwater Scientists and Engineers of NGWA
California Groundwater Association
Geologic Society of America (GSA)
Society for Sedimentary Geology (SEPM)

EDUCATIONAL BACKGROUND

Colorado State University, Ft. Collins, CO
M.S. Earth Resources

University of California, Santa Cruz, CA
B.S. Earth Sciences

EXPERIENCE SUMMARY

Mr. Brown is a geologist with over fourteen years of experience in the fields of hydrogeology, engineering geology, and environmental geology. He has experience in: surface and subsurface geologic investigations, hydrogeologic characterization investigations, remedial investigation/feasibility Studies (RI/FS) for landfill and industrial sites, hazardous waste contamination studies, remedial action design and implementation of soil and groundwater corrective action programs, fault and landslide investigations, engineering geologic evaluations, borrow investigations, and environmental impact studies.

At EBA Wastechnologies, he is responsible for applying his experience in the conduct of geologic and hydrogeologic investigations in support of the firm's sanitary landfill and hazardous waste disposal facility projects. He has supervised numerous geologic and hydrogeologic investigations at known and suspected hazardous waste disposal sites.

EXHIBIT A

These investigations have required photogeologic interpretation, regional and site geologic mapping, geophysical exploration, exploratory trenching and drilling, vadose zone monitoring, groundwater monitoring well installation, aquifer testing and analysis, and soil and groundwater sampling and analysis. At waste disposal sites throughout California, he has planned and supervised; development of surface and groundwater monitoring plans, evaluation of regional seismicity and faulting, and evaluation of slope stability. In addition, he has conducted borrow and final cover investigations for waste disposal facilities and investigated suspected soil and groundwater contamination at a number of private industrial sites.

Prior to joining EBA, Mr. Brown conducted a wide range of geologic studies in California. These studies include waste disposal, regulatory compliance, site assessment/remediation, geologic hazards and research of active and potentially active faults including the San Andreas, Hayward, Calaveras, San Gregorio, San Simeon-Hosgri, Sargent-Berrocal, and Shannon faults. He was also responsible for conducting site-specific geologic and geotechnical investigations for residential hillside development, landslide repair and control projects, flood potential and sediment transport studies, and studies of sea cliff erosion and littoral drift.

REPRESENTATIVE PROJECTS:

Project manager and senior geologist for a Class III landfill in Mendocino County, CA. Project includes the expansion of an existing Class III landfill and the design of corrective action alternatives for the remediation of leachate and VOC impacted groundwater at the toe of the landfill. Identification and mixing of multiple hydrogeologic and hydrochemical regimes was critical to the development and evaluation of effective monitoring and corrective action programs. The use of stable isotope geochemistry techniques provided significant cost savings for water quality monitoring. Tasks include:

Preparation of Report of Waste Discharge (ROWD).

Preparation of Report of Disposal Site Information (RDSI).

Development of a Water Quality Monitoring Program in accordance with CCR Title 23, Chapter 15, Article 5.

Preparation of a Remedial Investigation/Feasibility Study for leachate and VOC impacted groundwater.

Preparation of Remedial Action Alternatives

Preliminary Closure/PostClosure Maintenance Plans.

Quarterly water quality monitoring.

NPDES permit and Storm Water Poilution Prevention Plan.

- Served as technical project manager for an extensive multi-phase hydrogeological investigation and characterization for Remedial Investigation/Feasibility Study (RI/FS) for a Class I hazardous landfill facility in Los Angeles County, CA. Tasks included developing a new field office with on-site chemical and geotechnical analytical capabilities, supervising a 15 man field crew and multiple drill rigs using four different drilling methods; supervising installation of piezometers and lysimeters; performed in-situ permeability (packer) testing; downhole geophysical logging; performed aquifer testing and groundwater sampling. Program design under the guidance of the California Department of Health Services (now DTSC).

- Project manager and Construction Quality Control (CQA) officer for closure construction activities at an 80 acre Class III municipal landfill and Class I hazardous waste site in Northern California. Responsible for overall project coordination including borrow source investigation, test pad analysis, placement of engineered fill, low permeability clay cap, and drainage control facilities. Geology Project manager The investigation involved defining groundwater flow conditions and potential pathways for the migration of contaminants released from the Class III landfill and Class I liquid hazardous waste ponds beneath the Landfill. Presently proceeding with the remedial process to satisfy the requirements of both the DTSC and the RWQCB for cleanup of contaminant releases beneath and downgradient of the site.

- Served as geologic project manager for the expansion of an existing Class III landfill in Napa County, California. Tasks included geologic field mapping, installation of groundwater monitoring wells, sampling and analysis of soil and groundwater, slope stability study. Responsible for the preparation of a Master Development Report designed to furnish the site and operations descriptions required in the Report of Waste Discharge (ROWD) for the Regional Water Quality Control Board, and the Report of Disposal Site Information (RDSI) engineering Report for the California Waste Management Board.

- Engineering geologist responsible for engineering geologic evaluation of expansion excavations at a Class III disposal site in Solano County, California. Project included geologic mapping, fracture analysis, and identification and mitigation of high permeability subgrade materials in five expansion modules. Served as project geologist for in-situ field permeability investigation. Study included in-situ field and laboratory permeability testing of native subgrade materials and engineered clay liner material.

- Supervised hydrogeologic investigation to evaluate potential soil and groundwater contamination at three Class III landfills in the Mendocino National Forest, Lake County, California. Project included installation of groundwater monitoring wells, and sampling and analysis of soil and groundwater. Investigation performed in accordance with CCR Title 23, Chapter 15, and Solid Waste Assessment Test (SWAT) requirements.

- Supervised geologic and hydrogeologic investigation for Solid Waste Assessment Test (SWAT) in accordance with the requirements of Calderon Bill (AB 3525) at a Class III landfill in Santa Clara County, California. Managed landfill characterization, and groundwater contamination verification and remediation feasibility study (RI/FS) for an existing Class III landfill. Program designed in accordance with CCR Title 23, Chapter 15. Geology project manager responsible for developing design criteria to mitigate effects of shallow groundwater and Holocene faulting associated with a Class III landfill expansion project. Tasks included extensive exploratory trenching across active traces of the Calaveras fault, conducting a maximum probable earthquake evaluation to develop strong ground motion and ground rupture design parameters, aquifer testing, vadose zone monitoring and expanding existing groundwater monitoring system to evaluate horizontal and vertical groundwater gradients beneath base liner.

- Supervised geologic and hydrogeologic Solid Waste Assessment Test (SWAT) investigation to evaluate potential soil and groundwater contamination at two Class III landfill facilities in Lake County, California. Tasks included installation of piezometers and lysimeters, and soil and groundwater sampling and analysis.

- Project geologist responsible for the preparation of Report of Waste Discharge in accordance with the requirements of Regional Water Quality Control Board; and a Report of Disposal Site Information (RDSI) Report in accordance with the requirements of the Solid Waste Management Board for a proposed major Class III waste disposal site in Napa County, California.

- Prepared Solid Waste Assessment Test (SWAT) Exemption for transfer station facility located on abandoned landfill site in Santa Clara County, California.

- Engineering geologist responsible for conducting Holocene fault investigation for expansion of a Class III Landfill facility in Santa Clara County, California. Tasks included exploratory trenching across traces of the Shannon fault, and Carbon-14 age dating.

- Project Geologist responsible for conducting a geologic and hydrogeologic investigation of suspected hazardous waste contamination at a Class II solid waste disposal site in Santa Clara County, California.

- Responsible for conducting Holocene fault investigation and evaluating liquefaction potential and landslide hazards for expansion of a Class III landfill facility in San Luis Obispo County, California. Tasks included exploratory trenching across traces of the Indian Knob-Edna fault.

- Engineering Geologist responsible for the investigation of regional tectonics and seismicity and development of seismic design parameters for over 20 sanitary landfills and Hazardous waste disposal sites throughout California.

- Project Geologist responsible for geologic mapping, fracture analysis, and construction observation of a deep groundwater intercepter trench in highly fractured bedrock as part of a groundwater contamination remediation program at a Class III landfill site in Alameda County, California.

EBA Wastechnologies has been providing engineering and hydrogeologic consulting services for the City of Ukiah Landfill since 1986. EBA has performed following technical investigations:

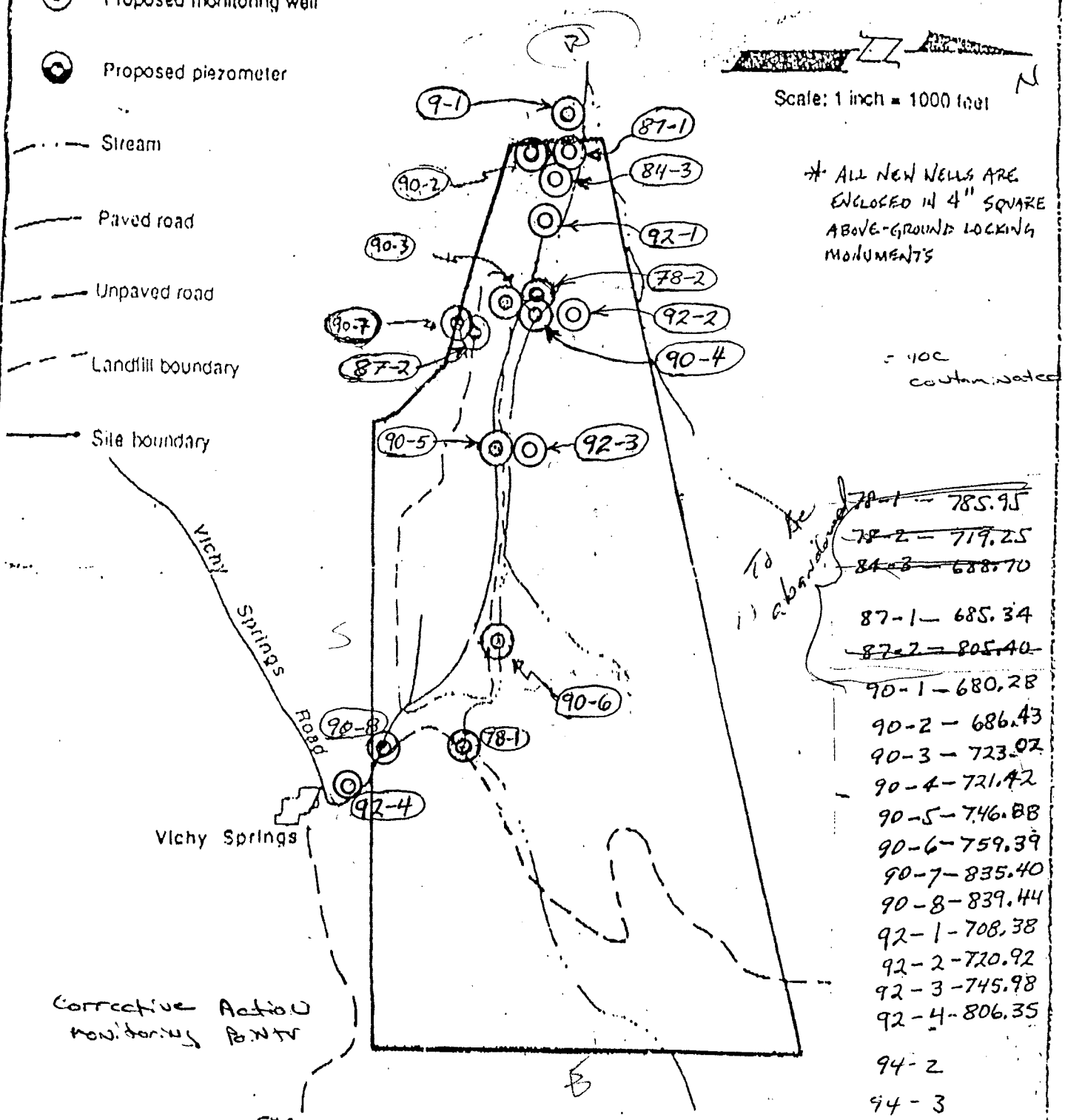
- 1986 - Geologic and hydrogeologic investigation for Solid Waste Assessment Test (SWAT) in accordance with the requirements of Calderon Bill (AB 3525) at the Ukiah Landfill. Tasks included installation of two new groundwater monitoring wells, sampling and analysis of five groundwater monitoring wells to characterize potential impact to groundwater from landfill activities.

- 1989 - Engineers Report and permitting documents for the Ukiah Landfill. Prepared (1) Engineers Report, (2) Report of Waste Discharge in accordance with requirements of RWQCB, and (3) Report of Disposal Site Information for submittal to California Integrated Waste Management Board. Tasks included installation of nine additional groundwater monitoring wells (maximum 160 feet deep), drilling six exploratory borings (maximum 265 feet deep), geologic mapping and preparation of geologic cross sections, performing aquifer permeability analyses, analysis of groundwater and surface water quality, perpetration of grading and fill plans, analysis of site capacity and borrow site investigation.

- 1992 - Remedial investigation and permitting documents for the Ukiah Landfill. Prepared (1) revised Report of Waste Discharge for submittal to RWQCB, (2) Report of Disposal Site Information for CIWMB, (3) Water Quality Monitoring Program in accordance with CCR Title 23, Chapter 15, Article 5 for RWQCB, (4) NPDES permit and Storm Water Pollution Prevention Plan. Tasks included installation of four additional groundwater monitoring wells (maximum 130.5 feet deep), drilling one exploratory boring (26 feet deep), air photo analysis, seismic refraction analysis of landfill, hydrochemical and statistical analysis of groundwater and surface water quality, stable isotope analysis of groundwater, characterization of VOC impacted groundwater at the toe of the landfill, erosion and sediment control analysis, and analysis of site capacity.

  1993/1994 - Landfill gas migration investigation, prepare Preliminary Closure Plan and Preliminary PostClosure Maintenance Plan, additional hydrogeologic investigation to further characterize the extent of benzene impact and direction of groundwater flow. Tasks included installation of two additional groundwater monitoring wells (performed september 1994, maximum 75 feet deep), development of Landfill Gas Perimeter Monitoring System, installation of five landfill gas monitoring wells (maximum 250 feet deep).

Mr. Brown became actively involved in the management and technical oversight of the project in November 1992. He is responsible for conducting the hydrogeologic and engineering investigations performed at the Ukiah Landfill since November 1992. Mr. Brown directed the installation of groundwater monitoring wells 92-1, 92-2, 92-3, 92-4, 94-1, 94-2; and landfill gas monitoring wells GAS-1 through GAS-5.



City of Ukiah Landfill

Proposed Monitoring Well and Piezometer Locations

Ukiah, California

HALLENBECK & ASSOCIATES

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION
5550 SKYLANE BLVD. SUITE A
SANTA ROSA, CA 95403
PHONE: (707) 576-2220

November 17, 1993

Ms. Sue Goodrick
Public Works Administrator
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482-5400

Subject: Ukiah Landfill

Dear Ms. Goodrick:

This letter responds to your correspondence dated November 1, 1993, regarding the Ukiah landfill. Specifically, your letter requests direction regarding further investigation of the benzene contamination found in monitoring wells 90-8 and 92-4.

The groundwater quality data for the landfill indicates that the water in 90-8 and 92-4 is different from groundwater samples collected from wells along the toe of the landfill. It is our belief that these are separate aquifers which may or may not flow in the same direction. The groundwater gradient for the toe aquifer is well established as flowing to the northwest. The groundwater gradient for the aquifer to the southeast of the fill has not yet been established. A third well (non-colinear with 90-8 and 92-4) is necessary to determine the gradient. The next step in the investigation is to determine the direction of groundwater flow.

Please submit a workplan for determining the direction of the groundwater gradient for the aquifer southeast of the landfill by December 15, 1993. The workplan should include well construction specifications and a site plan showing the proposed well location.

Please call, if you have questions.

Sincerely,

Ray O'Connor

for David S. Evans
Associate Water Resource Control Engineer

DSE:tab/newwell

cc: Dave Koppel, Mendocino County Health Department
Damon Brown, EBA Wastechnologies, 825 Sonoma Avenue, Suite C, P.O. Box 4600, Santa Rosa, CA 95402
Gilbert Ashoff, Vichy Springs Resort, 2605 Vichy Springs Road, Ukiah, CA 95482

EXHIBIT

Prepared for:

CITY OF UKIAH DEPARTMENT OF PUBLIC WORKS
300 Seminary Avenue
Ukiah, CA 95482

CITY OF UKIAH SANITARY LANDFILL

GROUNDWATER MONITORING WELL INSTALLATION WORK PLAN

MENDOCINO COUNTY, CALIFORNIA

January 1994

Project No. 93-461(1)

Prepared by:

EBA WASTECHNOLOGIES, INC.
825 Sonoma Avenue
Santa Rosa, CA 95404

Printed on Recycled Paper

EXHIBIT D

EBA WASTECHNOLOGIES
Engineers & Environmental Consultants

January 24, 1994

Mr. Rick Kennedy, Director
Public Works Department
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

RE: UKIAH SANITARY LANDFILL, WORK PLAN 93-461(1)

Dear Mr. Kennedy:

EBA Wastechnologies is please to submit this work plan for the installation of two additional groundwater monitoring wells at the Ukiah Landfill. The work Plan has been prepared to address the concerns expressed in conversations with North Coast Regional Water Quality Control Board (RWQCB) personnel and letters from the RWQCB dated November 17, 1993 and December 23, 1993. As you requested, we have submitted this work plan directly to the RWQCB on behalf of the City of Ukiah Public Works department.

We look forward to working with you on this project and will be pleased to discuss any questions you may have.

Sincerely,
EBA WASTECHNOLOGIES

Damon F. Brown, R.G., C.E.G.
Senior Geologist

cc: David Evans, RWQCB

L:\PROJECT\461UKIAH\WORKPLAN.LTR

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Table 1 Groundwater Monitoring Parameters

FIGURES

Figure 1 (Sheet 1) - Monitoring Well Location Map
Figure 2 Monitoring Well Design

1.0 INTRODUCTION

This Work Plan has been prepared for the Ukiah Landfill, Mendocino County, California, by EBA Wastechnologies (EBA) on behalf of the City of Ukiah. The landfill has accepted waste since 1953 and volatile organic compounds (VOCs) have been found in the uppermost water-bearing zone beneath the site.

This Work Plan has been prepared at the request of the Regional Water Quality Control Board (RWQCB). In a letters dated November 17, 1993 and December 23, 1993, the RWQCB requested that an additional monitoring well be installed southeast of the landfill to aid in determining the groundwater flow direction and gradient in this area. This well will also be used to further characterize the extent of elevated levels of benzene detected in nearby monitoring wells.

During subsequent discussions with RWQCB personnel, a second monitoring well has been requested. This well will be installed northwest of the sediment retention ponds located at the toe of the landfill and be used to further define the extent of VOC impact at the toe of the landfill.

1.2 PURPOSE AND SCOPE

Groundwater contamination in the form of VOCs is evident in the groundwater beneath the landfill. The implementation of this Work Plan will provide additional information concerning the hydrogeologic conditions that influence the movement of contaminates, and aid in additional evaluation of the vertical and lateral extent of VOC contamination in groundwater. The Work Plan described in this document outlines the activities for the Ukiah Landfill, including:

- Proposed drilling and sampling methods
- Rationale for the placement of the two additional monitoring wells
- Monitoring well construction and development details
- Proposed groundwater sampling and analysis

2.0 GROUNDWATER MONITORING WELL INSTALLATION

2.1 MONITORING WELL 94-1

The RWQCB has requested that a groundwater monitoring well be established in the area southeast of the landfill to assess the groundwater flow direction and gradient, and to further characterize the extent of benzene contamination detected in nearby monitoring wells 90-8 and 92-4 (see Figure 1). We propose to install one additional monitoring well (94-1) in this area. We anticipate that the total depth of a monitoring well in this area will be approximately 130 feet. Based on experience drilling wells 90-8 and 92-4, we anticipate that well 94-1 will be drilled with a truck-mounted Schramm T685 air-rotary rig using steam-cleaned rod and a 7-7/8 inch bit. In order to drill this area some grading will be necessary to provide access and a drilling pad. We understand that access an road and drilling pad will be provided by the City of Ukiah.

In addition to the standard logging procedures utilized during past well installations, we are considering the use of down-hole wireline geophysical logging in wells 94-1, 92-4, and 90-8. Borehole logging will aid in the interpretation of lithology, stratification, and occurrence of liquids in the subsurface materials. The geophysical logs will help indicate changes in geology, help evaluate hydrogeology, and aid in setting the screened interval of well 94-1. Geophysical logs that may be run include:

- EM Induction
- Natural Gamma

For the installation of monitoring well 92-4 (see Figure 1), the RWQCB requested the preparation of a Work Plan Addendum which addressed specific concerns raised by the owner of the Vichy Springs Resort that installation of monitoring well 92-4 in the vicinity of the resort property could impact the mineral springs (EBA, 1993, *Work Plan Addendum, Installation and Development of Groundwater Monitoring Well 92-4*). Experience gained during exploratory drilling and well installation at the site in general, and wells 90-8 and 92-4 in particular, suggests that it is unlikely the relatively shallow monitoring wells installed in the area threatens the mineral springs. Therefore, the use of a blowout preventer and other specialized drilling equipment, which was used in the drilling of well 92-4, is not proposed for the installation of monitoring well 94-1.

2.2 MONITORING WELL 94-2

The purpose of installing this well is to further characterize the extent of VOC contaminants discovered in the vicinity of monitoring well 92-1, which is located next to the northeastern

corner of the leachate containment pond, near the western boundary of the fill area (see Figure 1). We propose to install an additional monitoring well (well 94-2) northwest of monitoring well 92-1. Because groundwater in this area has been calculated to flow to the northwest, well 94-2 will aid in identifying groundwater contaminants which may be migrating to the northwest from the leachate pond.

We anticipate that this well will be extended to a total depth of approximately 50 feet, in order to ensure penetration of the saturated zone throughout the year. However, the total depth of the well may vary, depending on the elevation of the drilling site and local hydrogeology. Based on experience drilling the other monitoring wells in this area, we anticipate that the well will be drilled with a truck-mounted Failing FA-100, or Deep Rock drilling rig using steam-cleaned 8 inch O.D. by 4.5 inch I.D. hollow-stem augers.

2.3 MONITORING WELL DESIGN

The monitoring wells will be designed in accordance with specifications outlined in ***Bulletin 74-90, Monitoring Well Standards: State of California***, prepared by the State Department of Water Resources in cooperation with the State Water Resources Control Board. They will be constructed of clean, two inch-diameter, flush-threaded PVC casing, and secured within above-ground locking monuments.

Approximately ten to fifteen feet of perforated well screen will be installed from just above the highest seasonal groundwater level to the bottom of the well, and surrounded by a filter pack of washed Maunder sand. To ensure that the well casing is properly centered in the boreholes, it will be installed within the string of hollow-stem augers, or by using stainless steel centralizers, depending on the drilling method. The annular materials (filter pack, bentonite, etc.) will be placed within the hollow-stem as the augers are withdrawn, or through a tremie pipe. Figure 2 presents a schematic drawing of a typical groundwater monitoring well design for the Ukiah landfill.

2.5 MONITORING WELL DEVELOPMENT

The monitoring wells will be developed by gently surging the wellbore with a stainless steel surge block, followed by continued purging using a bailer, a Brainard-Kilman 1.7 inch hand pump, and/or an air-lift pump driven by an oil-less compressor. At regular intervals (approximately after each well volume of water is removed) the pH, conductivity, temperature and clarity of the water will be tested to verify the effectiveness of the development process.

2.6 SAMPLING AND ANALYSIS PROCEDURES

Specific sampling methodologies, field and laboratory analytical methods, and Quality Assurance/Quality Control (QA/QC) procedures are presented in the Sampling and Analysis Plan

developed for the Ukiah Landfill site. These procedures are summarized below and are consistent with the following guidance documents:

- *Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities*, U.S. Environmental Protection Agency (EPA), EPA-530/SW-611, August 1977
- *Test Methods for Evaluating Solid Waste: Physical/chemical Methods*, EPA, EPA SW-846, Third Edition, November 1986
- *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater*, EPA, EPA-600/4-82/057, July, 1982
- *RCRA Groundwater Monitoring Technical Enforcement Guidance Document*, OSWER 9950.1, September 1986

Three and five well volumes of water will be purged from the monitoring wells prior to sampling, again testing the pH, conductivity, and temperature for signs of representative formation groundwater. If a well is completed in a zone of low productivity, the well would be purged dry, then sampled after there has been sufficient recharge. Groundwater samples will then be withdrawn from the wells with a bladder pump driven by an oil-less compressor, or a sanitized bailer. All groundwater samples will be stored in the appropriate containers, placed in a refrigerated environment, and immediately transported under chain-of-custody to a certified analytical laboratory for testing. The groundwater samples will be tested for the same parameters proposed in the Article 5 Detection Monitoring Program prepared for the landfill and outlined on Table 1.

Table 1
Groundwater Monitoring Parameters
for City of Ukiah Landfill

- Halogenated Volatile Organic Compounds (EPA method 8010)
- Aromatic Volatile Organic Compounds (EPA method 8020)
- Title 22 Metals*
- Major and Minor Dissolved Cations:
  - Magnesium
  - Sodium
  - Calcium
  - Potassium
  - Iron
  - Manganese
- Major Dissolved Anions:
  - Bicarbonate
  - Nitrate
  - Sulfate
  - Chloride
- Other Parameters:
  - Total Dissolved Solids (TDS)
  - Specific Conductance
  - Boron
  - Fluoride
  - COD
  - pH
  - Dissolved Oxygen
  - Dissolved Silica

* Title 22 metals include: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, manganese, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc.

2.7 SITE SANITATION PROCEDURES

All drill cuttings generated during drilling should be recycled as cover material for the landfill. Groundwater extracted from the wells, as well as rinsate generated from steam cleaning augers and other equipment will be collected in suitable containers (i.e., D.O.T. approved 55 gallon drums) and deposited in the leachate containment pond.

3.0 REPORTING

Upon completion of the field tasks, EBA will prepare a written report summarizing our methods, our observations, monitoring well logs and construction details. The report will also incorporate the recent data into the hydrogeologic framework of the site, include an analysis of laboratory testing results, and a presentation of our conclusions regarding environmental concerns at the site.

REVISIONS	BY
1	
2	
3	
4	

EBA WASTECHNOLOGIES

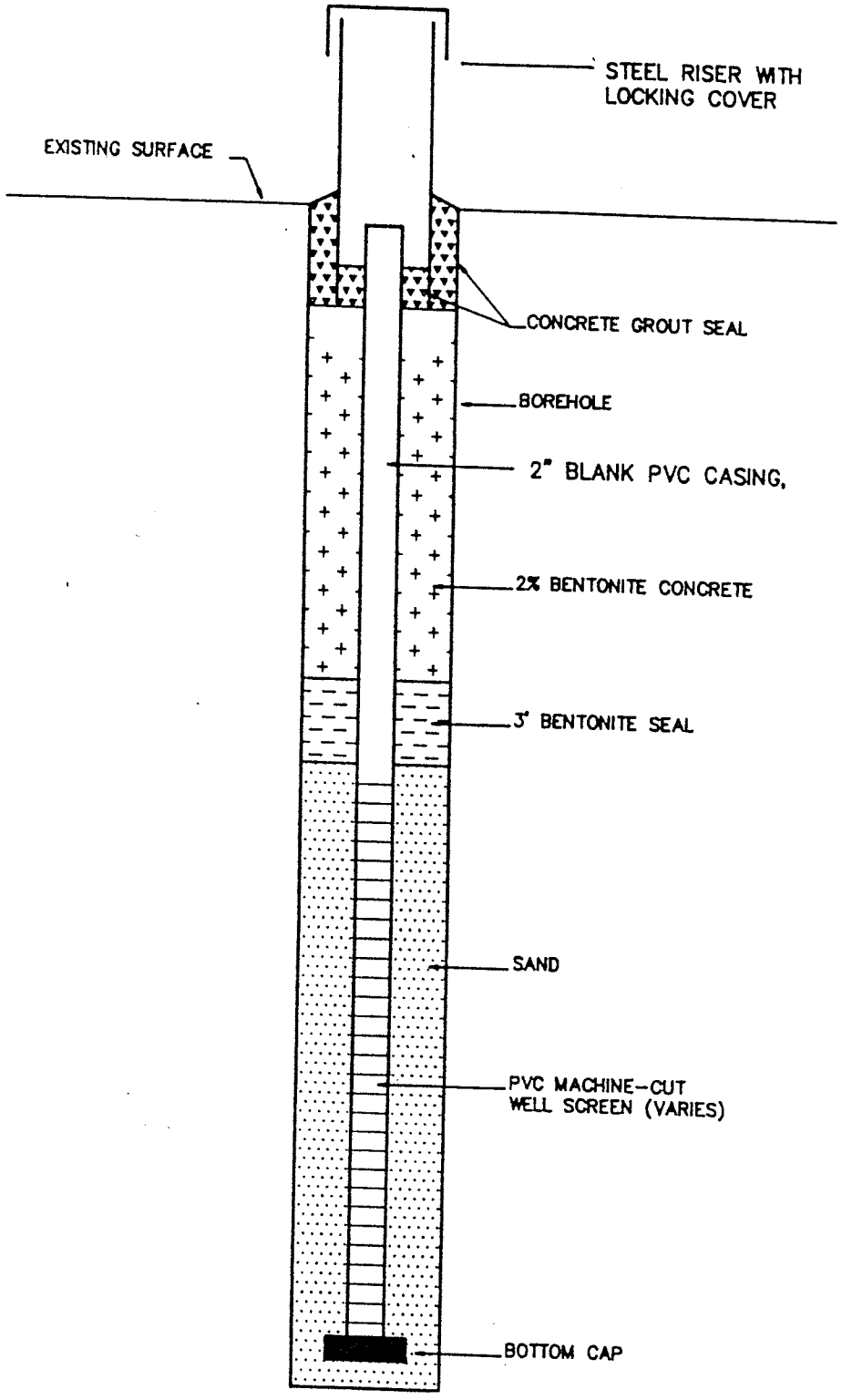
825 SONOMA AVENUE, SUITE C, SANTA ROSA, CALIFORNIA 95404
707-544-0784 FAX 707-544-0866

3164 GOLD CAMP DRIVE, SUITE 250, RANCHO CORDOVA, CALIFORNIA 95670
916-852-6800 FAX 916-852-0866

CALIFORNIA

JKIAH LANDFILL

G WELL LOCATION MAP



N.T.S.

EBA

CITY OF UKIAH SANITARY LANDFILL
UKIAH, CALIFORNIA

GROUNDWATER MONITORING WELL

TYPICAL CONSTRUCTION DETAIL

FIGURE 2

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION
5550 SKYLANE BLVD. SUITE A
SANTA ROSA, CA 95403
PHONE: (707) 576-2220

February 1, 1994

Mr. Rick Kennedy, Director
Department of Public Works
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Subject: Ukiah Landfill

Dear Mr. Kennedy:

This letter responds to the Groundwater Monitoring Well Installation Workplan dated January 1994, prepared by EBA Wastechnologies.

The Workplan appears to be in order and it is hereby approved. We concur with the recommendation that borehole logging techniques be employed to develop as much subsurface information as possible. Please contact this office at least a week in advance of scheduled drilling so that we can arrange to have a staff member present.

Please call if you have questions on this matter.

Sincerely,

David S. Evans

David S. Evans
Associate Water Resource Control Engineer

DSE:tab/ukiahwp

cc: Dave Koppel, Mendocino County Health Department
Damon Brown, EBA Wastechnologies, 825 Sonoma Avenue, Suite C, P.O. Box 4600, Santa Rosa, CA 95402
Gilbert Ashoff, Vichy Springs Resort, 2605 Vichy Springs Resort, Ukiah, CA 95482

EXHIBIT E

CITY OF UKIAH

AMENDMENT TO MASTER AGREEMENT FOR PROFESSIONAL CONSULTING SERVICES DATED NOVEMBER 12, 1992

TERMS AND CONDITIONS

All terms and conditions of Master Agreement for Professional Consulting Services between City of Ukiah and EBA Wastechnologies dated November 12, 1992 shall remain in force and effect except as modified by this and previous executed amendments.

AUTHORIZATION

Upon execution of this amendment, consultant is authorized to perform the work described under "Scope-of-Work" of this amendment, on a time and expense basis not to exceed the total amount of compensation indicated for each work task.

SCOPE-OF-WORK

The following work tasks shall be performed under this amendment.

Task I - Preparation of a Preliminary Closure and Postclosure Maintenance Plan including closure and postclosure cost estimates all in compliance with 14 CCR and 23 CCR. Documents shall be completed for City's review no later than April 1, 1994. Total compensation for this task shall not exceed $29,138.

Task II - Perform gas monitoring well installation and field evaluation related to City's effort in determining the extent of any gas migration along the south boundary line of the landfill in the vicinity of existing gas probe PP4. All work shall conform to applicable sections of 14 CCR and Subtitle D. Perform reporting, monitoring and other required work as outlined in Consultant's proposal dated December 8, 1993. Total compensation for this Task shall not exceed $34,000. Work shall begin promptly after LEA approves Landfill Gas Monitoring Work Plan and shall be completed by the following dates:

Well and/or probe installations	April 15, 1994
Monitoring	May 13, 1994
Report	May 27, 1994

Task III - Perform two (2) groundwater monitoring well installations. One well shall be installed at the toe of the landfill north of Wells 90-2 and 92-1 to further characterize the extent of contamination in that area. The second well shall be installed in the area southeast of the landfill in order to further characterize the extent of groundwater contamination and to aid in the determination of groundwater gradient of the aquifer monitored at Well 90-8 and 92-4. Work includes preparation of report documenting the well installation procedures, boring logs, applicable maps and drawings. Reference is made to consultants proposal dated December 8, 1993. Work shall begin promptly after LEA approves Groundwater Monitoring Work Pan and shall be completed in the most expeditious manner. Total compensation for this work Task shall not exceed $24,960.

EBA WASTECHNOLOGIES

Dale Solheim
Project Manager

Duane Butler
Principal

CITY OF UKIAH

Charles L. Rough, Jr.
City Manager

2/10/94
DATE

B:\AGREEMENTS
EBA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION
5550 SKYLANE BLVD. SUITE A
SANTA ROSA, CA 95403
PHONE: (707) 576-2220

May 23, 1994

Mr. Rick Kennedy, Director
Department of Public Works
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Subject: Ukiah Solid Waste Disposal Site

Dear Mr. Kennedy:

This letter is to review the status of landfill regulatory requirements and to outline additional work which needs to be accomplished in the forthcoming fiscal year.

We have begun drafting waste discharge requirements for the Ukiah landfill to reflect compliance with Chapter 15 and Subtitle D solid waste disposal regulations. We have received and conditionally approved the Article 5 Monitoring Proposal and Report of Waste Discharge earlier this year. The approval conditions primarily involved additional monitoring capabilities to completely define the extent of groundwater contamination and submittal of a corrective action plan. These issues are discussed separately below:

Groundwater Investigation

There are two areas of concern regarding groundwater beneath the landfill. The first is the presence of volatile organic compounds (VOC's) in the stream bed alluvium along the landfill toe. The second is the presence of benzene in a deeper aquifer beneath the ridge which separates the landfill from the Vichy Springs Resort. Two additional wells are needed to complete the investigation of the contamination in the alluvial aquifer. One needs to be installed to the northwest of the bottom of the fill and another in the canyon above the fill to serve as a background well. It is our expectation that these two additional wells will complete this part of the groundwater investigation. The wells should be installed, developed and sampled during this summer.

The benzene problem was initially encountered in MW 90-8 at the landfill gate. Additional contamination was detected in MW 92-4 further down the access road toward Vichy Springs. The next step in the investigation is to determine the direction of groundwater flow for the affected aquifer. Once this gradient information is available further thought can be given to isolating the benzene source. Since it is not certain what the results of a third monitoring well in this area would be, contingency funds should be set aside in this year's budget beyond funding a single additional monitoring well.

We are aware of the stated concerns by representatives of Vichy Springs that the existing and any new monitoring wells might affect their water supply. They have

EXHIBIT G

recently requested that MW 90-8 and MW 92-4 be removed. We have had numerous communications with Vichy Springs representatives regarding these monitoring wells. We do not believe that evidence has been submitted which warrants the removal of MW 90-8 and 92-4.

It is our understanding that the City of Ukiah is currently compiling a summary of groundwater quality data and hydrogeological information in advance of a meeting with consultants for Vichy Springs, the Regional Board and the local Health Department. We look forward to participating in this discussion at the earliest possible opportunity because we want to see the groundwater investigation completed in a timely matter.

Corrective Action Plan

Corrective action will likely be performed in two separate phases. The first will involve removal of VOC's from the alluvial aquifer. The second will be to abate the benzene problem in the area between the landfill and Vichy Springs. It is difficult and perhaps premature at this time to budget for the cost of remedial work regarding the benzene problem. Decisions on that matter will need to be made after the site investigation has been completed.

However, most of the information is already developed to design a corrective action plan for the alluvial aquifer VOC problem. The City of Ukiah should plan for completion of the remaining two monitoring wells and design of an extraction, treatment, and disposal system for contaminated groundwater. The actual construction of physical facilities as well as start up and operation and maintenance can be deferred until the 1995/96 fiscal year.

I hope this clarifies our expectations regarding progress to correct groundwater problems related to the Ukiah landfill in the upcoming fiscal year. Please give me a call if you have further questions.

Sincerely,

David S. Evans

David S. Evans
Associate Water Resource
Control Engineer

DSE:bp\ukiahltr

cc: Dave Koppel, Mendocino County Health Department
Gilbert Ashoff, Vichy Springs Resort
Damon Brown, EBA Wastechnologies

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION
5550 SKYLANE BLVD. SUITE A
SANTA ROSA, CA 95403
PHONE: (707) 576-2220

August 1, 1994

Mr. Rick Kennedy, Director
Department of Public Works
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Dear Mr. Kennedy:

Subject: Ukiah Solid Waste Disposal Site

This letter regards the groundwater investigation at the Ukiah landfill and, in particular, the investigation of the presence of benzene and toluene in MW 90-8 and 92-4.

In previous discussions and correspondence we have indicated that additional monitoring wells are necessary to understand the presence of benzene and toluene in the groundwater as well as to design measures to correct the problem. This work has been delayed by concerns put forth by Gilbert Ashoff at Vichy Springs Resort that monitoring wells in this area will damage his geothermal springs at the resort. We would like to see those concerns resolved so the groundwater investigation can continue. In this regard, we request that a technical report be prepared which summarizes the information which the City has developed to date in support of the position that additional monitoring facilities will not adversely impact geothermal water sources located on the Vichy Springs property. A similar request is being made to Mr. Ashoff to support his contention that his springs are in real jeopardy. This request is made pursuant to Section 13267 of the California State Water Code. Please submit your report by September 1, 1994.

Your attention to this matter is appreciated.

Sincerely,

David S. Evans

David S. Evans
Associate Water Resource
Control Engineer

DSE:lmf/ukrpt

cc: Dave Koppel, Mendocino County Health Department
Paul Blais, Cal EPA
Gibert Ashoff, Vichy Springs Resort

EXHIBIT 14

EBA WASTECHNOLOGIES
Engineers & Environmental Consultants

August 31, 1994

Mr. Rick Kennedy, Director
Department of Public Works
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

RE: UKIAH LANDFILL SITE MONITORING WELLS AND VICHY SPRINGS RESORT

Dear Mr. Kennedy:

This letter report summarizes the data we have developed to date regarding the potential for groundwater impact to Vichy Springs by groundwater monitoring wells at the Ukiah landfill. This report was prepared in accordance with a letter dated August 1, 1994, from the California Regional Water Quality Control Board, North Coast Region (RWQCB), requesting a summary of information supporting our conclusion that the existing or future groundwater monitoring wells at the landfill will not adversely impact Vichy Springs. It is our understanding that the RWQCB has made a similar request for data and a technical report from Mr. Ashoff, the owner of the Vichy Springs Resort.

BACKGROUND

As you are aware we have examined the available hydrogeologic and geochemical data, and found no evidence supporting Mr. Ashoff's claim that Ukiah Landfill site monitoring wells have adversely affected geothermal spring activity at Vichy Springs Resort. The RWQCB has requested a summary of relevant facts so that concerns can be resolved and the hydrogeologic groundwater investigation at the landfill can continue. This letter presents the data supporting our conclusion that the monitoring wells at the landfill do not influence geothermal spring activity at the Vichy Springs Resort.

Through a letter, dated May 6, 1994, from attorney James R. Mazzoni, Jr., Mr. Ashoff contends that immediately following the installation of the well 92-4, (installed March 15, 1993 through March 18, 1993) the temperature at Vichy Springs declined 12 degrees (a six degree increase was later observed, for a net decrease of six degrees from its "*historic temperature*"). Mr. Ashoff further alleges an accompanying decrease in discharge of thirty percent from a

EXHIBIT 1

825 Sonoma Ave., Suite C P.O. Box 4600 Santa Rosa, California 95402 (707) 544-0784 FAX (707) 544-0866
11344 Coloma Rd., Suite 245 Gold River California 95670 (916) 852-6800 FAX (916) 852-0866

reported flow of 65 gallons per minute (gpm). This decrease in flow of 19.5 gpm (30% of 65 gpm) is also attributed to the presence of monitoring well 92-4. We believe it is highly improbable that either monitoring well 90-8 or 92-4 (see sheet 1) can adversely impact Vichy Springs. The two principal arguments for this position are 1) there are a number independent lines of evidence (geologic, hydrogeologic, and hydrochemical) supporting the conclusion that the monitoring wells are completed in a water-bearing zone that is different, distinct and physically separate from that of Vichy Springs, and 2) the monitoring wells can not physically account for the quantity of heat loss claimed, and volume of groundwater extracted from the monitoring wells is far too low to account for the reduction in spring flow attributed to them. Mr. Ashoff, to date, has not presented records of groundwater temperature or flow rate data for Vichy Springs to document the deviation from historic temperature or discharge referred to in Mr. Mazzoni's letter.

SITE GEOLOGY

The geology and hydrogeology of the area have been studied by a number of researchers (Blake and Jones, 1981; Cardwell, 1965; Farrar,1986; Treasher, 1958; and Upp, 1982) and is discussed in the Environmental Monitoring Program (EBA, 1993a) and the Report of Waste Discharge (ROWD) prepared for the landfill (EBA, 1993b). Based on a review of available geologic maps (Cardwell, 1965; Farrar, 1986) and site field reconnaissance mapping of the area, there appear to be three major geologic units represented in the vicinity of the landfill site. These include rocks from the coastal belt of the Franciscan Assemblage, Pliocene-Pleistocene Continental Basin Deposits, and contemporary (Holocene) alluvial deposits.

The central belt of the Cretaceous-Jurassic age Franciscan Assemblage, underlies the majority of the Mayacamas range east of the Maacama fault (Blake and Jones, 1981). The Franciscan Assemblage outcrops in the Sulphur Creek drainage to the south of the landfill site, near Vichy Springs Resort. The central belt of the Franciscan Assemblage predominantly consists of what is known as a tectonic melange. The melange consists of an admixture of disrupted sandstone and assorted metavolcanic, greenstone and chert inclusions, within a highly sheared and deformed, dark-gray shale matrix. Bedding deformation within blocks of interbedded sandstone and shale turbidites indicates that there has been a complex and varied strain history within the Central belt of the Franciscan Assemblage. As a result of the intense deformation history, the primary porosity of the Central belt of the Franciscan Assemblage has been greatly reduced. Accordingly, the ability of the Franciscan Assemblage melange to absorb, store and transmit water is almost entirely dependent on the degree of faulting, fracturing and weathering. Water often percolates into large upland areas underlain by Franciscan basement, and later discharges from springs and/or provides base flow for tributaries to the Russian River. Discharge of thermal water, such as Vichy Springs, is also quite common throughout the area. Historical records, however, indicate that groundwater yield to wells within Franciscan bedrock is

generally unpredictable and in most cases volumetrically insignificant (Cardwell, 1965; Farrar 1986). Vichy Springs flows from fractured Franciscan bedrock exposed in a hillside along the southern edge of the Sulphur Creek drainage basin (see Figure 1).

The entire landfill site is underlain by Pliocene-Pleistocene Continental Basin Deposits, which are referred to locally as the Ukiah Beds (Treasher, 1958). These relatively undeformed deposits consist of poorly sorted, highly consolidated, partially indurated, silt-dominated conglomerates, clayey sands, and silty clays which unconformably overlie an irregular surface of Franciscan bedrock. The maximum thickness of the Continental Basin Deposits is estimated to be in excess of 2,000 feet (Cardwell, 1965). The basal contact of the continental deposits, where it overlies the Franciscan bedrock has not been encountered in any of the test borings or monitoring wells drilled at the site to date, including a deep test boring (TB-90-4, see Sheet 1) which was abandoned at a depth of 265 feet below the surface, approximately 545 feet MSL (EBA, 1993b).

The hydraulic properties of the Continental Basin Deposits in the saturated zone at selected groundwater monitoring wells at the site were determined by in-situ testing. Hydraulic conductivity values were obtained from rising- and falling-head slug tests and are reported by EBA (1993b). Hydraulic conductivities reported from slug tests for the Plio-Pleistocene Continental Basin Deposits ranged from 7.5×10^{-6} cm/sec to 2.8×10^{-5} cm/sec, and Holocene alluvium tested from 1.6×10^{-5} cm/sec to 1.6×10^{-4} cm/sec.

Lithologic boring logs of monitoring wells 90-8 and 92-4 (EBA, 1993b) indicate they are drilled through a continuous section of Continental Basin Deposits consisting of low permeability silty clays and clayey silts. No perched groundwater, aquitards or Franciscan bedrock were encountered during drilling. This demonstrates that the monitoring wells are completed in a distinctive and separate geologic formation, consisting of significantly different hydrogeologic properties, from the Franciscan bedrock in which Vichy Springs occurs. .

HEAT LOSS

The alleged energy loss associated with a 12 degree (assumed fahrenheit) decrease in temperature of Vichy Springs, immediately following the installation of well 92-4, was calculated assuming an aquifer with a conservatively small area of influence consisting of 1,000 feet by 2,000 feet by 50 feet deep with 30% porosity. The energy loss was calculated as 22.3×10^{9} British thermal units (Btu) or 6,533,841 kWh. On a practical level it is extremely improbable that an energy transference of this magnitude could solely occur via a monitoring well with a 2-inch PVC casing without destroying or resulting in significant damage to the well.

Mr. Singer, in a letter to Mr. Ashoff, dated March 19, 1994, presents examples of adiabatic

cooling related to the rapid release of pressure in rocket motors and explosions designed to extinguish oil well fires. It is well established that rapid decompressive cooling may be achieved in gasses, however, Mr. Singer states "*it is clear that cooling of the spring water resulted from a reduction in formation pressure and release of the natural carbon dioxide gases in the formation by the drilling of this single well*". Mr. Singer fails to present any site specific hydrogeologic data to support this conclusion or his recommendation that no further drilling be allowed in the vicinity of the springs. No significant changes in pressure (other than barometric variations) were observed during drilling or following installation of monitoring well 92-4. In addition, monitoring well 92-4 is located in relatively low permeability material, making it unlikely that gasses would migrate at the rate comparable to Mr. Singer's cited past experience.

Based on the discussion presented above, and in the absence of historic temperature data for Vichy Springs, it is reasonable to assume that the temperature oscillations observed in Vichy Springs water are likely within the range of normal fluctuation. Evaluation of a detailed temperature database should allow the identification of historical temperature ranges and possibly temporal variations in temperature.

Recent observations by the Mendocino County Environmental Health Department indicate that the temperature of Vichy Springs has evidently returned to a "normal level" (personal communication, Mendocino Environmental Health Department personnel, 7/28/94). This further suggests the landfill monitoring wells are not influencing Vichy Springs.

FLOW REDUCTION

A flow reduction of thirty percent from a "*historic level*" of 65 gpm has apparently been observed at Vichy Springs. This equates to a 19.5 gpm reduction in flow or an annual reduction of 10,249,200 gallons. This loss has been attributed, by Mr. Ashoff, to monitoring wells 90-8 and 92-4. To date sampling records show that the volume of water extracted from the two wells due to development and sample purging is approximately 172 gallons from 90-8 since April 1991 (an annual total of 57 gallons) and approximately 36 gallons from well 92-4 since May 15, 1993. Additionally, during the drilling of both monitoring wells no zones of high permeability were encountered. Further, no free water was encountered in well 92-4 during drilling. Well 92-4 was completed on March 18, 1993 and groundwater was not observed until April 27, 1993, 40 days later. Both well 90-8 and 92-4 have slow recharge rates following sample purging consistent with the low permeability subsurface materials in which they are installed. Clearly, the monitoring wells are not physically capable of extracting groundwater at flow rates sufficient to account for the reduction in discharge from Vichy Springs.

Further, the thickness of the Continental Basin Deposits and the depth to the Franciscan bedrock (the geologic formation associated with Vichy Springs) beneath the site is not known, however

exploratory borings from the site, as previously discussed, illustrate that the thickness of the low permeability Continental Basin Deposits is significant. Therefore the likelihood of groundwater flow from the water-bearing zone encountered in wells 90-8 and 92-4 to Franciscan bedrock is very low.

ORGANIC AND INORGANIC HYDROCHEMICAL ANALYTICAL RESULTS

Wells at the Ukiah Landfill have been analyzed for a number of water-quality parameters since 1987. As part of this analysis available chemical data for Vichy Springs was evaluated to examine the similarities and differences in groundwater hydrochemistry between groundwater encountered beneath the landfill and mineral water from the Vichy Springs Resort. These analytical results are presented and discussed in detail by EBA (EBA, 1993a; 1993b).

Sampling of landfill wells has identified three areas of groundwater impact (well 87-1; wells 90-4 and 90-5; and well 90-8) based on the consistent detection of volatile organic compounds (VOC's). Samples analyzed from Vichy Springs in 1987, 1990 and 1991 did not detect VOC's. Analysis of groundwater samples from Vichy Springs for total (unfiltered) metals has also been performed in 1987, 1990, 1991 and 1993 of which a number of metals (antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, mercury, molybdenum, selenium, silver, thallium, tim, titanium, vanadium and zinc) have not been detected above their respective MDL's.

To date, no pesticides or PCB's have been detected in any landfill groundwater samples or samples collected from Vichy Springs.

Analysis of major anions and cations suggests, in general, that the landfill monitoring wells exhibit significant variations in the concentration of all parameters evaluated but do not appear to exhibit a consistent pattern. No monitoring well is significantly different from all other wells for all parameters evaluated. Well 90-8 and Vichy Springs generally exhibit higher parameter concentrations than most other monitoring wells. Compositionally, however, the analysis indicates that well 90-8 and Vichy Springs exhibit significant differences from each other in cation and anion content.

As noted in the Hydrochemical and Statistical Evaluation of the City of Ukiah Landfill (EBA, 1993a; 1993b) the general hydrochemical signature of Vichy Springs is similar to some landfill wells and different from others. Vichy Springs is readily distinguishable from all landfill wells. VOC's have been identified in specific monitoring wells and have not been detected in samples from Vichy Springs.

Boron is believed to be associated with recent volcanic activity in the northern coast ranges, and is commonly reported in groundwater on the east side of the Ukiah Valley (Cardwell, 1965;

Farrar, 1986). Boron was detected at Vichy Springs in 1990, 1991, and 1993 in concentrations ranging from 100 mg/l to 126 mg/l, significantly higher than any of the landfill monitoring wells. Based on data from the July 12, 1994 sampling event, boron concentration in landfill wells ranged from <0.5 to 54 mg/l. Boron concentrations in well 90-8 and 92-4 were 23 mg/l and 54 mg/l, respectively. Boron concentrations for southeastern landfill well locations (90-6, 90-8, and 92-4) are not significantly different from one another but appear to be significantly higher than all other monitoring wells, suggesting a possible relationship between location and concentration.

Temperature data provided by Mr. Ashoff collected on December 6, 1979 indicates that the temperature of Vichy Springs was 30.5°C, significantly higher than the temperature of groundwater water in monitoring wells 90-8 and 92-4, which ranges from 20° to 21°C and 15° to 25°C, respectively. However, as discussed previously, evaluation of a detailed temperature database from Vichy Springs is needed to identify historic temperature ranges.

STABLE ISOTOPE ANALYSIS

To further characterize the hydrochemistry and hydrogeologic relationship between the shallow groundwater beneath the Ukiah Landfill and Vichy Springs mineral water, stable isotope studies were performed (EBA, 1993b, 1994a, and 1994b). Important trace isotopes of hydrogen and oxygen atoms in water ($H_2{}^{16}O$) are deuterium (D) and oxygen-18 (^{18}O) which can provide a "Fingerprinting" of a source water by its stable isotopic signature. This fingerprinting can provide a very effective method for water characterization, with particular application in tracing the source, migration, recharge, and history of a particular groundwater. Rather than relying solely on the concentrations of constituents that are susceptible to chemical, physical, and biological transformations, stable isotopic identification of a water type allows tracking of its subsequent flow and mixing, independent of its chemical concentrations.

The results of the stable isotope analyses exhibits very distinct isotopic variations in groundwaters in the Ukiah Landfill area, and that the different waters can be easily distinguished. In a plot of δD vs $\delta^{18}O$ the majority of the samples lie along the Meteoric Water Line (MWL) at values appropriate for coastal California (Craig, 1961). The plot clearly shows that Ardeche Spring and Vichy Springs water have isotope characteristics distinct from all other groundwaters at the landfill (see Figure 2). Furthermore, no mixing trend between Vichy Springs/Ardeche Springs water and any other water is apparent. Non-mixing further indicates there is no interconnectivity between groundwater at the Vichy Springs Resort and any of the groundwaters collected from the landfill wells.

As discussed previously, Ardeche Springs and Vichy Springs both flow from fractures and joints in the Franciscan bedrock exposed in the Sulphur Creek drainage. Both of the springs plot close

together, well to the right of the MWL, appropriate for connate or mineralized formation waters. Samples with δD and $\delta^{18}O$ values that plot to the right of the MWL have usually undergone isotopic enrichment by evaporation or water-rock interaction associated with older waters that have also undergone mineralization through long residence time in contact with bedrock. Water-rock isotopic exchange is not significant in cool, meteoric groundwaters, including most young shallow groundwater (Dr. Bob Criss, personal communication, 1993).

Samples from wells 90-8 and 92-4 also plot to the right of the MWL, but are significantly separated from those of Ardeche Springs and Vichy Springs. As described in the ROWD (EBA, 1993b) these low yielding wells have been installed in silts and clays of the Continental Basin Deposits along the northern divide between the Sulphur Creek drainage basin, where the Vichy Springs Resort is located, and the landfill drainage basin. The City Range Spring is located on the north side of the ridge which divides the two drainage basins. The City Range Spring flows from the Continental Basin Deposits, and plots closely with samples from wells 90-8 and 92-4. It appears likely that groundwater in wells 90-8 and 92-4, and the City Range Spring are related, and represent another formation water in the area.

In a letter dated July 26, 1994 to Mr. Ashoff, Mr. Davisson concurs with the results and interpretation of the stable isotope evaluation. He further presents a hypothetical example in which two formation waters may belong to the same general hydrologic system and recommends that a hydrogeologic investigation be performed in the region. Unfortunately, Mr. Davisson may be unaware of the results of the ongoing hydrogeologic investigation and the geologic and hydrogeologic information developed which supports a different scenario. Mr. Davisson also does not present an opinion regarding the probability of site monitoring wells impacting Vichy Springs.

CONCLUSIONS

Local and regional geology, hydrochemical analytic results and stable isotope analysis provide data supporting the conclusion that monitoring wells 90-8 and 92-4 are not impacting Vichy Springs because they are installed in a water-bearing zone significantly different from and not connected to, or intermixing with, the water-bearing zone of Vichy Springs. Further, calculations examining heat loss and flow reduction reported to have occurred at Vichy Springs, clearly demonstrate that the monitoring wells are not physically capable of influencing the hydrology or temperature of Vichy Springs. Based on the data developed, it is our opinion that the likelihood of future landfill site monitoring wells adversely impacting vichy Springs is extremely improbable.

It should be noted that Mr. Ashoff has demanded that an in-depth surface and subsurface hydrogeologic investigation be performed in the area. The City of Ukiah has been attempting

to perform hydrogeologic investigations at the landfill site to identify and characterize the vertical and lateral extent of impacted groundwater, which could pose a threat to the waters of the State. Any responsible and detailed hydrogeologic study must include the installation of monitoring wells in order to further evaluate groundwater conditions. These investigations have been delayed by Mr. Ashoff and are as yet incomplete. In order to further characterize benzene contamination detected in groundwater samples collected from 90-8 and 92-4 and aid in the determination of the direction of groundwater flow in the area, the installation of additional groundwater monitoring wells at the site is required.

As you requested, we have submitted this letter report directly to the RWQCB on behalf of the City of Ukiah. We trust this provides the information you require. Please call me if you have any questions.

Sincerely,
EBA WASTECHNOLOGIES

Damon F. Brown, RG, CEG
Senior Geologist

Duane Butler, P.E.
President

DFB/DB/lyv
attachments

cc: David Evans, RWQCB

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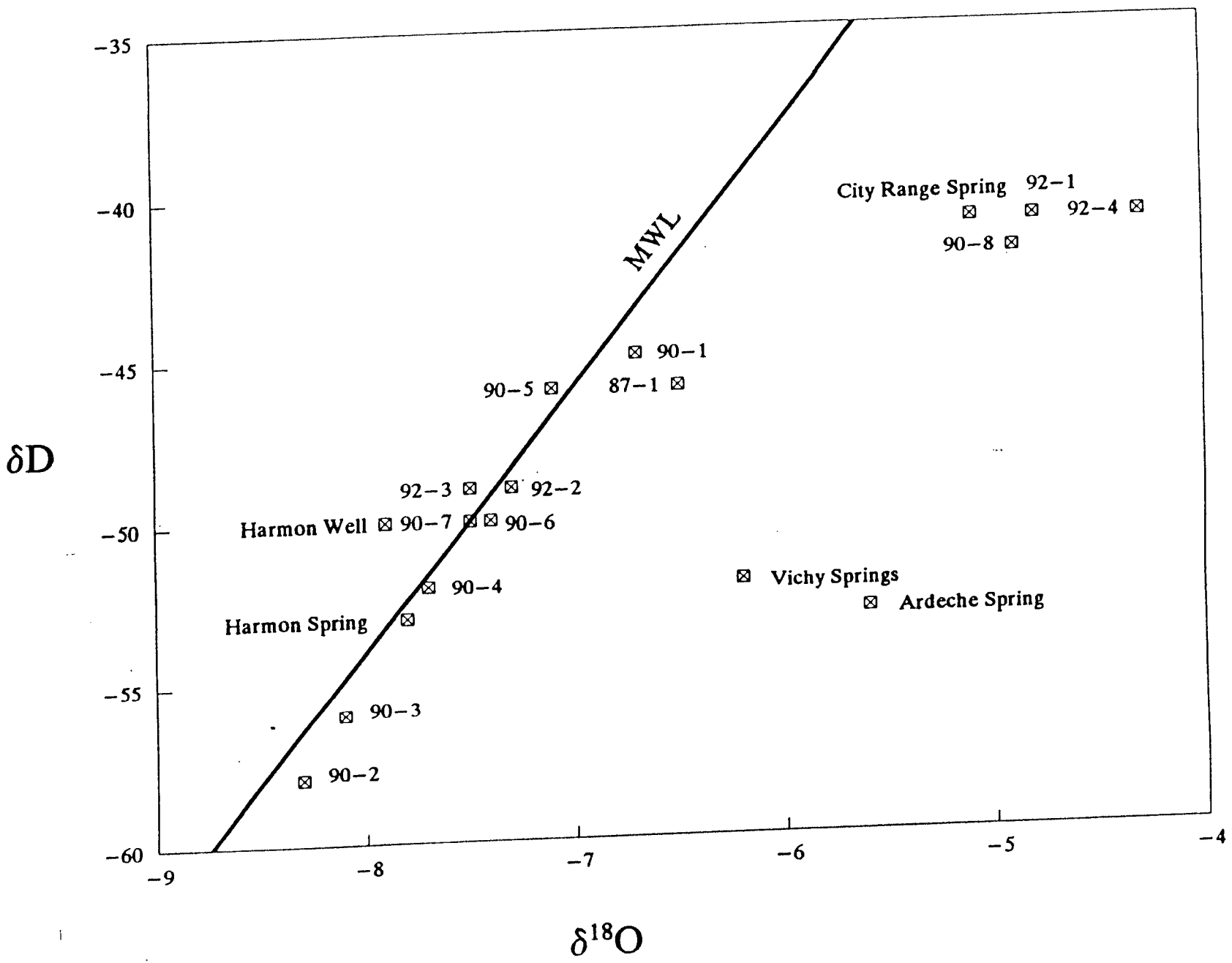
CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SITE LOCATION MAP

FIGURE



CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

FIGURE

REVISED 6/94

11/8/94

WATER QUALITY CONTROL BOARD REGION 1

OCT 31 '94

State of California

M E M O R A N D U M

To: Benjamin Kor
North Coast RWQCB

Date: OCT 2 1994

☐ BK ☐ PK
☐ ☐
☐ FR ☐ KD
☑ RT ☐ PG
☐ JH ☐ JS
☐ SW ☒ DSE
☐ ☐ REPLY
☐ ALL STAFF ☐ FILE

Harry M. Schueller, Chief
Division of Clean Water Programs

From: **STATE WATER RESOURCES CONTROL BOARD**

Subject: REVIEW OF UKIAH LANDFILL MONITORING WELL INFORMATION

As you know, you contacted us recently to request that we review information relating to the drilling of a monitoring well near the Ukiah Landfill and its possible effects on the temperature and flow rate of a spring at the Vichy Hot Springs Resort.

We have reviewed the information forwarded to us regarding the possible effects of drilling monitoring well 92-4 in March, 1993. The well was drilled by the City of Ukiah to monitor water quality in the vicinity of the Ukiah Landfill. The information we reviewed consisted of:

- October 24, 1994 letter from Gilbert Ashoff to Benjamin Kor
- October 17, 1994 letter from Gilbert Ashoff to Benjamin Kor
- October 14, 1994 letter from Robert E. Mackensen to Paul Blais
- October 13, 1994 letter from Alisto Engineering Group to Gilbert Ashoff
- August 31, 1994 letter from EBA Wastechnologies to Rick Kennedy
- September 20, 1994 letter from Judy Pruden to Chuck Rough and Rick Kennedy
- July 26, 1994 letter from M. Lee Davisson (Lawrence Livermore Lab) to Gilbert Ashoff

EXHIBIT 1

- o March 19, 1994 letter from Stanley J. Singer to Dani Renan
- o U.S. Geological Survey Water-Supply Paper 338, 1915
- o U.S. Geological Survey Professional Paper 492, 1965

Our review of these materials, indicates that: (1) the monitoring well was drilled into a different geological formation from the formation underlying the hot springs; (2) apparently no pressure effects were noted during drilling; (3) the temperature of the water in the monitoring well apparently ranges between 59°-77°F, in contrast to the 90°F temperature of the hot spring; and (4) data from Lawrence Livermore Lab shows that the water in the monitoring well and the hot spring have different oxygen isotope values and therefore are from separate water sources and have no apparent mixing relationship. One would expect waters which are in the same hydrothermal regime to have similar oxygen isotope values and elevated temperatures. Furthermore, if the monitoring well were in fact responsible for the drop in temperature of the spring, one would not have expected the temperature in the spring to have recovered almost to its pre-drilling temperature without a subsequent change in the condition of the well, e.g., plugging. In summary, we have not seen convincing evidence to support the conclusion that the drilling of this monitoring well could have impacted the temperature and flow rate of the hot spring.

In order to better ascertain any relationship between drilling boreholes and the hot spring, the following information could be collected if subsequent monitoring wells are drilled: the temperature of the borehole during drilling; insofar as possible, the pressure of the borehole during drilling; the temperature of the spring during and after drilling; and flow rates of the spring during and after drilling.

If you have any questions, please contact Liz Haven at (916) 227-4395 or Calnet 498-4395.

cc: Dave Evans

VICHY SPRINGS (UKIAH - MENDOCINO Co.)

HYDROGEOLOGICAL FIELD TESTS PERFOMED

BY M. WALGENWITZ (BRGM)

December 5 - 9 1979

APPENDIXES 1.1. to 1.4.

An investigation carried alongside the river called Sulphur Creek has shown the lack of relationship between surface water and carbon dioxide rich springs. Pump tests on the Vichy and Ardeche Beauty springs (appendixes 1.2. and 1.3. photos 1 to 3) did show besides, that those two springs don't have any direct link as far as water-heads are concerned.

Ardeche spring's discharge (1.0 l/s) cannot be increased through pumping, whereas in Vichy spring case the mean discharge pumped during 4 hour (8.8 l/s) is more than double than that measured just after opening the pipe (3.4 l/s), allowing to forecast the possibility of pumping or siphoning 8.0 l for eight hours in succession.

The discharge meassured the next day, after 18 hours recovery, was 2 but on comparison can be made between this value and the not stabilized 3.4 l/s. It was not possible to measure the discharge from the overflow.

The drilled well in the courtyard produced water with a smaller mineral content than that of the springs (3.6 g/l instead of 5.0 g/l); it reacts like a well in an unconfined aquifer (the permeability cannot be computed due to the lack of the well log) and it can be assessed that this aquifer is feld both by meteoric water and by mineral water.

EXHIBIT K

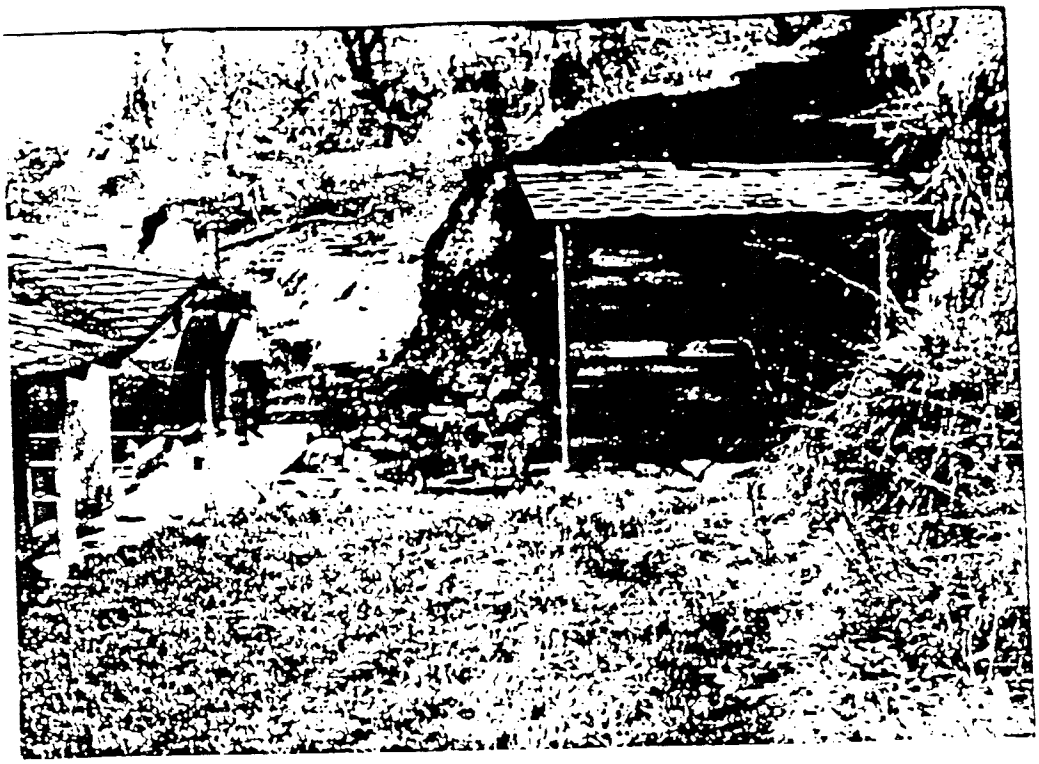


Photo 1. Pumping test on Vichy spring.

. to the right : shed sheltering the basin

. to the left : old 19 th century baths

. at the back : Mr. Hans Koopal, SGEMV.

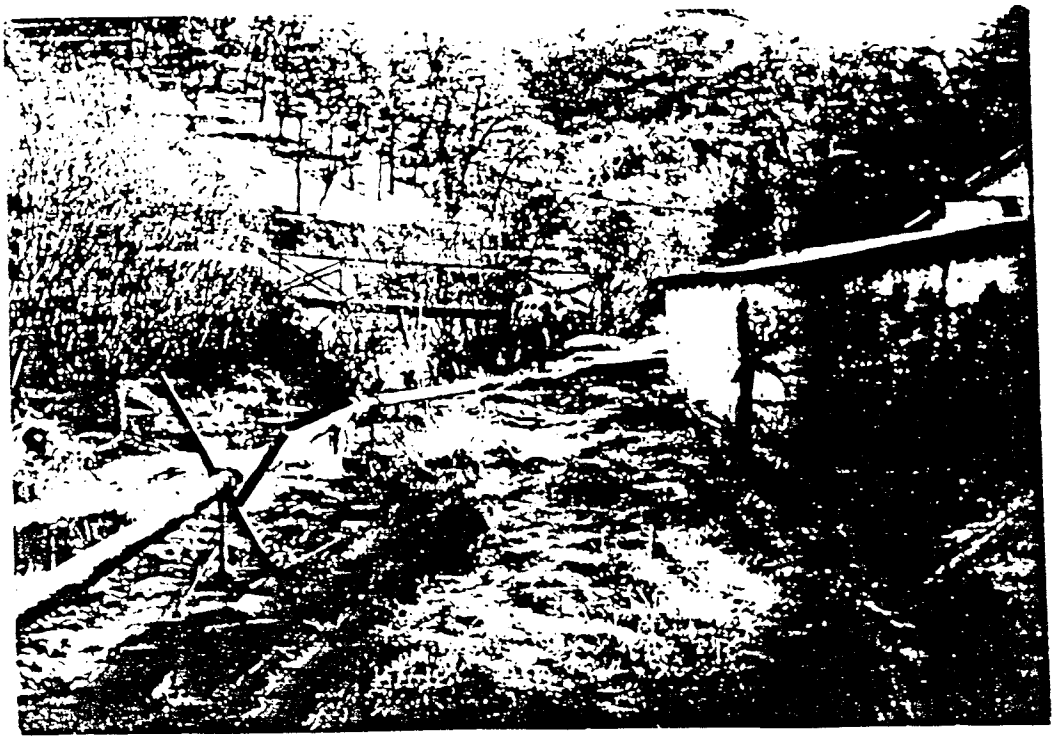


Photo 2. Water pipe from Vichy spring to the plant.

VICHY SPRINGS
HISTORIC FLOW AND TEMPERATURE DATA
PRIOR TO DRILLING OF MONITORING WELLS 90-8 AND 92-4
UKIAH, CA

Date	Temperature (F°)	Flow (gpm)[1]	Reference
1889	93°	333.3	Anderson[(2)]
1915	88°	16	Waring[(3)]
1965	50-90°[(4)]	30[(4)]	Waring[(5)]
1979	86.9°	53.9	Walgenwitz[(6)]

Notes:

(1) gpm = gallons per minute

(2) Anderson, W., M.D., 1889, *Mineral Springs and Health Resorts of California with a Complete Chemical Analysis of Every Important Mineral Water in the World*, Pacific Medical Journal, San Francisco, CA.

(3) Waring, G.A., 1915, *Springs of California*, U.S. Geological Survey, Water-Supply Paper 338, 410 p.

(4) Reported temperature is range for all springs at site; reported flow represents combined discharge from all springs at site.

(5) Waring, G.A., 1965, *Thermal Springs of the United States and Other Countries of the World - A Summary*, U.S. Geological Survey, professional Paper 492, 383 p.

(6) Walgenwitz, M., 1979, *Vichy Springs, Ukiah - Mendocino County, Hydrogeologic Field Tests Performed*, Bureau de Recherches Geologiques en Minieres, Orléans Cédex, France

L:\461UKIAH\FLOW-TEMP.TBL

EXHIBIT M

MINERAL SPRINGS

AND

HEALTH RESORTS OF CALIFORNIA

WITH A

COMPLETE CHEMICAL ANALYSIS

OF

EVERY IMPORTANT MINERAL WATER
IN THE WORLD

Illustrated

A PRIZE ESSAY

ANNUAL PRIZE OF THE MEDICAL SOCIETY OF THE STATE OF CALIFORNIA, AWARDED APRIL 20, 1889

BY

WINSLOW ANDERSON, M. D.

Joint Editor and Publisher of the PACIFIC MEDICAL JOURNAL

Asst. Chair Medical Chemistry and Materia Medica, and Teacher of Chemistry in the Laboratories of the University of California in the Medical and Dental Departments.
Active Member of the American Medical Association, and of the Medical Society of the State of California.
Active Member of the San Francisco County Medical Society, and of the College of Pharmacy and Pharmaceutical Society.
Secretary and Member of the Alumni Association of the Medical Department of the University of California.
Member of the Board of Medical Examiners for the State of California.
Member of the National Educational Association.
Analytical Chemist to the Coroner of the city of San Francisco.
Author of
"Desiccated Human Remains;" "Adulterations in Food Products;" "Western Mummies;"
"Mortality in Diphtheria;" Morphio-Mania, Etc., Etc."

SAN FRANCISCO
THE BANCROFT COMPANY
1890

PRICE $1.50

Special rates to Spring owners

Their action is almost identical, as indeed is their chemical composition, with the noted Ems on the Lahn; Fachingen of Nassau, Germany; and Vichy of Grande Grille, France.

From the following chemical analysis, made in 1888, it will be observed that the waters from the Doolan Vichy are heavily charged with carbonic acid gas and carbonates and that they contain some iron and potassium salts.

Solid Ingredients in One Gallon of 231 inches in Grains	Doolan's Ukiah VICHY of California analyzed by DR. ANDERSON *Temp. 93° F.*	VICHY France Grande Grille analyzed by BOQUET *Temp. 105.8° F*	FACHINGEN Nassau Germany analyzed by FRESENIUS *Temp. not given*	EMS ON THE LAHN Germany analyzed by FRESENIUS *Temp. 115° F.*
Sodium Chloride	28.60	32.80	36.48	62.16
Sodium Carbonate	195.52	208.00	155.84	84.24
Sodium Sulphate	.36	18.32	1.12	trace
Sodium Phosphate	.....	6.24	.41	.....
Potassium Chloride	.09	.....	.....	.....
Potassium Carbonate	trace	16.32	.....	.....
Potassium Sulphate	trace	.....	.....	3.03
Magnesium Carbonate	19.75	11.04	10.85	6.80
Calcium Carbonate	18.14	18.48	16.09	10.00
Ferrous Carbonate	.07	.16	.64	.16
Strontium Carbonate	.....	.08	trace	trace
Barium Carbonate	.....	.....	.....	trace
Lithium Carbonate	.....	.....	trace	.....
Borates	trace	.....	.....	.....
Arseniates	.....	.08	.....	.....
Aluminates	trace	.....	trace	trace
Silica	5.92	.40	2.09	2.88
Total	268.45	311.88	223.52	169.27
Gases, cubic inches				
Carbonic Acid Gas	224.75	14.74	263.76	54.24

For an antacid, tonic, aperient, diuretic and alterative mineral water the Ukiah Vichy ranks among the finest on the Coast. They have proved highly beneficial in Bright's disease, torpidity of the bowels and liver. For dyspepsia and acid conditions of the urine and the blood they are excellent.

The waters are soon to be sold commercially.

Owing to recent developments the flow has increased enormously, flowing now about 20,000 gallons per hour.

On the premises are numerous springs which will soon be developed and analyzed.

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 5
To SUE GOODRICH | From DAVE EVANS
Co. | Co.
Dept. | Phone # 576-2703
Fax # | Fax #

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 339

SPRINGS OF CALIFORNIA

BY

GERALD A. WARING

GEOLOGY UNIT
San Francisco Bay District
DOCUMENT NO. 2.23

WASHINGTON
GOVERNMENT PRINTING OFFICE
1915

EXHIBIT L

issue consists of the crushed sediments that cover a large part of the region.

CARBONATED SPRING NEAR BOONVILLE (MENDOCINO 46).

A small carbonated spring rises on the Hotel ranch, near Boonville, about 25 miles northwest of Cloverdale. It has not been improved, however, and has been used only occasionally for drinking.

SINGLEYS SODA SPRING (MENDOCINO 47).

Singleys Soda Spring is on the main road between Ukiah and Boonville, about 5 miles northeast of the latter place. There has been a roadhouse near the spring for a number of years and the place is well known to travelers through this region. The spring has been improved only for drinking.

VICHY SPRINGS (MENDOCINO 48).

Vichy Springs form a resort that has been established for many years on Sulphur Creek, 3 miles northeast of Ukiah. In 1909 a small hotel and several cottages provided accommodations for 50 guests, and tub baths were supplied by the two principal springs, which rise on the southern side of the creek, about 200 yards southeast of the hotel. One of them, known as Ardecho Spring, rises in a cemented basin about 5 by 15 feet in size and 2 feet deep and supplies half a dozen tubs in a bathhouse beside it. Many bubbles rise with the water, which is slightly clouded as if by a small precipitate of iron, and a slight deposit, probably of calcium carbonate, forms on its surface. The water is noticeably carbonated and slightly alkaline in taste. Its discharge is about 8 gallons a minute, and the temperature is 60°.

About 45 yards southeastward, upstream from Ardecho Spring, Vichy Spring rises in a pool of irregular shape, about 6 by 10 feet in size, in a natural grotto of lime carbonate. It is said to have formerly issued at a point 3 or 4 yards farther west but changed to its present outlet at the time of a small earthquake. The earthquake of April 18, 1906, is said not to have affected it, however. When visited, the water of Vichy Spring was somewhat clearer than that of Ardecho Spring, but a more noticeable deposit of iron was formed. Its recorded temperature was 58°, being slightly lower than that of Ardecho Spring, but its discharge was approximately twice as great. Because of the temperature of the waters of these main springs they are shown on the map (Pl. III, in pocket) as thermal-carbonated, but they are best known for their carbonated character.

The water of Vichy Spring is kept flowing through tubs in a bathhouse beside it, when they are in use. A tingling sensation that is caused by small bubbles of carbon dioxide which collect on the bather

DISTRICT ID:9163227184 OCT 19'94 14:22 No.002 P.04

is locally ascribed to an electric property of the water. Two other carbonated springs rise in the gravel at the creek edge opposite Vichy Spring, but they have not been improved. They yield flows of about one-half gallon and 8 gallons a minute and have the same temperature as Vichy Spring. There is also a small seeping pool known as the Arsenic Spring on the bank 20 yards westward from Ardeche Spring, but it has been only slightly used. A quarter of a mile south of east from the main group, on the hillside 25 or 30 feet above the creek, a third spring of importance issues in a rock-walled basin that is protected by a roof, and yields perhaps a quarter of a gallon a minute. Like the other springs, it deposits iron and its water has a slightly alkaline taste. It is known as Crystal Spring and is a favorite for drinking, for its water is cool (59°) and pleasantly carbonated. Another small pool is formed by a seepage spring on the hillside 30 yards above Crystal Spring, but it has not been improved.

The following analyses of the three principal springs show their waters to be primary alkaline in character:

Analyses of water from Vichy Springs, Mendocino County, Cal.

[Constituents are in parts per million.]

	1		2		3		4	
Temperature	32° C. (90° F.)		34° C. (93° F.)		32° C. (90° F.)		16° C. (59° F.)	
Properties of reaction:								
Primary salinity	0		10		0		11	
Secondary salinity	0		0		0		0	
Tertiary salinity	0		0		0		0	
Primary alkalinity	73		73		73		71	
Secondary alkalinity	18		17		18		18	
Tertiary alkalinity	118		107		(1)		(1)	
Constituents.	By weight.	Reacting values.	By weight.	Reacting values.	By weight.	Reacting values.	By weight.	Reacting values.
Sodium (Na)	1,454	71.90	1,049	71.64	1,141	49.60	1,248	64.26
Potassium (K)	Trace.	Trace.	.8	.02	20	.41	19	.44
Calcium (Ca)	127	6.11	124	6.20	135	6.64	149	7.43
Magnesium (Mg)	112	9.19	92	7.58	66	6.95	54	4.74
Iron (Fe)	Trace.	Trace.	.9	.02	0.1	.55	1.9	.28
Aluminum (Al)	Trace.	Trace.	Trace.	Trace.	.....	.....	.....	.....
Sulphate (SO_4)	Trace.	Trace.	4.2	.09	.....	.....	.....	.....
Chloride (Cl)	280	8.05	298	8.41	201	5.16	260	7.07
Carbonate (CO_3)	2,376	79.16	2,281	77.90	1,012	53.14	1,250	58.54
Metaborate (HO_2)	.....	.....	Trace.	Trace.	66	1.14	66	1.47
Silica (SiO_2)	117	3.88	101	3.35	54	1.10	32	1.06
	4,004	.....	4,595.6	.....	3,287.1	.....	3,387.9	.....
Carbon dioxide (CO_2)	2,126	96.70	1,952	88.18	.....	.....	.....	.....

1. Vichy Spring. Analyst, John Howston. Authority, U. S. Geol. Survey Bull. 22.
2. Vichy Spring. Analyst and authority, Winslow Anderson (1880).
3. Ardeche Spring. Analyst, Price & Son. Authority, advertising matter.
4. Crystal Spring. Analyst, Price & Son. Authority, 12th Cal.

Water from these springs has not been bottled commercially, chiefly perhaps because the iron and calcium it contains stain the bottles and injure its sale.

DISTRICT ID:9163227184 OCT 19'94 14:25 NO.002 P.05

The rocks of the locality are soft sandstones and clay shales. Along the creek for some distance below the springs there is a conglomerate that has probably been cemented by lime carbonate deposited from the spring water.

GOBBIS SODA SPRING (MENDOCINO 30).

A small carbonated spring, known as Gobbis Soda Spring, rises at the base of the hills a mile southwest of the business portion of Ukiah. A brick-lined, tunnel-like basin has been constructed in the bank, and in summer the spring is visited for drinking water. As is true at most of the other carbonated springs, there is considerable iron stain along its outflow channel, but the water does not seem to be strongly mineralized. The rock at the locality is soft, light-colored shale that yields a clay soil.

CARBONATED SPRINGS AT SHOEMAKER DELL (MENDOCINO 31).

At Shoemaker Dell, a mountain resort in the hills 6 miles northwest of Ukiah, there are a number of carbonated springs that are used for drinking. They are cool and of small flow, like most of the springs of the locality. One or two of the springs are said to be magnesic, and magnesium, derived from serpentinous material associated with the sedimentary series, may be present in unusual amount. Accommodations for about 50 guests were provided at the property in 1910.

CARBONATED SPRINGS AT HAZEL HILL (MENDOCINO 32).

Three small springs that are used for drinking are situated at Hazel Hill, a small mountain resort about 35 miles northwest of Cloverdale. Only one spring has been improved by a cement basin, but they all furnish cool drinking water. The principal spring is moderately carbonated; the other two are respectively sulphureted and ferruginous in character.

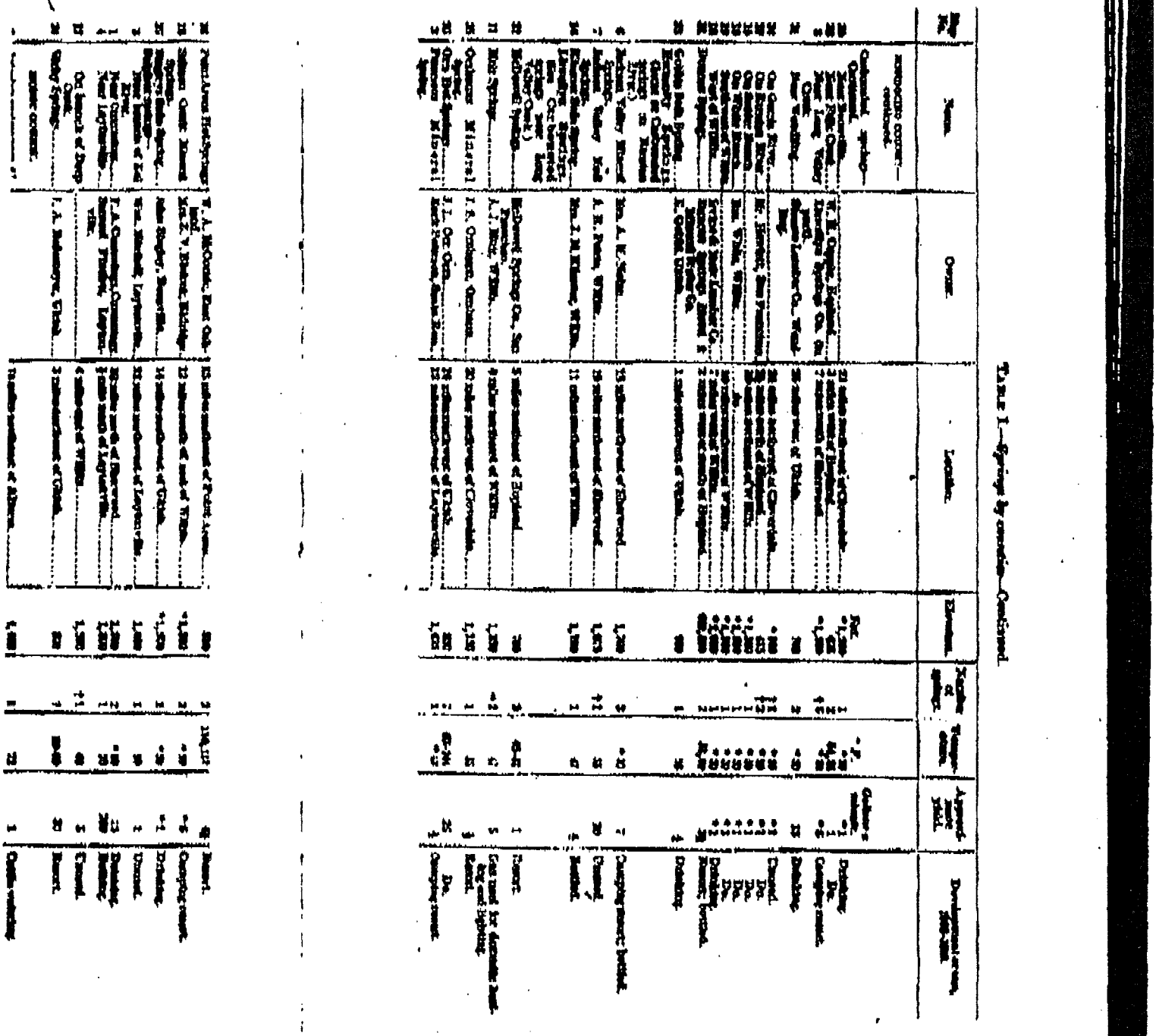
CARBONATED SPRINGS NEAR WENDLING (MENDOCINO 33).

Near Wendling, a lumbering settlement about 45 miles northwest of Cloverdale, there are two or three small carbonated springs. One of these was formerly visited by picnic parties, but in recent years it has become neglected and partly filled up. A 200-foot well that furnishes part of the water that supplies a mill pond in the neighborhood also yields water that is carbonated.

BAKER MINERAL SPRINGS (MENDOCINO 37).

Baker Mineral Springs are about 18 miles by road east of Willits, on the banks of a stream that is tributary to Tomki River. The place has been a small camping resort for several years, and there are five small mineral springs on the property. At the lowermost spring

Page 3721 of 4165



determination which the City was required to make in deciding whether the project is categorically exempt.

Even though the plaintiffs' experts disagree with the City's, the City must make a factual determination as to whether there is " . . . a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances." (14 CCR §15300.2(c).) It must also determine whether the project will ". . . result in a serious or major disturbance to an environmental resource." (14 CCR §15306.)

In making these determinations the City is entitled to rely upon substantial evidence. (See Dehne v. County of Santa Clara (1981) 115 Cal. App. 3d 827, 844-845 [" . . . courts in similar situations [reviewing categorical exemption determinations] have consistently refused to exceed the scope of their authority, on review of administrative decisions, by undertaking independent evaluation of the evidence. Instead, they have properly limited themselves to application of the substantial evidence test. (Citations omitted.)"].)

If the Court were to adopt the plaintiffs' standard of review, it would order the City to conduct more studies to determine whether the project will adversely affect the Vichy Springs; that is, whether the project is categorically exempt. CEQA clearly contemplates that the City make this threshold factual determination based on substantial evidence.

B. The City's determination that drilling the monitoring well will not harm the Vichy Springs is supported by substantial evidence.

Plaintiffs contend that the flow and temperature of their springs declined significantly one month after the City drilled

monitoring well no. 92-4. They contend that no other change took place that could account for this decline. Based on this fact alone, they contend that drilling any additional monitoring wells in the same area could further damage their springs.

Their experts, then, hypothesize a set of circumstances that could explain how monitoring well no. 92-4 caused these reductions. Recognizing that well 92-4 has tapped a different groundwater aquifer than the one which supplies the springs, the plaintiffs' experts contend that well 92-4 could have tapped the pressure zone that causes the springs to flow. Mr. Singer, the plaintiffs' retired rocket scientist, explains that if gas is allowed to escape, the resulting reduction in pressure could cool the water which that pressure influences. (See, also, Declaration of David Evans, para 13, p. 5, which also explains this fundamental principal of physics.)

The City's hydrogeologist has considered the plaintiffs' theories. His firm has been conducting hydrogeotechnical investigations of the landfill for the last eight years. Mr. Brown personally supervised the drilling of wells 90-8 and 92-4. He has studied the borings from those wells. He has studied aerial photographs of the area where the wells were drilled. The photographs provide information on the cracks and fissures in the geologic zone where the wells were drilled. He has studied and mapped the geology of the area.

Based on his investigations and his specific knowledge of the area, he believes that the plaintiffs' theories are highly improbable. First, it is highly improbable for a well with a two inch diameter located 980 feet from the springs to cause the kind

of pressure reduction that could account for the amount of temperature and flow reduction reported by the plaintiffs.

Second, it is highly improbable that a well drilled in one geologic zone could influence pressures in a separate geologic zone.

Third, the Continental Basin Deposits where the City has and will drill the monitoring wells does not contain the cracks and fissures through which gases could travel from the Franciscan Deposits, where the Vichy Springs are located.

Fourth, if well 92-4 had caused a release of sufficient pressure to cause the changes in the springs which plaintiffs report, the pressure in the well would have changed significantly. Neither during the drilling nor after the drilling has Brown detected that kind of pressure change in the well. (Brown Declaration, p. 15.)

Fifth, if well 92-4 had tapped the pressure zone influencing the springs, it would have penetrated a confining layer capable of maintaining gas under pressure. The soils extracted when the City drilled well 92-4 indicates that the City did not penetrate such a layer. (Brown Declaration, pp. 14-15.)

Mr. Brown states that there is no evidence of a cause and effect relationship between the drilling of well 92-4 and the reported reductions of the springs temperature and flow. (Brown Declaration, p. 19.) If sun spots appeared thirty days before these reductions occurred, it would make just as much sense to blame these reductions on them.

Based on a review of the data developed by EBA, both David Evans of the RWQCB, who is a registered Civil Engineer, and Liz

Haven, a geologist with the State Water Resources Control Board independently determined that the existing monitoring wells have not caused the reported reduction of flow and temperature at the Vichy Springs and the proposed benzene well will not cause further reductions. (Evans Declaration, pp. 10-11; Kennedy Declaration, para. 17, pp. 6-7; Exhibits N and O thereto.)

There is also considerable uncertainty over the consistency of the springs' flow and temperature before the City drilled well 92-4.

Although the Ashoff's claim that both the flow and temperature of the springs declined in April 1993, they did not inform the City or the RWQCB about the decline until January 1994, eight months later. During that time, they made numerous contacts with the defendants and many other agencies and officials. Those communications reported many complaints about the operation of the landfill, the drilling of well 92-4, and their adverse effects on the Ashoff's resort business. However, none of those letters or phone calls referred to a reduction in flow or temperature, even though the plaintiffs' now characterize these effects as "disasterous." (Evans Declaration, pp. 10-11.)

When Gilbert Ashoff contacted David Evans in January 1994 and later Margie Ashoff contacted Rick Kennedy in February 1994, they complained about a temperature reduction, but not a reduction of flow. (Evans Declaration, para. 22, p. 7, Exhibit E thereto; Kennedy Declaration, para. 6, p. 3; Exhibit D thereto.)

The first mention of a flow reduction came in a letter to the City Manager from attorney James Mazzoni who reported a flow reduction of 30%. This is a smaller reduction than the Ashoffs

represented in Exhibit I to the Ashoff Declaration, dated October 24, 1994, which was the first time temperature and flow figures were provided to the City and the RWQCB. (Evans Declaration, para. 28, p. 10. See also note 4, p. 5, ante.)

Moreover, the record of temperatures and flows for the springs at the Vichy Springs resort show a considerable fluctuation in both temperature and flow over the more than 100 years for which there is a record. (Brown Declaration, p. 18; Exhibit M thereto.) The historic record shows fluctuations that are greater than those reported by the Ashoffs for the period after March 1994, when the City drilled well no. 92-4. (Id.)

Fluctuations of this type are common for mineral springs and can be caused by a number of natural events, including very small seismic events. (Brown Declaration, p. 19.)

Given the total absence of evidence showing an interconnection between the monitoring wells and the Vichy Springs, the considerable uncertainty as to the "normal" temperature or flow of the springs and the likelihood that a natural event and not the monitoring wells are responsible for any observed changes in spring flow or temperature, this Court must conclude that substantial evidence supports the City's determination that drilling the monitoring well is categorically exempt from CEQA.

DATED: December 12, 1994

Respectfully submitted,

RAPPORT AND MARSTON

By: _____
DAVID I. RAPPORT, City Attorney
Attorneys for City of Ukiah

DATE: DECEMBER 9, 1994

CLIENT: UKIAH
LIBRARY: CAL
FILE: CAADMN

YOUR SEARCH REQUEST IS:
23 CCR 2205

NUMBER OF SECTIONS FOUND WITH YOUR REQUEST THROUGH:
LEVEL 1... 1

1ST SECTION of Level 1 printed in FULL format.

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THIS SECTION IS CURRENT THROUGH REGISTER 94, NO. 47, NOVEMBER 25, 1994

TITLE 23. WATERS
DIVISION 3. STATE WATER RESOURCES CONTROL BOARD
CHAPTER 9. WASTE DISCHARGE REPORTS AND REQUIREMENTS
ARTICLE 2. WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OTHER THAN FROM POINT SOURCES TO NAVIGABLE WATERS

23 CCR 2205 (1994)

@ 2205. Preliminary Procedures

Each waste discharge report together with the required filing fee shall be submitted to the appropriate regional board on forms supplied by the board. Relevant supplemental information as required by the board shall also be provided. The report shall contain all the available information required by the form and shall be sworn to or submitted under penalty of perjury. The board shall determine the adequacy of a report and fee within the time limits set forth in Government Code Section 65943. Pursuant to Section 13260 of the Water Code, the board may waive the filing of a report, in which case it will notify the sender and return any fee that has been paid.

AUTHORITY:

Note: Authority cited: Section 1058, Water Code. Reference: Section 13260, Water Code.

HISTORY:

1. Amendment filed 6-30-80; effective thirtieth day thereafter (Register 80, No. 27).

2. Amendment filed 10-26-88; operative 11-25-88 (Register 88, No. 45).

DATE: DECEMBER 9, 1994

CLIENT: UKIAH
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FILE: CAADMN

CITATION: 23 CCR 2240 (1994)

YOUR SEARCH REQUEST IS:
23 CCR 2205

23 CCR 2240 (1994) printed in FULL format.

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THIS SECTION IS CURRENT THROUGH REGISTER 94, NO. 47, NOVEMBER 25, 1994

TITLE 23. WATERS
DIVISION 3. STATE WATER RESOURCES CONTROL BOARD
CHAPTER 9.1. ENFORCEMENT PROCEDURES
ARTICLE 1. CEASE AND DESIST ORDERS

23 CCR 2240 (1994)

@ 2240. When Issued

A cease and desist order should be issued whenever significant violations of waste discharge requirements or prohibitions are threatened or such violations are occurring or have occurred and there is a likelihood that the violations will continue in the future.

AUTHORITY:

Note: Authority cited: Section 185 and 1058, Water Code. Reference: Section 13283 and Chapters 4, 5 and 8 of Division 7, Water Code.

HISTORY:

1. New Subchapter 9.1 (@@2240 through 2245) filed 12-3-70; effective thirtieth day thereafter (Register 70, No. 49).

2. Amendment of title in subchapter 9.1 filed 11-21-78; effective thirtieth day thereafter (Register 78, No. 47).

DATE: DECEMBER 9, 1994

CLIENT: UKIAH
LIBRARY: CAL
FILE: CAADMN

CITATION: 23 CCR 2242 (1994)

YOUR SEARCH REQUEST IS:
23 CCR 2205

23 CCR 2242 (1994) printed in FULL format.

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THIS SECTION IS CURRENT THROUGH REGISTER 94, NO. 47, NOVEMBER 25, 1994

TITLE 23. WATERS
DIVISION 3. STATE WATER RESOURCES CONTROL BOARD
CHAPTER 9.1. ENFORCEMENT PROCEDURES
ARTICLE 1. CEASE AND DESIST ORDERS

23 CCR 2242 (1994)

@ 2242. Threatened Violations of Time Schedules

Failure of the discharger to meet an intermediate date in a time schedule issued pursuant to Water Code Section 13300 should, if the failure jeopardizes compliance with the final date in the schedule, be treated as a threatened violation of requirements and a cease and desist order should be issued.

AUTHORITY:

Note: Authority cited: Sections 185 and 1058, Water Code. Reference: Section 13300, Water Code.

HISTORY:

1. Amendment filed 12-7-81; effective thirtieth day thereafter (Register 81, No. 50).

7 PAGES 94 LINES

8:13 P.M. STARTED 8:13 P.M. ENDED

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E       N  NN   D   D
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EEEEE   N   N   DDDD
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SEND TO: RAPPORT, DAVID
RAPPORT & MARSTON
200 HENRY ST.
UKIAH, CALIFORNIA 95482-4355

PROOF OF SERVICE BY MAIL OR HAND DELIVERY

I am employed in the County of Mendocino, State of California. I am over the age of 18 years and not a party to the within action; my business address is that of Rapport & Marston, 200 West Henry Street, P.O. Box 488, Ukiah, CA 95482.

On December 12, 1994, I served the below listed document(s) described as:

MEMORANDUM OF POINTS AND AUTHORITIES IN OPPOSITION TO PLAINTIFFS' APPLICATION FOR PRELIMINARY INJUNCTION

by depositing _X_ true copy ___ original thereof enclosed in a sealed envelope addressed as follows:

PANO STEPHENS, ESQ. (by Hand Delivery)
Attorney at Law
201 North State Street
Ukiah, CA 95482

JOHN DAVIDSON, ESQ. (by Mail)
Deputy Attorney General
State of California
Justice Department
455 Golden Gate Avenue, #6200
San Francisco, CA 94102-3658

_X_ **BY** MAIL

_X_ I deposited such envelope in the mail at Ukiah, California. The envelope was mailed with postage thereon fully prepaid.

___ As follows: I am "readily familiar" with the firm's practice of collection and processing correspondence for mailing. Under that practice it would be deposited with U.S. postal service on that same day with postage thereon fully prepaid at Ukiah, California, in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

_X_ **BY PERSONAL SERVICE** (I caused said envelopes to be delivered by hand to the offices of the addressees).

_X_ **STATE** I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

___ **FEDERAL** I declare that I am employed in the office of a member of the bar of this court at whose direction the service was made.

Executed on December 12, 1994, at Ukiah, California

Carol Notaro

CAROL NOTARO

EBA WASTECHNOLOGIES
Engineers & Environmental Consultants

August 31, 1994

Mr. Rick Kennedy, Director
Department of Public Works
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

RE: UKIAH LANDFILL SITE MONITORING WELLS AND VICHY SPRINGS RESORT

Dear Mr. Kennedy:

This letter report summarizes the data we have developed to date regarding the potential for groundwater impact to Vichy Springs by groundwater monitoring wells at the Ukiah landfill. This report was prepared in accordance with a letter dated August 1, 1994, from the California Regional Water Quality Control Board, North Coast Region (RWQCB), requesting a summary of information supporting our conclusion that the existing or future groundwater monitoring wells at the landfill will not adversely impact Vichy Springs. It is our understanding that the RWQCB has made a similar request for data and a technical report from Mr. Ashoff, the owner of the Vichy Springs Resort.

BACKGROUND

As you are aware we have examined the available hydrogeologic and geochemical data, and found no evidence supporting Mr. Ashoff's claim that Ukiah Landfill site monitoring wells have adversely affected geothermal spring activity at Vichy Springs Resort. The RWQCB has requested a summary of relevant facts so that concerns can be resolved and the hydrogeologic groundwater investigation at the landfill can continue. This letter presents the data supporting our conclusion that the monitoring wells at the landfill do not influence geothermal spring activity at the Vichy Springs Resort.

Through a letter, dated May 6, 1994, from attorney James R. Mazzoni, Jr., Mr. Ashoff contends that immediately following the installation of the well 92-4, (installed March 15, 1993 through March 18, 1993) the temperature at Vichy Springs declined 12 degrees (a six degree increase was later observed, for a net decrease of six degrees from its "*historic temperature*"). Mr. Ashoff further alleges an accompanying decrease in discharge of thirty percent from a

825 Sonoma Ave., Suite C P.O. Box 4600 Santa Rosa, California 95402 (707) 544-0784 FAX (707) 544-0866
11344 Coloma Rd., Suite 245 Gold River, California 95670 (916) 852-6800 FAX (916) 852-0866
Also Las Vegas, Nevada

reported flow of 65 gallons per minute (gpm). This decrease in flow of 19.5 gpm (30% of 65 gpm) is also attributed to the presence of monitoring well 92-4. We believe it is highly improbable that either monitoring well 90-8 or 92-4 (see sheet 1) can adversely impact Vichy Springs. The two principal arguments for this position are 1) there are a number independent lines of evidence (geologic, hydrogeologic, and hydrochemical) supporting the conclusion that the monitoring wells are completed in a water-bearing zone that is different, distinct and physically separate from that of Vichy Springs, and 2) the monitoring wells can not physically account for the quantity of heat loss claimed, and volume of groundwater extracted from the monitoring wells is far too low to account for the reduction in spring flow attributed to them. Mr. Ashoff, to date, has not presented records of groundwater temperature or flow rate data for Vichy Springs to document the deviation from historic temperature or discharge referred to in Mr. Mazzoni's letter.

SITE GEOLOGY

The geology and hydrogeology of the area have been studied by a number of researchers (Blake and Jones, 1981; Cardwell, 1965; Farrar,1986; Treasher, 1958; and Upp, 1982) and is discussed in the Environmental Monitoring Program (EBA, 1993a) and the Report of Waste Discharge (ROWD) prepared for the landfill (EBA, 1993b). Based on a review of available geologic maps (Cardwell, 1965; Farrar, 1986) and site field reconnaissance mapping of the area, there appear to be three major geologic units represented in the vicinity of the landfill site. These include rocks from the coastal belt of the Franciscan Assemblage, Pliocene-Pleistocene Continental Basin Deposits, and contemporary (Holocene) alluvial deposits.

The central belt of the Cretaceous-Jurassic age Franciscan Assemblage, underlies the majority of the Mayacamas range east of the Maacama fault (Blake and Jones, 1981). The Franciscan Assemblage outcrops in the Sulphur Creek drainage to the south of the landfill site, near Vichy Springs Resort. The central belt of the Franciscan Assemblage predominantly consists of what is known as a tectonic melange. The melange consists of an admixture of disrupted sandstone and assorted metavolcanic, greenstone and chert inclusions, within a highly sheared and deformed, dark-gray shale matrix. Bedding deformation within blocks of interbedded sandstone and shale turbidites indicates that there has been a complex and varied strain history within the Central belt of the Franciscan Assemblage. As a result of the intense deformation history, the primary porosity of the Central belt of the Franciscan Assemblage has been greatly reduced. Accordingly, the ability of the Franciscan Assemblage melange to absorb, store and transmit water is almost entirely dependent on the degree of faulting, fracturing and weathering. Water often percolates into large upland areas underlain by Franciscan basement, and later discharges from springs and/or provides base flow for tributaries to the Russian River. Discharge of thermal water, such as Vichy Springs, is also quite common throughout the area. Historical records, however, indicate that groundwater yield to wells within Franciscan bedrock is

generally unpredictable and in most cases volumetrically insignificant (Cardwell, 1965; Farrar 1986). Vichy Springs flows from fractured Franciscan bedrock exposed in a hillside along the southern edge of the Sulphur Creek drainage basin (see Figure 1).

The entire landfill site is underlain by Pliocene-Pleistocene Continental Basin Deposits, which are referred to locally as the Ukiah Beds (Treasher, 1958). These relatively undeformed deposits consist of poorly sorted, highly consolidated, partially indurated, silt-dominated conglomerates, clayey sands, and silty clays which unconformably overlie an irregular surface of Franciscan bedrock. The maximum thickness of the Continental Basin Deposits is estimated to be in excess of 2,000 feet (Cardwell, 1965). The basal contact of the continental deposits, where it overlies the Franciscan bedrock has not been encountered in any of the test borings or monitoring wells drilled at the site to date, including a deep test boring (TB-90-4, see Sheet 1) which was abandoned at a depth of 265 feet below the surface, approximately 545 feet MSL (EBA, 1993b).

The hydraulic properties of the Continental Basin Deposits in the saturated zone at selected groundwater monitoring wells at the site were determined by in-situ testing. Hydraulic conductivity values were obtained from rising- and falling-head slug tests and are reported by EBA (1993b). Hydraulic conductivities reported from slug tests for the Plio-Pleistocene Continental Basin Deposits ranged from 7.5×10^{-6} cm/sec to 2.8×10^{-5} cm/sec, and Holocene alluvium tested from 1.6×10^{-5} cm/sec to 1.6×10^{-4} cm/sec.

Lithologic boring logs of monitoring wells 90-8 and 92-4 (EBA, 1993b) indicate they are drilled through a continuous section of Continental Basin Deposits consisting of low permeability silty clays and clayey silts. No perched groundwater, aquitards or Franciscan bedrock were encountered during drilling. This demonstrates that the monitoring wells are completed in a distinctive and separate geologic formation, consisting of significantly different hydrogeologic properties, from the Franciscan bedrock in which Vichy Springs occurs..

HEAT LOSS

The alleged energy loss associated with a 12 degree (assumed fahrenheit) decrease in temperature of Vichy Springs, immediately following the installation of well 92-4, was calculated assuming an aquifer with a conservatively small area of influence consisting of 1,000 feet by 2,000 feet by 50 feet deep with 30% porosity. The energy loss was calculated as 22.3×10^{9} British thermal units (Btu) or 6,533,841 kWh. On a practical level it is extremely improbable that an energy transference of this magnitude could solely occur via a monitoring well with a 2-inch PVC casing without destroying or resulting in significant damage to the well.

Mr. Singer, in a letter to Mr. Ashoff, dated March 19, 1994, presents examples of adiabatic

cooling related to the rapid release of pressure in rocket motors and explosions designed to extinguish oil well fires. It is well established that rapid decompressive cooling may be achieved in gasses, however, Mr. Singer states "*it is clear that cooling of the spring water resulted from a reduction in formation pressure and release of the natural carbon dioxide gases in the formation by the drilling of this single well*". Mr. Singer fails to present any site specific hydrogeologic data to support this conclusion or his recommendation that no further drilling be allowed in the vicinity of the springs. No significant changes in pressure (other than barometric variations) were observed during drilling or following installation of monitoring well 92-4. In addition, monitoring well 92-4 is located in relatively low permeability material, making it unlikely that gasses would migrate at the rate comparable to Mr. Singer's cited past experience.

Based on the discussion presented above, and in the absence of historic temperature data for Vichy Springs, it is reasonable to assume that the temperature oscillations observed in Vichy Springs water are likely within the range of normal fluctuation. Evaluation of a detailed temperature database should allow the identification of historical temperature ranges and possibly temporal variations in temperature.

Recent observations by the Mendocino County Environmental Health Department indicate that the temperature of Vichy Springs has evidently returned to a "normal level" (personal communication, Mendocino Environmental Health Department personnel, 7/28/94). This further suggests the landfill monitoring wells are not influencing Vichy Springs.

FLOW REDUCTION

A flow reduction of thirty percent from a "*historic level*" of 65 gpm has apparently been observed at Vichy Springs. This equates to a 19.5 gpm reduction in flow or an annual reduction of 10,249,200 gallons. This loss has been attributed, by Mr. Ashoff, to monitoring wells 90-8 and 92-4. To date sampling records show that the volume of water extracted from the two wells due to development and sample purging is approximately 172 gallons from 90-8 since April 1991 (an annual total of 57 gallons) and approximately 36 gallons from well 92-4 since May 15, 1993. Additionally, during the drilling of both monitoring wells no zones of high permeability were encountered. Further, no free water was encountered in well 92-4 during drilling. Well 92-4 was completed on March 18, 1993 and groundwater was not observed until April 27, 1993, 40 days later. Both well 90-8 and 92-4 have slow recharge rates following sample purging consistent with the low permeability subsurface materials in which they are installed. Clearly, the monitoring wells are not physically capable of extracting groundwater at flow rates sufficient to account for the reduction in discharge from Vichy Springs.

Further, the thickness of the Continental Basin Deposits and the depth to the Franciscan bedrock (the geologic formation associated with Vichy Springs) beneath the site is not known, however

exploratory borings from the site, as previously discussed, illustrate that the thickness of the low permeability Continental Basin Deposits is significant. Therefore the likelihood of groundwater flow from the water-bearing zone encountered in wells 90-8 and 92-4 to Franciscan bedrock is very low.

ORGANIC AND INORGANIC HYDROCHEMICAL ANALYTICAL RESULTS

Wells at the Ukiah Landfill have been analyzed for a number of water-quality parameters since 1987. As part of this analysis available chemical data for Vichy Springs was evaluated to examine the similarities and differences in groundwater hydrochemistry between groundwater encountered beneath the landfill and mineral water from the Vichy Springs Resort. These analytical results are presented and discussed in detail by EBA (EBA, 1993a; 1993b).

Sampling of landfill wells has identified three areas of groundwater impact (well 87-1; wells 90-4 and 90-5; and well 90-8) based on the consistent detection of volatile organic compounds (VOC's). Samples analyzed from Vichy Springs in 1987, 1990 and 1991 did not detect VOC's. Analysis of groundwater samples from Vichy Springs for total (unfiltered) metals has also been performed in 1987, 1990, 1991 and 1993 of which a number of metals (antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, mercury, molybdenum, selenium, silver, thallium, tim, titanium, vanadium and zinc) have not been detected above their respective MDL's.

To date, no pesticides or PCB's have been detected in any landfill groundwater samples or samples collected from Vichy Springs.

Analysis of major anions and cations suggests, in general, that the landfill monitoring wells exhibit significant variations in the concentration of all parameters evaluated but do not appear to exhibit a consistent pattern. No monitoring well is significantly different from all other wells for all parameters evaluated. Well 90-8 and Vichy Springs generally exhibit higher parameter concentrations than most other monitoring wells. Compositionally, however, the analysis indicates that well 90-8 and Vichy Springs exhibit significant differences from each other in cation and anion content.

As noted in the Hydrochemical and Statistical Evaluation of the City of Ukiah Landfill (EBA, 1993a; 1993b) the general hydrochemical signature of Vichy Springs is similar to some landfill wells and different from others. Vichy Springs is readily distinguishable from all landfill wells. VOC's have been identified in specific monitoring wells and have not been detected in samples from Vichy Springs.

Boron is believed to be associated with recent volcanic activity in the northern coast ranges, and is commonly reported in groundwater on the east side of the Ukiah Valley (Cardwell, 1965;

Farrar, 1986). Boron was detected at Vichy Springs in 1990, 1991, and 1993 in concentrations ranging from 100 mg/l to 126 mg/l, significantly higher than any of the landfill monitoring wells. Based on data from the July 12, 1994 sampling event, boron concentration in landfill wells ranged from <0.5 to 54 mg/l. Boron concentrations in well 90-8 and 92-4 were 23 mg/l and 54 mg/l, respectively. Boron concentrations for southeastern landfill well locations (90-6, 90-8, and 92-4) are not significantly different from one another but appear to be significantly higher than all other monitoring wells, suggesting a possible relationship between location and concentration.

Temperature data provided by Mr. Ashoff collected on December 6, 1979 indicates that the temperature of Vichy Springs was 30.5°C, significantly higher than the temperature of groundwater water in monitoring wells 90-8 and 92-4, which ranges from 20° to 21°C and 15° to 25°C, respectively. However, as discussed previously, evaluation of a detailed temperature database from Vichy Springs is needed to identify historic temperature ranges.

STABLE ISOTOPE ANALYSIS

To further characterize the hydrochemistry and hydrogeologic relationship between the shallow groundwater beneath the Ukiah Landfill and Vichy Springs mineral water, stable isotope studies were performed (EBA, 1993b, 1994a, and 1994b). Important trace isotopes of hydrogen and oxygen atoms in water ($H_2{}^{16}O$) are deuterium (D) and oxygen-18 (^{18}O) which can provide a "Fingerprinting" of a source water by its stable isotopic signature. This fingerprinting can provide a very effective method for water characterization, with particular application in tracing the source, migration, recharge, and history of a particular groundwater. Rather than relying solely on the concentrations of constituents that are susceptible to chemical, physical, and biological transformations, stable isotopic identification of a water type allows tracking of its subsequent flow and mixing, independent of its chemical concentrations.

The results of the stable isotope analyses exhibits very distinct isotopic variations in groundwaters in the Ukiah Landfill area, and that the different waters can be easily distinguished. In a plot of δD vs $\delta^{18}O$ the majority of the samples lie along the Meteoric Water Line (MWL) at values appropriate for coastal California (Craig, 1961). The plot clearly shows that Ardeche Spring and Vichy Springs water have isotope characteristics distinct from all other groundwaters at the landfill (see Figure 2). Furthermore, no mixing trend between Vichy Springs/Ardeche Springs water and any other water is apparent. Non-mixing further indicates there is no interconnectivity between groundwater at the Vichy Springs Resort and any of the groundwaters collected from the landfill wells.

As discussed previously, Ardeche Springs and Vichy Springs both flow from fractures and joints in the Franciscan bedrock exposed in the Sulphur Creek drainage. Both of the springs plot close

together, well to the right of the MWL, appropriate for connate or mineralized formation waters. Samples with δD and $\delta^{18}O$ values that plot to the right of the MWL have usually undergone isotopic enrichment by evaporation or water-rock interaction associated with older waters that have also undergone mineralization through long residence time in contact with bedrock. Water-rock isotopic exchange is not significant in cool, meteoric groundwaters, including most young shallow groundwater (Dr. Bob Criss, personal communication, 1993).

Samples from wells 90-8 and 92-4 also plot to the right of the MWL, but are significantly separated from those of Ardeche Springs and Vichy Springs. As described in the ROWD (EBA, 1993b) these low yielding wells have been installed in silts and clays of the Continental Basin Deposits along the northern divide between the Sulphur Creek drainage basin, where the Vichy Springs Resort is located, and the landfill drainage basin. The City Range Spring is located on the north side of the ridge which divides the two drainage basins. The City Range Spring flows from the Continental Basin Deposits, and plots closely with samples from wells 90-8 and 92-4. It appears likely that groundwater in wells 90-8 and 92-4, and the City Range Spring are related, and represent another formation water in the area.

In a letter dated July 26, 1994 to Mr. Ashoff, Mr. Davisson concurs with the results and interpretation of the stable isotope evaluation. He further presents a hypothetical example in which two formation waters may belong to the same general hydrologic system and recommends that a hydrogeologic investigation be performed in the region. Unfortunately, Mr. Davisson may be unaware of the results of the ongoing hydrogeologic investigation and the geologic and hydrogeologic information developed which supports a different scenario. Mr. Davisson also does not present an opinion regarding the probability of site monitoring wells impacting Vichy Springs.

CONCLUSIONS

Local and regional geology, hydrochemical analytic results and stable isotope analysis provide data supporting the conclusion that monitoring wells 90-8 and 92-4 are not impacting Vichy Springs because they are installed in a water-bearing zone significantly different from and not connected to, or intermixing with, the water-bearing zone of Vichy Springs. Further, calculations examining heat loss and flow reduction reported to have occurred at Vichy Springs, clearly demonstrate that the monitoring wells are not physically capable of influencing the hydrology or temperature of Vichy Springs. Based on the data developed, it is our opinion that the likelihood of future landfill site monitoring wells adversely impacting vichy Springs is extremely improbable.

It should be noted that Mr. Ashoff has demanded that an in-depth surface and subsurface hydrogeologic investigation be performed in the area. The City of Ukiah has been attempting

to perform hydrogeologic investigations at the landfill site to identify and characterize the vertical and lateral extent of impacted groundwater, which could pose a threat to the waters of the State. Any responsible and detailed hydrogeologic study must include the installation of monitoring wells in order to further evaluate groundwater conditions. These investigations have been delayed by Mr. Ashoff and are as yet incomplete. In order to further characterize benzene contamination detected in groundwater samples collected from 90-8 and 92-4 and aid in the determination of the direction of groundwater flow in the area, the installation of additional groundwater monitoring wells at the site is required.

As you requested, we have submitted this letter report directly to the RWQCB on behalf of the City of Ukiah. We trust this provides the information you require. Please call me if you have any questions.

Sincerely,
EBA WASTECHNOLOGIES

Damon F. Brown, RG, CEG
Senior Geologist

Duane Butler, P.E.
President

DFB/DB/lyv
attachments

cc: David Evans, RWQCB

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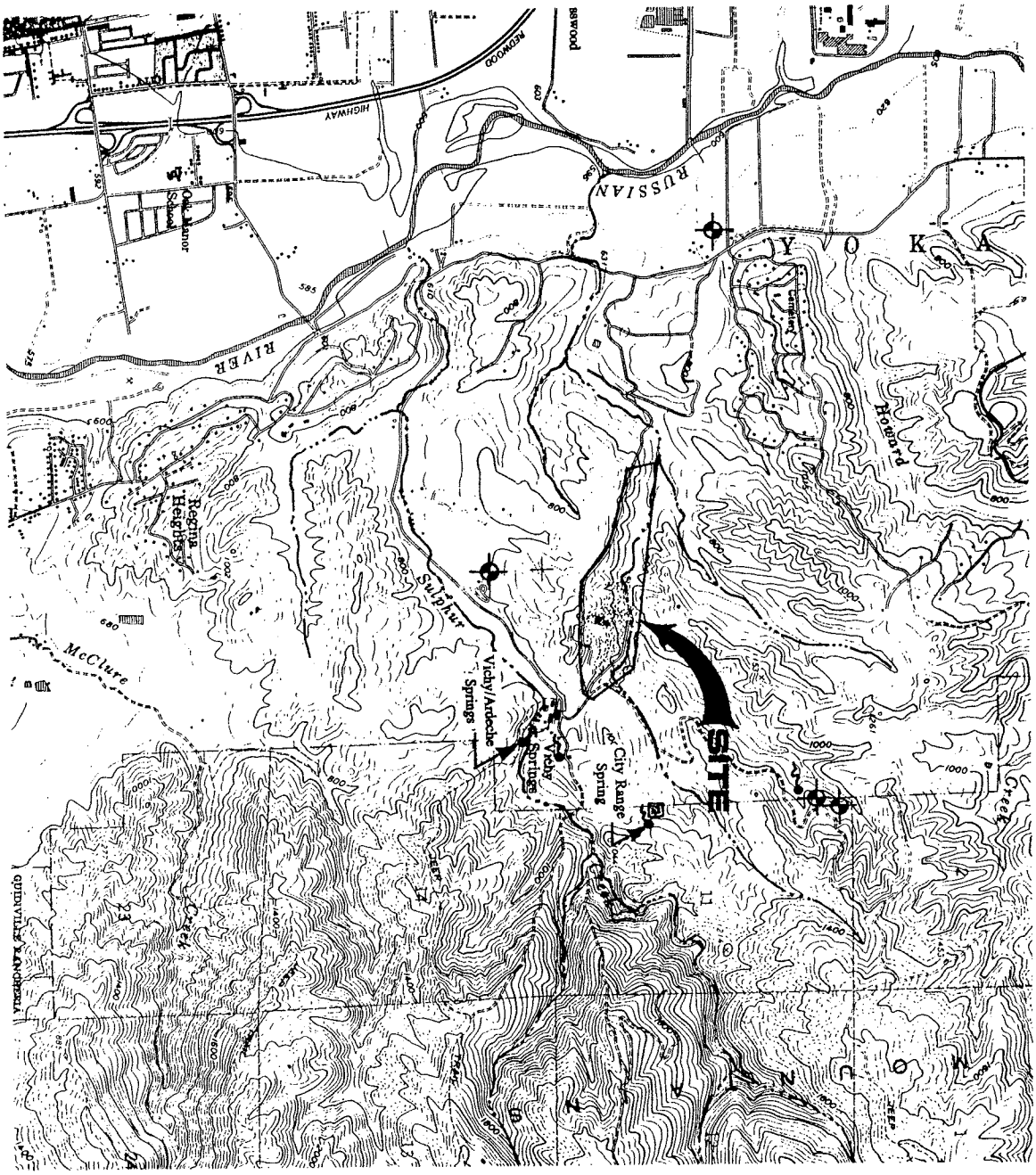

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

SITE LOCATION MAP

FIGURE
1
SEPT., 1994
385T3\JOHN

REVISED 6/94

EBA

CITY OF UKIAH LANDFILL
MENDOCINO COUNTY, CALIFORNIA

STABLE ISOTOPE RATIOS

FIGURE
2

JUNE 1994
46YSR.DWG

11/8/94

WATER QUALITY
CONTROL BOARD
REGION 1

OCT 31 '94

State of California

MEMORANDUM

To: Benjamin Kor
North Coast RWQCB

Date: ☐ BK ☐ RK
☐ ☐ OCT 2 1994
☐ FR ☐ KD
☑ RT ☐ PG
☐ JH ☐ JS
☐ SW ☑ DSE
☐ ☐ REPLY
☐ ALL STAFF ☐ FILE

From: Harry M. Schueller, Chief
Division of Clean Water Programs
STATE WATER RESOURCES CONTROL BOARD

Subject: REVIEW OF UKIAH LANDFILL MONITORING WELL INFORMATION

As you know, you contacted us recently to request that we review information relating to the drilling of a monitoring well near the Ukiah Landfill and its possible effects on the temperature and flow rate of a spring at the Vichy Hot Springs Resort.

We have reviewed the information forwarded to us regarding the possible effects of drilling monitoring well 92-4 in March, 1993. The well was drilled by the City of Ukiah to monitor water quality in the vicinity of the Ukiah Landfill. The information we reviewed consisted of:

- October 24, 1994 letter from Gilbert Ashoff to Benjamin Kor
- October 17, 1994 letter from Gilbert Ashoff to Benjamin Kor
- October 14, 1994 letter from Robert E. Mackensen to Paul Blais
- October 13, 1994 letter from Alisto Engineering Group to Gilbert Ashoff
- August 31, 1994 letter from EBA Wastechnologies to Rick Kennedy
- September 20, 1994 letter from Judy Pruden to Chuck Rough and Rick Kennedy
- July 26, 1994 letter from M. Lee Davisson (Lawrence Livermore Lab) to Gilbert Ashoff

EXHIBIT 1

- March 19, 1994 letter from Stanley J. Singer to Dani Renan
- U.S. Geological Survey Water-Supply Paper 338, 1915
- U.S. Geological Survey Professional Paper 492, 1965

Our review of these materials, indicates that: (1) the monitoring well was drilled into a different geological formation from the formation underlying the hot springs; (2) apparently no pressure effects were noted during drilling; (3) the temperature of the water in the monitoring well apparently ranges between 59°-77°F, in contrast to the 90°F temperature of the hot spring; and (4) data from Lawrence Livermore Lab shows that the water in the monitoring well and the hot spring have different oxygen isotope values and therefore are from separate water sources and have no apparent mixing relationship. One would expect waters which are in the same hydrothermal regime to have similar oxygen isotope values and elevated temperatures. Furthermore, if the monitoring well were in fact responsible for the drop in temperature of the spring, one would not have expected the temperature in the spring to have recovered almost to its pre-drilling temperature without a subsequent change in the condition of the well, e.g., plugging. In summary, we have not seen convincing evidence to support the conclusion that the drilling of this monitoring well could have impacted the temperature and flow rate of the hot spring.

In order to better ascertain any relationship between drilling boreholes and the hot spring, the following information could be collected if subsequent monitoring wells are drilled: the temperature of the borehole during drilling; insofar as possible, the pressure of the borehole during drilling; the temperature of the spring during and after drilling; and flow rates of the spring during and after drilling.

If you have any questions, please contact Liz Haven at (916) 227-4395 or Calnet 498-4395.

cc: Dave Evans

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Attorneys for VICHY SPRINGS RESORT

CITY OF UKIAH CITY COUNCIL

VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL JUSTICE FOUNDATION Petitioner v. **CITY OF UKIAH PUBLIC WORKS DEPARTMENT and CITY OF UKIAH CITY COUNCIL** Respondent	Case No. **CEQA NON-COMPLIANCE FOR CITY OF UKIAH'S FINAL ENVIRONMENTAL IMPACT REPORT (FEIR) FOR LANDFILL CLOSURE PLAN**

I. OVERVIEW: THE FEIR FAILS TO DISCLOSE, EVALUATE AND MITIGATE FIRE HAZARDS, WATER QUALITY IMPACTS AND SCENCIC EFFECTS THAT WILL ADVERSELY IMPACT THE BROADER COMMUNITY

1. VICHY SPRINGS RESORT is a business and land-owner located immediately adjacent to the location of the City of Ukiah ("CITY") landfill on Vichy Springs Road in Mendocino County, California, and immediately adjacent to the location of the CITY's proposed Landfill Closure Plan. VICHY SPRINGS RESORT was established more than 160 years ago in 1854 and is a California

Registered Landmark. People come to VICHY SPRINGS RESORT for the outdoor naturally effervescent "champagne" mineral baths and to explore the extensive hillside hiking trails. As the current brochure for VICHY SPRINGS RESORT states: "Guests are invited to explore and hike the 700-acre private reserve where wildlife abounds in woods, meadows, streams and hills." The natural scenic beauty and quietude of the grounds and trails of the VICHY SPRINGS RESORT are a main reason people come and return.

2. RUSSIAN RIVERKEEPER is a nonprofit organization focused on the protection and restoration of the Russian River and its tributary waters. There are streams and creeks below and in the vicinity of the former Ukiah landfill that are part of the Russian River watershed. RUSSIAN RIVERKEEPER co-submits these comments along with VICHY SPRINGS RESORT and MATEEL ENVIRONMENTAL to ensure that the CITY's Landfill Closure Plan does not pose a threat of harmful releases of landfill contents and toxic materials into such tributary waters.

3. MATEEL ENVIRONMENTAL JUSTICE FOUNDATION ("MATEEL ENVIRONMENTAL") is a California nonprofit organization focused on the prevention of pollutants and toxic releases into air and water and the protection of ecosystems. MATEEL ENVIRONMENTAL co-submits these comments along with VICHY SPRINGS RESORT and RUSSIAN RIVERKEEPER to ensure that the CITY's Landfill Closure Plan does not pose a threat of harmful releases of pollutants into the air and into streams and creeks near the landfill site.

4. In December 2019, the owner and legal counsel for VICHY SPRINGS RESORT attended and participated in a public hearing in Ukiah on the draft environmental impact report ("DEIR") prepared by the CITY for the Landfill Closure Plan. On January 9, 2020, VICHY SPRINGS RESORT submitted written comments to the CITY on the DEIR prepared for the Landfill Closure Plan. In both its December 2019 public hearing testimony and its January 9, 2020 written submission, VICHY SPRINGS RESORT explained the numerous tangible ways that the currently proposed Landfill Closure Plan would adversely impact the local community and natural environment and why the DEIR for the Landfill Closure Plan failed to comply with the requirements of the California Environmental Quality Act ("CEQA").

5. As set forth in VICHY SPRINGS RESORT's January 9, 2020 written submission, and as set forth herein, the CEQA non-compliance concerns raised by VICHYS SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL are not trivial or procedural in nature, but focus on critical substantive environmental concerns that will have a lasting impact on the surrounding community and broader natural environment for decades to come, such as: the enhanced fire risks and public safety hazards associated the toxic highly flammable cover proposed for the landfill; the pollution of nearby streams, creeks and the Russian River due to microplastic and PFAS releases from the synthetic cover proposed for the landfill; the long-term scenic degradation of the beautiful natural hillsides where the former landfill is located; the noise impacts that may ruin the outdoor recreational experience for people living, hiking and walking near the landfill; the operation of groundwater monitoring wells that have previously depressurized the carbonated subsurface mineral springs that are the namesake of the Vichy Springs. Beyond these environmental impacts, in terms of the true costs of the current Landfill Closure plan to Ukiah taxpayers, there is the fact that project budget provided to the Ukiah City Council and the public in the CEQA documents do not include the costs of the additional financial assurances and fire insurance that will be necessitated by the proposed synthetic plastic landfill cover and do not include the likely costs of removing, disposing and replacement the interim synthetic landfill cover. The failure to disclose the financial assurance, fire insurance and likely removal/disposal/replacement costs associated with the proposed synthetic landfill cover indicates that – in direct contradiction to claims in the CEQA documents for the project – the selection of the synthetic landfill cover will cost the CITY and Ukiah taxpayers *more* than the selection of a clay/earthen landfill cover.

6. In late April 2020, the CITY released its proposed final environmental impact report ("FEIR"), and indicated its intention to certify the FEIR and move forward with the proposed Landfill Closure Plan which included the proposed synthetic landfill cover. Unfortunately, as explained and detailed herein, the FEIR released in late April 2020 does nothing to address or remedy the fundamental CEQA shortcomings and omissions of the earlier DEIR, and as such the CITY's certification of the FEIR would constitute a material violation of CEQA. If need be, VICHY SPRINGS RESORT, RUSSIAN

RIVERKEEPER and MATEEL ENVIRONMENTAL will file a Petition for Writ of Mandamus in Mendocino County Superior Court to have the CITY's certification of the FEIR and the CITY's approval of the Landfill Closure Plan set aside. However, the preference of VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL would be for the CITY to instead prepare and recirculate an EIR that complies with CEQA by properly addressing and mitigating impacts thereby obviating the need for litigation.

II. CERTIFICATION OF THE APRIL 2020 FEIR WILL EXPOSE UKIAH TAXPAYERS TO EXTENSIVE LIABILITY FOR ATTORNEYS' FEES FOR THE FAILURE TO COMPLY WITH CEQA

7. In the unfortunate event that VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER or MATEEL ENVIRONMENTAL is forced to pursue litigation to ensure that the CITY prepares and certifies an EIR for the Landfill Closure Plan that complies with CEQA's requirements, such litigation may come at a significant cost to Ukiah taxpayers. In addition to the legal fees Ukiah taxpayers will need to directly pay its own outside private legal counsel to litigate the case, under CEQA, the CITY may also be liable for the reimbursement of VICHY SPRINGS RESORT's, RUSSIAN RIVERKEEPER's and MATEEL ENVIRONMENTAL's attorneys' fees in the event that VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER or MATEEL ENVIRONMENTAL prevails in the lawsuit.

8. To provide Ukiah taxpayers and the Ukiah City Council with a sense of potential magnitude of the CITY's exposure for attorneys' fees in this instance, it is useful to recount the outcome of a CEQA lawsuit brought against the County of Madera (and brought by the legal counsel now representing VICHY SPRINGS RESORT) for its unlawful certification of an FEIR for a project. In that previous litigation, the County of Madera lost the case at trial, the FEIR certification (and project approvals) were all set aside by the court, and the County of Madera ended up paying the petitioner more than $600,000 in reimbursement for the attorneys' fees expended in bringing the litigation. Again, for the CITY and Ukiah taxpayers, any attorneys' fees awarded to VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL would be in addition to the monies the CITY

directly paid its own outside legal counsel to represent the City.

9. As discussed in more detail in the January 9, 2020 written submission by VICHY SPRINGS RESORT, it should be noted that, according to documentation provided by the CITY in its DEIR and FEIR, the additional upfront costs of using the clay/earthen landfill cover advocated for by VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL (as well as by the North Coast Regional Water Quality Control Board) would be about $460,000. As set forth herein, VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL believe this $460,000 figure to be illusory because it fails to account for the additional financial assurances and fire insurance that will be required if the CITY selects the synthetic landfill cover. However, even if for argument's sake one were to assume that the $460,000 figure was in fact somehow accurate, this $460,000 figure is considerably less than the amount of legal fees (and liability for reimbursement of attorneys' fees) that the CITY can reasonably be expected to pay if this matter proceeds to litigation. As explained further herein, it should also be noted that this $460,000 figure is significantly less that the likely removal, disposal and replacement costs for the proposed interim synthetic plastic cover (costs which can be avoided altogether if the CITY opts for the permanent clay/earthen landfill cover rather than the interim synthetic cover). From a fiscal standpoint, it is therefore hard to understand why Ukiah taxpayers would support a decision by the Ukiah City Council to certify the FEIR prepared for the current Landfill Closure Plan and proceed with the proposed interim synthetic landfill cover.

III. CEQA VIOLATIONS PERTAINING TO THE CITY'S FEIR FOR THE LANDFILL CLOSURE PLAN

10. As set forth herein and in VICHY SPRINGS RESORT's written comments dated January 9, 2020, which are part of the administrative record in this case, the underlying concerns with the shortcomings of the CITY's FEIR for the Landfill Closure Plan are not of a trivial or merely procedural nature. To the contrary, these concerns address fundamental and important issues, such as: whether the proposed synthetic cover for the landfill presents fire and public safety hazards to the local community; whether microplastic releases from the synthetic landfill cover will pollute nearby creeks, streams and the Russian River; whether the landfill closure will mar and degrade the landscape for decades to come;

whether the landfill closure construction activities will generate noise impacts that will ruin the outdoor recreational experience for the surrounding community. The CEQA violations noted below go well beyond the interests of VICHY SPRINGS RESORT and relate to impacts that will affect the broader public, the broader community in Ukiah, and the entire Russian River watershed. The CITY's compliance with the CEQA requirements noted below is the only means to ensure that the CITY has properly studied, disclosed and incorporated feasible alternatives and mitigation measures to avoid enhanced fire hazards/fire risks, water quality and biological resource impacts, long-term scenic impacts, and construction-related noise impacts on outdoor recreation. This CEQA compliance may, in turn, help avoid the unnecessary and avoidable waste of Ukiah taxpayer money on removal, disposal and replacement costs associated with the interim synthetic landfill cover, and on the additional financial assurances and fire insurance associated with the interim synthetic landfill cover.

First CEQA Claim – Failure to Evaluate Fire Hazards and Fire Risks of Proposed Project

11. As those who live in the County of Mendocino know all to well from the recent experience with the deadly Paradise wildfire, and with many other wildfires that have broken out in the hillsides around Ukiah in recent years, the public safety threats posed by wildfire in this regional are tremendous. This is why Appendix G of CEQA now expressly requires that EIRs address the fire hazards and risks associated with proposed projects, as a means to ensure that lead agencies consider feasible alternatives and adopt feasible mitigation measures to reduce such fire hazards and risks. The California Department of Fire (Cal Fire) has specifically identified Ukiah as a high wildfire hazard area. More specifically, Cal Fire's Fire Hazard Risk Map for Mendocino County (attached as **Exhibit 1** to these written comments) identifies the area around and immediately to the east of Ukiah as a high fire hazard zone.

12. The synthetic landfill cover that is currently proposed as part of the Landfill Closure Plan is particularly flammable, and given the synthetic toxic materials that are part of this synthetic cover may release dangerous toxic materials if it catches fire. More specifically, the opinion letter from Pangea Environmental Services (attached as **Exhibit 2** to these written comments) documents that the synthetic landfill cover is composed of polyethylene fibers that emit numerous airborne toxins (including

hydrogen cyanide) when ignited and that present acute health and safety risks to both firefighters and nearby residents that would not occur with a clay/earthen landfill cover. This is in contrast a clay/earthen landfill cover, in which the clay is not particularly flammable and in which the natural grasses on the surface do not present the prospect of toxic releases if they burn in the event of a wildfire. The fire hazard/fire risks associated with the proposed synthetic landfill cover were noted in the January 9, 2020 letter submitted to the CITY by the North Coast Regional Water Quality Control on the DEIR prepared for the Landfill Closure Plan. In its January 9, 2020 comment letter to the CITY, the North Coast Regional Water Quality Control Board stated: "Lastly, regarding the Proposed Project- turf-based design, Regional Water Board staff has reviewed and expressed concerns unique to a turf-based system with the City of Ukiah representatives. **Given the State of California's recent experience with catastrophic wildland fires which resulted in significant infrastructure loss and damage, the Proposed Project's synthetic turf design has an inherent surface-based vulnerability in this regard**." (bold added.)

13. The DEIR and the FEIR prepared by the CITY for the Landfill Closure Plan did not disclose or identify the additional fire hazards and fire risks (and associated public safety risks to firefighters and nearby residents) associated with the selection of the proposed synthetic landfill cover, did not compare these fire hazards and fires risks with those associated with selection of a clay/earthen cover, and did not identify or evaluate alternatives or mitigation measures to reduce such fire hazards and fire risks. The DEIR and FEIR did not disclose and discuss that firefighters would need to wear full hazardous material gear and use breathing apparatuses if the synthetic cover ignites in a wildfire, and the DEIR and FEIR did not identify or discuss the financial liability the CITY and Ukiah taxpayers may face in the event of personal injury claims by nearby residents should the synthetic cover ignite in a wildfire. Instead, in the FEIR (in the final paragraph of its Response to Comment B-1), the CITY conceded the fire hazards and fire risks associated with its proposed synthetic landfill cover and stated as follows: "The City also shares concerns about catastrophic wildfires and its potential to adversely impact the landfill cover. As such and as standard City practice, the City has addressed the maintenance and replacement values in the Final Closure and Post-Closure Maintenance Plan ("FCPMP") and will take out an adequate

insurance policy(s) to cover the costs of replacement in the event of a catastrophic such as a fire." The procurement of an insurance policy to cover the costs of "replacing" the synthetic cover in the event of a wildfire is not a substitute for CEQA's obligation to evaluate and avoid such additional fire hazards and fire risks. More specifically and more importantly, the CITY's promise to procure such an insurance policy does not provide the Ukiah City Council and the public with a *comparison* of the respective fire hazards/fires risks associated with the proposed synthetic landfill cover vis-à-vis a clay/earthen landfill cover, and does not provide the Ukiah City Council and the public with an evaluation of feasible alternatives and feasible mitigation measures to avoid or reduce the fire hazards and fire risks associated the proposed synthetic landfill material. The omission of such information and analysis constitutes a material violation of CEQA.

Second CEQA Claim – Failure to Analyze Microplastic Releases into Waterways

14. The synthetic landfill cover that the CITY proposes to use in its Landfill Closure Plan is manufactured by ClosureTurf. The statutory duration of the postclosure maintenance period is a minimum of 30 years. (*See* 27 CCR §§ 21180, 21190.) In the ClosureTurf product information included in the FEIR, on the page titled "Weathering", ClosureTurf explains after a 30-year period "[t]he tensile strength of the engineered turf fibers is projected to have 75% retention." This claim also means that, according to ClosureTurf, by the end of a 30-year period the tensile strength of the engineered turf fibers is anticipated to lose 25% of their retention. This substantial and increasing loss of structural integrity means that the synthetic fibers on the surface of the ClosureTurf cover (the strands of plastic designed to resemble strands of natural grass) will disintegrate and detach over time. The decrease in tensile strength will likely increase beyond this amount as the synthetic cover ages and is exposed to ultra violet light, rainfall, and wind. (See, e.g., The effects of natural and artificial UV exposure on the physical properties of synthetic turf used for various sports fields, available at: https://core.ac.uk/download/pdf/54185067.pdf.) The disintegration and detachment of these plastic strands on the ClosureTurf synthetic landfill cover will result in such plastic strands (or the disintegrated

microplastic materials in such strands) being washed downhill by rains into nearby streams and creeks, where they will then make their way into the Russian River and eventually the ocean.

15. Attached as **Exhibit 3** to these written comments is a May 2019 paper published by Stockholm University's Department of Physical Geography titled *Tracking Microplastics from Artificial Football Fields to Stormwater Systems* (2019 Stockholm University Paper). The 2019 Stockholm University Paper reports that a recent study found that artificial turfs are the second largest sources of microplastics released into waterways and oceans and that "Microplastics from artificial turfs are discharged to stormwater during precipitation events which can be then recognized as a pathway of transporting microplastics to the marine environment." The 2019 Stockholm University Report further found that: "Microplastics in the marine environment can be ingested passively or actively by a wide range of organisms from small invertebrates to large mammals. …Ingestion of microplastics affects life activities such as feeding, digestion and reproduction, and even leads to mortality directly by entanglement and choking, especially in fish in larval stage." In terms of artificial turf coverings, such as the synthetic landfill cover proposed by the CITY as part of the Landfill Closure Plan, the 2019 Stockholm University Report explained: "At the selected field sites, runoff due to rainfall is a main pathway transporting microplastics to stormwater wells during the summer and autumn, while in the spring microplastic accumulated in cleared snow can be transported by meltwater." The 2019 Stockholm University Report therefore documents data and research showing that, as they degrade and breakdown, artificial synthetic turf coverings such as the one proposed in the Landfill Closure Plan tend to release microplastics when subject to rainfall. Presumably, on a sloped environment such as where the former Ukiah landfill is located this would cause the microplastics to wash into the streams and creeks downhill from the landfill site.

16. The DEIR and the FEIR prepared by the CITY did not contain analysis of what happens to the synthetic plastic strands in the ClosureTurf landfill cover when they begin to degrade and lose structural integrity (a 25% loss of retention after 30 years according to ClosureTurf's own analysis). The DEIR and FEIR prepared by the CITY did not contain analysis of how, as a result of this anticipated degradation, microplastics are likely to be released and (propelled by rains and runoff) washed into the

streams and creeks located downhill of the landfill site, and from these creeks and streams into the Russian River and the ocean. The DEIR and the FEIR did not contain analysis of the financial liability of the CITY and Ukiah taxpayers for polluting waterways with microplastics, such as civil penalties, remediation costs and natural resource damages under environmental laws such as the federal Clean Water Act and California's Porter-Cologne Water Quality Act. The failure of the DEIR and FEIR to identify and analyze the environmental risks presented by the release of such microplastics into nearby waterways constitutes a material failure under CEQA to assess hydrologic resource/water quality impacts and well as a material failure to assess impacts on biological resources (fisheries).

Third CEQA Claim – Failure of Evaluate Reasonable Range of Alternatives

17. As set forth in detail in VICHY SPRINGS RESORT's written submission dated January 9, 2020, CEQA requires that an EIR consider a reasonable range of alternatives to avoid or reduce the environmental impacts of a proposed project. This decision of whether to provide full evaluation of the environmental impacts for alternatives to a proposed action is not a discretionary decision left to the lead agency preparing the EIR, it is a black letter law requirement of CEQA. The failure to provide full evaluation of alternatives to the proposed action is unlawful under CEQA.

18. In the case of the current FEIR for the Landfill Closure Plan, the CITY only provided full evaluation of *one* alternative – the proposed action (which included the use of a synthetic landfill cover, and which omitted any mitigation measures to reduce construction-related noise impacts). The CITY's FEIR mentioned the "no project" alternative of simply not doing a Landfill Closure Plan at all, but then acknowledged that the "no project" alternative was not in fact an alternative at all because the California Health and Safety Code requires the adoption and implementation of a closure plan for all landfills.

19. In the DEIR for the Landfill Closure Plan that was prepared before the current FEIR, the CITY had made a finding that the use of the more permanent clay/earthen landfill cover alternative was not "feasible" and based on this "infeasibility" finding eliminated the clay/earthen cover option from more detailed evaluation. Only after receiving written comments on the DEIR highlighting the use of clay/earthen landfill covers is standard practice throughout the State of California, and highlighting that

the additional incremental costs of using the clay/earthen landfill cover (as provided by the CITY and accepted as correct) would be minimal in the overall budget of the project, the subsequent FEIR prepared by the CITY removed the earlier "infeasibility" finding in the DEIR regarding the clay/earthen cover. Sidestepping the question of whether the clay/earthen cover was a "feasible" alternative, Chapter 4 of the FEIR then went on to include a cursory new analysis discussing why there might be certain advantages (such as reduced upfront installation costs and possible reduced slippage) with the synthetic cover option versus the clay/earthen cover option, and based on these few additional sentences in Chapter 4 then, again and just as with the DEIR, eliminated the clay/earthen cover from further evaluation. That is, the clay/earthen cover alternative was not then independently analyzed in subsequent sections of the FEIR – for reduced fire hazards/risks associated as compared with the proposed synthetic landfill cover, for avoiding the risk of the release of microplastics into waterways with the proposed synthetic landfill cover, for reduced adverse visual/aesthetic impacts as compared with the mono-color synthetic landfill cover, for reduced risks of damage by wild boar populations as compared with the proposed synthetic landfill cover. The FEIR did not therefore provide further substantive analysis of these important environmental advantages of the use of clay-earthen cover, it just provided a few additional sentences in Chapter 4 to explain why it was not going to provide any further analysis of this alternative, of why this alternative was being eliminated from further analysis.

20. The FEIR's added discussion of an earthen/clay final cover alternative does not cure the DEIR's complete failure to include a discussion of this alternative in the alternatives analysis (Chapter 4 of the DEIR). By omitting the required discussion and information concerning this feasible alternative the City deprived the public and responsible agencies of the ability to meaningfully comment on the comparative environmental impacts such an alternative would cause in relation to the proposed project design.

21. In particular, in terms of whether the clay/earthen landfill cover is a feasible alternative to the proposed synthetic landfill cover, it should be noted that the CITY had previously proposed using a clay/earthen landfill cover as part of its Landfill Closure Plan for the Ukiah landfill and that the use of such a clay/earthen landfill cover had previously been approved by both the North Bay Regional Water

Quality Control Board (Regional Board) and CalRecycle – two state agencies with extensive experience with landfill sites and closures. (*see* WDR Order R1-2002-0061, incorporated herein by this reference) It is only more recently that the CITY has indicated its changed preference to select a synthetic landfill cover instead of the previously approved clay/earthen landfill cover. The fact that the Regional Board and CalRecycle had previously approved the use of a clay/earthen landfill cover for the Ukiah landfill is inconsistent with the CITY's current claims (in the DEIR and the FEIR) that the use of a clay/earthen landfill cover would somehow present a dangerous and unacceptable risk of slippage due to the slope of the site. If such slippage concerns had been present, the Regional Board and Cal Recycle would not have previously approved the use of such a clay/earthen landfill cover as a permanent closure remedy for the Ukiah landfill. Additionally, since the Ukiah landfill stopped receiving waste 20 years ago and placed a preliminary clay/earthen cover over the landfill, it should be noted that there have not been problems with slippage of this cover. This 20 years of actual experience on the site of the former Ukiah landfill, with a clay/earthen cover that in fact did not experience slippage problems, contradicts the current claims by the CITY that the option of clay/earthen cover should be limited from further consideration as an alternative in the DEIR and FEIR because this option presents an unacceptably high risk of slippage. The 20 years of actual experience at this site, with a clay/earthen cover that did not suffer slippage, is something that the DEIR and the FEIR fail to disclose.

22. In terms of construction-related noise impacts on nearby outdoor recreation areas, the DEIR did not give full consideration to any alternatives to the proposed action – which involves weekday construction activities from 7:00 am to 7:00 pm (essentially during all the weekday daylight hours when outdoor recreation would take place), includes no seasonal restrictions to restrict construction activities at times of the year when outdoor recreational usage is at its highest, and includes no measures to reduce vehicular and equipment noises. Such construction-related noises include the relentless pounding thud of the soil compaction machines (which pursuant to the Landfill Closure Plan will need to compress material under the synthetic cover across the entire 40-square acres of the site) and the continuous piercing sound of the backup beepers used on all trucks and motor vehicles on site. In regard to alternatives to the use of backup beepers on motor vehicles, Regulation 1926.601(b)(4) issued by the

federal Occupational Health and Safety Administration (OSHA) provides: "No employer shall use a motor vehicle having an obstructed view to the rear unless: (i) The vehicle has a reverse signal alarm audible above the surrounding noise level **or** (ii) **The vehicle is backed up only when an observer signals that it is safe to do so**." (bold added.) OSHA guidelines therefore explicitly provide that the use of an observer is a feasible alternative to backup beepers for motor vehicles used at construction sites. Instead of considering any alternatives to avoid or reduce construction-related noise impacts on outdoor recreation, the CITY's FEIR simply declares (without any data or support or analysis) that construction-related noise associated with the proposed action will not affect the "quiet and enjoyment" of hikers on the trails at VICHY SPRINGS RESORT or other outdoor recreation users in the vicinity of the project. No information was provided in the FEIR to suggest that the alternatives available to reduce construction-related noise were infeasible. The FEIR (and the DEIR) just omitted evaluation of any alternatives to reduce construction-related noise impacts.

23. In terms of compliance with CEQA, VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL recognize that CEQA vests some discretion with lead agencies to develop a reasonable range of alternatives in an EIR that would reduce some of the anticipated adverse environmental impacts of a proposed project. In the case of the proposed Landfill Closure Plan, the administrative record is clear that the action proposed by the CITY will have fire hazard and fire risks, adverse water quality impacts associated with microplastic releases, adverse scenic impacts (by converting a hillside of natural grasses to one of a mono-color synthetic cover), and adverse noise impacts on outdoor recreation resources. While CEQA provides the CITY with some discretion to develop a reasonable range of alternatives to address these environmental concerns, CEQA does not provide the CITY with discretion to simply forgo the comprehensive analysis of alternatives altogether and only provide full evaluation of the proposed action. Simply put, full evaluation of only *one* alternative does not satisfy CEQA's requirement that a reasonable range of alternatives be evaluated, and the CITY's failure to comply with this requirement undercuts the very heart of the CEQA process – to provide decision-makers (the members of the Ukiah City Council) and the public with a meaningful comparison of feasible alternatives to be able to meaningfully weigh the competing environmental

impacts associated with different feasible alternatives. The CITY's consideration of only *one* alternative in the FEIR for the Landfill Closure Plan is therefore not an exercise of lawful discretion. CEQA simply does not allow it.

Fourth CEQA Claim – Failure to Provide an Accurate and Complete Project Description

24. CEQA requires that an EIR provide an accurate and complete description of all the component of the proposed project being evaluated. CEQA similarly prohibits the "piecemealing" and "segmentation" of a larger comprehensive project into smaller discrete "projects" (in terms of the project description) to avoid having to acknowledge and evaluate the larger comprehensive project and thereby fail to disclose the true costs and true environmental impacts associated with the larger project.

25. In the EIR, the CITY proposes the use of an interim synthetic plastic landfill cover for the 30-year period of the Landfill Closure Plan. (*See*, *e.g.*, DEIR, Appendix A, Final Closure and Postclosure Maintenance Plan, p. 1-1, 4-1.) Neither the DEIR nor the FEIR address what will become of the synthetic turf cover beyond 30 years. Because the plastic cover will inevitably disintegrate over time due to multiple weathering forces (including UV light, rain, and wind), at some undetermined point following this 30-year period, according to discussions with staff at the Regional Board, the interim synthetic cover would then likely need to be removed and replaced with another more permanent landfill cover. Although it is likely that the interim synthetic landfill cover will need to be removed, disposed above and replaced with a permanent cover, the DEIR and the FEIR do not include such landfill cover removal, disposal and replacement components as part of the project description. By omitting such landfill cover removal, disposal and replacement components as part of the project description in the DEIR and FEIR, the DEIR and FEIR as a result did not contain an estimate of the costs associated with such removal, disposal and replacement components nor did they contain any analysis of the environmental impacts associated with such removal, disposal and replacement components. This is a classic example of what is referred to as "piecemealing" under CEQA, of unlawfully using an improperly narrow project description to avoid having to acknowledge and evaluate the full environmental impacts of a broader-integrated project. In the case of the Ukiah landfill, the strong

likelihood of eventual removal and disposal of the interim synthetic cover (and the replacement of the interim synthetic cover with a permanent cover) are not some remote speculative possibility – they are a foreseeable and likely component of the overall closure process. The CITY's failure to include these components in the project description is therefore a violation of CEQA's piecemealing prohibition. Every aspect of the environmental impact analysis is compromised by this failure to consider the long-term removal, disposal and replacement of the interim synthetic cover.

26. As explained further below, as part of the Landfill Closure Plan, the CITY will be required by the Regional Board to provide additional "financial assurances" if the CITY selects the synthetic landfill cover option, due to concerns by the Regional Board regarding fire-related risks associated with the synthetic landfill cover as well as concerns the Regional Board has about the interim synthetic landfill cover being subject to degradation and breakdown from ultra-violet exposure, heat and other weather elements. As the Regional Board stated in its January 9, 2020 comment letter on the DEIR: "Given the State of California's recent catastrophic experiences with wildland fires which resulted in significant infrastructure loss and damage, the Proposed Project's synthetic turf design has an inherent surface-based vulnerability in this regard. Also, the surface-based turf system and underlying **synthetic geomembrane liner have a greater exposure to ultraviolet light, weather/temperature impacts and potential degradation and cracking** over the buried type of liner systems…For these reasons **we have requested the financial assurance mechanism to address the possible replacement scenario in the event the surface-based liner system fails. The Proposed Project description should adequately reflect this**." (bold added.) As also further explained below, the CITY has conceded that (due to the enhanced fire hazards and fire-risks associated with the proposed synthetic landfill cover) it will be necessary to maintain fire-related insurance throughout the minimum 30-year duration that the interim synthetic cover will be in place. The DEIR and FEIR failed to include any information about the additional financial assurances and fire-related insurance policies as part of the project components and project description, and as such failed to provide any information about the what these financial assurances and fire-related insurance policies will cover. For instance, in terms of fire risks and fire hazards associated with the synthetic plastic landfill cover, are the amounts included in such additional

financial assurances available to cover these fire-related risks? For instance, in terms of the enhanced risks of degradation and liner failure with the proposed synthetic landfill cover, are the amounts in such additional financial assurance adequate to cover the costs of the anticipated damages that would result if the synthetic cover failed? For instance, will the fire-related insurance policy provide coverage for personal injuries to firefighters or nearby residents if the 40-acre synthetic landfill cover catches fire, or will such insurance policies only apply to the costs of "replacing" the synthetic cover after such a fire? In terms of public safety concerns and impacts, the answers to these questions are critical. Yet, because these items were excluded from the project description for the DEIR and FEIR prepared for the Landfill Closure Plan, these items were not analyzed in the DEIR and FEIR, in terms of either costs or environmental impacts.

27. Pursuant to CEQA Guideline 15124(d)(1), the project description in an EIR must include a list of all other agencies and agency approvals that it is anticipated will reply on CEQA compliance by the lead agency. In the case of the Landfill Closure Plan for the Ukiah landfill, the CITY is the lead CEQA agency Although the CITY is aware that there will be other agency approvals required for the Landfill Closure Plan to proceed, including but not limited to approval by the Mendocino County Environmental Health Department (the lead enforcement agency/LEA under the California Health and Safety Code), CalRecycle and the North Coast Regional Water Quality Control Board, and that these other agencies will need to rely on the CITY's preparation of a legally-adequate CEQA EIR, the DEIR and the FEIR failed to disclose that the Mendocino County Environmental Health Department, CalRecycle and North Coast Regional Water Quality Control Board would be relying on the EIR prepared by the CITY to satisfy their own CEQA compliance obligations. The failure of the CITY to include the information required pursuant to CEQA Guideline 15124(d)(1) in the DEIR and FEIR constitutes a material failure to provide an adequate and accurate project description.

28. Without an accurate and complete project description, an EIR cannot provide decision-makers and the public with a true accounting of the anticipated costs associated with a proposed action, and will be unable to provide decision-makers (Ukiah City Council) and the public with a proper analysis of the environmental impacts and concerns associated with a proposed action. The DEIR and

FEIR prepared for the Landfill Closure Plan fail to include the likely removal, disposal and replacement of the interim landfill cover as part of the project description, fail to include additional financial assurances (to be required by the Regional Board) and the procurements of fire-related insurance policies, and fail (as expressly required by CEQA Guideline 15124(d)(1)) to identify the other agency approvals that would rely upon the EIR as part of the project description. In this regard, the DEIR and FEIR prepared by the CITY for the Landfill Closure Plan fail to satisfy this core and basic requirement of CEQA.

Fifth CEQA Claim – Failure to Provide Accurate Description of Baseline Conditions

29. As set forth in detail in VICHY SPRINGS RESORT's written submission dated January 9, 2020, for each environmental impact evaluated in an EIR, CEQA requires that an accurate and complete description of "baseline conditions" (sometime also referred to as the "existing environmental setting") is provided. The presentation of an accurate and complete description of baseline conditions is required because of the components and basic sequencing involved in environmental impact assessment, which are as follows: (1) presentation of accurate and complete project description; (2) description of baseline conditions/existing environmental setting for each of the resources/impacts evaluated in the EIR; (3) quantification and analysis of anticipated impacts of the proposed project for each of the resources evaluated in the EIR and comparison of these impacts against the baseline conditions/existing environmental setting for these resources; (4) for each of the resources evaluated in the EIR, a determination as to whether the anticipated effects of the project can be considered "insignificant" based on reference to well-articulated significance criteria/thresholds; and (5) consideration and evaluation of a reasonable range of alternatives and feasible mitigation measures to avoid or reduce the adverse environmental impacts of the proposed project. Without an accurate description of baseline conditions (step 2 in CEQA's environmental impact analysis) as a starting point, it is impossible to properly complete steps 3, 4 and 5 in CEQA's environmental impact assessment process.

30. In terms of fire risks and fire hazards, the "baseline conditions/existing environmental setting" are the wildfire threat conditions on and in the vicinity of the landfill property at the time the

EIR is being prepared (current wildfire threat conditions *now*). Appendix G of CEQA now contains special provisions expressly requiring the analysis of wildfire related conditions and risks. These baseline wildfire threat conditions are pertinent to an evaluation of the Landfill Closure Plan because (as explained above) the synthetic landfill cover that the CITY has proposed is particularly flammable, and because the materials that comprise this synthetic landfill cover will result in the release of toxic air fumes and the release of toxic liquified material in the event they catch fire, which presents public health risks to firefighters and nearby residents. As noted above, numerous wildfires have occurred in recent years in the vicinity of the former Ukiah landfill and the area around Ukiah has been designated a high fire hazard zone by the California Department of Fire (see **Exhibit 1** to these comments). As also noted above, in the opinion letter by Pangea Environmental Services attached as **Exhibit 2** to these written comments, the materials used in the proposed landfill cover are highly flammable and are likely to produce dangerous toxic releases if ignited. By failing to describe baseline wildfire threat conditions on and in the vicinity of the landfill site, the EIR then failed to conduct any analysis of the public health risks and environmental risks that would result if the proposed synthetic landfill cover caught fire.

31. In terms of scenic/aesthetic/visual impacts and resources related to the Landfill Closure Project, the "baseline conditions/existing environmental setting" is the scenic condition of the landfill property at the time the EIR is being prepared (current scenic conditions *now*). As set forth in detail in VICHY SPRINGS RESORT's written submission dated January 10, 2020, the Ukiah landfill stopped accepting waste deliveries in 2002, nearly 20 years ago, and at that time a layer of clay and earthen fill was placed over the open landfill until such time as a formal Landfill Closure Plan was developed and implemented. In the nearly 20 years since the Ukiah landfill has been inactive, and the layers of clay earthen fill were placed over the landfill, natural grasses and vegetation have returned and grown on the site such that (currently) there is no clear visual indication that there was ever an open landfill at the site. The natural grasses that have grown over the Ukiah landfill are the same as the grasses on the surrounding hillsides, and these natural grasses change with the seasons (dry/brown in late spring, summer and early fall; lush/green in the late fall, winter and early spring; and all the subtle transitions in between).

32. In the DEIR, and then again in the FEIR, the CITY did not provide photographs or clear accurate narrative information that clearly represented and indicated that that baseline scenic conditions of the Ukiah landfill site are of natural grasses that blend in seamlessly with the surrounding grass-covered hillside and that change color and texture throughout the seasons of the years. Instead, in the DEIR, and the FEIR, the CITY omitted providing an accurate description of baseline scenic conditions, and instead tried to bypass this critical environmental impact assessment step (Step 2) and go directly to the reasons why the CITY thought that the 40-square acre mono-color plastic synthetic landfill cover would not look that bad. But that is not how CEQA requires that environmental impact assessment be done. Putting aside for the moment the credibility of its claims about how visually attractive the "contrast" between the mono-color synthetic cover and natural grass hillsides will be (discussed more below), under CEQA, an EIR does not just look at the conditions that will exist *after* the project is done and ask whether these conditions are "that bad." Rather, CEQA requires that an EIR *compare* the conditions that will exist *after* the project is completed to the baseline conditions that exist *prior* to undertaking the project. It is this *comparison,* of baseline conditions with post-project conditions, that is critical to how CEQA works. And when it comes to scenic/aesthetic impacts, this *comparison* is absent from the both the DEIR and the FEIR because the DEIR and the FEIR failed to provide an accurate description of current baseline scenic conditions – of the natural grasses that now currently cover the Ukiah landfill site.

33. In fact, there is information in the April 2020 FEIR (and the response to comments included in the FEIR) that is fundamentally misleading to decision-makers (Ukiah City Council) and the public in terms of current baseline scenic conditions. In the FEIR, in its Response to Comment 5d, the CITY states: "The existing landfill already is distinct from the existing natural landscape as it is a landfill with waste underneath the existing vegetation and there are no trees on top of the landfill. As a result, the 40-acre area of the closed landfill will always be in contrast to the surrounding natural environment (with sparse or dense stands of trees) even with a clay/natural cover." As the photographs submitted by VICHY SPRINGS RESORT make plain to any viewer, however, there are many hillsides nearby and that surround the 40-square acre patch where the landfill is located that contain either no trees at all or

few trees, and are therefore fairly barren As the photographs submitted by VICHY SPRINGS RESORT also make plain to any viewer, because there are many relatively barren hills nearby with few trees in the vicinity, the area of natural grasses where the Ukiah landfill was located is virtually indistinguishable from many of the surrounding hillsides. In fact, the only way for VICHY SPRINGS RESORT to clearly identify the former Ukiah landfill site in these photographs was to circle the site with blue marker – because without the blue marker the location of the former Ukiah landfill simply looks like many of the natural grass hillsides that surround it. The narrative response provided by the CITY in the FEIR in its Response to Comment 5g – suggesting the former landfill site was somehow situated in a forest or an area where all the surrounding hills were dense with trees – is profoundly inaccurate and misleading. This misrepresentation of current baseline scenic conditions is evident to any person that looks at the photographs submitted by VICHY SPRINGS RESORT.

34. In the FEIR, the CITY baldly claims "The Ukiah landfill is, has been, and will always be a landfill site and is not, nor will ever be considered to be a scenic resource." VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL fundamentally disagree with this claim, as any highly visibly part of the landscape and hills around Ukiah is in fact a scenic resource, is in fact an important viewshed – regardless of whether portions of this vista were at one point in time in the past may have been used as a landfill site. The falsity of the CITY's claim here is revealed through the color photographs included as part of VICHY SPRINGS RESORT's January 9, 2020 written submission, which clearly show that (whether the CITY likes it or not) the landfill site is in fact an undeniable part of the scenery and landscape of the hillsides in the vicinity, and that (in its present/current condition covered with natural grass) the former Ukiah landfill site is in fact now an integral scenic component of this beautiful natural landscape. What is particularly telling about the CITY's claim (quoted above from the FEIR) is that it reveals the FEIR's strangely narrow view of the former Ukiah landfill site – that it should somehow *not* be considered a scenic resource at all and that therefore there cannot conceivably be any possible adverse scenic impacts resulting from what cover is selected for the former landfill. This narrow view, contradicted by any person that views photographs of the landfill site or that visits the actual site and surrounding areas, perhaps explains why the DEIR and

the FEIR are so unwilling to acknowledge that there could possibly be any scenic/visual resources involved or that there could possibly be any adverse scenic impacts associated with the cover selected for landfill closure.

35. In terms of the functionality and viability of the proposed synthetic plastic landfill cover, the FEIR and DEIR failed to provide accurate information about the prevalence of wild boars in the area where the landfill is located. Such wild boars are likely to trample on and burrow and dig (root) into the synthetic landfill cover thereby compromising its integrity. This concern was specifically raised in the comment letter submitted by Gilbert Ashoff, owner of VICHY SPRINGS RESORT, on the DEIR prepared for the Landfill Closure Plan. More specifically, in 2018, the CITY hired a trapper name Kyle Seever to install a series of "pig traps" on the landfill property over a 3-month period to catch wild boars as well as video-cameras to monitor wildlife on the site. During this 3-month period, approximately 20 wild boars were caught in "pig traps" on the landfill property and the video-cameras filmed wild boars regularly roaming the landfill property. Kyle Seever's work in 2018 trapping wild boars was overseen by Dan Hunt, who worked for the CITY at the landfill. All of the information regarding Kyle Seever's activities is in the CITY's files and therefore are part of the administrative record in this case. Additionally, there are professional hunting outfits in the area that routinely organize hunts for wild boars. For example, Lockwood Hunting Services in Ukiah has a wild boar as its official company logo (see **Exhibit 4** to these written comments) and its website states "We specialize in guided hunts for **wild pigs** on thousands of acres on private land in California's Mendocino County near Hopland, CA." (bold added.) Moreover, it is well-known that many landowners in the area (including VICHY SPRINGS RESORT) often maintain their own "pig traps" to capture the wild boars that roam throughout the surrounding hills. For years, VICHY SPRINGS RESORT has had to deal with the problem of wild boars on its property.

36. There is also well documented scientific literature indicating that wild boars routinely engage in "rooting" behavior – that is they dig up and overturn ground covering (whatever that ground covering might be). The "rooting" behavior of wild boars, which is separate and distinct from their tendency to forage for food, is discussed in the 2015 *Wild Pigs Report* by the United States Department

of Agriculture and the *Feral Swine Damages* report prepared by the University of California (attached respectively as **Exhibit 5** and **Exhibit 6** to these written comments). In the opinion letter from Pangea Environmental Services attached as Exhibit 2 to these written comments, information is provided about how "abrasion" activities (such as rooting by wild boars) result in the release of PFAS (perfluoroalkyl and polyfluoroalkyl substances) that are part of synthetic artificial turf coverings like the ClosureTurf landfill cover proposed by the CITY. Pangea Environmental Services' opinion letter notes how the abrasion of the landfill cover by wild boar rooting is likely to cause the release of PFAS into nearby streams and creeks, and notes that the presence of PFAS in waterways is now regulated under several environmental laws and by many environmental agencies. As part of its description of baseline conditions in the DEIR and FEIR for the Landfill Closure Plan, the CITY failed to present an accurate description and evaluation of wild boar populations that have been found on and in the vicinity of the Ukiah landfill and their well-documented "rooting" behavior, and based on this omission failed to properly analyze the potential risks such wild boar populations present to the integrity of the proposed synthetic landfill cover and the likelihood that wild boar rooting will result in the release of PFAS into nearby streams and creeks and from there into the Russian River. In its response to comments on the FEIR, the CITY stated that there had not been any "reported sightings" of wild boars on the former landfill but this statement is in direct contraction to what is common knowledge throughout the area (that wild boars roam the hills where the landfill is located) and is in direct contraction to the fact that the CITY itself hired a trapper that caught many wild boars on the landfill property and that took video-footage of wild boars on the landfill property. In light of the wild boars that Kyle Seever's caught on the landfill property in 2018 (both in pig traps and on video-footage), work that was done on behalf of the CITY and reported to the CITY two years ago, the FEIR's claims of no "reported sightings" of wild boars is misleading in the extreme. The failure of the DEIR and FEIR to disclose and describe and evaluate the presence of wild boars on the landfill site and in the landfill project area, and the risks such wild boars present to the integrity of the propose synthetic landfill cover, is inconsistent with the baseline condition requirements of CEQA.

37. In terms of historic resources, the CITY is aware that VICHY SPRINGS RESORT has been

designated a California Historic Landmark. Information about this landmark designation has been previously provided to the CITY, and is attached to these comments as **Exhibit 7**. The landmark designation applies not only the buildings and mineral springs at VICHY SPRINGS RESORT but also applies to outdoor grounds and, importantly, the "uses" as a resort for more than 150 years. More specifically, the landmark designation for VICHY SPRINGS RESORT specifically identifies "outdoor recreation" as a recognized "historic function" of the property, meaning that adverse impacts on such "outdoor recreation" (such as adverse scenic and noise impacts associated with the Landfill Closure Plan) can impair this "historic function." In Section 3.4 of the DEIR and FEIR on cultural resource the CITY claims that it conducted a search of California State Historic State Landmarks and determined that there were no such sites within a ¼ mile of Landfill Closure Plan project boundaries. This determination is factually incorrect. The property boundary for VICHY SPRINGS RESORT is across the road from the entrance to the landfill (a few hundred feet away), and the outdoor recreation grounds on the VICHY SPRINGS RESORT property covered by the landmark designation are also well within ¼ mile of the entrance to the landfill. The entrance to the landfill is within the Landfill Closure Plan project boundary. As a result of this incorrect determination of baseline conditions in regard to historic and cultural resources, the DEIR and FEIR failed to conduct any analysis of the impacts – including but not limited to noise and scenic impacts – of the Landfill Closure Plan on the uses and features covered by the landmark designation for VICHY SPRINGS RESORT. In failing to conduct a historical resource impacts analysis related to the effects of the project on uses and functions protected by VICHY SPRINGS RESORT's landmark designation, the CITY also violated provisions of the CITY's General Plan concerning the protection of Historic and Archaeological ("HA") Resources. More specifically, in failing conduct a historical resource impacts analysis in the DEIR and FEIR related to the effects of the Landfill Closure Plan on uses and functions protected by VICHY SPRINGS RESORT's landmark designation, the CITY violated Policies HA-2.2., HA-4.1 and HA-7.1 of the CITY's General Plan which require that CITY land-use decisions avoid adverse environmental impacts on historic resources such as those designated and protected by VICHY SPRINGS RESORT's landmark designation.

38. In terms of outdoor recreational resources (hiking trails) located on the VICHY SPRINGS

RESORT property and the construction-related noise impacts of the Landfill Closure Project on such outdoor recreational resources, the "baseline conditions/existing environmental setting" are the current background ambient noise levels for these outdoor recreational resources/hiking trails at the time the EIR is being prepared (current noise conditions now). There are no county noise ordinances that pertain specially to impacts on outdoor recreation areas and hiking trails. Under basic CEQA environmental impact assessment methodology, the EIR for the Landfill Closure Plan would then need to *compare* these baseline/existing noise levels to the expected construction-related noise levels to determine whether such increases in noise will have a significant adverse impact on the experience of "quiet and enjoyment" now available to hikers/outdoor recreation users on these trails. For instance, under current baseline conditions, people using nearby outdoor recreation trails are not subjected to the continuous thud of compression equipment or the regular piercing sound of motor vehicle backup beepers. In the DEIR and then again in the FEIR, however, the CITY never provided information on current/baseline ambient noise levels on the hiking trails on the VICHY SPRINGS PROPERTY. VICHY SPRINGS RESORT most certainly would have, and again here offers, to provide access to the CITY and/or the CITY's consultants to undertake such baseline ambient noise level testing. In its Response to Comments in the FEIR, the CITY states conclusively that the construction-related noise generated by the Landfill Closure Plan would not represent an significant increase over ambient/baseline noise levels on such outdoor recreational area/trails, but since there is no indication that the CITY ever determined such ambient/baseline noise levels this statement lacks any evidentiary support. Without such testing and baseline information, there is no basis to quantify the *increase* in noise levels on such outdoor hiking trails that will result from construction-related noise associated with the Landfill Closure Plan, and therefore no basis for the CITY's FEIR to find that the construction-related noise impacts on such outdoor recreational resources are less-than-significant. Once again, as explained above, without an accurate description of baseline conditions (step 2 in CEQA's environmental impact analysis) as a starting point, it is impossible to complete steps 3, 4 and 5 in CEQA's environmental impact analysis. The CITY's failure to acknowledge and properly analyze the construction-related noise impacts on outdoor recreation areas, in turn, led to a cascade of further and subsequent CEQA violations – including

the failure to consider a reasonable range of alternatives and feasible mitigation measures to reduce such noise impacts on outdoor recreation areas.

39. In its FEIR and Response to Comments, the CITY attempts to gloss over these CEQA omissions by focusing (as it did in the DEIR) exclusively on the sleeping cabins located on the portion of the VICHY SPRING PROPERTY that is the farthest away from where the construction-related activities will occur, and the effects of construction noise on these more remote sleeping cabins. But any analysis of noise impacts on persons staying in these more remote sleeping cabins (which are located on the other side of a hill that would dampen noise impacts) is unrelated to the question of the adequacy of analysis of construction-related noise impacts on outdoor recreation areas/hiking trails in areas considerably closer to where the construction noise would be generated (and on the side of hills facing the former landfill site).

40. As set forth in its previous written comments submitted on the DEIR for the Landfill Closure Plan on January 9, 2020, in 1994 the CITY installed a series of groundwater wells on land located just off the VICHY SPRINGS RESORT property. The purpose of installing these groundwater wells was to monitor potential releases and contamination coming from the Ukiah landfill. At the time such groundwater well installation was taking place, the owner of VICHY SPRINGS RESORT raised concerns with CITY about whether such wells might impact the nearby subsurface mineral springs but such concerns were disregarded. Immediately following the installation of said groundwater wells, VICHY SPRINGS RESORT experienced a 50% drop in the pressure and flow of its mineral springs water and a 20-degree Fahrenheit drop in mineral spring temperature. This drop in pressure and temperature lasted for several months. Such a precipitous drop in pressure and temperature had never been documented before and has never happened since, and this precipitous drop in pressure and temperature occurred immediately after the CITY's groundwater wells were installed and operationalized. Therefore, all indications are that there is a direct hydrological connection between the CITY's groundwater wells and the subsurface source of the Vichy Springs, and that this previous drop in pressure and temperature was caused by the CITY's installation and operation of the groundwater wells. This hydrological connection is documented in the letter submitted to the CITY by Al Sevilla of

Alisto Engineering (included as part of VICHY SPRINGS RESORT's January 9, 2020 written comments on the DEIR and part of the administrative record). In the DEIR, FEIR and Response to Comments, the CITY has alleged that the contemporaneous drop in spring pressure/flow and temperature with the installation of the groundwater wells was merely a "temporal coincidence" that can be attributed to natural fluctuations in the springs' pressure/flow and temperature. The CITY's failure to acknowledge and describe the documented hydrologic connection between the CITY's groundwater wells (which will be used for monitoring as part of the Landfill Closure Plan) and the nearby subsurface Vichy Springs in the DEIR and FEIR for the Landfill Closure Plan constitutes a failure under CEQA to adequately describe baseline conditions.

Sixth CEQA Claim – Failure to Recirculate DEIR After Disclosing Significant New Information Regarding Scenic and Noise Impacts in FEIR

41. CEQA requires the recirculation of an EIR for public comment by other agencies and the public whenever "significant new information" is disclosed in the FEIR that was not disclosed originally in the DEIR. CEQA defines "significant new information" to include information that identifies additional potential significant environmental impacts (such as scenic/visual impacts or noise impacts) or that reveals potential increased severity of environmental impacts (such as scenic/visual impacts or noise impacts).

42. As set forth above, in its January 9, 2020 comment letter to the CITY on the DEIR prepared for the Landfill Closure Plan, the North Coast Regional Water Quality Control Board stated: "Lastly, regarding the Proposed Project- turf-based design, Regional Water Board staff has reviewed and expressed concerns unique to a turf-based system with the City of Ukiah representatives. **Given the State of California's recent experience with catastrophic wildland fires which resulted in significant infrastructure loss and damage, the Proposed Project's synthetic turf design has an inherent surface-based vulnerability in this regard**." (bold added.) The comment letter from the North Coast Regional Water Quality Control Board (included in the FEIR) disclosed to the public and Ukiah City Council the issue of enhanced fire hazards and fire risks associated with the proposed synthetic landfill cover, an issue that was not disclosed or analyzed in the previous DEIR for the Landfill

Closure Plan. This information regarding fire hazards and fire risks associated with the proposed synthetic landfill cover constitutes "significant new information" under CEQA that requires recirculation of the EIR.

43. The DEIR prepared and circulated for comment by the CITY stated that the Ukiah landfill site was not directly visible from VICHY SPRINGS RESORT or from any residences or public roads in the area. In its January 9, 2020 written submission of comments on the DEIR, VICHY SPRINGS RESORT included numerous photographs from the VICHY SPRINGS RESORT property and from several nearby residences and public roads that clearly indicated that the location of the Ukiah landfill (and therefore of the proposed mono-color synthetic plastic cover for the landfill) was directly and prominently visible from these vantage points. The FEIR prepared by the CITY included these photographs which made plain that the statements in the DEIR regarding the lack of visibility of the Ukiah landfill site from VICHY SPRINGS RESORT and nearby residences and public roads were fundamentally incorrect, and that the DEIR's analysis of scenic impacts in the DEIR based on these incorrect statements was therefore also significantly flawed, inaccurate and incomplete. The FEIR acknowledged this previous error in the FEIR when it conceded for the first time (in the last paragraph on Page 3.2-10) that "there are some partial views of the Ukiah Landfill from some vantage points on the Vichy Springs Resort's 700-ares, which include hiking trails for its guests." This new acknowledgement in the FEIR is in direct contradiction to the information provided by the CITY in the DEIR, in which it incorrectly claimed that the Ukiah landfill was not visible at all from the VICHY SPRINGS RESORT property or other residences and public roads. As to whether these current views of the landfill site from VICHY SPRINGS RESORT and nearby residences will be adversely impacted by the 40-acre mono-color synthetic cover that is now proposed to replace the natural grass vistas on the landfill site, this is "significant new information" which goes directly to the question of the severity of the project's impact on scenic/visual resources. None of this information was previously disclosed in the DEIR, and the DEIR in fact expressly (and incorrectly) denied such views of the project site even existed. Moreover, in its response to comments in the FEIR, the CITY claimed (without any support again) that the photographs provided showing numerous prominent views of the landfill site from the

VICHY SPRINGS REORT were taken from locations on the resort property where resort guest don't walk or hike. This claim by the CITY is incorrect, as all of the photographs submitted with views of the landfill are taken from locations on VICHY SPRINGS PROPERTY that are frequented by guests. This unsupported claim by the CITY was merely an effort to try to somehow explain away the incorrect and misleading information the CITY had previously provided in the DEIR, that no such views of the landfill existed. And even after the CITY was provided by VICHY SPRINGS RESORT with photographs depicting prominent views of the landfill from public roads, in the FEIR (in Response to Comment C-5g) the CITY nonetheless incorrectly and misleadingly continues to state that it "not did find any *public* vantage points where the landfill could be readily seen." (emphasis added.)

44. In terms of the construction-related noise impacts on outdoor recreation areas and hiking trails located on the VICHY SPRINGS RESORT property, the DEIR had failed to acknowledge that such outdoor recreation areas and hiking trails existed. Because the DEIR failed to acknowledge that such outdoor recreation areas and hiking trails existed, the DEIR similarly failed to provide any analysis whatsoever regarding the impacts of construction-related noise on these outdoor recreation areas and hiking trails. In the FEIR, for the first time, the CITY acknowledged the existence of outdoor recreation areas and hiking trails on the VICHY SPRINGS RESORT property, but then (again without any supporting data or analysis) made an unsupported finding that the construction-related noise would not affect the quiet and enjoyment of persons using these outdoor recreation areas and hiking trails. In its Response to Comments (included in the FEIR), the CITY justified this less-than-significant finding on the basis that the construction-related noise would not prevent people from being able to "walk and talk" in these outdoor recreation areas. For places that people value primarily for the quietude and tranquility of their surroundings and the restorative effect of silent interaction with nature (like the hiking trails on the VICHY SPRINGS RESORT property), the fact people might still be able to "walk and talk" amidst the persistent roar of diesel trucks, the continuous pounding thud of compression equipment and the jarring sounds of backup beepers tells us nothing about the ways that such noise would compromise and degrade the quality of the recreational experience in such places. Then, based on this bald unsupported finding that the construction-related noise would not affect the experience of persons using these

outdoor recreation areas and hiking trails, and relying on its finding that construction-related noise would constitute a less-than-significant impact on such recreational resources, the FEIR went on to determine that this new disclosure did not amount to "significant new information" and therefore that recirculation of the EIR with this new information was not required. The CITY's logic here is circular, without any evidence to support it, and inconsistent with what CEQA requires.

45. CEQA does not permit the CITY to avoid its obligation to recirculate the EIR for public comment by simply including an unsupported bald finding in the FEIR that the construction-related noise impacts on such just-acknowledged outdoor recreation areas and hiking trails are less-than-significant. To avoid circulation in this instance, the FEIR would need to provide data, evidence and substantive analysis (substantial evidence) to support this finding of less-than-significant impacts. Because the FEIR failed to provide any evidence (let alone substantial evidence) to support this finding, recirculation is required.

Seventh CEQA Claim – Failure to Identify and Consider Feasible Mitigation Measures to Reduce Adverse Environmental Impacts

46. CEQA requires that an EIR identify and evaluate feasible mitigation measures to avoid or reduce the severity of adverse environmental impacts for a proposed action.

47. As noted above, the FEIR prepared by the CITY disclosed (for the first time) that the proposed synthetic landfill cover would create enhanced fire hazard and fire risks. Although the FEIR conceded the enhanced fires hazard and fire risks associated with the proposed synthetic plastic landfill cover, the DEIR and the FEIR did not contain analysis of feasible mitigation measures to avoid or reduce such fire hazards and fire risks. More specifically, in terms of such fire hazards and fire risks, the DEIR and FEIR prepared by the CITY did not evaluate the advantages of using a clay/earthen landfill cover instead of the proposed synthetic landfill cover. This failure to provide such a *comparative* evaluation constitutes a failure to comply with CEQA's obligation to consider feasible mitigation measures to reduce adverse environmental impacts of a proposed project

48. As noted herein, there are large numbers of large wild boars (weighing as much as 200 pounds) that roam on and in the immediate vicinity of the landfill site, and such wild boars have a

natural tendency to "root" – to force their hoofs and snouts into the ground and tear up any ground covering. The presence of wild boar populations and their tendency to "root" poses a significant risk to the integrity of the propose synthetic plastic offer, a risk that it is not posed by the use of a clay/earthen landfill cover. The DEIR and FEIR prepared by the CITY did not evaluate the environmental and performance advantages of using a clay/earthen landfill cover as a feasible means to avoid or mitigate the threats posed by wild boar populations in the vicinity of the landfill site.

49. As noted herein, as a natural consequence of the anticipated degradation during the 30-year period of the Landfill Closure Plan, the synthetic landfill cover proposed by the CITY is likely to release microplastic into nearby streams and creeks, and into the Russian River and the ocean. As also noted herein, as a result of abrasion caused by wild boar rooting, the synthetic landfill cover proposed by the City is likely to release PFAS into nearby stream and creeks, and into the Russian River. The DEIR and FEIR prepared by the CITY did not evaluate the use of a clay/earthen landfill cover as a feasible means to avoid and mitigate the anticipated release of microplastics and PFAS into waterways and thereby reduce adverse impacts on hydrological resources/water quality and biological resources.

50. As noted above and further detailed in VICHY SPRINGS RESORT's January 9, 2020 written submission, construction-related noise generated by the Landfill Closure Plan will have adverse impacts on outdoor recreation resources and hikers both on VICHY SPRINGS RESORT and other nearby properties. As detailed above, although the FEIR prepared by the CITY acknowledged (for the first time) that such nearby outdoor recreation resources and hiking trails exist, the DEIR and the FEIR in fact contained no data, evidence or substantive analysis to evaluate the severity of how construction-related noise (e.g. compression equipment, backup beepers) will increase noise levels above existing/baseline noise levels on such outdoor recreation areas and hiking trails. Without such information and comparative analysis, there is no basis (no substantial evidence) to support the FEIR's finding that the construction-related noise impacts on such outdoor recreation areas and outdoor recreation users will be less-than-significant. This is because, as explained above, for these impacted outdoor areas closer to the landfill site the DEIR and FEIR do not contain a *comparison* of ambient noise levels *prior* to the project (which reflect the peaceful quietude that is an essential part of the

hiking/outdoor experience for such areas) with noise levels while the construction-related activities are taking place. Because the CITY lacks any basis to find that the construction-related noise impacts on such outdoor recreation areas/hiking trails are less-than-significant, CEQA's requirements regarding feasible mitigation measures apply.

51. In the written comments VICHY SPRINGS RESORT submitted to the City on January 9, 2020, several mitigation measures were presented to help reduce or otherwise minimize the construction-related noise impacts of the Landfill Closure Plan on nearby outdoor recreation areas and hiking trails. More specifically, in its January 9, 2020 written submission, VICHY SPRINGS RESORT proposed that the construction work could forgo the use of loud jarring backup beepers on motor vehicles used on the project site, and instead deploy additional construction personnel to help guide such trucks/equipment so the use of such backup beepers would not be needed to ensure the safety of workers (and alternative that, as noted above, is expressly allowed pursuant to OSHA Regulation 1926.601(b)(4)). More specifically, in its January 9, 2020 written submission, VICHY SPRINGS RESORT proposed that instead of scheduling construction work weekdays from 7:00 am to 7:00 pm (essentially all daylight hours when people would be hiking or otherwise using nearby outdoor recreation areas), such construction work could be scheduled for either designated morning shifts or designated after shifts. VICHY SPRING RESORT is open every weekday, and its weekday guests make frequent use of the hiking trails over the hills from the resort buildings. For instance, if weekday construction work was scheduled from 7:00 am to 2:00 pm on weekdays, then people enjoy the nearby outdoor recreation areas/hiking trails from 2:00 pm until 7:00 pm without being subjected to adjacent construction-related noise. Similarly, if weekday construction work was scheduled from 12:00 am to 7:00 pm, then people could enjoy the nearby outdoor recreation areas/hiking trails from 7:00 am to 12:00 am without being subjected to adjacent construction-related noise. As another potential mitigation measure, weekday construction activities could be limited to 9:30 am to 4:30 pm, which would at least provide limited hours in the early morning and late afternoon for nearby hiking and outdoor recreation activities that would be undisturbed by construction-related noise impacts. VICHY SPRINGS RESORT recognizes that, regardless of which landfill cover is selected, there will necessarily be some adverse

noise impacts associated the construction-related aspects of the Landfill Closure Plan. What VICHY SPRINGS RESORT requested was that the CITY, as part of its CEQA environmental impact assessment process, identify and evaluate feasible mitigation measures (such as those noted above) to reduce and minimize such construction-related noise impacts as they related particularly to persons using outdoor recreation areas/hiking trails.

52. Aside from its purely conclusory statement (in its Response to Comments) that forgoing the use of backup beepers would present unacceptable risks to workers on the site (a statement not supported by any analysis of the OSHA-approved option of having additional construction staff on site to address safety concerns related to vehicles backing up), the DIER and FEIR did not consider or evaluate any further measures to reduce or minimize construction-related noise impacts on outdoor recreations areas/hiking trails and on the people that use those recreational resources. As such, the DEIR and the FEIR did not determine that the noise impact mitigation measures proposed by VICHY SPRINGS RESORT were not feasible, but rather simply refused to consider or evaluate them at all. The CITY attempted to justify this refusal on the basis that it did not need to consider and evaluate such mitigation measures because the FEIR had made a finding that the construction-related noise impacts on nearby outdoor recreation areas/hiking trails were less-than-significant.

53. However, as explained above, the CITY's reasoning here is completely circular because the FEIR did not provide any data, evidence or substantive analysis (substantial evidence) to support its finding that the construction-related noise impacts on nearby outdoor recreation areas/hiking trails would be less-than-significant. As such, this finding in the FEIR will simply be disregarded by any reviewing court on the basis that there is no substantial evidence to support it. Because this finding will be disregarded, there is no justification under CEQA for the CITY's refusal to consider and evaluate feasible mitigation measures to reduce and minimize construction-related noise impacts on nearby outdoor recreation areas/hiking trails.

Eighth CEQA Claim – Absence of Substantial Evidence to Support FEIR Findings Regarding Environmental Impacts and True Project Costs

54. CEQA requires that all findings in an EIR be supported by substantial evidence. Under

CEQA, findings in an EIR that are not supported by substantial evidence will be disregarded by a reviewing court.

55. It its Response to Comments (included as part of the FEIR), the CITY claimed that the North Coast Regional Water Quality Control Board, CalRecycle and Mendocino County Health Department (the "LEA" under the California Health and Safety Code) had already "approved" the synthetic landfill cover design in 2018. This is incorrect. Under CEQA, the North Coast Regional Water Quality Control Board, CalRecycle and Mendocino County Environmental Health Department are legally prohibited from making a final approval of the proposed synthetic landfill cover until such time as the CITY (as the CEQA lead agency) first completes its environmental impact assessment for the Landfill Closure Plan. In the case of the Landfill Closure Plan, this means that the North Coast Regional Water Quality Control, CalRecycle and Mendocino County Environmental Health Department may not make a final approval of the proposed synthetic landfill cover until the CITY first certifies a legally-adequate EIR (which has not yet happened). The reason for this sequencing under CEQA is because, before the making a final approval of the proposed synthetic landfill cover, the Regional Board, CalRecycle and Mendocino need to review and consider all of the information and analysis contained in the certified EIR regarding the environmental performance and risks associated with the proposed synthetic cover, including but not limited to fire safety/fire hazard risks, risks to waterways and biological resources associated with the release of microplastics and PFAS, risks to water quality associated with the rooting behavior of wild boar populations that roam on and in the vicinity of the landfill site, and impacts associated with removing, disposing of, and replacing the interim final cover (discussed herein). To the extent the EIR prepared by the CITY for the Landfill Closure Plan is legally inadequate under CEQA, this would preclude the North Coast Regional Water Quality Control Board, CalRecycle and Mendocino County Environmental Health Department from issuing any permits or approvals for the Landfill Closure Plan. Should the North Coast Regional Water Quality Control Board, CalRecycle and Mendocino County Environmental Health Department issue approvals or permits for the Landfill Closure Plan without first determining that a legally-adequate EIR has been prepared, VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL reserve the right

to file administrative appeals and/or litigation to have such agency approvals/permits set aside.

56. The FEIR including the following finding regarding the proposed ClosureTurf synthetic landfill cover on page 4-30: "The durable, high-strength system components ensure a long-life (**100-year design life**) of protection against operational and natural forces." (bold added.) Yet, as noted above, the ClosureTurf company product materials included in the DEIR and FEIR acknowledge (on the page titled "Weathering") that by the end of a 30-year period customers should anticipate a 25% loss in the tensile strength of the engineered turf fibers. If the engineered turf fibers that comprise the synthetic landfill cover are expected (by the manufacturer ClosureTurf) to lose 25% of their strength/integrity in the first 30 years than presumably it can be expected that there would be additional and increasing losses in strength/integrity of the engineered turf fibers during a 100-year period. In light of this acknowledgement of anticipated turf fiber degradation by the manufacturer, there is not substantial evidence to support the CITY's finding the FEIR that the proposed synthetic landfill cover has a "l00-year design life."

57. The DEIR and the FEIR for the Landfill Closure Plan found that there was a less-than-significant impact on hydrologic resources/water quality and a less-than-significant impact on biological resources. In making these findings, the DEIR and FEIR failed to acknowledge (as discussed herein) the likelihood that the anticipated degradation of the engineered turf fibers in the proposed synthetic cover during the minimum 30-year life of the Landfill Closure Plan would result in the release of microplastics into nearby streams and creeks and into the Russian River and the ocean, and failed to acknowledge the adverse impact of such microplastic releases on fisheries. As set forth above, the DEIR and FEIR also failed to disclose and discuss how wild boar rooting is likely to cause to the release of PFAS from the synthetic landfill cover into nearby streams and creek (see Exhibit 2 to these comments). The DEIR and FEIR's disregard of the likelihood of microplastic releases and PFAS releases into waterways and the resulting impacts of such microplastic and PFAS releases on fisheries indicates a lack of substantial evidence to support the finding that the Landfill Closure Plan will have a less-than-significant impact on hydrologic resources/water quality and biological resources.

58. The DEIR and FEIR for the Landfill Closure Plan contained a finding that the proposed

synthetic cover was an "environmentally superior alternative" to the option of using a clay/earthen landfill cover (the cover preferred by the Regional Board). In making its finding in the DEIR and the FEIR that the synthetic landfill cover was an "environmentally superior alternative" the DEIR and FEIR failed to acknowledge and evaluate that the proposed synthetic landfill cover presented enhanced fire hazards and fire risks as compared with the option of a clay/earthen landfill cover (an enhanced fire hazard and fire risks that would be avoided if the clay/earthen landfill cover were selected). In making its finding in the DEIR and FEIR that the synthetic landfill cover was an "environmentally superior alternative" the DEIR and FEIR also failed to:

- acknowledge and address the threats to waterways and biological resources from the release of microplastics and PFAS associated with the use of the proposed synthetic landfill cover;
- acknowledge and address the presence of large numbers of wild boars on and in the vicinity of the landfill site, and failed to recognize the threat such wild boars (and their "rooting" behavior) presented to the integrity of the proposed synthetic landfill cover and the resulting risks of PFAS releases into nearby streams and creeks;
- acknowledge and discuss that the use of a clay/earthen/natural grass landfill cover versus the proposed mono-color synthetic plastic landfill cover would avoid adverse scenic impacts; and
- Acknowledge and address the fact that the interim final cover would ultimately need to be removed, disposed of, and replaced, causing additional environmental impacts.

By failing to acknowledge and address these fire-related, water quality-related, wild boar-related risks and increased adverse scenic and other impacts associated with the selection of the synthetic landfill cover, the DEIR and the FEIR lacked substantial evidence to support the finding that the proposed synthetic landfill cover was the 'environmentally superior alternative."

59. As set forth above, although the DEIR and FEIR contained information that the CITY would be required by the Regional Board to provide additional financial assurances if it selected the synthetic landfill cover option, the DEIR and FEIR did not attempt to estimate the cost of such additional financial assurances nor did it include the costs of a such additional financial assurances in its project budget for the Landfill Closure Plan. As set forth above, due to the fire hazards and fire risks associated with the

selection of the synthetic landfill cover option, the CITY will need to maintain fire-related insurance throughout the entire 30-years of the Landfill Closure Plan (and beyond, until released from postclosure maintenance responsibilities) to provide coverage for these fire-related hazards and risks. The DEIR and the FEIR, however, did not attempt to monetarily quantify the costs of maintaining such fire-related insurance nor did the DEIR or FEIR includes the costs of maintaining such fire-related insurance in its project budget for the Landfill Closure Plan. As explained above, the proposed synthetic plastic landfill cover is an "interim" measure. After these 30 years, the synthetic landfill cover will likely need to be removed and disposed of, and replaced with a "permanent" clay/earthen landfill cover. The DEIR and FEIR, however, did not provide an estimate of the costs of removing and disposing of the interim synthetic landfill cover, or of replacing the interim synthetic landfill cover with a permanent clay/earthen landfill cover. The failure to include and quantify the costs associated with these additional financial guarantees, fire-related insurance premiums, and the failure to include the likely costs of removing, disposing and replacing the interim synthetic landfill cover evidences that there is not substantial evidence to support the findings in the DEIR or FEIR regarding the budget/anticipated costs associated with selecting the synthetic landfill cover, nor is there substantial evidence in the DEIR or FEIR to support the findings that the true budget/anticipated costs of the synthetic cover option will be *less* expensive than the clay/earthen landfill cover option (which the CITY will need to install anyway after 30 years).

60. As set forth above, the DEIR and FEIR for the Landfill Closure Plan do not contain substantial evidence (or any evidence) to support the finding that the construction-related noise impacts of the Landfill Closure Plan will have a less-than-significant on nearby outdoor recreation areas/hiking trails, including impacts on those outdoor recreation areas/hiking trails located on the VICHY SPRINGS RESORT property. As set forth above, the DEIR and FEIR for the Landfill Closure Plan do not contain substantial evidence (or any evidence) to support the claim that foregoing the use of backup beepers for trucks/equipment would present an unacceptable risk to workers (due to the failure to consider the option, approved by the federal Occupational Safety and Health Administration, of having additional construction staff on site to address the worker safety concerns that backup beepers are intended to

address).

61. As set forth above, the FEIR found that forgoing the use of backup beepers for construction vehicles operating at the landfill site would create an unacceptable safety risk. In making this finding the FEIR failed to consider that OSHA Regulation 1926.601(b)(4) expressly provides that, in lieu of the use of backup beepers, motor vehicles at construction sites may rely on an "observer that signals" it is safe to back up. The availability of this OSHA-approved "observer" option makes clear that there is not substantial evidence to support the FEIR's finding that forgoing the use of backup beepers creates an unacceptable safety risk.

62. As set forth above, the CITY's DEIR, FEIR and Response to Comments determined that there was no hydrological connection between the groundwater wells that will be operated as part of the Landfill Closure Plan and the subsurface source of the Vichy Springs, and that the installation and activation of the such groundwater wells in 1994 was unrelated to the precipitous drop in mineral spring pressure and temperature that occurred immediately after the installation and operation of the wells. The CITY determined that these contemporaneous events were just a temporal "coincidence." In support of this finding, the CITY referred to a 1994 study showing that the chemical constituency of the water found in the groundwater wells was different from the chemical constituency of the water in the subsurface springs. This 1994 study, however, is completely off-point from a scientific standpoint because the cause of the depressurization of the springs was not the ongoing co-mingling of waters, it was that the groundwater wells provided a short-term conduit for CO2 to vacate the subsurface springs thereby temporarily reducing pressure that maintained the springs' flow and temperature. A comparison of chemical constituency samples, taken months after this CO2 depressurization had occurred and the CO2 levels had later re-established, does not provide any evidence as to effect of the groundwater wells on the pressure and temperature of the springs (which occurs because of the hydrologic connection between the wells and the springs). For these reasons, there is no evidence (let alone substantial evidence) to support the DEIR's and FEIR's finding that under current baseline conditions the operation of the groundwater wells as part of the Landfill Closure Plan cannot impact the pressure and temperature of subsurface mineral springs upon which VICHY SPRINGS RESORT relies.

63. Beyond the above-noted examples of the lack of substantial evidence to support key findings in the DEIR and FEIR, it is particularly important to note the lack of substantial evidence to support the finding in the DEIR and FEIR that the selection of the synthetic plastic landfill cover will have a less-than-significant impact on scenic/visual resources. It is with this particular finding that the lack of substantial evidence is perhaps the most glaring. In the DEIR, the CITY claimed that the synthetic landfill cover would have a less-than-significant scenic impact because the mono-color synthetic landfill cover would somehow blend naturally into the surrounding natural grass hillsides. Perhaps recognizing the absurdity of this claim, in the FEIR the CITY took a different tack. For the FEIR, instead of sticking with it previous claim that the mono-color synthetic landfill cover would somehow blend naturally into the surrounding natural grass hillsides, the FEIR instead argued that the "contrast" between the surrounding natural grass hillsides and the 40-acre mono-color swath of synthetic plastic might be considered by some people to be visually "pleasing" because it might remind them of an irrigated field. The FEIR then noted that there many irrigated fields throughout Mendocino County and that some people find such irrigated fields picturesque. In support of this new "pleasing contrast" argument, the FEIR then showed a picture of a baseball field with astroturf, and claimed that when seen from a distance it was difficult for most viewers to be able to recognize that the baseball field was artificial astroturf rather than natural grass. The FEIR also claimed that the concerns raised by VICHY SPRINGS RESORT about the adverse scenic/visual impact of the proposed mono-color synthetic plastic cover should be disregarded because they were not made by an appropriate "expert." While a comprehensive refutation of all of the CITY's illogical and strained claims here is beyond the scope of what can be covered herein, a few critical common-sense points can be highlighted.

64. In terms of the CITY's observation that there are many irrigated fields in Mendocino County and that some people find these irrigated fields visually pleasing, this observation is completely irrelevant from a CEQA standpoint. Pursuant to the environmental impact analysis required by CEQA, the pertinent inquiry is not whether some people sometimes find irrigated fields pleasant to look at. The pertinent question is whether, at the former landfill site, the change from the current natural grass hillside to a mono-color synthetic plastic 40-acre swath would be considered an adverse scenic impact. It

is this *comparison* of *existing* scenic conditions to *post-project* scenic conditions at this particular location that is relevant, not whether (in some general sense) some people find irrigated fields pretty. Moreover, in the context the natural grass hillsides surrounding the landfill site (where there are no other irrigated fields), it would be apparent to any viewer that the 40-acre mono-color swath is not an irrigated field as it would make no sense to plant and maintain such an irrigated field in this setting.

65. In terms of the CITY's analogy to a baseball field covered in astroturf, for anyone that has ever attended a professional or college baseball game and sat in the stands to watch the game (several hundred feet away from the playing field), it is immediately visually apparent whether the field is composed of natural grass or of astroturf. The uniformity of color and the texture of astroturf are visually different from natural grass. The claim in the FEIR (in Response to Comment C-3a), in regard to the suggested analogous situation with an astroturf baseball field, that "from over 500-feet away it would be difficult if not impossible to tell the difference between artificial synthetic turf and real/natural grass" is absurd and defies common experience. If one were attending a baseball game with an astroturf field (instead of a real grass field) and asked 100 spectators sitting in the stands 500 feet away from the field, "is that astroturf or natural grass?" it is likely that 100 out of 100 spectators would look at the field and respond "That's astroturf." It is doubtful any spectator attending the baseball game would be mistaken or confused about what it is they are looking at, that they are looking at synthetic artificial turf rather than natural grass. Moreover, the photograph of the baseball field provided by the CITY in its Response to Comments (as part of the FEIR), of a baseball field that has astroturf on the infield and natural grass in the outfield (that both just coincidentally happen to be almost the exact same color), is completely distinguishable from the scenic situation presented with the former Ukiah landfill. As explained herein and as conceded by the CITY, during the drier/hotter portions of the year, the hillsides surrounding the 40-acre mono-color synthetic plastic green cover will be *brown* (not the same color as the synthetic plastic cover). In terms of the baseball field, if the CITY wanted to provide a photograph that was visually analogous to the situation with the former Ukiah landfill, it should have provided a photograph of a mono-color synthetic green infield set against an unirrigated *brown* dry outfield. Had the CITY provided such a photograph, any viewer of the photograph (and any person actually looking at

the real baseball field) would immediately recognize that the strangely uniform *green* infield is artificial astroturf rather than natural grass (because the natural grass in the outfield would be dry and *brown*).

66. Finally, the CITY claims that VICHY SPRINGS RESORT's concerns regarding the scenic impacts of the proposed mono-color plastic synthetic cover should be disregarded because such concerns were not raised by an appropriately trained "expert." When it comes to assessing adverse visual/scenic impacts, unlike with many other environmental impacts, there is no such thing as a technically-trained "expert." There is no professional or academic degree of certification that qualifies someone as an expert to determine whether a scenic change from a natural grass hillside to a mono-color synthetic cover is considered adverse when set in the context of surrounding natural grass hillsides. To determine such scenic impacts, in terms of whether they are adverse and to gauge the severity of any such adverse impact, we are simply left with the preferences and reactions of a reasonable common person. The CITY, and the environmental consultant hired by the CITY to prepare the FEIR and the DEIR, do not have any particular "expertise" in determining or quantifying such adverse scenic impacts. If the question is presented to a judge as to whether the proposed synthetic mono-color plastic landfill cover constitutes a negative scenic impact as compared with the current natural grass condition of the landfill site and in comparison with the surrounding natural grass hillsides, the judge will look to the preferences and reactions of a reasonable common person. VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL are confident that under such an approach the CITY's position and claims – that for some people the synthetic plastic mono-color landfill cover may present a "pleasing contrast" with the natural grass hillsides, or that some people may somehow mistake the synthetic plastic landfill cover for an irrigated field – will be given little if any credence. Those types of claims may be offered up in the marketing materials by the company that manufactures the proposed synthetic landfill clover (ClosureTurf) the CITY proposes to use, but such self-serving marketing claims are inconsistent with the actual preferences and actual experiences of a reasonable common person.

IV. RELIEF SOUGHT

67. For the reasons set forth herein, and in the previous written submissions to the CITY by

VICHY SPRINGS RESORT and other parties, VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL respectfully request that the CITY prepare a revised EIR for recirculation that addresses the shortcomings and instances of CEQA-noncompliance identified herein and in other previous submissions. The preparation and recirculation of such an EIR will not only help ensure that the Landfill Closure Plan reduces adverse fire hazards, scenic impacts, noise impacts, historic resource impacts, public safety impacts, hydrologic resource/water quality impacts and biological resource impacts, but will also help to reduce the true project costs to Ukiah taxpayers and as well as costs and liabilities that are likely to be incurred by the CITY and Ukiah taxpayers if litigation is unfortunately required to ensure compliance with CEQA.

Respectfully submitted,

Paul Stanton Kibel

Dated: May 15, 2020 By: _____

PAUL STANTON KIBEL
WATER AND POWER LAW GROUP
Attorneys for VICHY SPRINGS RESORT

Dated: May 15, 2020 By: _____

Don McEnhill, President
RUSSIAN RIVERKEEPER

Dated: May 15, 2020 By: _____

William Verick, Executive Director
MATEEL ENVIRONMENTAL JUSTICE FOUNDATION

Exhibits

Exhibit 1: Cal Fire's Fire Hazard Risk Map for Mendocino County
Exhibit 2: Opinion Letter from Pangea Environmental Services
Exhibit 3: 2019 Stockholm University Report on Microplastics and Artificial Fields
Exhibit 4: Company Logo for Lockwood Hunting Services in Ukiah
Exhibit 5: *Wild Pigs Report* by United States Department of Agriculture
Exhibit 6: *Feral Swine Damages* Report by University of California
Exhibit 7: Vichy Springs Resort Landmark Designation

VICHY SPRINGS RESORT and other parties, VICHY SPRINGS RESORT, RUSSIAN RIVERKEEPER and MATEEL ENVIRONMENTAL respectfully request that the CITY prepare a revised EIR for recirculation that addresses the shortcomings and instances of CEQA-noncompliance identified herein and in other previous submissions. The preparation and recirculation of such an EIR will not only help ensure that the Landfill Closure Plan reduces adverse fire hazards, scenic impacts, noise impacts, historic resource impacts, public safety impacts, hydrologic resource/water quality impacts and biological resource impacts, but will also help to reduce the true project costs to Ukiah taxpayers and as well as costs and liabilities that are likely to be incurred by the CITY and Ukiah taxpayers if litigation is unfortunately required to ensure compliance with CEQA.

Respectfully submitted,

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Dated: May 15, 2020 By: _____

PAUL STANTON KIBEL
WATER AND POWER LAW GROUP
Attorneys for VICHY SPRINGS RESORT

Dated: May 15, 2020 By: _____

Don McEnhill, President
RUSSIAN RIVERKEEPER

Dated: May 15, 2020 By: /s/William Verick

William Verick, Executive Director
MATEEL ENVIRONMENTAL JUSTICE FOUNDATION

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Exhibit 1

MENDOCINO COUNTY
FIRE HAZARD AREAS
LOCAL RESPONSIBILITY AREAS
FEDERAL RESPONSIBILITY AREAS

Moderate Fire Hazard
High Fire Hazard
Very High Fire Hazard
Local Responsibility Area - Uncorporated
Local Responsibility Area - Incorporated
Federal Responsibility ARea
Cities & Towns
Major Roads
Major Rivers

Source: This map was derived from the CAL FIRE, Fire Hazard Severity Zones in SRA, Adopted By AL FIRE on November 7, 2007.

This map is provided as a visual display of County Information.
Reasonable effort has been made to ensure the accuracy of the map and data provided: nevertheless, some information may not be accurate.
The positional accuracy of the data is approximate and not intended to represent map accuracy from a published record of survey.
THE MAPS AND ASSOCIATED DATA ARE PROVIDED WITHOUT WARRANT OF ANY KIND.
Either expressed or implied, including but not limited to, the impelled warranties of merchantability and fitness for a particular purpose.
Do not make a business decision based on these data without first validating the information with appropriate County agency or other government entity.

2 1 0 2 Miles

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Exhibit 2

TRANSMITTAL

To: Paul S. Kibel, Esquire

Date: May 13, 2020

Re: **Opinions**
Vichy Springs Resort v. City of Ukiah Public Works and City of Ukiah City Council

I, Bob Clark-Riddell, a registered Professional Engineer in California (C49629) and President/Principal Engineer of Pangea Environmental Services, Inc.. prepared the enclosed opinions regarding potential impacts to human health, animals, and water quality for the subject matter. If you have any questions, please contact me at briddell@pangeaenv.com or (510) 435-8664.

Sincerely,
Pangea Environmental Services, Inc.



Bob Clark-Riddell, P.E.
President/Principal Engineer

Enclosure: Opinions

Vichy Springs Resort v. City of Ukiah Public Works and City of Ukiah City Council

Opinion #1: In the event of a wildfire, the proposed synthetic landfill cover would likely represent a significant health risk to nearby residences via airborne emissions.

This opinion is based on the following information:

1. A number of residences are located within 2,000 of the proposed synthetic landfill cover.

2. According to the limited product information readily available from Watershed Geo, ClosureTurf (the apparent proposed synthetic landfill cover material) is comprised of a) an artificial grass on top (polyethylene fibers), b) an infill material (likely a ¾" thick coated sand layer supporting the artificial grass), and c) a MicroSpike plastic bottom layer (composed of high-density polyethylene [HDPE] and linear low-density polyethylene [LLDPE])(Exhibit A).

3. For the polyethylene fibers, according to a material safety data sheet (MSDS) as Exhibit B, the product polymer may decompose under fire conditions to give off hazardous products. The MSDS lists hazardous decomposition products of carbon monoxide, carbon dioxide, nitrogen oxides, and traces of hydrogen cyanide.

4. For HDPE, according to a material safety data sheet (MSDS) as Exhibit C, polyethylene is a combustible substance which in contact with flame ignites and burns until exhausting. The MSDS lists toxic combustion products of carbon monoxide, carbon dioxide, and other oxidizing organic compounds. Molten polymer presents thermal burns hazard in case of skin contact.

Opinion #2: In the event of a wildfire, the proposed synthetic landfill cover would likely represent a significant health risk to fire fighters via airborne emissions.

This opinion is based on This opinion is based on the following information:

1. Information presented in Opinion #1 regarding ClosureTurf components and hazardous decomposition and toxic combustion products (Exhibits A, B and C).

2. For HDPE, according to a material safety data sheet (MSDS) as Exhibit C, fire fighting equipment should include self-contained breathing apparatus and complete fire fighting clothing. Molten polymer presents thermal burns hazard in case of skin contact.

<u>Opinion #3:</u> The proposed synthetic landfill likely represents a threat to water quality near the proposed synthetic cover location.

This opinion is based on the following information:

1. Creeks and surface water are present in the area of the proposed synthetic landfill cover.

2. PFAS chemicals have been found in artificial turf (Exhibit D). 'PFAS' is short for perfluoroalky and polyfluoroalkyl substances and includes chemicals known as PFOS, PFOA and GenX**,** sometimes called 'forever chemicals'. These chemicals all share signature elemental bonds of fluorine and carbon, which are extremely strong and difficult to break down in the environment or in our bodies. PFAS chemicals have been used widely to help with the production of plastic polymers that are molded into the shape of grass blades when in molten form. Exhibit D references water in a wetlands near discarded turf contained PFAS when tested. Exhibit D references research that PFAS is released from turf when exposed to abrasion (maintenance equipment or feral pigs rooting could contribute to turf degradation and PFAS releases). Exhibit D suggests that limited information is available about the presence of PFAS in artificial turf and the potential for releasing and affecting air, soil, and water where these products are used.

3. According to U.S. EPA, there is evidence that exposure to PFAS chemicals can lead to adverse human health outcomes for humans (including cancer) and for animals (Exhibit E). PFAS has been evaluated at numerous sites for potential releases into air, soil and water, and including sources of drinking water. In May 2016, U.S. EPA issued a lifetime health advisory PFOS and PFOA for drinking water. Exhibit E documents that PFAS can affect people via contaminated air and that drinking water has been impacted by PFAS.

4. Persuant to U.S. EPA recommendations, the California State Water Resources Control Board (SWRCB) has issued notifications to sensitive receptors, is investigating PFAS, and has established guidelines for PFAS testing to assess the scope of the problem (Exhibit F). Exhibit F cites that people are exposed to PFAS through dust and drinking water, and that PFASs tend to accumulate in groundwater.

5. A SWRCB map tracking PFAS testing of drinking water. Exhibit G shows a portion of the PFAS map for northern California, where PFAS has been found in drinking water in the main well for the Stonegate Mobile Home Park of Santa Rosa, California.

6. The California Office of Environmental Health Hazard Assessment (OEHHA) has issued a notice that the agency intends to list PFOA and PFOS as known to cause reproductive toxicity under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Exhibit H).

<u>Opinion #4:</u> Due to PFAS, the proposed synthetic landfill cover likely represents a threat to human health via airborne emissions of wildfires or long-term deterioration of the cover.

This opinion is based on the following information:

1. Information presented in Opinion #3 regarding likely PFAS presence and the associated exhibits.

2. The U.S. EPA and CSWRB exhibits reference human health concerns from PFAS via air contamination, which could be exacerbated by wildfires, deterioration over time, and abrasion from mechanical equipment or wildlife (e.g., pig rooting).

Exhibit A for Bob Clark-Riddell Opinion

ClosureTurf

ClosureTurf® w 40 mil MicroSpike® Liner

Product Data	Test Method	LLDPE Values	HDPE Values
Thickness (nominal), mil (mm)	ASTM D5994	40 (1.0)	40 (1.0)
Thickness (min. avg.), mil (mm)	ASTM D5994	38 (0.95)	38 (0.95)
Thickness (lowest indiv.), mil (mm)	ASTM D5994	34 (0.85)	34 (0.85)
Asperity Height (min. avg.), mil (mm)	ASTM D7466	20 (0.51)	20 (0.51)
Density, g/cc	ASTM D792, Method B	0.939 (max.)	0.94 (min.)
Tensile Properties (avg. both directions)	ASTM D6693, Type IV		
Strength @Yield (min. avg.), lb/in. width (N/mm)		N/A	88 (15.4)
Elongation @ Yield (min. avg.), % (GL=1.3 in.)		N/A	12
Strength@Break (min. avg.), lb./in. width (N/mm)		112 (19.6)	88 (15.4)
Elongation@Break (min. avg.), %(GL=2.0 in.)		400	350
Tear Resistance (min. avg.), lbs. (N)	ASTM D1004	25 (111)	30 (133)
Puncture Resistance (min. avg.) lbs. (N)	ASTM D4833	50 (222)	90 (400)
Carbon Black Content (range %)	ASTM D4218	2-3	2-3
Carbon Black Dispersion (Category)	ASTM D5596	Only near spherical agglomerates for 10 views in Cat. 1 or 2	
Stress Crack Resistance (Single Point NCTL), hours	ASTM D5397, Appendix	N/A	500
Oxidative Induction Time, minutes	ASTM D3895, 200°C, 1 atm O_2	≥140	≥140

Agru America's geomembranes are certified to pass Low Temp. Brittleness via. ASTM D746 (-80°C), and Dimensional Stability via. ASTM D1204 (± 2% @ 100°C)

ENGINEERED TURF COMPONENT (CT)

Product Data	Test Method	Values
Yarn Type	N/A	Polyethylene, Fibrillated
Yarn Color	N/A	Olive Green, Play Green, Tan
Yarn Weight (Total Product Weight)	ASTM D5261 (sample size, 1 yd^2)	≥20 oz. / sq. yd. (≥ 32 oz. / sq. yd.)
Tensile Strength of Yarn	ASTM D2256	15 lbs. min.
CBR Puncture	ASTM D6241	1,500 lb. (MARV)
Tensile Product (MD/XD)	ASTM D4595	2,100 MD / 1,600 XD lb/ft (MARV)
Interface Friction between ClosureTurf CT and MicroSpike®	ASTM D5321	21°, min. Peak
Engineered Turf Fiber UV Stability	ASTM G147	>60% retained tensile strength at 100 yrs. (projected)
Backing System UV Stability (Exposed)	ASTM G154 Modified Cycle 1., UVA340	110 lbs./ft. retained tensile strength at 6,500 hrs (projected)
Aerodynamic Evaluation	GTRI Wind Tunnel	120 mph with max. uplift of 0.12 lb/sf
Rainfall Induced Erosion	ASTM D6459	Infill Loss 0.1% at 6 in./hr. Rainfall
Steady State Hydraulic Overtopping (ClosureTurf® w/ HydroBinder®)	ASTM D7277/D7276	5 ft. overtopping resulting in 29 ft/s velocity and 8.8 psf shear stress for Manning's n value of 0.02
Full Scale Wave Overtopping Test Cumulative Volume (ClosureTurf® with HydroBinder®)	Colorado State University Wave Simulator	165,000 ft^3/ft
Full Scale Wave Overtopping Test Discharge (ClosureTurf® with HydroBinder®)	Colorado State University Wave Simulator	4.0 ft^3/s/ft
HydroBinder® Infill Mix	ASTM C387 / ASTM C109	3/4 in. infill 5,000 psi (min. at 28 days)

SUPPLY INFORMATION (Standard Roll Dimensions)

	Thickness		Width		Length		Area (approx.)		Weight (avg.)	
	mil	mm	ft.	m	ft.	m	ft^2	m^2	lbs	kg
MicroSpike®	40	1.0	23	7	750	229	17,250	1,603	~3,900	~1,770
Turf Component	N/A	N/A	15	4.6	300	91.44	4,500	418	~1,000	~454

ClosureTurf®/and HydroTurf®/ products (US Patent No. 7,682,105, 8,585,322, 9,163,375, and 9,199,287; Canadian Patent No. 2,663,170; and other Patents Pending) and trademarks are the property of Watershed Geosynthetics LLC. All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, this information should not be used or relied upon for any specific application without independent professional examination and verification of its accuracy, suitability and applicability. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Watershed Geosynthetics LLC as to the effects of such use or the results to be obtained, nor does Watershed Geosynthetics LLC assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

v. 20058

Exhibit B for Bob Clark-Riddell Opinion

ForeverLawn INC.

Grass without limits.

MATERIAL SAFETY DATA SHEET

FOREVERLAWN PRODUCTS CONTAINING POLYETHYLENE AND NYLON FIBERS

A. IDENTITY

Chemical name:	Polyethylene fibers/Nylon fibers with polyurethane backing
Distributor:	ForeverLawn, Inc., 4500 Bogan Ave. NE, Albuquerque, NM 87109
Emergency Telephone Number:	505.217.0177

B. HAZARDOUS INGREDIENTS

This product is considered to be a non-hazardous chemical under the Federal Occupational Safety and Health Administration Hazard Communication Standard 29CFR1910.1200

C. PHYSICAL DATA

Melting Point:	Polyethylene yarn 221° – 249°F/105° – 115°, Nylon yarn 428° – 436°F/220° – 230°C
Specific Gravity:	(H20=1) 0.94 turf
Appearances:	Solid
Odor:	None

D. FIRE HAZARD DATA

Unusual fire and explosion hazards:	None
Flashpoint:	>600°F
Extinguishing Method:	Water, Foam, Carbon Dioxide
Fire Fighting Equipment:	Wear protective pressure, self-contained, breathing apparatus. This product is resistant to damage and spreading of ignition in typical exposures such as lighted cigarette dropped on the surface.

E. REACTIVITY DATA

Stability:	(Conditions to avoid) Polymer may decompose under fire conditions to give off hazardous products
Dissolution:	Softening or discoloration may occur with yarn, phenol, formic acid, other acidic exposures below PH5
Hazardous Decomposition Products:	Carbon Dioxide, Carbon Monoxide, Nitrogen Oxides, Traces of Hydrogen Cyanide
Hazardous Polymerization:	Will not occur

F. HEALTH HAZARD INFORMATION

No health hazards are evident from MSDS documentation of constituents of this product, in the form presented when installed and used for its intended application as a synthetic turf product.

G. ENVIRONMENTAL & DISPOSAL INFORMATION

Environmental Impact:	This product is in compliance with the EPA RCRA backing standard TCLP in US Federal register to CRF261 for all heavy metals on that list.
Disposal Procedures:	Safe for landfills; Can be processed and used as a combustible fuel where proper recycling facilities are available.

H. LEGAL DISCLAIMER

While the information set forth herein is believed to be accurate and complete as of the date hereof. ForeverLawn Inc. makes no warranty with respect thereto and disclaims all liability and release thereon.

I. DATE OF ISSUE

April 2, 2007

Exhibit C for Bob Clark-Riddell Opinion

MSDS -04: HDPE -MATERIAL SAFETY DATA SHEET

1. Product and company identification

Product identification HDPE
Manufacturer Rompetrol Petrochemicals S.R.L., company of Rompetrol Group
DJ226, KM23, COD 905700, CONSTANTA, ROMANIA
Tel: +(40) 241 506 868 Fax: +(40) 241 506 909

2. Composition/information on ingredients

Chemical name: high-density polyethylene
Synonyms: HDPE

Composition:	**CAS #**	**% m/m**
Polyethylene	9002-88-4	> 99
Additives	-	<1

Physical appearance: Translucent white pellets ,cake and powder. Contains slight traces of titanium,chlorine,aluminium. Various organic and inorganic additives may be incorporated.
Potential hazard: Spilled material may present a slipping hazard. Following handling and packing various procedures, polyethylene dust may occur. Molten polymer may cause thermal burns. When burning without sufficient oxygen, it starts to release fumes that can contain carbon mono and dioxide, other oxidizing organic compounds. To minimize exposures, adequate room and ventilation should be provided.

3. Hazard identification

Polyethylene is not classified as toxic, harmful, irritant or corrosive product.

Eye contact: The product may content small particles that may cause eyes irritation, due to the mechanical action. Gaseous emissions released while burning may cause eyes irritation/redness.
Skin contact: The product may content small particles that may cause irritation. The contact with molten polymer cause thermal burns.
Ingestion: The product presents minimal toxicity. No hazard anticipated from swallowing incidental small amounts.
Inhalation: In normal concentrations, polymer dust induces no health effects. The product is not volatile at room temperature. Gaseous emissions released while burning may cause nose and breathing tract irritation.

4. First aid measures

Eye contact: Flush with plenty of water for 15 minutes. Remove large particles. In case the irritation persists, get medical attention.
Skin contact: Flush with water and soap for several minutes. In case the irritation persists, get medical attention. Molten polymer – if molten material comes in contact with the skin, cool under ice water or a running stream of cold water. Cover the affected area with clean cotton sheeting or gauze. Do not attempt to remove the product from skin; it could result severe tissue damage. Get medical attention.
Ingestion: not applicable
Inhalation: In case typical symptoms occur, remove the victim to fresh air. Get medical attention if symptoms persist.

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5. Fire fighting measures

Flashpoint: > 340°C
Ignition conditions: Polyethylene is a combustible substance but under normal housekeeping conditions there is no risk of ignition. It not easily ignites but in contact with a flame it becomes soft, flows, ignites and burns until exhausting (if it isn't stabilized with a flame retardant agent). In foil form ignites easily. Static electricity may accumulate during handling/storage, and in certain conditions may constitute an ignition source source in case a high dust concentration exists.
Toxic combustion products: Carbon mono and dioxide, other oxidizing organic compounds. In case of burning without sufficient oxygen, a black, dense smoke is released
Extinguishing media: Small fire: dry chemicals, and carbon dioxide extinguishers. Large fires: large quantities of water spray.
Fire fighting procedures: Keep people away. Isolate fire area and deny unnecessary access. Cool the area with water to localize the fire. Soak with water to cool and to avoid re-ignition.
Protective equipment for fire fighters: Complete fire fighting clothing, self-contained breathing apparatus. In case these are not available, fire extinguishing has to be done from a safe distance or a protected location.
Explosion hazard: The product as delivered has no explosive character. In case of accumulation, polymer dust may form explosive mixtures with the air.

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6. Accidental release measures

Personnel protection*:* Remove unnecessary personnel from area. Limit access to the area. Spilled pellets may induce slipping hazard. Molten polymer presents thermal burns hazard in case of skin contact.
Environment protection*:* The released material will not be discharged to the sewerage.
Clean up: The contaminated area shall be swept and cleaned, and the residual material collected in dried and labeled containers. For disposal, see section 13.

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7. Handling and storage

Store polyethylene in dark, dry and well-ventilated area, away from all heat and ignition sources (sparks, open flames or hot surfaces, welding operations), combustible materials or incompatible substances (strong oxidizing agents). Temperature in the storage area shall not exceed 40^0C. Avoid dust accumulation by frequent cleaning and suitable warehouses structure. Local exhaust ventilation is recommended for control of airborne dust, fumes and vapors, in enclosed areas.
During handling and processing, polymer may charge electrostatic. Use only machines fitted with earth.

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8. Exposure control /personal protection

Eyes and hands protection: Safety glasses for handling at ambient temperature. Thermal resistant gloves, arm protection and goggles/face shield in case of possible contact with molten product.
Skin and body protection: In case of polymer handling or processing at elevated temperatures or in a molten state, adequate protective equipment will be used over the skin, to prevent contact.
Respiratory protection: For most conditions, no special respiratory protection is necessary. When polymer is heated, general and local ventilation systems will be provided.
Hygienic measures: Inside work areas, eating is not allowed. Normal clothing will be kept separately from work and protective equipment.

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9. Physical and chemical properties

Physical state: Pellets, powder
Color: White translucent

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Odor: No odor
Melting temperature: 190- 210 °C
Flash point: > 340 °C
Density: 0.94 - 0.97 g/cm^3
Water solubility: Negligible

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10. Stability and reactivity

Chemical stability: Polyethylene pellets and cakes are normally stable. The product is not corrosive.
Hazardous polymerization: No
Conditions to avoid: Excessive temperatures (over 250 °C) or open flames.
Materials to avoid: Strong oxidizing agents (chlorates, nitrates, peroxides, free halogens), organic solvents.
Hazardous decomposition products: carbon mono and dioxide, other oxidizing organic products.

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11. Toxicological information

Acute toxicity: Polyethylene is considered non-toxic for animals, in case of powder inhalation or solid swallowing.
Local effects: Unknown
Sensibility: Unknown
Chronic toxicity: Unknown
Cancer hazard: Not established
Maximum concentration accepted: Not regulated.
According to Governmental Regulations HG 1218/6.09.2006 related to establishment of minimal health and safety work conditions for personnel protection against chemical agents, for polyethylene there are not regulations regarding the exposal limits of personnel .
If toxic impurities or decomposition products appear, it has to take into consideration the smallest limits stipulated in local or national legislation.

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12. Ecological information

Movement: Soil- the product will not migrate.
Degradation: The product is inert and it is not biodegradable. Surface photo degradation is expected with exposure to sunlight. Due to the negligible water solubility, it produces no effects on aquatic environment.
Bioaccumulation: Not expected
Ecotoxicity: Minimal, due to the negligible water solubility. Pellets may be harmful for birds and fish if swallowed.

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13. Disposal considerations

Spilled material removal: Sweep and clean contaminated area, collect residual material into dried, labeled containers. Wash the area with water.
Wastes disposal: Polyethylene wastes are recyclable materials. It is preferably that production rejects and conversion wastes be recycled instead of being disposed.
Disposal of any wastes should observe all national and local valid regulations. In this case should be provided the information regarding the delivered polyethylene : the additives content ,the fillers or other components which can affect the disposal process.
Polyethylene can be disposed by burial (after the elimination of risk of soil contaminations) or controlled incineration, respecting valid regulations regarding gaseous or solid particles discharges. Due to the high heat value, incineration has to be done only in units designed to handle high heats of combustion. In case it is landfilled: polyethylene is inert, does not degrade quickly and does not release gases or other compounds known to pollute water resources.

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14. Transport information

International settlements: not regulated by RID, ADR, DOT, IATA, ICAO, IMDG rules.

Polyethylene pellets transport: CP4 euro pallets (1375 kg HDPE/pallet, distributed in polyethylene bags, containing each one 25 kg of product), big-bags- in truck or rail silo, maritime transport containers

Polyethylene powder transport: polyethylene bags, containing each one 25 kg of product, big-bags- in truck or rail silo.

Polyethylene cake transport : Bulk and big-bags- in truck or rail silo.

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15. Regulatory information

According valid Romanian legislation:

Label:	**Hazard symbol:**	Not regulated
	R - phrases:	Not regulated
	S - phrases:	Not regulated

According international legislation: To the best of Rompetrol Petrochemicals knowledge, the product contains no chemical subject to SARA /Title III, OSHA or CERCLA requirements.

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16. Other information

Rompetrol Petrochemicals does not recommend any company product for applications that involve human tissues or internal fluids contacts (regardless of the contact length of time), for cardiac devices, for medical device components that support human life, as well as for applications that have connections with human reproduction.

The information relates only to the specific product described above and not to use of the product in combination with other materials. The information contained in this material has been compiled from sources that Rompetrol Petrochemicals considers reliable and accurate. However, the information is provided without any warranty, expressed or implied, regarding its correctness and completeness. Because use conditions and valid regulations may differ from one location to another and may change in time, the customer is responsible for deciding whether the product and the information in this document are suitable for his use and for ensuring that his workplace or disposal practices are in compliance with valid legal regulations. To determine applicability or effects of any law or regulation with respect to the product, user should consult his legal advisor or the appropriate government agency. Rompetrol Petrochemicals does not undertake to furnish advice on such matters. Rompetrol Petrochemicals does not assume nor authorize anyone to assume on Rompetrol Petrochemicals behalf any liability with the use of the information in this MSDS.
The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this, we do not assume responsibility for loss, damage, or expense arising out or connected with handling, storage, use or disposal of this product.

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Exhibit D for Bob Clark-Riddell Opinion

Illustration: Sc

TOXIC PFAS CHEMICALS FOUND IN ARTIFICIAL TURF



Sharon Lerner

October 8 2019, 6:00 a.m.

PFAS CHEMICALS HAVE been identified in synthetic turf, according to lab tests performed on several samples of the artificial grass that were shared with The Intercept. The presence of the chemicals, members of a class that has been associated with multiple health problems, including cancer, adds to growing concerns about the grass replacement that covers many thousands of acres in parks, schools, professional sports stadiums, and practice fields around the U.S.

In one set of tests, the PFAS chemicals were detected in the plastic backing of two samples of the turf. In another, in which the "blades" of the artificial grass were analyzed, scientists measured significant levels of fluorine, which is seen as an indication of the presence of the chemicals.

"We're seeing unexplained levels of fluorine-based compounds in all of the eight samples of turf grass blades we've looked at," says Jeff Gearhart of the Ecology Center, a nonprofit environmental research group based in Michigan that tested the turf blades. The samples of the blades that tested positive for fluorine were made by two different companies, Shaw Industries and Turf Factory Direct.

Neither Turf Factory Direct nor Shaw Industries responded to requests for comment for this story.



Read Our Complete Coverage

Bad Chemistry

PFAS chemicals are used widely to help with the molding and extrusions of plastic, according to a 2005 paper from the Journal of Vinyl and Additive Technology. The latest version of the synthetic turf, which is prized for its durability, is made with plastic polymers that are molded into the shape of grass blades when in molten form.

"When you extrude plastic, it's like a cookie cutter," explained Graham Peaslee, a professor of nuclear physics at the University of Notre Dame who has spent the last five years studying PFAS compounds. Without the PFAS, the rigid plastic used to make the turf durable clogged up the extruding machines that make the turf. "So they added fluorochemicals and now it runs through the extruders just fine." While other chemicals can also ease the turf-making process, "the fluorinated ones work the best," said Peaslee, who likened the PFAS in turf to "chemical hitchhikers" that are left over from the processing rather than used as ingredients.

The Synthetic Turf Council did not respond to specific questions about the presence of PFAS in turf. In an emailed response to questions from The Intercept, Dan Bond, president and chief executive officer of the Synthetic Turf Council, wrote that "STC members are at the forefront of technology that continuously improves the durability, performance and end of life uses of synthetic turf systems."

Blades and Backing

Bennett was also extremely disappointed that the EPA investigated only the crumb rubber from the fields and not the plastic grass blades and the backing to which they're attached. So she decided to test them herself. This summer, Bennett and a friend went to a sports field near her home in Massachusetts while new turf was being installed. She secured two samples and sent one of the turf pieces to a lab to be analyzed for the presence of specific PFAS chemicals.

The tests on the turf came back positive for a short-chain PFAS chemical (known as 27619-97-2) that was the subject of risk reports sent to the EPA between 2007 and 2011. While there is little published about the health effects on this chemical, one of those reports, submitted by DuPont in 2009, noted that some rats died after being exposed to the compound. Another noted that the chemical induced chromosomal aberrations in hamsters' ovary cells. Nevertheless, the chemical was approved for use and is produced in large quantities, according to EPA records.

Bennett sent the other turf piece to the Ecology Center, which found that PFAS were also in the blades of the turf. The center used a new method known as a "total fluorine" analysis. Using this technique, researchers can get a total signal for all of the PFAS that are present in products as opposed to just the 30 or so that they are now able to identify and test for individually.

The Ecology Center's Gearhart used the total fluorine test to determine that about half of the hundreds of commercial and residential carpeting samples it tested at the beginning of this year contained PFAS. And Peaslee of Notre Dame, who pioneered the total fluorine method, has used it to identify PFAS in food packaging, cosmetics, and in the protective gear worn by firefighters, at "thousands of times over the drinking water limit."

Discarded Turf

Meanwhile Bennett found another source of turf she could test: 11 rolls of the used field covering that were sitting alongside some bags of crumb rubber a short walk from a field in Franklin, Massachusetts. New turf had been installed on the Franklin field in 2017, and the old turf had been sitting there ever since. So Bennett cut off a piece of the fraying, discarded turf and sent that for testing too. That sample came back positive for PFOS, a chemical that is no longer in use but has been recognized as both a health threat and widespread water contaminant.

Bennett also collected water from a wetland just feet from the rolls of old turf and found that PFOS was in the water as well, suggesting another possible way that this and other PFAS chemicals may been getting into water.

Asked about the discarded turf and the presence of PFOS in both the turf and nearby water, Franklin town administrator Jamie Hellen said that he wasn't aware that turf contained any dangerous chemicals. Hellen also said that he hadn't known that the rolls of old turf had been left near the water. Days later, he sent a photo of the spot where the discarded turf had been, showing that the turf was no longer there. Bennett noticed the turf rolls stashed near some trees about a mile away from where it had last been dumped, though the bags of infill were no longer nearby.

In an email, Hellen also wrote, "The Town of Franklin has excellent fields that the community is very proud of and are very safe. The Town invests millions in taxpayer dollars into making our fields the best in the state, always trying to stay on the cutting edge of what technology offers and to have the safest fields for the public."

Franklin, Massachusetts, is hardly the only place struggling with the problem of how to discard turf once it's no longer in use. Turf eventually wears out — typically within about a decade of installation — and when it does, it needs to be replaced. Between 1,200 and 1,500 new turf fields are being installed across the country each year, according to estimates from the Synthetic Turf Council.

The infill and turf for a single field can weigh 495,000 pounds, according to an estimate in recycling guidelines found on the Synthetic Turf Council's website. That document explains that "as with any recycle, reuse and recovery effort, the diversity of component materials may represent economic or technical challenges." It also notes that "the industry continues to research and identify the most economical and responsible way to process all turf components such as turf plastics, infill(s) and underlayment pads that need to be removed, recycled and reused."

Failures to dispose of used turf have recently grabbed public attention in Europe. The Dutch public television documentary program Zembla ran an investigative report showing that several companies falsely claimed to recycle turf and have instead stacked it in towering piles. And in Norway, after turf was found discarded in the woods near waterways in June, the minister of the environment said he was considering new rules to control and clean up the dumping of turf.

Although asked repeatedly, the Synthetic Turf Council did not provide the name of any facility currently able to recycle turf in the U.S. But at least one company listed on the trade group's website does claim to do so. Target Technologies International, Inc., which is based in British Columbia, offers "a one-of-a-kind solution to recycle 100% of your used artificial turf and turn it into useful post-consumer products keeping it from ending up in our landfills, vacant properties and warehouses," according the copy found in the online buyers' guide and membership directory of the Synthetic Turf Council.

Asked about the company's ability to repurpose turf, Target Technologies International did not provide convincing evidence. Although a 2018 report from international soccer governing body FIFA on the environmental impact of turf fields noted that "a full 'closed-loop' process is yet to be developed," Nadia Minato, who answered the phone at the Target Technologies International, said that the company has recycled every bit of "maybe 75 fields" in the past five years by sending the turf to Malaysia, where it is made into "fence posts and different kinds of lumber."

When asked for details about where exactly in Malaysia the company sends the turf and what happens to it when it gets there, Minato replied that that information was "proprietary." She then supplied the email address and phone number of Thomas Lam, who she said handles the "leg work" for Target Technologies International's recycling in Malaysia. In an email sent by a third party, Lam responded to a question about how exactly the company is able to recycle 100 percent of turf with the statement, "This is one of our Trade Secrets." Asked for the location of the company's facility and any evidence that it actually recycles turf there, Lam responded that the plant is not open to the public and that "our recycled, marketable and environmentally safe, end product is a plastic fence post and they are available in the USA."

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Whether on a field, dumped in the woods, or sitting in a facility awaiting the advent of effective recycling methods, turf almost certainly ultimately releases its PFAS chemicals, according to Peaslee.

"The question is: Does it come off? And I'm pretty convinced from my previous research on textiles that it does," he said. "When you expose the fibers to mechanical abrasion, some of these chemicals ooze from the fibers." For Peaslee, the discovery of PFAS in turf is a troubling indication that the chemicals are likely present in other products for which they were used as a processing aid. "Turf is only the tip of the iceberg. It's going to happen wherever they're using PFAS as an extrusion agent," said Peaslee, who expressed concern that widespread dumping of the turf in landfills and other places may result in water contamination.

For athletes and their parents, the presence of PFAS in turf may raise more immediate concerns about exposure to yet another group of troubling chemicals while playing on the fields. "We just don't know yet how this might affect people," said PEER's Bennett. For her, the unanswered questions about PFAS in turf and in the water near where it is dumped should be met with caution. "Synthetic turf is now causing a risk to everyone who drinks water," said Bennett, who thinks anyone planning to install turf fields should reconsider. "If there's a potential for risk," she said, "just don't do it."

Exhibit E for Bob Clark-Riddell Opinion

An official website of the United States government.

PFAS Home

Basic Information on PFAS

EPA Actions

PFAS Infographic

Data and Tools

State Information

Basic Information on PFAS

What are PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that includes PFOA, PFOS, GenX, and many other chemicals. PFAS have been manufactured and used in a variety of industries around the globe, including in the United States since the 1940s. PFOA and PFOS have been the most extensively produced and studied of these chemicals. Both chemicals are very persistent in the environment and in the human body – meaning they don't break down and they can accumulate over time. There is evidence that exposure to PFAS can lead to adverse human health effects.

PFAS can be found in:

- **Food** packaged in PFAS-containing materials, processed with equipment that used PFAS, or grown in PFAS-contaminated soil or water.
- **Commercial household products**, including stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams (a major source of groundwater contamination at airports and military bases where firefighting training occurs).
- **Workplace**, including production facilities or industries (e.g., chrome plating, electronics manufacturing or oil recovery) that use PFAS.

- **Drinking water**, typically localized and associated with a specific facility (e.g., manufacturer, landfill, wastewater treatment plant, firefighter training facility).
- **Living organisms**, including fish, animals and humans, where PFAS have the ability to build up and persist over time.

Certain PFAS chemicals are no longer manufactured in the United States as a result of phase outs including the PFOA Stewardship Program in which eight major chemical manufacturers agreed to eliminate the use of PFOA and PFOA-related chemicals in their products and as emissions from their facilities. Although PFOA and PFOS are no longer manufactured in the United States, they are still produced internationally and can be imported into the United States in consumer goods such as carpet, leather and apparel, textiles, paper and packaging, coatings, rubber and plastics.

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Why are PFAS important?

PFAS are found in a wide range of consumer products that people use daily such as cookware, pizza boxes and stain repellants. Most people have been exposed to PFAS. Certain PFAS can accumulate and stay in the human body for long periods of time. There is evidence that exposure to PFAS can lead to adverse health outcomes in humans. The most-studied PFAS chemicals are PFOA and PFOS. Studies indicate that PFOA and PFOS can cause reproductive and developmental, liver and kidney, and immunological effects in laboratory animals. Both chemicals have caused tumors in animals. The most consistent findings are increased cholesterol levels among exposed populations, with more limited findings related to:

- low infant birth weights,
- effects on the immune system,
- cancer (for PFOA), and
- thyroid hormone disruption (for PFOS).

What is the difference between

PFOA, PFOS and GenX and other replacement PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that have been in use since the 1940s, and are (or have been) found in many consumer products like cookware, food packaging, and stain repellants. PFAS manufacturing and processing facilities, airports, and military installations that use firefighting foams are some of the main sources of PFAS. PFAS may be released into the air, soil, and water, including sources of drinking water. PFOA and PFOS are the most studied PFAS chemicals and have been voluntarily phased out by industry, though they are still persistent in the environment. There are many other PFAS, including GenX chemicals and PFBS in use throughout our economy.

GenX is a trade name for a technology that is used to make high performance fluoropolymers (e.g., some nonstick coatings) without the use of perfluorooctanoic acid (PFOA). HFPO dimer acid and its ammonium salt are the major chemicals associated with the GenX technology. GenX chemicals have been found in surface water, groundwater, finished drinking water, rainwater, and air emissions in some areas.

As part of EPA's draft toxicity assessment, the agency has developed draft oral reference doses (RfDs) for GenX chemicals and PFBS. Learn more about EPA's draft toxicity assessment on GenX.

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How are people exposed to PFAS?

There are a variety of ways that people can be exposed to these chemicals and at different levels of exposure. For example, people can be exposed to low levels of PFAS through *food*, which can become contaminated through:

- Contaminated soil and water used to grow the food,
- Food packaging containing PFAS, and
- Equipment that used PFAS during food processing.

People can also be exposed to PFAS chemicals if they are released during normal *use, biodegradation, or disposal of consumer products* that contain PFAS. People may be exposed to PFAS used in commercially-treated products to make them stain- and water-repellent or nonstick. These goods include carpets, leather and apparel, textiles, paper and packaging materials, and non-stick cookware.

People who *work* at PFAS production facilities, or facilities that manufacture goods made with PFAS, may be exposed in certain occupational settings or through contaminated air.

Drinking water can be a source of exposure in communities where these chemicals have contaminated water supplies. Such contamination is typically localized and associated with a specific facility, for example,

- an industrial facility where PFAS were produced or used to manufacture other products, or
- an oil refinery, airfield or other location at which PFAS were used for firefighting.

PFOA, PFOS, and GenX have been found in a number of drinking water systems due to localized contamination. You can view more information about exposures to PFAS through drinking water on our Drinking Water Health Advisories for PFOA and PFOS page.

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Are there health effects from PFAS?

There is evidence that exposure to PFAS can lead to adverse health outcomes in humans. If humans, or animals, ingest PFAS (by eating or drinking food or water than contain PFAS), the PFAS are absorbed, and can accumulate in the body. PFAS stay in the human body for long periods of time. As a result, as people get exposed to PFAS from different sources over time, the level of PFAS in their bodies may increase to the point where they suffer from adverse health effects.

Studies indicate that PFOA and PFOS can cause reproductive and developmental, liver and kidney, and immunological effects in laboratory animals. Both chemicals have caused tumors in animal studies. The most consistent findings from human epidemiology studies are increased

cholesterol levels among exposed populations, with more limited findings related to:

- infant birth weights,
- effects on the immune system,
- cancer (for PFOA), and
- thyroid hormone disruption (for PFOS).

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Contact Us to ask a question, provide feedback, or report a problem.

Exhibit F for Bob Clark-Riddell Opinion

[redacted] COVID-19 and Water Boards Meetings

- As a result of the COVID-19 emergency and the Governor's Executive Order N-33-20, non-essential file reviews are postponed and essential file reviews are by appointment only.
- The COVID-19 emergency has resulted in the cancellation or postponement of some recent meetings of the Water Boards. The Water Boards are continuing day-to-day work protecting public health, safety, and the environment. The Water Boards are conducting Board Meetings solely via remote presence by video and teleconference. Members of the public will be able to listen to and watch the meeting and comment if desired. Please follow our website or subscribe to an applicable Lyris list for your area of interest for further updates.

Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS)

Announcements

- **NEW!** Media Release: Response Levels Lowered for Water Systems Statewide as PFAS Investigation Continues (02/06/20)
- **NEW!** Frequently Asked Questions: What Does AB 756 Require For Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) (02/06/20)
- **NEW!** Results - Public Water System Per- and Polyfluoroalkyl Substances (PFAS) 2nd Quarter (July-September 2019 Orders) (02/06/20)
- News Release: State Water Board Updates Guidelines for Testing and Reporting PFOA and PFOS As It Assesses Scope of Problem (08/23/19)
- Fact Sheet: Update on Spring 2019 State Water Board Directives for Soil and Water Samples at Likely Per- and Poly-Fluoroalkyl Substance (PFAS) "Hot Spot" Locations (08/23/19)
- Fact Sheet: Frequently Asked Questions: Drinking Water Guidelines for PFOA and PFOS (08/23/19)

PFOA and PFOS are fluorinated organic chemicals that are part of a larger group of chemicals referred to as per- and poly-fluoroalkyl substances (PFASs). PFOS and PFOA have been extensively produced and studied in the United States. These manmade substances have been synthesized for water and lipid resistance. They have

been used extensively in consumer products such as carpets, clothing, fabrics for furniture, paper packaging for food, and other materials (e.g., cookware) designed to be waterproof, stain-resistant or non-stick. In addition, they have been used in fire-retarding foam and various industrial processes.

People are exposed to PFOS and PFOA through food, food packaging, consumer products, house dust, and drinking water. Exposure through drinking water has become an increasing concern due to the tendency of PFASs to accumulate in groundwater. Such contamination is typically localized and associated with a specific facility, for example, an industrial facility where these chemicals were manufacture or used in other products, or airfield which used the chemicals for firefighting. Between 2000 and 2002, PFOS was voluntarily phased out of production in the U.S. by its primary manufacturer. Beginning in 2006 other manufacturers began to voluntarily limit the number of ongoing uses.

Since these chemicals have been used in an array of consumer products, scientists have found PFOA and PFOS in the blood of nearly all people tested. According to the Center for Disease Control (CDC), blood levels of both PFOS and PFOA have steadily decreased in U.S. residents since 1999-2000.

In May 2016, the United States Environmental Protection Agency (U.S. EPA) issued a lifetime health advisory for PFOS and PFOA for drinking water, advising municipalities that they should notify their customers of the presence of levels over 70 parts per trillion (PPT) in community water supplies. U. S. EPA recommended that the notification of customers include information on the increased risk to health, especially for susceptible populations. Based on the current available peer-reviewed studies on laboratory animals and epidemiological evidence in human populations, the U.S. EPA released the following statement:

"These studies indicate that exposure to PFOA and PFOS over certain levels may result in adverse health effects, including developmental effects to fetuses during pregnancy or to breastfed infants (e.g., low birth weight, accelerated puberty, skeletal variations), cancer (e.g., testicular, kidney), liver effects (e.g., tissue damage), immune effects (e.g., antibody production and immunity), thyroid effects and other effects (e.g., cholesterol changes)."

Notification Level

Notification levels are nonregulatory, health-based advisory levels established for contaminants in drinking water for which maximum contaminant levels have not been established. Notification levels are established as precautionary measures for contaminants that may be considered candidates for establishment of maximum contaminant levels but have not yet undergone or completed the regulatory standard setting process prescribed for the development of maximum contaminant levels and are not drinking water standards.

Health and Safety Code section 116271 delegates to the Division of Drinking Water's (DDW) Deputy Director the authority "to take action pursuant to Article 5," including the power to issue a notification level (NL) pursuant to Health and Safety Code section 116455. Assembly Bill 756 (codified as Health and Safety Code section 116378) provides for new reporting and notification requirements for detections of perfluoroalkyl substances and polyfluoroalkyl substances (collectively, PFAS).

In August 2019, after further review, **the Office of Environmental Health Hazard Assessment**

(OEHHA) recommended NLs for PFOA and for PFOS be set at the lowest levels at which they can be reliably detected in drinking water using currently available and appropriate technologies. This recommendation is based on OEHHA's development of reference levels intended to protect against cancer and noncancer effects, including effects on the liver and immune system. These recommendations supersede the recommended interim NLs that OEHHA provided to SWRCB in July 2018. After independent review of the available information on the risks, DDW established NLs at **6.5 PPT for PFOS** and **5.1 PPT for PFOA.** These levels are consistent with OEHHA's recommendations.

A response level (RL) is set higher than a notification level and represents a recommended chemical concentration level at which water systems consider taking a water source out of service or provide treatment if that option is available to them. Starting in January 2020, water systems that receive an order and detect levels of PFAS substances that exceed their response level, shall take a water source out of use, treat the water delivered, or provide public notification.

Certain requirements and recommendations apply to a water system if it serves customers drinking water containing a contaminant greater than its notification level. In addition to notification levels and pursuant to Health and Safety Code section 116455, DDW has lowered the response levels for PFOA and PFOS from 70 PPT combined to **10 PPT for PFOA** and **40 PPT for PFOS** based on a running four quarter average.

At the request of the Division of Drinking Water, OEHHA is initiating the development of Public Health Goals (PHGs) for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) in drinking water. PHGs are concentrations of contaminants in drinking water that pose no significant acute or chronic health risks. OEHHA establishes PHGs, which are used as the health basis for the development of California's primary drinking water standards (Maximum Contaminant Levels or MCLs).

Through the State Water Board's investigation, seven additional PFAS chemicals have been detected in multiple wells in California. The State Water Board has requested OEHHA's recommendation in developing notification levels for the following chemicals:

- perfluorohexane sulfonic acid (PFHxS)
- perfluorobutane sulfonic acid (PFBS)
- perfluorohexanoic acid (PFHxA)
- perfluoroheptanoic acid (PFHpA)
- perfluorononanoic acid (PFNA)
- perfluorodecanoic acid (PFDA)
- 4,8-dioxia-3H-perflourononanoic acid (ADONA)

As additional PFAS data become available, DDW may request from OEHHA to include additional PFAS chemicals. The State Water Board also requested that OEHHA include an evaluation of whether some of the PFAS chemicals should be grouped together when being considered in a regulatory manor and if it is possible to consider them in subclasses based on specific characteristics or features of the chemicals.

For more information regarding the impact of Assembly Bill 756 (as codified as Health and Safety Code section 116378) on public water systems, please refer to the Frequently Asked Questions: AB 756 Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS).

Analytical Methods and Reporting

During the third Unregulated Contaminant Monitoring Rule (UCMR3), USEPA required laboratories to use EPA Method 537 to analyze for six perfluorinated compounds. At that time, the minimum reporting levels established by USEPA for PFOS and PFOA were 0.04 µg/L and 0.02 µg/L, respectively.

The minimum reporting level is similar to the detection limit for purposes of reporting, (DLR), which is established in regulation for chemicals with maximum contaminant levels. The DLR is the level at which the DDW is confident about quantification being reported.

DDW has identified EPA Method 537.1 as a validated analytical method for detecting perfluorinated compounds in drinking water. This method is capable of detecting the following 18 perfluorinated compounds:

STORET Code	CHEMICAL	Abbreviation
C2801	PERFLUOROBUTANE SULFONIC ACID	PFBS
C2802	PERFLUOROHEPTANOIC ACID	PFHpA
C2803	PERFLUOROHEXANE SULFONIC ACID	PFHxS
C2804	PERFLUORONONANOIC ACID	PFNA
C2805	**PERFLUOROOCTYL SULFONIC ACID**	**PFOS**
C2806	**PERFLUOROOCTANOIC ACID**	**PFOA**
C2807	N-ETHYL PERFLUOROOCTANESULFONAMIDOACETIC ACID	NEtFOSAA
C2808	N-METHYL PERFLUOROOCTANESULFONAMIDOACETIC ACID	NMeFOSAA
C2809	PERFLUORODECANOIC ACID	PFDA
C2810	PERFLUORODODECANOIC ACID	PFDoA
C2811	PERFLUOROHEXANOIC ACID	PFHxA
C2812	PERFLUOROTETRADECANOIC ACID	PFTA
C2813	PERFLUOROTRIDECANOIC ACID	PFTrDA
C2814	PERFLUOROUNDECANOIC ACID	PFUnA
C2815	HEXAFLUOROPROPYLENE OXIDE DIMER ACID	HFPO-DA
C2816	9-CHLOROHEXADECAFLUORO-3-OXANONE-1 SULFONIC ACID	9Cl-PF3ONS

C2817	11-CHLOROEICOSAFLUORO-3-OXAUNDECANE-1-SULFONIC ACID	11Cl-PF3OUdS
C2818	4,8-DIOXA-3H-PERFLUORONONANOIC ACID	ADONA

Findings in California Drinking Water

From 2013 to 2015,UCMR3 required all large water systems (i.e., water systems serving over 10,000 people) to collect and analyze more than12,000 drinking water samples for PFOS and PFOA. In addition, some water systems serving less than 10,000 people reported approximately 400 drinking water results for PFOS and PFOA. This occurrence data identified 36 sources with PFOS detections and 32 sources with PFOA detections.

Drinking water systems are not currently required by state regulations to monitor for PFOA and/or PFOS. Nevertheless, because of concerns about possible contamination, some water systems have voluntarily chosen to sample their supplies for PFOA and PFOS.

The occurrence data for UCMR3 can be accessed at: https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule. **A summary of the findings for California is available here**.

Resources

Fact Sheet: Update on Spring 2019 State Water Board Directives for Soil and Water Samples at Likely Per- and Poly-Fluoroalkyl Substance (PFAS) "Hot Spot" Locations (08/23/19)

Fact Sheet: Frequently Asked Questions: Drinking Water Guidelines for PFOA and PFOS (08/23/19)

Frequently Asked Questions: Per- and Poly-fluoroalkyl Substances (PFAS)Water Monitoring

Example PFOA/PFOS Notification Letter: (PDF) (Word)

Laboratories Accredited to Analyze for PFAs in Drinking Water by EPA Method 537 Revision 1.1 or EPA Method 537.1

Drinking Water Sample Collection for PER and POLYFLUORINATED ALKYL SUBSTANCES (PFAS) Sampling Guidance

Primary Changes in the Revised April 2019 PFAS Sampling Guidance

PFAS Water Systems Orders - April 30, 2019

PFAS Phased Investigation Approach Presentation Training for Public Water Systems (Recording) - April 3, 2019

PFAS Phased Investigation Approach Presentation for Public Water Systems (Slides) – April 3, 2019

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US EPA, 2016. FACT SHEET:PFOA & PFOS Drinking Water Health Advisories (PDF), US Environmental Protection Agency, November.

US Federal Register, 2016. Lifetime Health Advisories and Health Effects Support Documents for Perfluorooctanoic Acid and Perfluorooctane Sulfonate. 81 Fed. Reg. 101, May 25, 2016. (PDF)

(Page last updated 04/23/2020)

Drinking Water Resources

California Laboratory Intake Portal (CLIP)
Contaminants in Drinking Water
Consolidation and Extension of Service
COVID-19 Drinking Water
Cyanobacteria/Cyanotoxins in Drinking Water
Consumer Confidence Reports (CCRs)
DRINC Portal
Drinking Water Branch Districts
Drinking Water Supply Service Area Lookup Tool
Drinking Water Watch Database
Electronic Annual Reports (EAR)
Environmental Laboratory Accreditation Program (ELAP)
Expired Drinking Water Laboratory Accreditation
Funding for Public Water Systems
Information for Public Water Systems
Lab-To-State Portal - Electronically Lead and Copper Submittal
Operator Certification - Drinking Water
Permits
Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS)
Public Water System Monitoring Schedules
Regulations and Statutes
Residential Water Treatment Devices
Safe Drinking Water Plan for California
SAFER Drinking Water
Water Quality Data
Water Recycling

Water is a precious resource in California, and maintaining its quality is of utmost importance to safeguard the health of the public and the environment.

Exhibit G for Bob Clark-Riddell Opinion

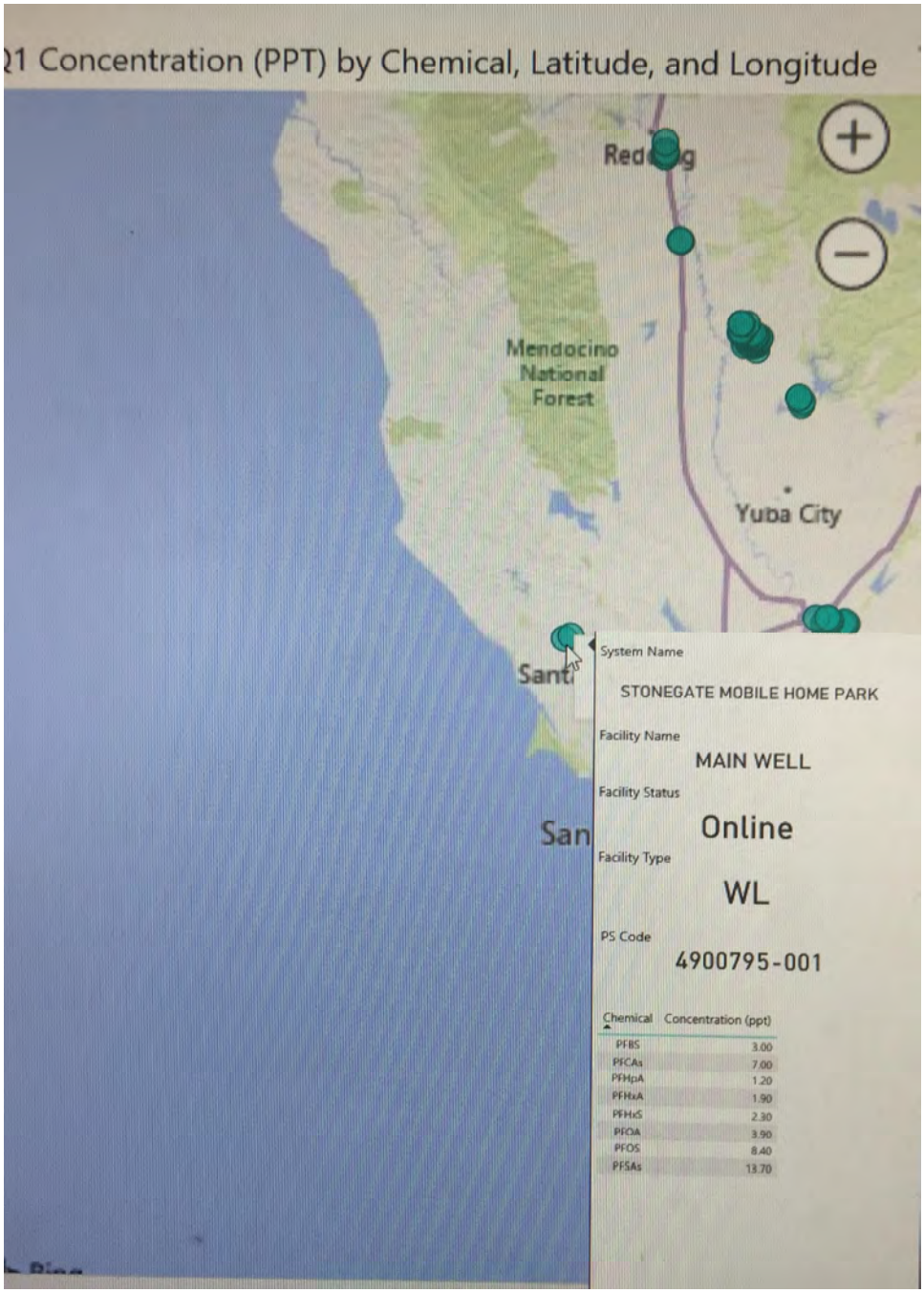
Q1 Concentration (PPT) by Chemical, Latitude, and Longitude
Mendocino National Forest
Yuba City
System Name
STONEGATE MOBILE HOME PARK
Facility Name
MAIN WELL
Facility Status
Online
Facility Type
WL
PS Code
4900795-001
Chemical Concentration (ppt)
PFBS 3.00
PFCAs 7.00
PFHpA 1.20
PFHxA 1.90
PFHxS 2.30
PFOA 3.90
PFOS 8.40
PFSAs 13.70

Exhibit H for Bob Clark-Riddell Opinion

Notice of Intent to List Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS)

Sep 16, 2016

The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) intends to list *perfluorooctanoic acid (PFOA)* and *perfluorooctane sulfonate (PFOS)* as known to the state to cause reproductive toxicity under the Safe Drinking Water and Toxic Enforcement Act of 1986[1]. This action is being proposed under the authoritative bodies listing mechanism[2].

Chemical [CAS No.]	References	Chemical Use	Endpoints
Perfluorooctanoic acid [335-67-1]	US EPA (2016a,b)	PFOA and PFOS are surfactants that have been used in a variety of consumer products, including carpets, textiles, leather, non-stick cookware, and paper coatings used in food packaging, to confer stain, grease and water resistance. PFOA is used in the production of fluoropolymers. PFOA and PFOS are generated as degradation products of other	Developmental toxicity
Perfluorooctane sulfonate [1763-23-1]	US EPA (2016c,d)		

		perfluorinated compounds.	

Background on listing via the authoritative bodies mechanism: A chemical must be listed under the Proposition 65 regulations when two conditions are met:

1. An authoritative body formally identifies the chemical as causing reproductive toxicity pursuant to Title 27, Cal. Code of Regs., section 25306(d)[3].
2. The evidence considered by the authoritative body meets the sufficiency criteria contained in section 25306(g).

However, the chemical is not listed if scientifically valid data which were not considered by the authoritative body clearly establish that the sufficiency of evidence criteria were not met (Section 25306(h)).

The US Environmental Protection Agency (US EPA) is one of several institutions designated as authoritative for the identification of chemicals as causing reproductive toxicity (Section 25306(l)). OEHHA is the lead agency for Proposition 65 implementation. After an authoritative body has made a determination about a chemical, OEHHA evaluates whether listing under Proposition 65 is required using the criteria contained in the regulations.

OEHHA's determination: *Perfluorooctanoic acid (PFOA)* and *perfluorooctane sulfonate (PFOS)* each meet the criteria for listing as known to the state to cause reproductive toxicity under Proposition 65, based on findings of the US EPA (2016a,b,c,d), as outlined below.

Formal identification and sufficiency of evidence for *PFOA*: In 2016, US EPA released the documents: *Drinking Water Health Advisory (HA) for Perfluorooctanoic Acid (PFOA)*(US EPA, 2016a) and *Health Effects Support Document for Perfluorooctanoic Acid* (US EPA, 2016b). In the former document, US EPA developed a lifetime drinking water HA for PFOA (US EPA, 2016a) based on a reference dose (RfD) derived from a developmental toxicity study in mice in which developmental toxicity was manifested as reduced ossification in proximal phalanges and accelerated puberty in males (US EPA, 2016b). Both documents contain conclusions about the developmental toxicity of PFOA, referencing studies in which developmental toxicity results entirely or predominantly from prenatal exposure to the chemical.

Section 25306(d)(1) provides three separate criteria, of which at least one must be met in order for the chemical to be formally identified. These reports and documents meet two of the formal identification criteria in Section 25306(d)(1) because PFOA "is the subject of a report which is published by the authoritative body and which concludes that the chemical causes…reproductive toxicity", *and* because PFOA "has otherwise been identified as causing … reproductive toxicity by the authoritative body in a document that indicates that such identification is a final action". The latter criterion is met by the development by US EPA of a lifetime drinking water HA for PFOA based on a reference dose (RfD) derived from developmental toxicity in mice. Further, Section 25306(d)(2) provides six additional criteria, of which at least one must be met in order for the chemical to be formally identified. In this case three criteria are met because the report or document has been "published by the authoritative body in a

publication, such as, but not limited to, the federal register…" (US EPA, 2016a,b); *and* "reviewed by an advisory committee in a public meeting, if a public meeting is required" (US EPA, 2016a); *and* "made subject to public review and comment prior to its issuance" (US EPA, 2016a).

These reports and documents also meet the sufficiency of evidence criteria in Section 25306(g). Pertinent statements in the US EPA reports documenting the Agency's conclusions about developmental toxicity include the following:

In *Drinking Water Health Advisory for Perfluorooctanoic Acid* (US EPA, 2016a):

- "The US Environmental Protection Agency (EPA) is issuing a lifetime drinking water Health Advisory (HA) for PFOA of 0.07 micrograms per liter (µg/L) based on a reference dose (RfD) derived from a developmental toxicity study in mice; the critical effects included reduced ossification in proximal phalanges and accelerated puberty in male pups following exposure during gestation and lactation." (p. 9)
- "For PFOA, ...studies report developmental effects (survival, body weight changes, reduced ossification, delays in eye opening, altered puberty, and retarded mammary gland development) … Overall, the toxicity studies available for PFOA demonstrate that the developing fetus is particularly sensitive to PFOA-induced toxicity." (p. 9)
- "The effects that serve as the basis for the RfDs for both PFOA and PFOS are developmental endpoints (reduced ossification and accelerated puberty in males for PFOA and decreased pup weight for PFOS)." (p. 55)
- "The animal toxicology studies were used in the dose-response assessment for PFOA. These studies demonstrated dose-related effects on systemic and developmental endpoints in multiple species (monkeys, rats, mice) …" (p. 33)
- "There are extensive human data from epidemiological data from the general population as well as worker cohorts. The epidemiology data provide strong support for the identification of hazards observed following exposure to PFOA in the laboratory animal studies and human relevance." (p. 51)
- "Based on the consistency of the responses across the chronic studies and those for reproductive and developmental endpoints, and with recognition of the use of developmental toxicity as the most sensitive endpoint, 0.00002 mg/kg/day was selected as the RfD for PFOA. This value is based on the HED *[Human Equivalent Dose]* for developmental effects (reduced ossification in male and female pups and accelerated puberty in male pups) from the Lau et al. (2006) study." (p. 54)
- "The lifetime HA for PFOA is based on effects (reduced ossification in male and female pups and accelerated puberty in male pups) on the developing fetus resulting from exposures that occur during gestation and lactation. These developmental endpoints are the most protective for the population at large and are effects that can carry lifetime consequences for a less than lifetime exposure." (p. 55)
- "EPA's risk assessment guidelines reflect that, as a general matter, a single exposure to a developmental toxin at a critical time in development can produce an adverse effect (US EPA 1991). In addition, short-term exposure to PFASs *[perfluoroalkyl substances]* can result in a body burden that persists for years and can increase with additional exposures. Thus, EPA recommends that the lifetime HA for PFOA of 0.07 µg/L apply to both short-term (i.e., weeks to months) scenarios during pregnancy and lactation, as well as to lifetime-exposure scenarios." (p. 10)

In *Health Effects Support Document for Perfluorooctanoic Acid* (US EPA, 2016b):

- "Developmental effects observed in animals include decreased survival, delayed eye opening and reduced ossification, skeletal defects, …" (p. ES-2)
- "Overall, the developmental and reproductive toxicity studies available for PFOA demonstrate that the developing fetus is particularly sensitive to PFOA-induced toxicity." (p. ES-3)

OEHHA has reviewed the studies or study descriptions cited by US EPA (2016a,b) in support of its formal identification of PFOA as causing reproductive toxicity (developmental endpoint) relative to the criteria in Section 25306(g). Based on the PFOA HA (US EPA, 2016a) and the supporting document (US EPA, 2016b), and the studies cited in those documents, OEHHA finds the criteria for listing PFOA through the authoritative bodies mechanism as causing reproductive toxicity (developmental endpoint) have been met.

Formal identification and sufficiency of evidence for *PFOS*: In 2016, US EPA released the documents: *Drinking Water Heath Advisory for Perfluorooctane Sulfonate (PFOS)* (US EPA, 2016c) and *Health Effects Support Document for Perfluorooctane Sulfonate* (US EPA, 2016d). In the former document US EPA developed a lifetime drinking water HA for PFOS (US EPA, 2016c) based on a reference dose (RfD) derived from a developmental toxicity study in rats in which developmental toxicity was manifested as reduced body weight of pups on lactation day 1 (US EPA, 2016d). Both documents make conclusions about the developmental toxicity of PFOS, referencing studies in which prenatal exposure to the chemical results in developmental toxicity.

Section 25306(d)(1) provides three separate criteria, of which at least one must be met in order for the chemical to be formally identified. These reports and documents meet two of the formal identification criteria in Section 25306(d)(1) because PFOS, "is the subject of a report which is published by the authoritative body and which concludes that the chemical causes…reproductive toxicity", *and* because PFOS "has otherwise been identified as causing … reproductive toxicity by the authoritative body in a document that indicates that such identification is a final action". The latter criterion is met by the development by US EPA of a lifetime drinking water HA for PFOS based on a reference dose (RfD) derived from developmental toxicity in rats. Further, Section 25306(d)(2) provides six additional criteria, of which at least one must be met in order for the chemical to be formally identified. In this case three criteria are met because the report or document has been "published by the authoritative body in a publication, such as, but not limited to, the federal register…" (US EPA, 2016c,d); *and* "reviewed by an advisory committee in a public meeting, if a public meeting is required" (US EPA, 2016c); *and* "made subject to public review and comment prior to its issuance" (US EPA, 2016c).

These reports and documents also meet the sufficiency of evidence criteria in Section 25306(g). Pertinent statements in the US EPA reports documenting the Agency's conclusions about developmental toxicity include the following:

In *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (US EPA, 2016c):

- "The US Environmental Protection Agency (EPA) is issuing a lifetime drinking water health advisory (HA) for PFOS of 0.07 micrograms per liter (µg/L) based on a reference dose (RfD) derived from a developmental toxicity study in rats; the critical effect was decreased pup body weight

following exposure during gestation and lactation." (p. 10)

- "For PFOS, … studies report developmental effects (decreased body weight, survival, and increased serum glucose levels and insulin resistance in adult offspring) … Overall, the toxicity studies available for PFOS demonstrate that the developing fetus is particularly sensitive to PFOS induced toxicity." (p. 10)
- "Adverse effects observed following exposures to PFOA and PFOS are the same or similar, and include effects on lipids, birth weight, and antibodies in humans…The effects serving as the basis for the RfDs for both PFOA and PFOS are developmental endpoints (e.g., reduced ossification and accelerated puberty in males for PFOA and decreased birth weight for PFOS…)" (p.51)
- "EPA believes the uncertainty in the chosen POD *[point of departure]* and the reliance on studies with serum data is minimized because of the large and extensive database examining hazard, and the selection of pup body weight as the critical effect with lifetime implications at a NOAEL (0.1 mg/kg/day) from the low end of the range of values evaluated." (p. 51)
- "The RfD is based on the HED derived from serum levels at the NOAEL from a developmental study in rats (Luebker et al. 2005b). …The selected RfD is based on the most sensitive endpoint, developmental effects (e.g., decreased pup body weight), to provide protection to the general population and sensitive life stages." (p. 52)
- "EPA's risk assessment guidelines reflect that, as a general matter, a single exposure to a developmental toxin, at a critical time in development can produce an adverse effect (US EPA 1991). In addition, short-term exposure to PFASs *[perfluoroalkyl substances]* can result in a body burden that persists for years and can increase with additional exposures. Thus, EPA recommends that the lifetime HA for PFOS of 0.07 µg/L apply to both short-term (i.e., weeks to months) scenarios during pregnancy and lactation, as well as to lifetime-exposure scenarios." (p. 11)

In *Health Effects Support Document for Perfluorooctane Sulfonate (PFOS)* (US EPA, 2016d):

- "EPA derived a reference dose (RfD) for PFOS…based on decreased neonatal rat body weight from the two-generation study by Luebker et al. (2005b). …The HED for effects on pup body weight in the two generation study is supported by comparable values derived from the lowest observed adverse effect level for the same effect in the one-generation study and the NOAEL for effects seen in a developmental neurotoxicity study." (p. ES-2)
- "At 3.2 mg/kg/day *[PFOS, oral dose in rats]*, there were significant decreases in gestation length and number of implantation sites, and reductions in litter size." (p. 3-63)
- "For pups only exposed prenatally, mortality was 9% compared to 1.1% for those exposed during lactation only. Reductions in pup body weights on LD 1 were observed in groups exposed both gestationally and lactationally and in those with gestational exposure only." (p. 3-64)
- "Based on the consistency of the response and of the use of the most sensitive endpoint, developmental toxicity, as the critical effect, the RfD of 0.00002 mg/kg/day from Luebker et al. (2005a) is selected as the RfD for PFOS. This RfD is derived from reduced pup body weight in the two-generation study in rats." (p. 4-16)

OEHHA has reviewed the studies or study descriptions cited by the US EPA (2016c,d) in support of its formal identification of PFOS as causing reproductive toxicity (developmental endpoint) relative to the

criteria in Section 25306(g). Based on the PFOS HA (US EPA, 2016c) and the supporting document (US EPA, 2016d), and the studies cited in those documents, OEHHA finds the criteria for listing PFOS through the authoritative bodies mechanism as causing reproductive toxicity (developmental endpoint) have been met.

Request for comments: OEHHA is requesting comments as to whether PFOA and PFOS meet the criteria set forth in the Proposition 65 regulations for authoritative bodies listings. In order to be considered, **OEHHA must receive comments by 5:00 p.m. on October 17, 2016.** We encourage you to submit comments via e-mail, rather than in paper form. Comments transmitted by e-mail should be addressed to P65Public.Comments@oehha.ca.gov with "NOIL – PFOA and PFOS" in the subject line. Comments submitted in paper form may be mailed, faxed, or delivered in person to the addresses below:

Mailing Address: Michelle Ramirez
Office of Environmental Health Hazard Assessment
P.O. Box 4010, MS-12B
Sacramento, California 95812-4010

Fax: (916) 323-2265

Street Address: 1001 I Street
Sacramento, California 95814

Comments received during the public comment period will be posted on the OEHHA web site after the close of the comment period. Electronic files submitted should not have any form of encryption.

If you have any questions, please contact Michelle Ramirez at Michelle.Ramirez@oehha.ca.gov or at (916) 445-6900.

Comment Period

- Extension of the Public Comment Period for the Notice of Intent To List: Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS)
- Comment Period – Notice of Intent to List Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS)

Link to Public Comments

Public Comments on the Notice of Intent to List PFOA/PFOS

Wednesday, December 7, 2016

Downloads

OEHHA's Response to Comments
Nov 10, 2017

Comments by the American Chemistry Council (ACC) on the Notice of Intent to List PFOS and PFOA
Dec 7, 2016

Comments by Kevin Dixon on the Intent to List PFOA and PFOS
Dec 7, 2016

Comments by Green Science Policy Institute on the Intent to List PFOA and PFOS
Dec 7, 2016

Comments by Grimaldi Law Offices for 3M Company on the Intent to List PFOA
Dec 7, 2016

Comments by Grimaldi Law Offices for 3M Company on the Intent to List PFOS
Dec 7, 2016

Comments by National Council of Textile Organizations on the Intent to List PFOA and PFOS
Dec 7, 2016

Comments by National Resource Defense Council on the Intent to List PFOA and PFOS
Dec 7, 2016

Downloads

Notice of Intent to List Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS)
Sep 16, 2016

Chemical Reference

- Perfluorooctanoic Acid (PFOA)
- Perfluorooctane sulfonate (PFOS)

Related Notices

- Chemicals Listed Effective November 10, 2017 as Known to the State of California to Cause Reproductive Toxicity: Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS)
  Nov 9, 2017

Footnotes and References

References

US Environmental Protection Agency (US EPA, 2016a). Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA). EPA Document Number: 822-R-16-005. May, 2016. Available at: https://www.epa.gov/sites/production/files/2016-05/documents/pfoa_health_advisory_final-plain.pdf

US Environmental Protection Agency (US EPA, 2016b). Health Effects Support Document for Perfluorooctanoic Acid (PFOA). EPA Document Number: 822-R-16-003. May, 2016. Available at: https://www.epa.gov/sites/production/files/2016-05/documents/pfoa_hesd_final-plain.pdf

US Environmental Protection Agency (US EPA, 2016c). Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS). EPA Document Number: 822-R-16-004. May, 2016. Available at: https://www.epa.gov/sites/production/files/2016-05/documents/pfos_health_advisory_final-plain.pdf

US Environmental Protection Agency (US EPA, 2016d). Health Effects Support Document for Perfluorooctane Sulfonate (PFOS). EPA Document Number: 822-R-16-002. May, 2016. Available at: https://www.epa.gov/sites/production/files/2016-05/documents/hesd_pfos_final-plain.pdf

Footnotes

[1] Commonly known as Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986 is codified in Health and Safety Code section 25249.5 *et seq*.

[2] See Health and Safety Code section 25249.8(b) and Title 27, Cal. Code of Regs., section 25306.

[3] All further references are to sections of Title 27 of the Cal. Code of Regulations, unless otherwise stated.

Cal EPA
- Air Resources Board
- Cal Recycle
- Department of Pesticide Regulation
- Department of Toxic Substances Control
- State Water Resources Control Board

Alerts
- Amber Alert
- Cal Alerts
- My Hazards

About
- Governor
- Lt. Governor
- California Data

Campaigns
- Register to Vote
- Save Our Water
- Flex Alert

Select Language

Exhibit 3

Department of Physical Geography

Stockholm University

Tracking Microplastics from Artificial Football Fields to Stormwater Systems



Ran Li

Master's thesis
Environmental Management and Physical Planning,
30 Credits

MA 67
2019

Preface

This Master's thesis is Ran Li's degree project in Environmental Management and Physical Planning at the Department of Physical Geography, Stockholm University. The Master's thesis comprises 30 credits (one term of full-time studies).

Cooperation with WSP Sverige AB.

Supervisors have been Stefano Manzoni at the Department of Physical Geography, Stockholm University, Lea Levi and Hjördis Steen at WSP Sverige AB. Examiner has been Salim Belyazid at the Department of Physical Geography, Stockholm University.

The author is responsible for the contents of this thesis.

Stockholm, 17 June 2019

Björn Gunnarson
Vice Director of studies

Abstract

Microplastic pollution as a global environment problem in marine systems has substantially raised public concern in recent years. In 2016, the Swedish Environmental Protection Agency performed a study about potential sources and pathways of microplastics spreading to the marine environment. Microplastics from artificial turfs have been recognized as the second most important source of microplastic emission in Sweden. Between 1640 to 2460 tons per year of microplastics are estimated to be lost from artificial turfs. The lost microplastics are potentially transported to stormwater wells by runoff during rainfall events, eventually reaching marine environments. This study aims to track microplastics from artificial turfs to stormwater wells.

Since the research of microplastic in stormwater has so far shown to be limited, field work and laboratory analysis have been developed in this study. Four artificial football fields located in Stockholm municipality were taken as sampling sites. First, pathways for microplastics from artificial turfs to stormwater were investigated. Second, the characteristics of microplastic granulates infill used in the football fields have been analyzed. Finally, stereo microscopy was used to visually identify microplastics in stormwater.

The results showed that rainfall as a driving force of runoff process contributes to microplastics transport from artificial turfs to stormwater. During this transport process, a fraction of microplastics is captured by the soil. The size of microplastic granulates identified not only in stormwater but also in stormwater sediments is typically between 1 mm to 3 mm. Due to its limitations, stereo microscopy is quite a subjective method for identifying microplastics and thus not suitable for quantitative analysis, since microplastic particles are comparable in size to and visually difficult to differentiate from organic particles co-occurring in stormwater.

In order to accurately quantify the amounts of microplastics transported to stormwater systems from artificial turfs, it is necessary to develop new methods for microplastics identification. This study presented an attempt in this direction, highlights its limitations, and discusses more suitable alternatives.

Key words: microplastics, artificial turfs, stormwater, runoff, rainfall, Sweden.

Acknowledgements

First and foremost, I would like to thank my internal supervisor Stefano Manzoni at the Department of Physical Geography for his professional guidance and creative suggestions. Thank you for encouraging me to overcome difficulties with your patience and efficient support. I would also like to give big thanks to my external supervisors Lea Levi and Hjördis Steen at WSP Sverige AB, for providing me with this interesting project and putting so much efforts in this research procedure. A special thank you to Veronika Köhler from Extrakta Strauss GmbH for analyzing samples and providing photos under microscopy in Germany. Deeply warm thank you to Lennart Nylund, it was a great pleasure to do field works with you no matter weekends or rainy days. Thank you Martina Hättestrand, for the possibility to use the laboratory and equipment support at the Department of Physical Geography.

This master thesis would not be completed without support from companies and municipalities. I would like to thank WSP Sverige AB as a company for providing me with this master thesis possibility as well as financial and professional support, place and tools for executing the field work and my thesis. Thank you Stockholm Vatten och Avfall, Stockholm Stad, Stockholms Stad fastighetskontor, and Stockholms stad idrottsföryaltning, for giving me permission to take stormwater samples. Thank you ALS Scandinavia AB, for providing me 20 dark glass bottles for free and inviting me to laboratory visit.

Last but not least, I would like to thank my family and dear friends. Thank you for supporting me to study abroad and always being there to listen my stress and calm me down. Without your support, I would not be so brave to do my master at Stockholm University. Thank you!

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1 Introduction

Over the past half century, the production and application of plastics has exponentially increased, which has resulted in large amounts of plastic litter directly discharged in water bodies, particularly into sea (IVL, 2017). Plastic production in the world increased from 1.5 million tons in the 1950s to 335 million tons in 2016. Approximately 10% of the plastic produced annually ends discharged into the marine environment (Alimba & Faggio, 2019). Large pieces of plastic litter can further be degraded into very small pieces (less than 5 mm) of plastic, which are abundant in aquatic ecosystems.

Small plastic particles in aquatic environments were first taken into consideration in the 1970s after quantities of small particles were discovered on the surface of the Sargasso Sea (Carpenter & Smith, 1972). The term microplastic was first introduced by Thompson et al. (2004) to describe small plastic particles collected from sediments around Plymouth, UK. Microplastics are now becoming recognized worldwide, with occurrence on the surface of open oceans, lakes, shorelines and sediments, often at exceptionally high concentrations. For instance, microplastics concentration in the main stream of the Yangtze River in China was reported to be up to 1.36×10^7 items per square kilometer and that so far is the highest value noted in the available literature (Zhang et al., 2015). In 2014, the accumulation of microplastics in world's ocean was estimated to 15 to 51 trillion particles, with a weight between 93 to 236 thousand metric tons (Sebille et al., 2015).

Microplastic in the aquatic environment has attracted attention in recent years as a major global environmental concern. In an attempt to raise awareness, National Geographic magazine has published a series of articles on the microplastics crisis, including an eye-catching photo of a green-glowing plastic fragment ingested by a water flea (Royte, 2018). Land-based debris and human activities on the sea and ocean are considered as the main sources of plastic debris. In 2015, the Swedish Environmental Protection Agency has been assigned to identify Swedish sources of microplastics in the sea and propose measures for their reduction and handling. According to the study done by Swedish Environmental Institute IVL (2017), the largest emissions of microplastics in Sweden are released from road wear and abrasion of tires. The same study has reported artificial turfs as the second largest source of microplastics, and drew attention to further investigations of spreading of microplastics from artificial turfs.

The use of artificial turfs as substitutes for nature-grass playgrounds has become more and more popular in the recent years. Loss of microplastics from artificial turfs was estimated to be around 1640-2460 tons per year, however the data about loads reaching the marine environment are scarce (IVL, 2017). Microplastics from artificial turfs are discharged to stormwater during precipitation events which can be then recognized as a pathway of transporting microplastics to marine environment, but the

volumes are still estimated with high uncertainty (IVL, 2017). Stormwater as a pathway transfers microplastics further to aquatic environments having an influence on its organisms, ecosystems as well as human health. In order to better understand environmental impacts of microplastics from artificial turfs it is necessary to improve knowledge about pathways of their spreading and loss that occurs on their way to stormwater. This master thesis aims to investigate possible methods for tracking microplastics from artificial turfs to stormwater networks.

1.1 Microplastics

1.1.1 Definition of microplastic

In general, microplastic is defined as any piece of plastic smaller than 5 mm to 1 µm in size along its longest dimension (Crawford & Quinn, 2017). The majority of materials in microplastics include polyethylene (PE), polypropylene (PP), Polyvinylchloride (PVC), polyethylene terephthalate (PET), polystyrene (PS), and polyamide (PA) (Bannick et al., 2019).

Microplastics can be divided into two categories according to their origins. Primary microplastics are intentionally produced as raw materials which are used as abrasives in applications such as cosmetics, personal caring and cleaning products (Crawford & Quinn, 2017). Many primary microplastics are released directly into the aquatic environment. Secondary microplastics are unintentionally produced by deriving from large pieces of plastic debris (Crawford & Quinn, 2017). An important group of secondary microplastics can be formed through fragmentation of plastic items as a result of solar ultraviolet light and mechanical means such as tidal waves. They may also be produced during washing of synthetic clothes, construction works or maintenance of plastic items.

Several studies on microplastic sources from Sweden and Norway have defined microplastics as a broad and general term without reference to a specific term (Sundt, et al., 2014 & IVL, 2017). Sundt et al. (2014) use term microplastic when referring to a wide range of particles including solid polymer particles and synthetic organic particles. In this study, ‘microplastic’ is used as the broad definition including ‘microplastic products’ that follows the same practice as in Sundt et al. (2014) and Magnusson et al. (2017). ‘Microplastics’ in this study includes petroleum by-products, man-made polymers, as well as synthetic rubbers e.g. EPDM (Ethylene Propylene Diene Monomer), silicone and polyurethane (Sundt, et al., 2014).

1.1.2 Sources of microplastics in Sweden

In order to reduce microplastics in the marine environment, in 2015 the Swedish Environmental Protection Agency was assigned to identify the sources and pathways of microplastics release in Swedish marine environments (IVL, 2017). Microplastics present in the sea come from various land and sea sources, and reach the sea through

different pathways such as transport in natural water bodies, stormwater effluents, or as fragments from plastic litter.

Microplastic derives from land-based sources contributes about 80% of the total microplastic emission, which is higher than that from sea-based sources (Andrady, 2011). According to the research from IVL Swedish Environmental Research Institute, the primary source of microplastics in Sweden derives from roads and tires, and the second from artificial turfs (IVL, 2017). Other sources of emission include industrial production and handling of plastic pellets, synthetics washing, boat hulls and littering. However, the contribution of the microplastic load in the sea is not only depending on the sources of emission but also on their pathways towards the sea. Microplastics can be retained in the pathways, for example microplastics produced by laundry will be retained by water treatment plants.

Pathways of microplastics reaching Swedish coastal waters are via wind transport, stormwater, and water treatment plants as well as those that are directly discharged from ships (IVL, 2017). However, it is difficult to identify the percentage of microplastics transported to marine environment from different sources due to scarcity of quantitative data. Hence, currently the total microplastic discharged by Sweden to the sea cannot be estimated.

1.1.3 Environmental impacts of microplastics

Considering the small size of microplastics, the risk of it being ingested by wild-life is high. Microplastics in the marine environment can be ingested passively or actively by a wide range of organisms from small invertebrates to large mammals. Schmid et al. (2018) found that 13.7% of 14 fish species from Amazon River estuary carries microplastics. Ingestion of microplastics affects life activities such as feeding, digestion and reproduction, and even leads to mortality directly by entanglement and choking, especially in fish in larval stage (*ibid*). Microplastics ingested by primary consumers can be accumulated through marine food webs and thus ingested by secondary consumers (do Sul & Costa, 2014) including humans. In addition, microplastics have the ability to concentrate a considerable amount of waterborne toxic pollutants, which exacerbates toxicological hazards to marine organisms along ingestions (Wang & Wang, 2018).

Microplastics not only have an impact on organisms individually, but also effect ecosystems negatively at various levels. Microplastics accumulate in the sediments, where small organisms such as lugworm have non-selective feeding. Sediments with microplastics ingested by these small organisms could reduce the primary productivity and energetic reserves and thus have influence on benthic habitat structure (Guzzetti et al., 2018). Moreover, microplastics in marine environment have potential impact on nutrient cycling and ecosystem functioning. Zooplankton as a pivotal role in nutrient cycling is vulnerable to microplastics ingestion. Microplastics ingested by zooplanktons could decrease the density and velocity of their faecal pellets (Cole et al., 2016). The vertical movement of these faecal pellets is important

for transportation of carbon, nutrients and organic matter, which are an important part of food production chain and carbon storage in oceans (Turner, 2015).

It is now well-known that microplastics can be accumulated in different ecosystems and transferred within food webs (Carbery et al., 2018). With everything mentioned above it is indicative that high concentrations of microplastics pose risks for human food security. Animals of commercial interest such as fish and shrimp containing microplastics could be consumed by human as seafood, which is a potential route for human exposure to these particles (Barboza et al., 2018). Even though microplastics have been observed in several seafood products, the adverse effects of microplastics on human following ingestions are still not well understood (Wright & Kelly, 2017). Thus, subsequent long-term effects of microplastic on human health should be researched further.

1.2 Microplastics from artificial turfs

1.2.1 Characteristics and use of artificial turfs

Artificial turfs are surfaces made of synthetic fibers with the characteristic of natural grass fields, and the technology has developed in four generations (***Figure 1***). In the late 1960's the first-generation artificial turfs with polyamide (nylon) began to be used as playing surfaces. The second-generation brought polypropylene straw and sand as a replacement applied from 1977 to 1995. With the development of artificial turfs, the third-generation artificial turfs with polyethylene and different fillings used today are more similar to natural grass (Twomey et al., 2018). The fourth-generation was introduced in 2006, which are made by polyethylene complex, sand and pad. Artificial turfs have the advantages of stability, safety and weather resistance. Hence artificial turfs are more and more popular to be used in football arenas, playgrounds and sports fields in recent years.



Figure 1 The development of artificial turfs. (source: NTNU, 2018)

During the last ten years, the construction of artificial turf fields has increased in Sweden. According to IVL Swedish Environmental Research Institute there are approximately 1336 artificial turf fields in Sweden in 2016, in which 50% are artificial football fields with 7140 m^2 for 11 players (IVL, 2017). The total area of artificial turf fields in Sweden is estimated to around 6,056,580 m^2 (*ibid*). However, the number of new large artificial football fields in Sweden has recently been declining after the rapid development in last decades, while construction of small sports fields made of artificial turfs, with size of around 800 m^2, is increasing rapidly in recent years (*ibid*).

The life span of artificial turf is within a range of 8 to 15 years depending on the using frequency and maintenance (IVL, 2017). Components of artificial turfs could be degraded due to sunlight, water and wind, so artificial turfs reaching their life span should be disposed of. Landfilling as the default disposition for scrap rubbers has been banned in EU countries since 2006 (Cheng et al, 2014). At present, in some cases the spent rubber is used as fuel supplement for heating, although toxic emissions would be released during burning. However, a potential solution is to move life spanned artificial turfs to smaller football areas or recycle them for new artificial turfs.

1.2.2 Characteristics of microplastic granulates

Artificial turfs generally consist of different layers of straws, rubber granulates and crushed stones as shown in ***Figure 2*** (Fleming et al., 2015). The top layer of an artificial turf is made of straws with a mixture material of polypropylene (PP), polyamide 6, polyolefiner, and polyurethane (PUR) (Wredh, 2014). Straws with the length of 3-6 cm are typically filled with sands and rubber granulates, in order to make the straws stand up (IVL, 2017). Materials of rubber granulates vary depending on the design of the surface, and the size of granulates varies from 0.8 mm to 3 mm (Bujak, 2018). There is a rubber pad layer below the straws, which promotes shock absorption and reduces the risk of injuries. The bottom layer is made of crushed stones which are underlain by soil.

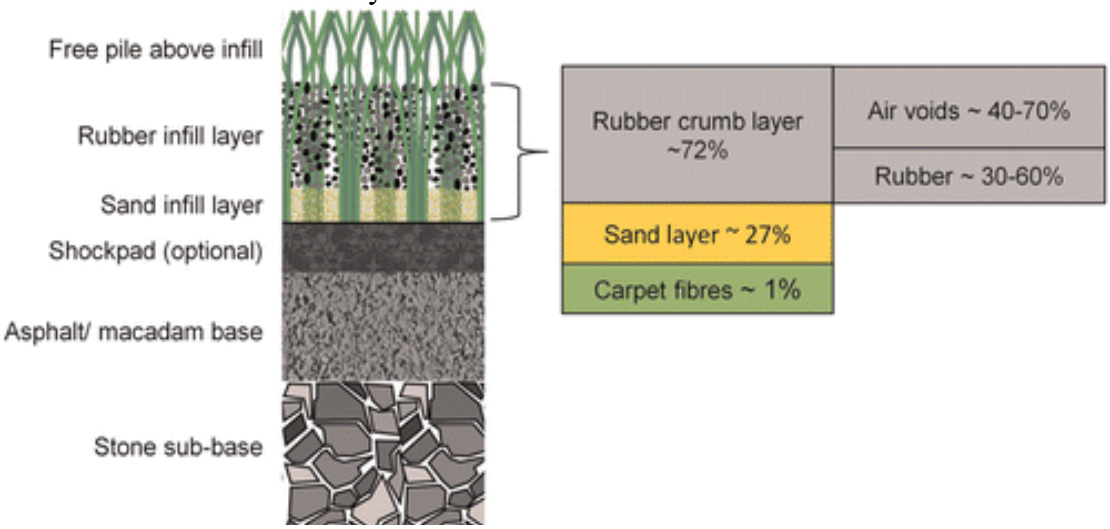

Figure 2 Structure of the third-generation artificial football field. (Fleming et al., 2015)

Rubber is an important filling material for artificial turfs, and its main function is to provide shock absorption and desirable playing characteristics. The amount of rubber infill for an artificial turf depends on the size and function of the field, as well as the type of rubber. An 11-player artificial football field of 7881 m^2 can contain 51 to 87 tons of rubber granulates (Magnusson, 2015).

Traditional rubber fillers consist of three types of granulates, which are styrene butadiene rubber (SBR), thermoplastic elastomer (TPE) and ethylene propylene diene (EPDM). In recent years some other organic fillers such as cork and coconut have been used as alternatives (Fjordefalk, 2018). However, the applicability of these organic fillers is still in the investigating stage.

SBR granulates are rubber from recycled tires, and they in the past they were the most popular filling material previously due to the low price and good properties (Bujak, 2018). SBR granulates with the size of 0.5 to 2 mm are resistant to acid, alkali and alcohol. However, SBR has been found containing black carbon and zinc oxide which can cause environmental hazards as well as negative influences on human's health (Magnusson, 2015). Hence, other granulate materials such as EPDM and TPE are becoming more popular in recent years. EPDM is a kind of new manufactured industrial rubber with high resistance to sunlight and heat, which is particularly suitable for outdoor environments (Wredh, 2014). TPE is made of a mixture of plastic and rubber with the size of 0.5 to 4 mm. TPE is an environmentally friendly alternative as it can be recycled with melting and reforming (Gustafsson, 2017).

1.2.3 Loss of microplastics from artificial turfs

Environmental risks associated with artificial turfs have been recognized in recent years. Wear and tear of the artificial turfs result in the loss of rubber infill. IVL estimated that artificial turfs in Sweden lose between 0.28 and 0.42 kg of rubber per m^2 per year on average, amounting to a total of 1640-2460 tons of infilled granulates lost per year, which has therefore become the second source of microplastics after tire wear (IVL, 2017). Loss of infilled granulates can be removed via people's shoes and clothes, melting of snow cleared from the field, drainage, as well as through runoff. Microplastics taken away by shoes and clothes may end up in the water treatment plants after washing the clothes. During snow melting, microplastics can spread outside the artificial turfs. In addition, microplastics lost from artificial turfs through the mentioned pathways are reaching stormwater, which is further reaching marine environments. However, it is uncertain how much of the lost microplastics are transported eventually by stormwater since data on microplastic content in stormwater are scarce.

Filtration methods are now being applied, in order to capture microplastics lost from the artificial turfs and reaching the stormwater. Setting filter bags into stormwater wells is an effective way to capture granulates from artificial turfs. Filter bags are fixed with granulate traps, and held in the well by means of clamping rings and guide plates (***Figure 3***). Filter bags with 0.4 mm pores can capture particles larger than 0.4

mm and at the same time water can flow through the filter bag to the well. Granulates captured by filter bags can be collected and returned to artificial turfs as reused infill, which could therefore reduce spread of most microplastics. Microplastics that are smaller than 0.4 mm cannot be captured by filter bags, and can still flow through pores into stormwater.



Figure 3 Granulate Trap with Filter Bag. (source: Unisport, 2018)

1.3 Microplastics in stormwater

Due to the different ways of microplastics loss including the loss from artificial turf fields, stormwater may accumulate numerous microplastic particles. The amount of microplastics present in stormwater depends on the design of artificial turfs and the availability of filtration appliances (Fjordefalk, 2018). Although some filtration systems have been introduced in several municipalities of Sweden, their effectiveness is still uncertain as the information of microplastics in stormwater is lacking. Therefore, increasing research on microplastic fate in stormwater is necessary to assess the spread of microplastics from artificial turfs as well as designing reasonable mitigation measures.

In order to better understand environmental impacts of microplastics, a number of studies have focused on monitoring quantity and quality of microplastics in freshwater systems and aquatic environments during the last few years (Wang & Wang, 2018). However, studies on microplastics in stormwater are fewer than those in freshwater systems and aquatic environments. Recently, a few theoretical studies have assessed methods for microplastic identification in stormwater from artificial turfs. Methods of quantitative analysis of microplastics from artificial turfs are at the beginning stage of development, and applied projects are quite limited. IVL Swedish Environmental Agency has researched microplastics in stormwater sediments from artificial turfs in 2019. Stereo microscopy has been used as technique to quantify microplastics. Research Institutes of Sweden (RISE) started sampling stormwater with

pumps to identify microplastics from artificial turfs in 2019. ICP-MS, FT-IR and electron microscopy were used as techniques in their quantitative analysis. Practical research is less and quantitative estimation is still scarce.

Hence, in this study, some practical measurements have been used to assess the occurrence of microplastics from artificial turfs reaching stormwater, in order to attain a better understanding of the spread of microplastics from artificial turfs and be able to adapt the filtration methods accordingly.

1.4 Aim of the study

The aim of this study is to investigate the spread of microplastics generated by artificial football fields through stormwater systems. Lacking established protocols for microplastic identification and quantification, a research method to identify microplastics from artificial football fields to stormwater has been designed. Properties of microplastic granulates have been assessed and quantities of microplastic contents in different stormwater wells have been estimated. The research questions guiding this work were:

1) What are the characteristics of microplastic particles from artificial turfs?
2) How are microplastics transported from artificial turfs to stormwater?
3) Is it possible to identify microplastics in stormwater with inexpensive methods?

2 Materials and methods

In order to quantify microplastics that are spread from artificial football fields through stormwater systems, four 11-people artificial football fields in Stockholm municipality (Stockholm kommun, Sweden) were taken as sampling fields. Sampling wells were selected according to topology and distribution of stormwater pipes. Microplastics analysis method was developed with information obtained through literature review. Samples were first filtrated in laboratory at the department of Physical Geography at Stockholm University. Subsequently, the samples were sent to Retch Technology in Germany to identify microplastics under stereo microscopy and Camsizer P4.

2.1 Literature review

In this study, the first step was to research reports published by different environmental organizations and institutions in order to evaluate the current level of understanding of microplastic pollutions caused by artificial turfs. The second step was to read through literature that focuses on analytical methods to identify microplastics. Literature review was performed using databases such as Science Direct, Google Scholar and Web of Science. The search keywords used were: ‘microplastics’, ‘water’, ‘marine environment’, ‘artificial turfs’, ‘environmental impact’, ‘stormwater’.

2.2 Sites description

In this study, four artificial football fields in Stockholm municipality were taken as site fields for taking the samples and in order to study the loss of microplastics that reach stormwater network. All four measurement sites are 11-people football fields with an area of 7881 m^2 and located in west of the capital Stockholm. Their names are: Åkeshovs IP, Bromstens IP, Spånaga IP and Grimsta IP (***Figure 4***). Water samples were taken from downstream stormwater main holes.

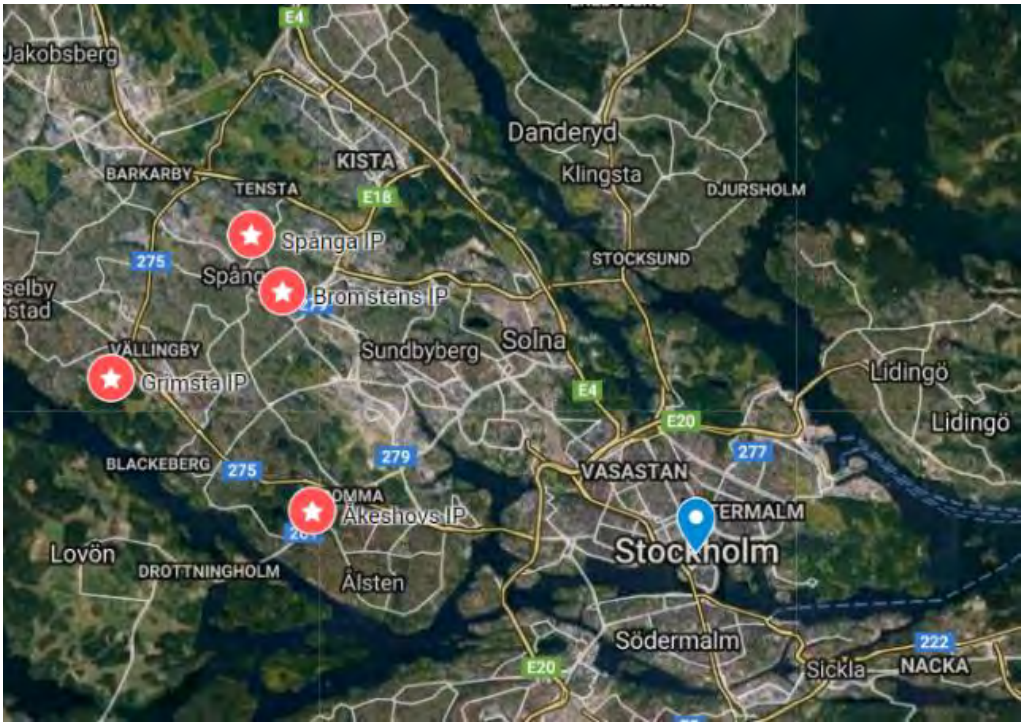

Figure 4 Location of four football fields equipped with artificial turf. (source: Google map)

2.2.1 Åkeshovs IP

Åkeshovs artificial football field is located in the west of Stockholm, 9.3km far from Stockholm centre. Water samples were taken from stormwater wells which are located in the south-east of artificial football field with the lowest elevation 8.14 m (***Figure 5***). The two stormwater wells shown in (***Figure 5***, blue points) are connected to each other. Elevation and flooded areas of Åkeshovs IP is shown in ***Figure 6***. Runoff flows along with the terrain from north (8.62 m) to south (8.14 m). Microplastics from artificial football turf can be transported into stormwater wells by rainfall with the longest route extending over 193 m and the shortest route over 153 m (***Figure 6***).



Figure 5 Satellite map of Åkeshovs IP and location of stormwater wells. (source: Google map)

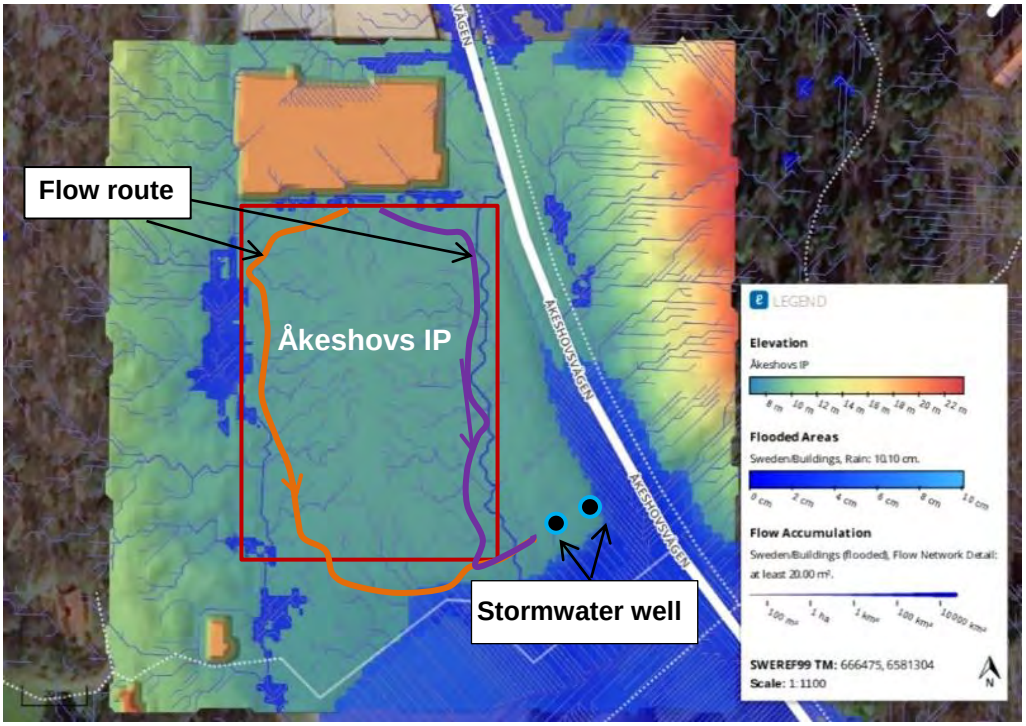

Figure 6 Elevation and flooded areas of Åkeshovs IP. (source: Scalgo Live)

2.2.2 Bromstens IP

Bromstens artificial football field was constructed in 2014, and is located in the north of Sundbyberg, south of Spånga IP. Next to the artificial football field is an 11-people natural grass field (***Figure 7***). The terrain descends from northeast (4.81 m) to southwest (3.65 m). Water samples were taken from two stormwater wells located in the southwest of the area. Microplastics from Bromstens IP could be transported to the stormwater wells downstream by runoff, over a grass-covered football field (***Figure 7***). The longest flow distance is 180 m and the shortest flow distance is 111 m. Elevation of the area and rainfall flow directions are shown in ***Figure 8***. The presence of the grass field might lower microplastic impact at this site by capturing particles in runoff water.



Figure 7 Satellite map of Bromsten IP and location of stormwater wells. (source: Google map)

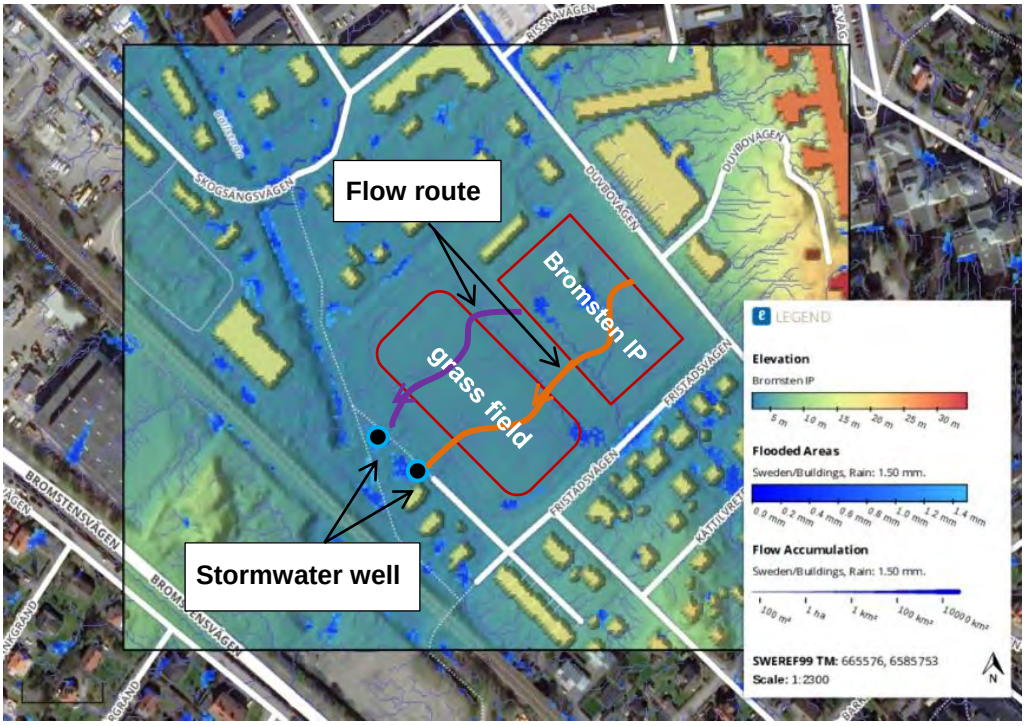

Figure 8 Elevation and flooded areas of Bromsten IP.
(source: Scalgo Live)

2.2.3 Spånga IP

Spånga artificial football turf was inaugurated in 1977 with TPE infilled ranging from 0.5 mm to 2.7 mm. It is located in the north of Sundbyberg, and is a regional facility for football, bandy and athletics. The terrain of Spånga area descends from southwest to northeast. Water samples were taken from two stormwater wells located in the northeast of the area (***Figure 9***). One stormwater well is located in the northeast corner of artificial football field, and microplastic granulates could be observed flowing into this stormwater well directly (personal observation from the site visit). The other stormwater well is 60 m away from the well located in the northeast corner, which is the main well for the whole area. Microplastics from Spånga artificial football field is assumed to be accumulated into the stormwater well located in the corner, and then spread to the main stormwater well. Elevation map and the flow routes of microplastics from Spånga IP are shown in ***Figure 10***.



Figure 9 Satellite map of Spånga IP and location of stormwater wells. (source: Google map)

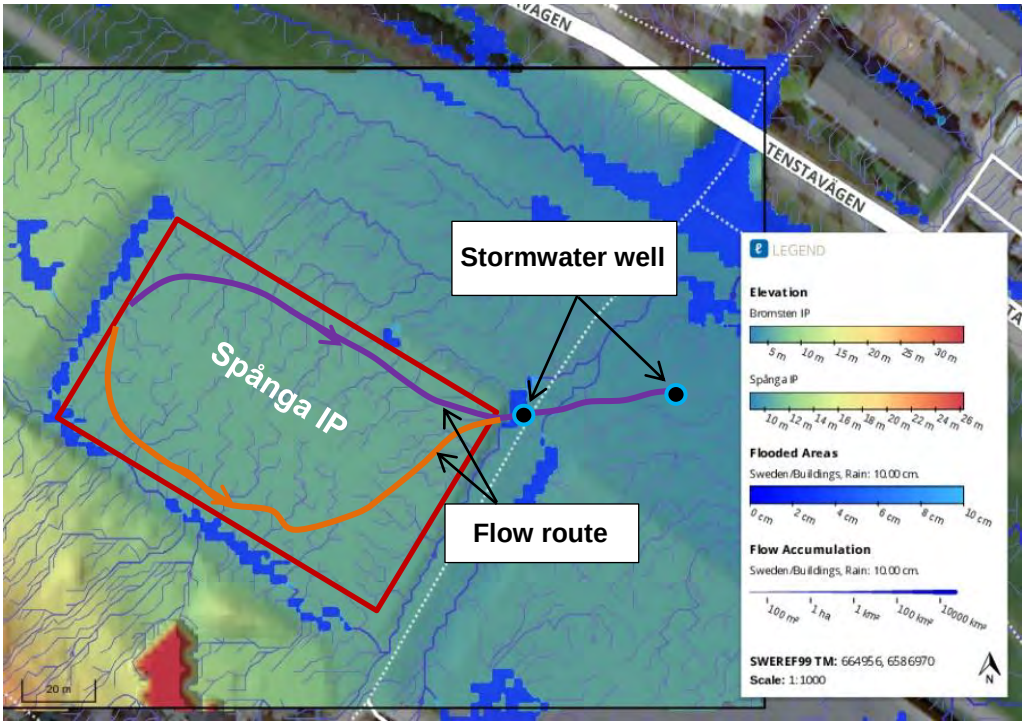

Figure 10 Elevation and flooded areas of Spånga IP. (source: Scalgo live)

2.2.4 Grimsta IP

Grimsta artificial football field is the home stadium of IF Brommapojkarna located in Vällingby. The latest expansion took place between 2015 and 2017 with a total capacity of 5,000 people. The terrain of the area is high in the south and low in the north, with elevation of 19.89 m and 18.02 m respectively. Water samples were taken from one drainage water well located in the northeast corner of the football field, and two stormwater wells located further north with lower elevation 18.02 m (***Figure 11***). The northeast stormwater well is the well that collects water from the basin area. Microplastics from Grimsta artificial football field transport partially to the drainage well through underground pipes. Another part of microplastics transport is carried to stormwater wells by surface runoff. Elevation map and the flow routes of microplastics of Grimsta IP are shown in ***Figure 12***.



Figure 11 Satellite map of Grimsta IP and location of stormwater wells. (source: Google map)

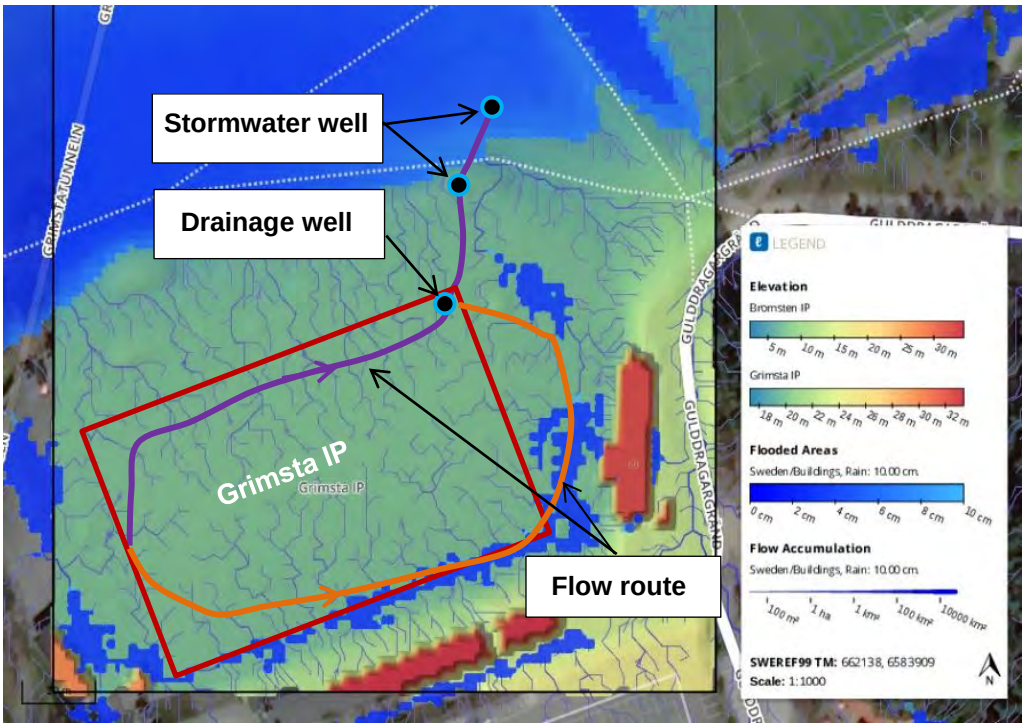

Figure 12 Elevation and flooded areas of Grimsta IP. (source: Scalgo live)

2.3 Sample collection

2.3.1 Granulate sampling

To understand the physical properties of microplastic granulate in artificial turf fields, granulates were randomly collected from the four artificial turf fields. It is important to have in mind that granulates can be damaged by wear and tear of long-term use before entering a stormwater system, or can be degraded into smaller pieces in stormwater itself due to transport. Granulate samples from four sites were artificially fragmented by mortar for five minutes respectively in the laboratory to simulate the wear and tear process, in order to have a better understand of the properties between raw granulates and old granulates. In this study, eight granulate samples are analyzed in total (two for each field; one of raw material and one fragmented).

2.3.2 Water sampling

Distribution of microplastics in water depends on their properties such as shape, size and densities, and environmental conditions such as water density and wind (Prata et al., 2019). The density of microplastic granulates varies between 0.9-1.53 g/cm^3 (Bujak, 2018). Microplastics tend to float on the water surface even though particles have higher density, which happens because air bubbles attached to the particle surfaces can lift the particles to water surface (*ibid*). In this study, samples were taken from surface water with water dispenser, using 500 ml dark glass bottles as containers.

Water samples were taken on the March 13th, March 25th and March 31st respectively from all four sites and under different weather conditions between measuring dates. Each main hole was opened by removing the metal cover lid and expected for the pipe connections within it in order to detect the direction of the flow. Then the water sample was taken from the upstream flow directly from the pipe opening. For collecting water samples, a plastic bottle installed on a telescope stick (***Figure 13***) was used. Samples were stored in 500 ml dark glass bottles and transported to the laboratory.



Figure 13 Lea Levi collecting stormwater. (photo by: Ran Li)

Meteorological data was obtained from Swedish Meteorological and Hydrological Institute (SMHI). Weather conditions are reported in

Table 1 (temperature data from Stockholm-Bromma station and precipitation data from Stockholm station). Precipitation data on March 31st was collected from WSP station located in Gullmarsplan, Stockholm due to data bias from SMHI.

Table 1 Sampling date and time, and meteorological conditions

Sample Time	Temperature (℃)	Precipitation (mm)	Number of bottles
2019-03-13 17:00	2.7	5.3	9
2019-03-25 7:00	1.8	0	12
2019-03-31 9:00	3.9	0.2	17

Water samples were taken from stormwater wells that are connected with the artificial turf fields. Two stormwater wells were selected in each of the artificial turf field. One sample per stormwater well were taken on March 13th, and two samples per well were

taken on March 25th and 31st to avoid contingency. In addition, 100 ml drainage sample was taken in Grimsta on March 13th, and one sediment in the well was taken in Åkeshov on March 31st. No sample was taken from Åkeshov on March 25th because the stormwater wells were dry.

2.4 Sample preparation

2.4.1 Filtration

Filtration is an effective approach applied to separate microplastic particles from water samples by use of a filter medium through which only liquid can pass. The medium utilized for filtration includes a funnel, a filter paper and a vacuum system (***Figure 14***), where microplastic particles can be retained in the filter paper (Crawford & Quinn, 2017). The pore size of the filter paper used in this study is 10 µm, which means in this research microplastic particles with a range from 10 µm to 5 mm could detected. Any particles smaller than the lower limit of the mentioned range could not be detected and thus taken into consideration for analysis. Complications can happen during the filtration process since stormwater samples are contaminated with debris and soils that can clog the filter paper. However, because the volume of water sample is small in this study, risks of blockage is assumed to be avoided.

After the filtration, curved mouth washing bottle was used to wash out particles from filter papers into 50 ml glass bottles. The samples were then dried in a dry-cabinet at 50℃ to evaporate water. Here it is important to note that the main decomposition temperature of microplastic polymers is between 375 and 500℃ (Dümichen et al., 2017). Under condition of 30 to 100℃, water can be evaporated while the polymers would not be degraded (*ibid*).

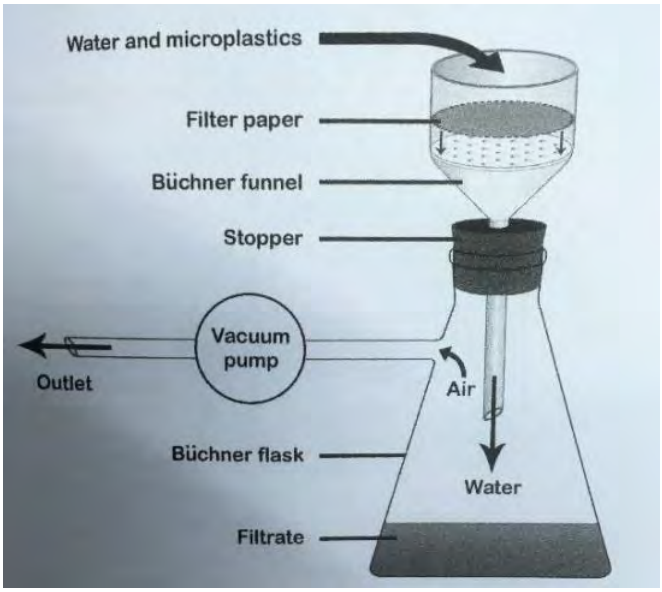

Figure 14 A vacuum filtration system.
(source: Crawford & Quinn, 2017)

2.4.2 Centrifugation

Sediments have been suggested as a long-term sink for microplastics (Van Cauwenberghe et al., 2015). Density separation is a common method to isolate microplastics from sediment samples. Centrifugation was applied in this study to separate microplastics from the sediment sample and in order to research distribution of microplastics in stormwater.

Stormwater samples were filled into centrifuge tubes to do centrifugation with 4000 r/min rotating speed for 4 minutes. In addition, clean water with plastic granulates was centrifuged as blank control. After the centrifugation was done, the supernatant was extracted and dried in the dry-cabinet to obtain microplastic particles.

2.5 Microplastic identification

2.5.1 Visual analysis with stereo microscopy

Stereo microscopy is a variant of optical microscopy designed for sample observation with low magnification. Stereo microscopy can provide three-dimensional erect and laterally-correct image, typically light reflect from the surface of object rather than transmit through it. A stereo microscopy produced by WILD Company with an enlargement up to 40x was used in study to evaluate type and appearance of microplastic particles from water samples (***Figure 15***).

Veronika Köhler from Extrakta Strauss GmbH analyzed and took photos dried water samples with stereo microscopy at laboratory Extrakta Strauss GmbH in Germany. Samples were observed with 6.4x, 16x, and 40x magnification respectively. According to the scale ruler, particles with a size range between 1mm to 5 mm were considered as microplastics. Symbols '○', '+', '++', '+++', '++++' were used to record the quantity estimation of microplastics in different samples. '○' represented zero microplastic were found. '+' represented that several scattered particles of microplastics can be identified in a photo. '++' represented that an amount of microplastics was concentrated in only one part of the photo. '+++' represented an amount of microplastics that was spread in several concentrated areas of the photo. '++++' represented a larger amount of microplastics that almost covered the whole photo. The same indexing was used to analyze the impurity contents of the samples. '○' represented the sample was clean. '+' represented that a few sand and soil were found, and the filter paper was grey (after filtration). '++' represented that an amount of black particles were mixing with microplastics, and the filter paper was black (after filtration). '+++' represented an amount of black particles and some fibers were found, and filter paper was black (after filtration). '++++' represented an amount of black particles and fibers were found, and filter paper was black (after filtration).



Figure 15 Wild M3C Microscopy at Extrakta Strauss GmbH.
(photo by: Veronika Köhler)

2.5.2 Particle size analysis with Camsizer

In this study, Camsizer P4 was used to analyze the characteristic of microplastic granulates from different artificial turf fields. Camsizer P4 as one shown in the ***Figure 16*** produced by Retsch GmbH is a particle sizer for analysis of particle size and particle size distribution in a defined sample. The principles of measurement are laser diffraction and dynamic image analysis. Camsizer P4 works with two cameras and makes 3D pictures for each particle while the sample falls through the case funnel. Eight granulate samples were analyzed with Camsizer P4 by Veronika Köhler at the laboratory Extrakta Strauss GmbH in Germany. Each sample was tested by three times in order to avoid bias and the data used for analysis was the median data.



Figure 16 The Camsizer P4 dynamic image analyzer.
(source: Retsch GmbH)

3 Results

3.1 Pathways for microplastics from artificial turfs to stormwater

At the selected field sites, runoff due to rainfall is a main pathway transporting microplastics to stormwater wells during the summer and autumn, while in the spring microplastic accumulated in cleared snow can be transported by meltwater. Microplastics from artificial football fields spread following the terrain slope to stormwater wells during rainfall. ***Figure 17*** shows the observation of microplastics spread from Åkeshovs IP after rainfall. It can be seen that large amount of microplastics are spread on the road and soils surrounding Åkeshovs IP due to rainfall-runoff process. These microplastics could be transported further downstream by runoff and stormwater system to stormwater wells.



Figure 17 Microplastics spreading route from Åkeshovs IP. In the photographs, microplastic is easily identified as the bright green fragments (photo by: Ran Li).

Microplastics granulates were observed in close surroundings of stormwater wells, which also indicates that stormwater wells are one of the destinations to which microplastics are transported by runoff and where lost part of microplastics from artificial football fields can be found. The stormwater well located in the northeast of the Spånga artificial football field has the shortest straight distance to artificial football field among the four investigated sites, with a straight distance of 7 m (***Figure 9***). ***Figure 18*** shows microplastics from Spånga IP transported to the nearest stormwater well. More microplastic granulates and plastic straws had been collected

in this stormwater well compared to the farther one located 50 m away. Stormwater wells located close to the artificial football fields have higher likelihood of trapping and concentrate microplastics if the topography allows for the runoff to flow through that path.



Figure 18 Stormwater well located in Spånga IP collecting microplastics. (photo by: Ran Li)

Snow clearance removes a large amount of microplastic granulates, which can be an indirect pathway of transporting microplastics to the stormwater system. The cleared snow is gathered around the artificial football field as shown in ***Figure 19***. Microplastic granulates are left as snow melts. This 'microplastic-rich snow' has been observed in Bromsten IP and Spånga IP during field work. Some of these microplastic granulates can spread to stormwater via snow melting and wind transport, but the quantity is uncertain. The remaining microplastic granulates are either recycled as waste or refilled into the artificial football field.

Wind spreading is also one of pathway through which microplastics are transported to stormwater. The amount and exact paths of microplastics transported this way are challenging to observe and quantify. The movement distance and direction of microplastics depend on wind speed and direction. Wind can not only spread microplastics from artificial football fields to stormwater, but also move microplastics from surrounding soils to stormwater. In contrast, grass-covered surfaces trap microplastics as shown in ***Figure 17***.



Figure 19 The 'microplastic-rich snow' located in Bromsten IP.
(photo by: Ran Li)

3.2 Properties of microplastics from artificial football fields

3.2.1 Size distribution of the granulates

Table 2 shows the median size of granulates from four artificial sites. Median size of fragmented granulates is larger than raw granulates. Åkeshov IP has the largest median size of granulates infill, and Spånga IP has the smallest granulates infill. The size of raw granulates is similar comparing between Bromsten IP and Grimsta IP. However, median size difference between raw granulates and fragmented granulates are largest in Grimsta IP. The size difference is 792.3μm.

Table 2 Median size of granulates of the each sample.

Site	Median size of raw granulates (μm)	Median size of fragmented granulates (μm)
Åkeshov	2155.38	2684.82
Bromsten	1702.92	1896.25
Spånga	1638.71	1659.86
Grimsta	1722.92	2515.22

Figure 20 shows the size distribution of the granulates (G) from the four artificial football fields. Value P3 represents the percentage of granulates in different size intervals (blue bars), and value Q3 represents the cumulative sum in percentage (orange lines). All the detected granulates have diameters smaller than 5000 μm (5 mm), and can thus be defined as microplastics. Approximately 90% of the detected granulates are between 1 mm to 3 mm in size, and 1.3% are larger than 3 mm. Granulates with a size of 1 mm to 2 mm account for the highest proportion, especially in Spånga IP and Grimsta IP, where more than 60% of granulates are within that range. The size of granulates from Åkeshovs IP is different compared to the other sites, with 32.4% granulates between 1 mm to 2 mm and 39.5% between 2.3 mm to 3 mm. All granulates from Spånga IP and Grimsta IP are less than 3 mm.

Figure 21 shows the size distribution of the fragmented granulates (FG) that simulate wear under field conditions. The proportion of large granulates in the fragmented samples is higher than that of raw granulates, although all the granulates are less than 5 mm as well. Approximately 81% of the destroyed granulates are concentrated between 1 mm to 3 mm, and 14 % are between 3 mm to 5 mm. In Åkeshovs IP, size of granulates between intervals of 1 mm to 2 mm, 2.5 mm to 3 mm, and 3.1 mm to 5 mm are account for more than 20% respectively. In the other three artificial turfs, granulates between 1 mm to 2 mm in size are dominant; however, the proportion of this size class is smaller compared to raw granulates. It should be noted that fragmented granulates between 3.1 mm to 5 mm are 28% more frequent than raw granulates from Grimsta IP.

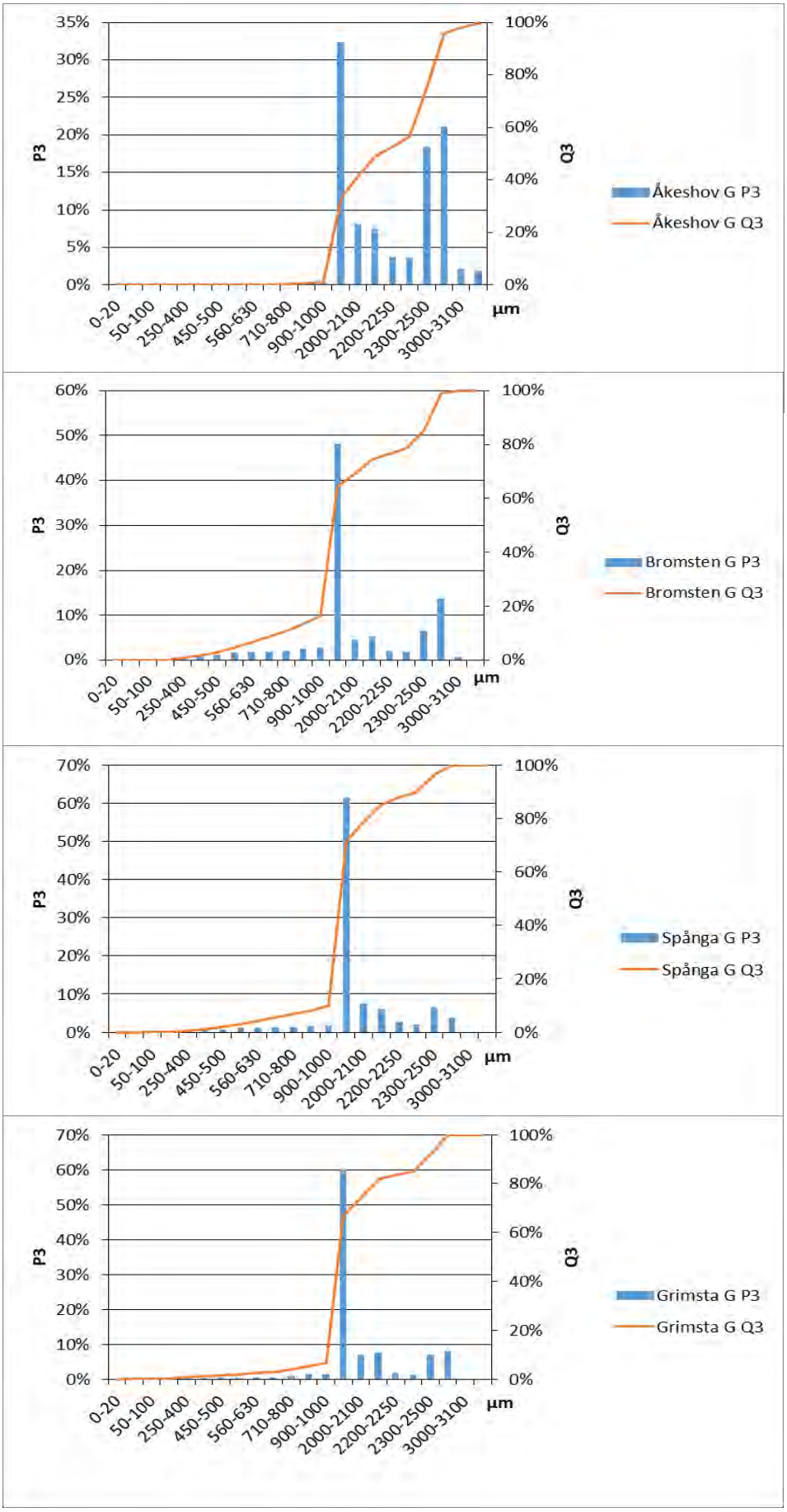

Figure 20 Size distribution of granulates from four artificial turf sites.

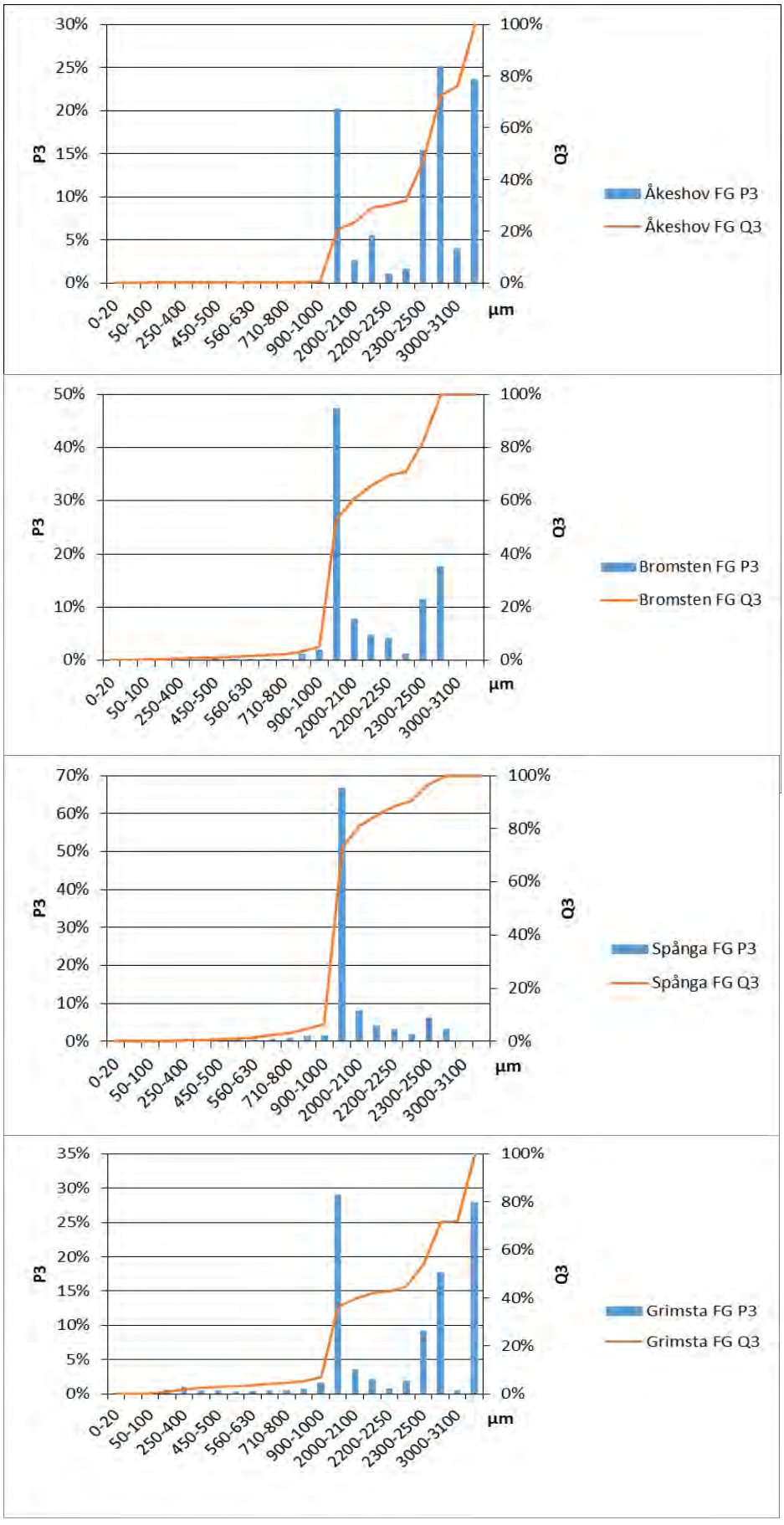

Figure 21 Size distribution of fragmented granulates from four artificial turf sites.

3.2.2 Shape properties of the granulates

Shape of the granulates from artificial football fields is between rectangular and spherical. ***Figure 22*** shows the average spherical index of the granulates, and b/l3 is the shape parameter of the granulates. If b/l3 equals to one it means that the granulates in one size range are perfectly spherical. On the other hand, if b/l3 equals zero it means that the granulates look different from different angles, for example cubic or triangle shape

The median spherical index of granulates from four artificial football fields is between 0.586 to 0.655, which means the shape of granulates is comparable to a sphere, but it also shows some edges. Granulates from Spånga IP are more spherical than those from the other sites. The spherical index of fragmented granulates is higher than that of raw granulates, except from Åkeshov IP. Granulates from Åkeshov IP became more angular after wear, unlike granulates from the other three artificial turfs that became more spherical.

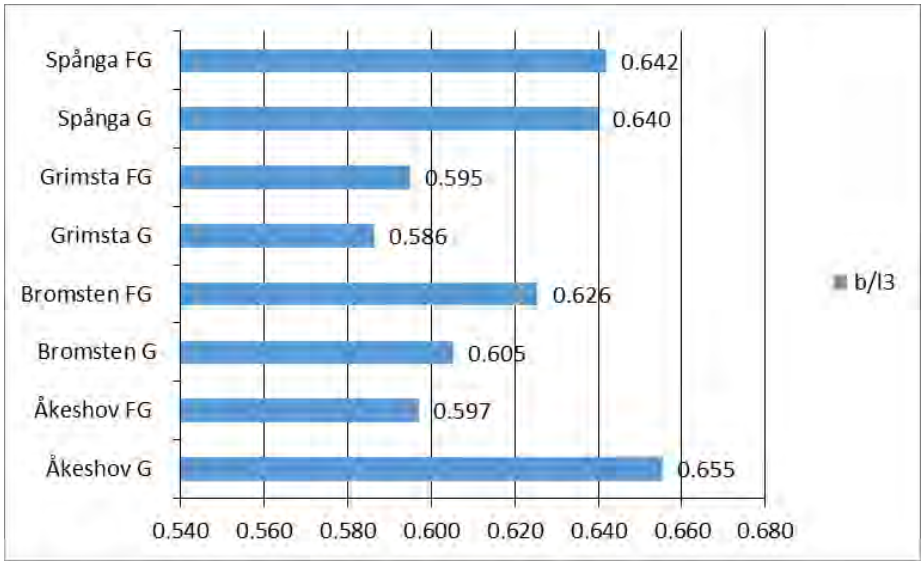

Figure 22 Median spherical index of granulates from different sites and subjected to either no treatment (F) or simulated tear and wear (FG).

3.2.3 Distribution of microplastic granulates in stormwater

In this study, although water samples were taken directly from the flow from a pipe opening into the body of a main hole, there could still be some sediment mixed with stormwater caught within a sample. In order to investigate distribution of microplastics in stormwater, experiments were simulated in the lab.

Distribution of microplastic granulates in stormwater under different conditions shows in ***Figure 23***. Microplastic granulates are floating on the surface of water when they flow into the water as the ***Figure 23a*** shows. In ***Figure 23b*** illustrates how using centrifugation to simulate the shaking process, microplastic granulates accumulated on the bottom. However, if microplastic granulates were added into the stormwater

with sediment, mixed sediments and microplastic granulates can be distributed both on the surface as well as in the bottom, as the ***Figure 23c*** shows.

The simulation experiments illustrate that these microplastic granulates can exist both on the surface of stormwater and in the sediment of stormwater wells. These microplastics could be transported into surface of stormwater by rainfall, and during the heavy rain and wind these microplastics would be mixed into sediments. Hence, once microplastic granulates reach the stormwater wells, they are distributed between the stormwater surface and in the sediments. Since the density of microplastics is similar to organic materials as well as water, separation of microplastics from stormwater is difficult.

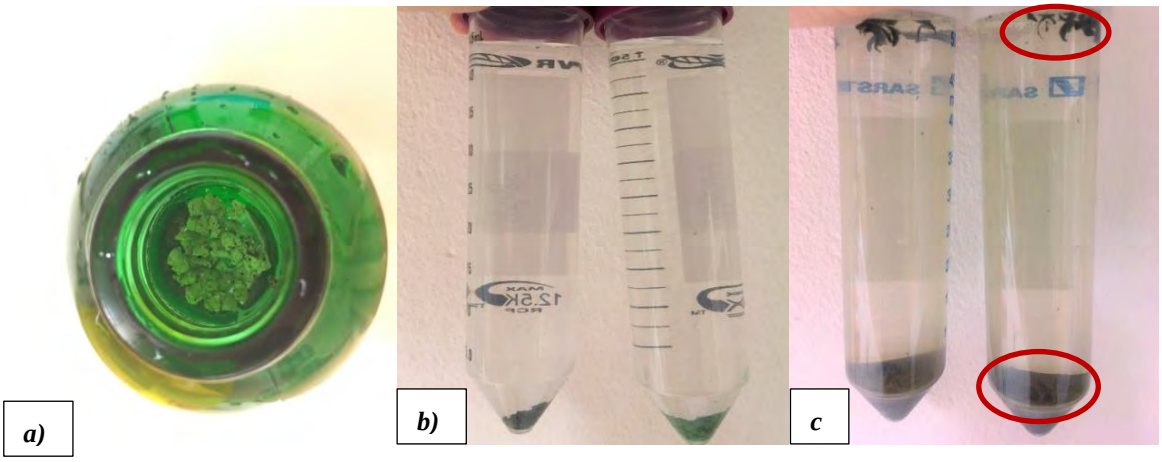

Figure 23 Distribution of granulates in stormwater under different conditions.

a) Microplastics granulates concentrated on the top of stormwater (without centrifugation).

b) Microplastics granulates concentrated at the bottom of stormwater (after centrifugation).

c) Micriplastics granulates present both on the top and at the bottom in stormwater sediments (after centrifugation).

3.3 Identification of microplastics in stormwater samples

3.3.1 Water samples under stereo microscopy

Figure 24 shows dried stormwater samples under naked eyes. After filtration, particles with size larger than 10 µm remain in samples including microplastics, sands, soils, plastic straws and other unknown organic materials. However, the amount of microplastic, sediments and other materials in samples from different sites is different. For instance, microplastic granulates and artificial grass straws can be seen by naked eyes in Spånga samples, but Grimsta samples are clean and nothing can be seen.

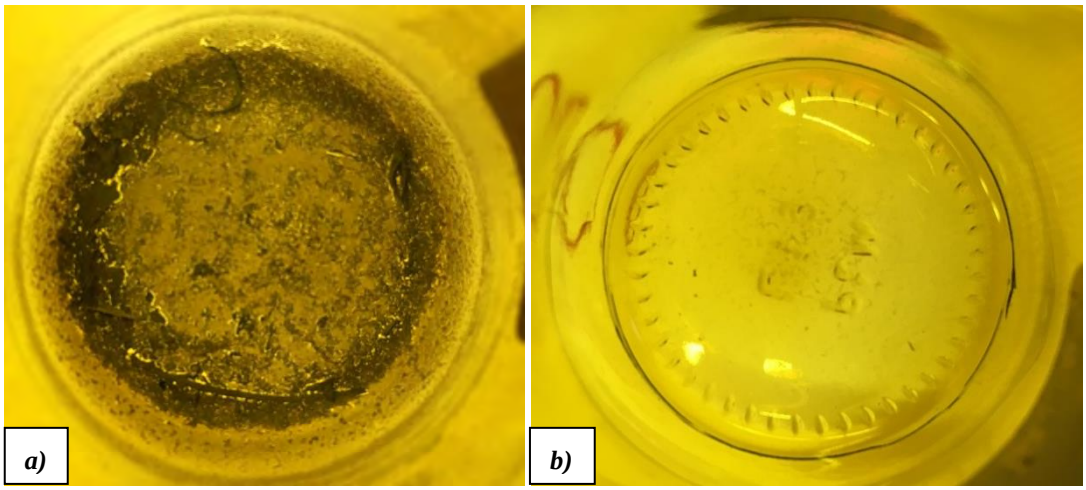

Figure 24 Dried stormwater samples under naked eyes. (photo by: Veronika Köhler)
a) *Spånga sample (3-31); b) Grimsta sample (3-31)*

Figure 25 shows the pictures of a water sample under stereo microscopy with different magnification. Greenish particles are found under microscopy, which could be identified as microplastics subjectively. However, stereo microscopy cannot identify microplastics quantitatively since large amount of fibrous material (possibly roots) and soil are mixed and intertwined with microplastics. Soil and sand with microplastic dimensions could be easily be mistaken as microplastics. Fibrous materials are found in all analysed water samples, though their origin is unknown. The presence of these fibres has influenced the identification of microplastics.

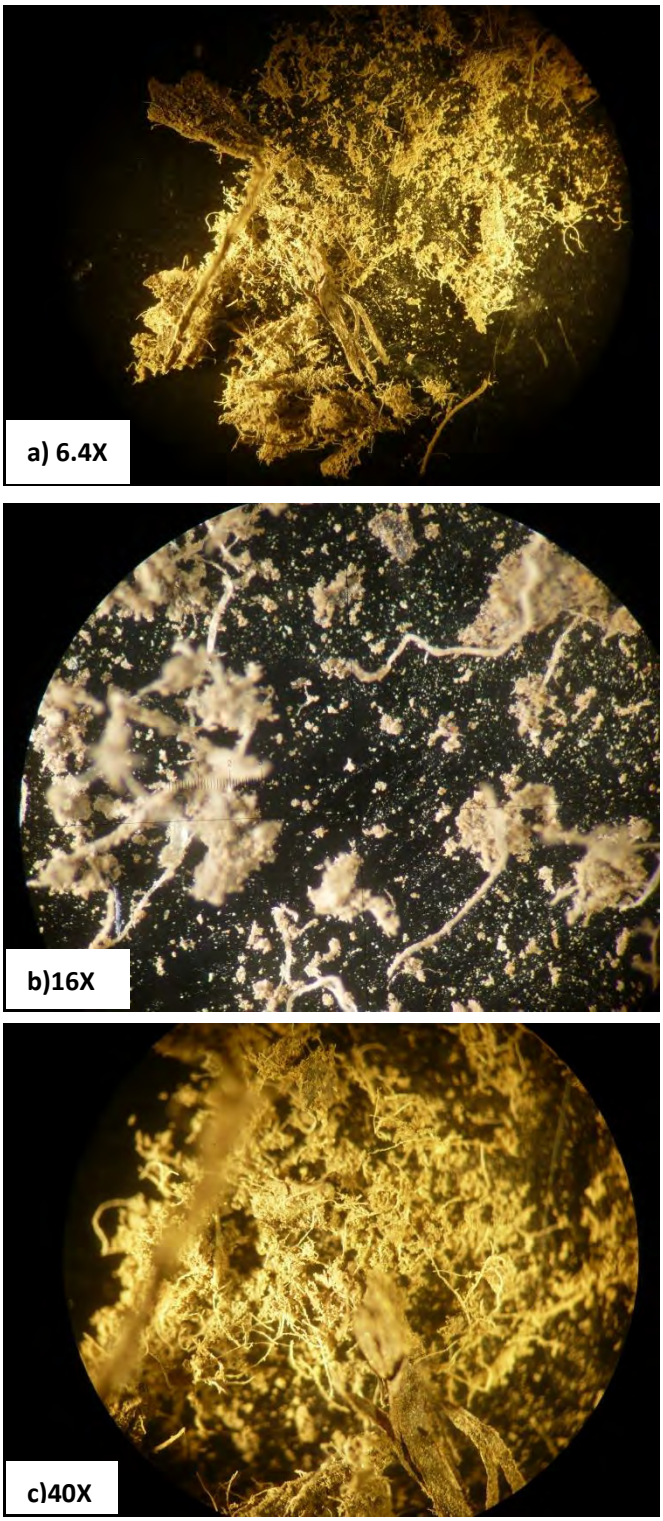

Figure 25 Spånga sample (3-31) under stereo microscopy with different magnification (6.4x, 16x and 40x). (photo by: Veronika Köhler)

3.3.2 Occurrence of microplastics in stormwater samples

According to the pictures of water samples under microscopy, ***Table 3*** and ***Table 4*** indicate microplastic content and impurity in different stormwater samples respectively. 'SW1' is the stormwater well closer to the artificial turf and 'SW2' is the stormwater well further away. '+' is used to indicate the microplastic and impurity content in samples (additional '+' allow a qualitative ranking of the samples); '○' means zero microplastic or zero impurity in samples.

Microplastic content is similar to impurity content. Stormwater wells with high impurity content have also higher likelihood to have more microplastics. In the study of eight stormwater wells, stormwater well 1 from Spånga IP (located in the northeast) has the highest microplastic content, as well as stormwater with highest impurity based on my visual identification approach. Stormwater wells located close to the artificial football fields are more likely to contain high microplastic content, as found in samples from Spånga IP and Grimsta IP (***Table 3***). Microplastic contents are similar for the two stormwater wells in Åkeshovs IP and Bromsten IP, possibly because the two stormwater wells are located close to each other (distances are 5 m and 30 m respectively).

In addition, microplastic content and impurity content could be influenced by precipitation. It has rained on March the 13th with 5.2 mm (***Table 1***) and stormwater wells in Bromsten IP contained more microplastics on that day compared with the other days (***Table 3***). On March 25th there was no water in stormwater wells from Åkeshovs IP. On March the 31st there was a small rain event (0.2 mm); hence, the results are almost the same as on March 25th.

Compared to stormwater wells, the content of microplastics is higher in drainage wells. Drainage wells located in Grimsta IP shows greenish particles mixed with sediments, which are more frequent than in the stormwater wells. Furthermore, in the case of the same stormwater well sediments contain more microplastics than surface water.

Table 3 Microplastic Content Index in Stormwater Samples

Date	Åkeshovs IP			Bromsten IP		Spånga IP		Grimsta IP		
	SW 1	SW 2	sediment	SW 1	SW 2	SW 1	SW 2	SW 1	SW 2	Drainage
3-13	++	++		+++	+++	+++	++	+	+	++++
3-25				+	+	+++	++	+	○	
3-31	++	++	+++	+	+	+++	++	+	○	

Table 4 Impurity Content Index in Stormwater Samples

Date	Åkeshovs IP			Bromsten IP		Spånga IP		Grimsta IP		
	SW 1	SW 2	sediment	SW 1	SW 2	SW 1	SW 2	SW 1	SW 2	Drainage
3-13	+++	+++		+++	+++	+++	++	++	++	++++
3-25				++	++	+++	++	+	○	
3-31	+++	+++	++++	++	++	+++	++	+	○	

4 Discussion

4.1 Uncertainties, knowledge gaps, and outlook for future work

In this study, the evaluation of microplastics in stormwater was quite limited and was done under several assumptions due to difficulties in extracting microplastics from stormwater and separation from suspended materials (mineral or organic). The size of microplastic granulates from artificial football fields are mainly between 1 mm to 3 mm. However, there are soil particles in the same size range as microplastics (e.g., sand grains), which could be visually identified as microplastics by mistake. During filtration, filter paper with 10 µm mesh could extract all the particles larger than 10 µm, including organic and mineral fragments of various origin, which makes identification of microplastics with microscopy even more challenging and demanding. Nowadays, filtration and density separation are commonly used as separation method, but it is challenging to operate them in practice due to the fact that the density of microplastics is similar to the density of stormwater and that there are organic particles similar to microplastics that can be found in the samples. Moreover, microplastics can be easily stuck within sediments in stormwater. Therefore, new techniques of separating microplastics from stormwater based on the unique characteristics of microplastics need to be developed.

The source of microplastics in stormwater added uncertainty in this study. Although stormwater wells were selected based on the location, topography and data about water system around artificial football fields, these fields are not the only potential source of microplastics. Microplastics could also originate from other sources such as road wear and abrasion of tires. Microplastics found in stormwater samples have possibility to be transported by runoff also from nearby roads. Therefore, unless microplastics in the artificial turfs are marked or unambiguously identified, microplastics collected in stormwater could have originated from other sources.

Transportation of the samples from the field to a laboratory can also increase the uncertainties of the results. A part of microplastics might be lost during the filtration process, because microplastics could be absorbed by filter paper. Apart from filtration, long-distance transportation to a laboratory in another country (in this case Germany) is another risk for microplastics loss. Small microplastic fragments can be easily attached to sample bottles or other surfaces and for this reason the identification of microplastics should avoid long distance transportation.

Due to time and weather limitations, stormwater samples were only taken on three different weather conditions in this study. Even though the small number of samples might not be sufficient enough to draw conclusions about the relationship between microplastic content and weather conditions, they could still be indicative and represent an important step towards assessing microplastics content and behavior in stormwater. In future studies, stormwater samples are suggested to be taken

continuously during the whole year, always following the same protocol to ensure homogenous sample quality.

Since there are interference factors in field measurements, lab simulation experiments could support future studies. For example, it would be interesting to test how turf responds to various types of artificial conditions. Preparing a square surface of artificial football turf and simulating runoff with clean water would help identifying how many microplastic fragments would be lost from artificial football turf. In this way, not only precipitation amounts and intensity could be controlled, but also interference from other particles would be effectively avoided.

4.2 Methods for microplastics identification

In recent years, with the increasing attention on microplastics, the discussion on the identification of microplastics has also increased. Based on experience gained in this work (Section 3.2.3) combined with a literature review (Section 2.1), in this section advantages and disadvantages of available methods for microplastics identification are discussed.

In this study, stereo microscopy was used to identify microplastics, which is an economic and simple method to assess morphological characteristics of microplastics. However, the stereo microscopy has shown to be neither suitable for quantitative analysis nor identification of microplastics from stormwater samples, and the assessment was conducted using an approach that is quite subjective. The challenging and difficult part of this study was to visually distinguish microplastics from other particles of similar size and shape, especially for the samples that contain organic particles (root fragments, plant detritus) as in this study. Hence, spectroscopic approaches are required for microplastic quantitative analysis.

Spectroscopic methods for microplastic identification include scanning electron microscopy (SEM), Fourier-transform infrared (FT-IR) spectroscopy and Raman spectroscopy. SEM is a technique that characterizes surface morphology of microplastics by the interaction of an electrons beam with the sample in order to measure the secondary ions (Rocha-Santos & Duarte, 2015). X-ray radiation can also be detected by scanning electron microscopy. This radiation can be analyzed with a specially designed spectrometer, so-called scanning electron microscopy-energy dispersive X-ray spectrometer (SEM-EDS), which measures the x-ray radiation emitted from the sample. Plastic particles can be separated from organic particles because of the specific, high carbon concentration contained in plastics (Bujak, 2018). SEM-EDS can be used to analyze SBR, EPDM, TPE and plastic straws, providing granulates with light color (*ibid*).

FT-IR microscopy is often used to identify the polymeric composition of the microplastics. FT-IR has the low requirement for sample preparation, and clean-up sample is enough. Microplastic analyses with FT-IR are well established and the results are reliable. However, the equipment and sample processing are expensive and

professional persons are required with data processing. As for microplastic granulates in artificial turfs, FT-IR can only be used for analyzing TPE granulates as well as plastic straws, which is not suitable for SBR and EPDM granulates due to their black and rubber materials (Bujak, 2018).

The technique of Raman spectroscopy (RS) resembles the FT-IR and involves a sample being irradiated with a monochromatic laser that creates vibrations in a molecule. Raman spectra provide information about bonding within the material and about networking structures (Rocha-Santos & Duarte, 2015). Small particles, including even dark particles between 1 to 20 μm can be analyzed by RS with high spatial resolution. Furthermore, RS can fast perform chemical mapping with automatic data collection (Li et al., 2018). However, the analysis by RS is time consuming and although RS can detect type of particles theoretically, the method has not been applied in microplastic identifications yet.

According to the literature review, in recent years FT-IR and SEM are common quantitative methods of microplastic identification in oceans. Since microplastics has been one of the most discussed environmental problems in recent years, and more and more applied studies have been conducted, quantitative identification of microplastics is improving in terms of accuracy, simplicity and economy. However, relatively fewer studies present methods and results on microplastics in stormwater, motivating further research in this area.

4.3 Mitigation measures of microplastics in stormwater

As artificial turfs have been studied as an important source of microplastics, municipalities and research institutes in Sweden have become aware of the environmental impacts of artificial turfs and some mitigation measures have been proposed to decrease the emission or transport of microplastics. On one hand, loss of microplastics can be reduced from the source by regular maintenance of artificial turfs. On the other hand, they can also be captured during their transport along different pathways.

Nowadays the most commonly used artificial turfs are the third-generation turfs with rubber infill granulates, which results in a large amount of loss of microplastics. Loss of microplastics has been observed spreading to the environment through mechanical snow removal, stormwater, and when mixed or trapped in sand. Reducing the snow removal in winter is a simple and effective measure to avoid spreading of microplastics. Matches and trainings can be coordinated between several artificial football fields in winter with an overall booking arrangement in order to reduce snow removal in total. Regular maintenance of artificial football fields can not only increase their life span, but also can be used as a measure to prevent spreading of microplastic granulates. During maintenance, deep-cleaning can help to remove unwanted particles from the artificial turfs and increase available store depth for microplastic granulates. Besides maintenance, reducing the quantities of microplastic granulates used for infill

is a direct way to mitigate loss of microplastics. Lidingö municipality has positive experience of using granulates made of natural materials such as coconut and cork. Some manufacturers have proposed the fourth-generation artificial turf without granulates, which prevents the spread of microplastics from the source. However, the application effect of the fourth-generation products is still under test. In Germany and the Netherlands, eight fourth-generation artificial turfs were replaced after several years due to fiber release (Krång et al., 2019). Recently, a fourth-generation artificial turf has been built in Stockholm with only sand infill, and it has met the expectations of environmentally-friendly requirements (*ibid*). Choice of infill granulates of artificial turfs should be considered based on site conditions, function requirements, price, as well as environment and sustainability.

Technical installations are effective ways to reduce the spread of microplastics through several different pathways. Installation of underlying sealing layers can be proposed to reduce spreading of microplastics. Most artificial football fields are well drained and are opened at the bottom, allowing part of the water to be transported through the drainage pipes while the rest flows directly to the groundwater and from tehre eventually to surface recipient (Krång et al., 2019). Underlying sealing layers should ensure water purification before it flows to drainage pipes.

Filtration installations surrounding stormwater wells are also effective measures to capture microplastics. Some municipalities have installed filter bags in stormwater wells to avoid microplastics reaching stormwater. In general, the pore size of a filter bag is 0.4 mm which can capture ca 99% microplastics from artificial turfs according to the properties of granulates. The filter bags need to be emptied regularly to avoid clogging the trap. Since filter bags are effective and inexpensive installations, they can be widely used in stormwater wells and drainage wells surrounding artificial turfs. However, the capacity of the filter bags and the installed locations should be considered in practice. Besides filtration bags, a filtration well installation is proposed in order to capture smaller microplastics. All the stormwater and drainage water are led to the filtration well (***Figure 26***) with filter materials such as sand, and during filtration not only microplastics but also metals or other particles can be settled before flowing out of the well. In order to avoid clogging, the filtration well should be installed in a bigger well with a balancing function that allows bigger particles to be deposited. However, the filtration well is difficult and expensive to be installed especially for the existing pipe system.

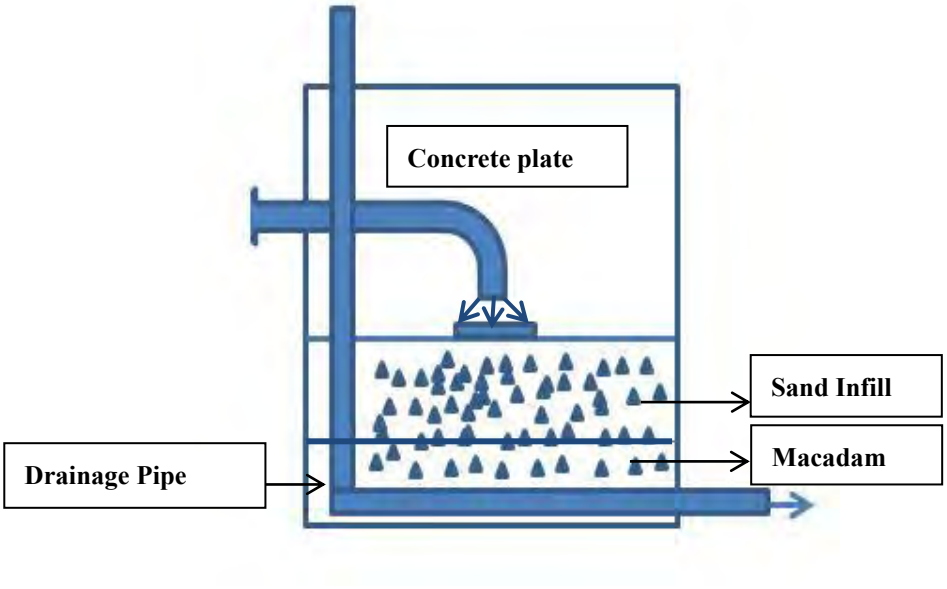

Figure 26 Filtration well installation.
(Reference: Skiss inspired by drawing by Skellefteå kommun)

Microplastics from artificial turfs are generally small and low-density particles, and they are difficult to be separated from sediments once mixed. Hence it is better to capture microplastics before they get transported from artificial turfs. When compared with other existing techniques for preventing microplastics loss, filter bags are the most economical and effective method at present. Based on the available literature data, filter bags are worth promoting as measures to mitigate microplastics entering stormwater. At the same time, the development of alternative material for microplastic granulates is essential as well, since microplastics from artificial turfs could be settled in surrounding soils, which are difficult to be degraded and have persistent negative impact on environment.

5 Conclusions

Microplastics from artificial turfs, as the second source of microplastics in Sweden, have attracted much attention in recent years. Stormwater is considered as one of the most important pathways transporting microplastics to environment and in particular ecologically-sensitive surface water bodies. However, because of challenges in the quantitative analysis of microplastics in stormwater, how much microplastic from artificial turfs reaches the stormwater is still unknown.

Approximately 90% of microplastic granulates from artificial turfs analyzed in this study from the four sites in Stockholm is between 1 mm to 3 mm. The density of microplastics is similar to stormwater and organic materials, and they can exist both on surface and in sediments of stormwater. Thus, microplastics are difficult to be separated from stormwater samples. Further development of method for separation of microplastics is necessary for quantitative studies in the future, because the approach developed here includes subjective evaluations that should be avoided.

Microplastics from artificial turfs flow with runoff along with the terrain slope to stormwater wells by. Stormwater wells located closer to an artificial turf capture more microplastics compared with stormwater wells further away. It has been detected that a certain amount of microplastics get stuck in soils during their spreading through rainfall-runoff process.

Stereo microscopy has shown as limited and rather subjective method for microplastic identification in stormwater samples as quantifying microplastics by naked eyes due to presence of other particles with characteristics similar to microplastics is very challenging process. Thus, the obtained results are more indicative than they could be used for conclusive purposes. In order to quantify microplastics transported from artificial turfs to stormwater, marking microplastic granulates and analyzing stormwater samples with electron microscopy are suggested. At present, although spread of microplastics from artificial turfs has been on the agenda in various municipalities and institutes, research perspectives and practical quantitative investigations of microplastics in stormwater are still scarce or in their initial phases. Hence, it is important to encourage, share and discuss obtained results as well as to cooperate in tracking and quantitatively analyzing microplastics spreading and loss. In this way one can adapt and develop future solutions with the best available technology.

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Exhibit 4


LOCKWOOD
HUNTING
SERVICES

Exhibit 5

FERAL SWINE DAMAGES

Manage the Damage
Stop Feral Swine

What are Feral Swine?

Feral swine, also known as wild pigs, Eurasian boar, or feral hogs, are not native to North America. They were first brought into the United States in the 1500s by early explorers and settlers as a source of food. Repeated introductions occurred thereafter, as well as breeding with escaped domestic pigs. They are a harmful and destructive invasive species whose geographic range is rapidly expanding and their populations are increasing across the nation. Over 6 million feral swine can now be found across more than 35 states.

Why are they a Problem?

The rapid expansion of feral swine across the country, along with the varied types of damage they cause, are creating problems. Feral swine can multiply faster than any other large mammal. Females begin breeding at about eight months and can produce two litters of four to 12 piglets every 12-15 months. Reasons for their expanding range involve illegal movements by people and accidental escapes from fenced facilities. Feral swine cause significant damage to property, agriculture (crops and livestock), native species and ecosystems, and historical and cultural resources. They also pose a threat to the health of wildlife, pets and other domestic animals, and humans. Damages and risks to animal and human health are expected to rise as feral swine populations continue to expand across the country.





Damage to Agriculture

Feral swine damage crops by consuming them or by their rooting, trampling, and wallowing behaviors, which can destroy fields or reduce yield. Field crops commonly damaged by feral swine include sugar cane, corn, grain sorghum, wheat, oats, peanuts, and rice, among others. Vegetable and fruit crops, such as lettuce, spinach, melons, and pumpkins are also attractive to these animals. Feral swine can also impact the regeneration of forests and stunt the growth of trees. Basically, feral swine could turn almost any crop into a meal.

Feral swine can transmit diseases to domestic livestock, resulting in economic losses through decreased production, decreased feed efficiency, lower reproductive success, mortality, and the costs associated with veterinary diagnostics and treatment. Feral swine are omnivorous, meaning they eat just about anything. They have killed calves and lambs, and adult animals are vulnerable to predation while giving birth.

Feral swine damage pasture grasses and consume, contaminate, and destroy livestock feed. Feral swine can also damage farm property, such as fences, water systems, irrigation ditches, troughs, and levees.

Risks to People

Feral swine can carry at least 30 diseases and nearly 40 parasites that may affect humans, pets, livestock, and other wildlife. Feral swine can also pass on bacteria associated with foodborne illness, such as E. coli, toxoplasmosis, and trichinosis. Feral swine collisions with vehicles and aircraft pose major risks to the safety of drivers, pilots and passengers. Feral swine in urban and suburban areas become less afraid of people over time and have been aggressive to golfers, picnickers, and others. This behavior is even more of a problem when they associate people with food because of handouts and improper waste disposal.

Feral swine also may pose risks to pets, either directly through aggressive behaviors or by spreading diseases. Some diseases, such as pseudorabies, are fatal to dogs that are exposed through hunting activities or from eating raw feral swine meat.





FERAL SWINE DAMAGES

Manage the Damage
Stop Feral Swine

Damage to Natural Resources





Feral swine consume large amounts of vegetation. Behaviors such as rooting, soil compaction, and wallowing all pose problems for plants. Consumption of seeds, nuts, and seedlings also reduces the potential for forest growth. Sites disturbed by rooting and wallowing are often vulnerable to erosion and establishment of non-native, invasive plants. In some habitats, feral swine may eat or uproot protected, sensitive, unique, or rare plants.

Feral swine diets overlap with those of native wildlife, which results in competition for important and limited natural food supplies. Mast crops, such as acorns, are a preferred food of feral swine and are also a critical food source for native wildlife. Consumption of seeds, seedlings, and other vegetation reduces the amount of food available for native animals. Feral swine will also eat invertebrates and other small animals, including insects, earthworms, voles, shrews, turtles, amphibians, and ground-nesting birds. Feral swine will destroy nests and consume eggs of reptiles and ground-nesting birds, such as alligators, quail, turkey, and shorebirds. In some areas, feral swine can have negative impacts on threatened and endangered species and their habitats. The preference of feral swine for wet environments also creates competition for limited water resources with native wildlife during dry seasons.

Soil disturbance and vegetation loss associated with trampling, wallowing, and rooting by feral swine increases erosion and associated problems with water quality. Siltation and water contamination in streams and coastal areas with swine activity have contributed to declines in aquatic organisms, including freshwater mussels and insects. In some areas, feral swine have been identified as the cause of elevated waterborne bacteria levels in streams, which can risk human health. The use of contaminated water in irrigating foods marketed for human consumption could lead to outbreaks of foodborne illness.

Feral swine can transmit diseases to wildlife, some of which can be fatal. Feral swine may also cause an increase in mosquito habitat which contributes to the prevalence of avian malaria and avian pox which impacts native birds.



Damage to Property

Estimates do not exist for costs associated with feral swine damage to landscaping or recreational areas. However, homeowners' efforts to improve their properties are often ruined quickly if feral swine are in the area. Destroyed vegetation and wallows reduce the aesthetic value of private properties, public parks, and recreational areas. Feral swine foraging, rooting, and wallowing can damage landscaping, golf courses, recreational fields, cemeteries, parks, lawns, and other natural areas.

On average, adult feral swine weigh from 75–250 pounds with some individual animals weighing considerably more. Consequently, collisions with vehicles such as motorcycles, automobiles, and aircraft can cause substantial damage.

Damage to Cultural and Historical Resources

Cultural sites can be impacted by feral swine and have included national historic sites, tribal sacred sites and burial grounds, cemeteries, and archaeological sites and digs. Feral swine damage can affect the significance and integrity of historic properties through physical disturbance to structures, vegetation, and soils. Foraging and habitat damage by feral swine can negatively impact the distribution and abundance of plants and animals which may be used for traditional purposes.



Want to Learn More?

The United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA, APHIS) is on the front lines in the battle with this invasive animal.

Call your state USDA, APHIS, Wildlife Services office at 1-866-4USDA-WS or go to http://www.aphis.usda.gov/wildlife-damage/stopferalswine to learn more about the problems caused by this invasive animal, and to seek advice and assistance in dealing with feral swine.

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USDA

United States Department of Agriculture

Exhibit 6

WILD PIGS

Integrated Pest Management for Home Gardeners and Landscape Professionals

Wild pigs are not native to North America and were first introduced in California in 1769 by the Spanish missionaries at Mission San Juan Bautista. The missionaries released domestic pigs near the missions in order to take advantage of the rich natural forage resources available. Released domestic pigs that were not harvested or recaptured became feral. Feral is a term that refers to an animal or group of animals that was once domesticated but has since lost its domestic nature and become wild. In the 1920's, Russian wild boars were introduced in Monterey County for sport hunting. Russian wild boar and domestic swine belong to the same species, *Sus scrofa*, (Figure 1) and are able to interbreed without restriction. Wild pigs in California today are descendants of both the released domestic pigs and the Russian wild boar.

Wild pigs are susceptible to at least 30 transmittable livestock diseases and are hosts to over 35 types of parasites. Of the 30 diseases that wild pigs carry, 20 can be transferred to humans. Wild pigs are known to cause extensive damage to crops and rangelands. Additionally, they are known carriers of five major waterborne pathogens that can contaminate drinking water: *Escherichia coli* (*E. coli*), *Campylobacter*, *Salmonella*, *Cryptosporidium*, and *Giardia*.

IDENTIFICATION

Since wild pigs in California today are descendants of both domestic swine and the Russian wild boar, their appearance can vary based on their heritage. Table 1 summarizes some of the physical differences that may be observed between wild pigs and domestic pigs.

LIFE CYCLE, BIOLOGY, AND BEHAVIOR

Wild pigs usually live to be 4 to 8 years old, with high mortality rates among the young and the very old. Full-grown males are usually 200 pounds at adult weight, while full-grown females weigh slightly less and average about 175 pounds. While they can grow larger than this, it is not considered common; and it would most likely occur under artificial supplementation of feed. Once juveniles reach 10 to 15 pounds, predation risk is minimal. Females are sexually mature and can be reproductive at 6 to 9 months of age, although most females are over a year before they have their first litter. Females can have up to 2 litters per year, and litter size can vary from as little as 3 to as many as 18 per litter, with an average litter size of 5 or 6. The size of the litter and the success rate of the young depend on available resources. In areas where food resources and cover are plentiful, litter sizes will be larger and a larger number of pigs will survive. When food resources are scarcer, litter sizes will be smaller; and there will be increased competition between the young for resources. Competition among littermates can be strong, leaving weaker pigs more susceptible



Figure 1. Wild pig, *Sus scrofa*.

Table 1: Physical Characteristics of Wild and Domestic Pigs.

Physical Characteristic	Wild Pigs	Domestic Pigs
Hair	Amply covered with coarse, long hair	Sparse, short hair
Ears	Relatively small and erect	Relatively large and floppy
Tail	Straight, covered in hair	Curly, little hair present
Body	Razor-backed, shoulders higher and wider than hindquarters	Wide body, flat back
Tusks	Long and sharp	Relatively short
Head	Longer snout with flat profile	Shorter snout, concave profile
Color	Mostly black, some pied or russet	Usually white, sometimes russet or pink
Young	Dark with horizontal stripes	Same uniform color as parents

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to disease and predation. Up to 48% of pigs may die within the first year of life.

Wild pigs are very smart and able to adapt and respond to an array of environmental conditions in order to sustain their population. Their fecundity and litter success rates are highly correlated with precipitation amounts. Like many other species during dry years, wild pigs have smaller litters with lower survival rates. During dry years, wild pigs also expand their home range in search of food and water. During years with above average precipitation, wild pigs have larger litters with higher survival rates among the young.

Known for their voracious appetite, wild pigs have a wide and varied diet made up of plant and animal matter. Wild pigs frequently scavenge and will prey upon reptiles, amphibians, and small mammals. Such feeding is indiscriminate; wild pigs will kill and eat whatever is most available or easiest to catch. Wild pigs will even prey upon lambs, full grown sheep, kids (baby goats), and calves. Wild pigs root through the soil to find roots, bulbs, and grubs, and show a strong preference for hard mast crops (e.g., acorns). The monogastric (one stomach) digestive system of the pig is similar to humans; pigs will digest food in as little as 4 to 6 hours. A full grown wild pig will consume about 3% of its body weight per day. However, they are capable of consuming considerably more in a short period of time. For example, one study reported 49 spade foot toads (*Scaphiopus holbrooki*) in the stomach of a harvested wild pig. Another wild pig stomach contained seven voles, two pocket gophers, one woodrat, and three mice. The rapid rate of digestion in the pig indicates that the harvested pigs had consumed the contents of their stomach in the last 4 to 6 hours and also demonstrates the substantial amount one pig is able to consume when binge feeding.

Wild pigs live in matrilineal groups called sounders that are led by a dominant female. While males are nomadic and are known to move about within their home range, females tend to stay in their familial groups with 80% of females remaining with the sounder in which they were reared. Although wild pigs are considered habitat generalists, a few common themes are often observed. Wild pigs like to rest and nest in areas with low growing dense vegetation. Like most other vertebrates, wild pigs need water. Additionally, since wild pigs do not have sweat glands, in hot weather they wallow in seeps and springs to cool themselves. Wild pigs show a dietary preference for a number of plants that grow in riparian areas, so their home range will be dictated by not only the availability of water resources but also proximity to riparian ecosystems, especially in the summer or during dry periods.

IMPACT

Wild pigs impact ecosystems through their rooting, wallowing, foraging, and hunting, with a conservative annual estimate of $1.5 billion in economic damage nationally to agriculture and the environment. They are highly competitive for food resources and have been known to drive cattle away from supplement. Deer are also known to vacate an area, such as a water source, upon the arrival of wild pigs.

Their rooting behavior overturns and tills the soil, uprooting plants, exposing bare soil, and creating opportunities for weeds to invade (Figures 2 and 3). They disturb native and naturalized vegetation and reduce available forage for livestock and other wildlife. Their wallowing disturbs springs and seeps, and they are known to cause damage to stock water troughs by rooting around their bases and undermining the troughs (Figure 4). Their rooting and wallowing behavior also disturbs riparian areas and reduces habitat suitability for native and endangered wildlife species. In urban areas, the rooting behavior of wild pigs can cause extensive damage to lawns and gardens.

The foraging behavior and dietary preferences of wild pigs makes them highly competitive with other wildlife species. Many native wildlife species (e.g., black bear (*Ursus americanus*) and mule deer (*Odocoileus hemionus*)) are highly dependent on hard mast crops, which are known to be a favorite of wild pigs. In years where hard mast crops are small, wild pigs may invade and rob the underground caches of small mammal species. Wild pigs have been implicated in the reduced regeneration of oak trees in California due to their



Figure 2. Wild pig rooting in an almond orchard. The drip irrigation system was most likely damaged as a result of this wallow.



Figure 3. A man sits in a deep hole created by wild pig rooting. Extensive rooting can lead to erosion, loss of forage, and invasion by weedy species.



Figure 4. Wild pigs drinking and swimming in a cattle water trough. The pigs can damage water control valves causing a waste of water resources and may spread disease by contaminating the water supply for livestock and other wildlife species. Direct interaction of wild pigs and livestock can also result in disease transmittance.

rooting behavior and their affinity for acorns. However, it has been proposed that wild pigs may instead facilitate oak regeneration because they do not generally consume all available acorns and may actually "plant" some through their rooting behavior; but there is no scientific evidence to support this theory. In fact, one study found that high density populations of wild pigs led to lower acorn survival.

Wild pigs can be a major nuisance for farmers and ranchers, as they will invade farm fields and eat crops, disturb plantings by rooting through the soil, defecate in fields leaving behind fecal coliforms that may be infectious to humans, and pose a serious risk to human and livestock health by serving as vectors for numerous diseases and parasites. In California, damage from wild pigs can be quite high. One study noted a 6 – 10% loss in revenue in various agricultural commodities when wild pigs are present, while a study in Texas estimated $57 million worth of damage caused by wild pigs to crops annually.

Wild pigs carry five major waterborne pathogens that can be infectious to humans. These five pathogens are: *E.coli*, *Campylobacter*, *Salmonella*, *Cryptosporidium*, and *Giardia*. For example, after the *E. coli* outbreak in spinach from California fields in 2006, *E. coli* was isolated from both cattle and wild pigs. Although the exact source could not be verified, wild pigs were considered the prime suspect. In another study in Texas, six of seven wild pigs tested positive for *E. coli*. Additionally, wild pigs increase turbidity in water sources by stirring up sediment. Turbidity, or the relative cloudiness of water, is a critical factor affecting the survival of waterborne pathogens. As turbidity increases, the survival rate of waterborne pathogens, including *E. coli*, also increases. Further, high levels of turbidity can protect waterborne pathogens during the chemical disinfection process used in water treatment facilities.

Wild pigs pose a significant potential disease threat to humans, domestic livestock, and native wildlife and are hosts to at least 37 parasites that can affect multiple species. Wild pigs can carry potentially devastating diseases to domestic livestock and wildlife including pseudorabies, foot and mouth disease, swine brucellosis, bovine tuberculosis, and classical swine fever. Given the diverse hazards posed by wild pigs, combined with the extreme negative economic impact they often impose, an effective management program is warranted.

LEGAL STATUS

Wild pigs are classified as a game animal by the California Department of Fish and Wildlife, and a license and tag is required to hunt them. If wild pigs are causing damage to property, depredation permits are available for removing nuisance individuals. Unmarked, free-roaming domestic pigs are legally equivalent to wild pigs.

MANAGEMENT

Wild pigs can be managed through small-scale exclusion, trapping, and/or shooting. While recreational hunting is often a preferred method, it is not effective at controlling wild pig population growth. Trapping, however, is highly effective at controlling and reducing wild pig population growth. All methods of control are only effective long-term if adjacent property owners work together cooperatively to reduce population size; otherwise, even the most efficient wild pig removal programs will suffer from frequent reinvasion from neighboring pig populations.

Exclusion

Excluding wild pigs using fencing is an effective option, although it can be expensive. However, if implemented on a small scale, it can be practical. Wild pigs are strong enough to upturn many types of fences and simply go under them by utilizing their natural rooting instinct. If wild pigs are excluded using a fence, it should be monitored closely to watch for signs that the perimeter has been breached. For more information on how to properly construct wild pig exclusionary fences, see the References section.

Trapping

Trapping is a common and effective method of removing wild pigs. There are two types of traps that are most commonly used with wild pigs, box traps and corral traps. Box traps are usually relatively small, about 4′ x 4′ x 8′, and constructed using heavy duty welded framing as well as wire paneling. A door system with a trip wire is used to allow entry but prevent escape from the trap. Some box traps are equipped with what is known as a rooting door, which allows multiple pigs to enter by utilizing their natural rooting tendencies but prevents escape.

Corral traps are generally larger than box traps and designed to capture larger numbers of wild pigs (Figure 5). Corral traps are either round or square, although round traps are recommended over square traps because pigs tend to pile up in the corners of square traps and will climb on top of each other to escape the trap. If a square corral trap is used, it is recommended that the corners be adequately covered to prevent pigs from climbing out. The two basic door types used in corral traps are the same as those used in box traps. Either a drop gate, triggered by a trip wire, is used or a rooting door on springs is used. In the case of the drop gate, the trip wire is generally attached to something of interest to the pigs at the furthest end of the trap from the door. This allows more than one pig to enter in search of food before the trip wire is triggered and the door drops closed. Corral traps are preferred by many because entire sounders can be



Figure 5. Wild pigs in a corral trap.

captured at once, which helps prevent trap education of other wild pigs.

Traps are baited with a number of food substances intended to draw wild pigs in as they search for food (Figure 6). Recommendations include corn, barley, oats, carrion, fruit, and fermented corn or soybeans, although any food that the wild pigs are currently feeding on is a good option. Trapping is considered more of an art than a science, and it may take some time to determine which bait works best. Some have developed mechanical feeding devices, like a 55-gallon drum with small holes that lets bait out. This allows wild pigs to access the bait but prevents smaller, non-target species from consuming bait. Pre-baiting traps can significantly improve the success rate of a trapping program. It is important to ensure a steady bait supply, check traps daily, and check traps from a distance. If trapped pigs are approached, they may become agitated and attempt to escape the trap. Wild pigs are large, strong animals; and traps must be constructed using materials that can withstand the force of agitated individuals. For more information on trapping and how to build and bait traps, see the References section.

OTHER CONTROL METHODS

Shooting is a popular method of controlling wild pig populations; however, recreational hunting alone is not an effective control method. Pressure from hunting will drive wild pigs to move away from where they are hunted or, at a minimum, will restrict their movements. The California Department of Fish and Wildlife maintains a "Guide to Hunting Wild Pigs in California" on their website. It is legal to use dogs when hunting wild pigs under some circumstances. However, it has been found that using dogs is most effective for locating individuals or smaller groups of wild pigs. In some cases, a female pig is trapped, spayed, fitted with a radio collar, and then released. Since female pigs live in groups, the spayed female pig will lead wildlife managers to local pig populations, which can assist population control efforts.



Figure 6. An example of a bait station inside a corral trap.

Chemical Control

There are no toxicants currently registered for use on wild pigs in the United States and there are no known effective repellents. Further, there are no oral contraceptives approved for use with wild pigs.

Eradication

Any eradication efforts should be approached with careful planning and forethought. Eradication efforts are expensive and time consuming; however, they can be successful by implementing multiple control methods. There are two examples of wild pig eradication documented in California. One example comes from Santa Cruz Island where wild pigs were eradicated in 2007 at a total cost of about $5 million. Eradication took about 26 months and 5,036 wild pigs were shot on the 62,000 acre island. Wild pigs were also eradicated from Pinnacles National Monument (now Pinnacles National Park) at a total cost of over $600,000 dollars for 200 wild pigs. This number does not include the approximate $2 million that was spent to install an exclusionary fence to prevent wild pigs from recolonizing the monument. The cost of maintaining the fence is over $50,000 annually.

Obviously, eradicating or even lowering a wild pig population to an acceptable level is quite expensive, difficult to achieve, and difficult to maintain. It should be noted that assistance in wild pig removal can often be obtained from USDA/APHIS/Wildlife Services and some County Agricultural Commissioner's offices. Contact your local County Agricultural Commissioner's office for more details.

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For more information, contact the University of California Cooperative Extension office in your county. See your telephone directory for addresses and phone numbers, or visit http://ucanr.edu/County_Offices/.

University of California scientists and other qualified professionals have anonymously peer reviewed this publication for technical accuracy. The ANR Associate Editor for Pest Management managed this process.

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WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original, labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Pesticides applied in your home and landscape can move and contaminate creeks, rivers, and oceans. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down the sink or toilet. Either use the pesticide according to the label, or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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Exhibit 7

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. See instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property

historic name: Ukiah Vichy Springs Mineral Resort
other names/site number: Day's Soda Springs, Doolan's Vichy Springs

2. Location

street & number: 2701 Vichy Springs Road ☐ not for publication
city, town: Ukiah ☒ vicinity
state: California code: 06 county: Mendocino code: zip code: 95482

3. Classification

Ownership of Property	Category of Property	Number of Resources within Property	
		Contributing	Noncontributing
☒ private	☐ building(s)	6	1 buildings
☐ public-local	☒ district	3	0 sites
☐ public-State	☐ site	4	1 structures
☐ public-Federal	☐ structure		objects
	☐ object	13	2 Total

Name of related multiple property listing: N/A

Number of contributing resources previously listed in the National Register: 0

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ☐ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of certifying official — Date

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of commenting or other official — Date

State or Federal agency and bureau

5. National Park Service Certification

I, hereby, certify that this property is:

☐ entered in the National Register. ☐ See continuation sheet.
☐ determined eligible for the National Register. ☐ See continuation sheet.
☐ determined not eligible for the National Register.
☐ removed from the National Register.
☐ other, (explain:) _____

Signature of the Keeper — Date of Action

Historic Functions (enter categories from instructions)	Current Functions (enter categories from instructions)
Domestic - Camp	Domestic - Camp
Commercial/Trade - Restaurant	Education - School
Recration & Culture - Outdoor Recreation	Recreation & Culture - Outdoor Recreation
Landscape - Natural Feature	Landscape - Natural Feature

7. Description

Architectural Classification (enter categories from instructions)	Materials (enter categories from instructions)
Mid 19th Century - Greek Revival	foundation Concrete
Late 19th & Early 20th -	walls weatherboard
	roof Composition
	other

Describe present and historic physical appearance.

Ukiah Vichy Sprigns Mineral Resort is located on an 82.64 acre parcel which is part of the 790.85 acre remainder of a Resort and Ranch which once encompassed 1400 acres. Located three miles east of Ukiah, the current ranch is divided into four assessment parcels (there are nine legalparcels), all under the ownership of the Vichy Springs Group. The resort parcel contains six historic buildings, the deteriorated remains of three guest cabins, eleven mineral springs, four historic structures, one dam, and a corrogated-metal building constructed in 1978 for the Vichy Springs Mineral Water bottling plant. A dam and natural waterfall are located on an eastern parcel, as is a cinnabar shaft mine at the northeastern corner of the ranch; the westernmost parcel has a stable complex which continues to provide boarding and riding facilities for guests of the resort. (See aerial overview (Photo 1), 1892 lithograph (Photo 2), and 1895 overview (Photo 3)).

The complex of structures and buildings which remain represent each of the major periods of development and almost every facet of life at Vichy Springs Resort. From the earliest period, that of Day's Soda Springs, 1854 to 1867, the Rock Cabin (the earliest building on the property), the Red Cabin, Myrtle Cabin, and both the Vichy and Ardeche bath houses are intact. All but one was originally sided with redwood board and batten and built in the vernacular Homestead style using square nails.

From the Doolan period, 1867 to 1897, only the 1875 Hotel has been lost. (This was more accurately a tavern, since it did not contain rooms for guests' lodging.) Long Row and Short Row, circa 1875, provide excellent examples of the architecture of the resort during this period. The vernacular Greek Revival or Homestead style, the redwood shiplap siding, and the appearance of square nails date and typify these buildings.

From 1897 until 1948, the resort was owned by the Redemeyer family. The structures built by these owners - the Plunge, Water Tank, and falls dam - were constructed in 1905. In 1914, leaseholder Bob Jones made major additions - the New Cabins, the Tent Houses, the Bowling Alley, Club House, and Garage. The bowling alley has survived; remodelled by lease-holder Bob Salsburger in 1936, it was restored to its original appearance by the current owner in 1987. Most cabins were demolished during the Erickson period, 1948 - 1979, when three of the earlier buildings were resided in stucco. The current owners have restored or rehabilitated most

[XX] See continuation sheet

STATE OF CALIFORNIA—THE RESOURCES AGENCY
GEORGE DEUKMEJIAN, *Governor*

STATE HISTORICAL RESOURCES COMMISSION
DEPARTMENT OF PARKS AND RECREATION
POST OFFICE BOX 942896
SACRAMENTO, CALIFORNIA 94296-0001
(916) 445-8006

August 26, 1988

Mr. and Mrs. Gilbert Ashoff
2605 Vichy Springs Road
Ukiah, CA 95482

Dear Mr. and Mrs. Ashoff:

The State Historical Resources Commission sitting in regular session in Santa Ana on August 5, 1988 considered the application for the registration of the Ukiah Vichy Springs Resort, Mendocino County. You will be pleased to know that the Commission recommended registration of this landmark. Landmark No. 980 has been assigned to this site.

The Commission also recommended allocation of an official bronze plaque for the Resort. Upon receipt of your suggested text, sponsoring organizations, dedication date, and shipping instructions, I will be pleased to order the plaque. Please allow eight weeks for casting of the plaque in addition to the length of time for corresponding about the wording.

Thank you very much for your continued interest in our State Landmark Program.

Sincerely,

Sandra J. Elder
Assistant Executive Secretary

0-5896H

SONOMA STATE UNIVERSITY
Department of History
707 664-2313

1801 East Cotati Avenue
Rohnert Park, California 94928

March 16, 1989

Mr. David Koppel
Division of Environmental Health
County of Mendocino
Courthouse
Ukiah, California 95482

Dear Mr. Koppel:

I am writing to express my concern that the City of Ukiah's Draft Application for Solid Waste Disposal Site Permit appears to ignore the cultural resource protection requirements of the National Historic Preservation Act, the National Environmental Protection Act, and the California Environmental Quality Act.

The application, County Solid Waste Management Plan, supporting permits and communications fails even to mention the existence of a recognized historic landmark which will be impacted by the proposed site. To date no environmental assessment meeting either CEQA or NEPA requirements for EIS and EIR has considered the direct and immediate or indirect and long-term impact of the project on the surface or subsurface cultural resources directly South of the project boundaries.

Ukiah Vichy Springs is both a Mendocino County and a California State Historic Landmark. When proposed for landmark status, the existing landfill operation was identified as a threat to the historic resource. The proposed expansion of that operation would, I believe, be an even more serious threat - both to the resort and to the unique spring waters of Ukiah Vichy. This threat is not identified, project alternatives which would mitigate the threat to this cultural resource are neither identified nor discussed, and the preferred project alternative would cause irreparable damage both to the buildings at the resort and to the subsurface springs upon which the resort's 135 year history of continuous operation is based.

Sincerely,

Dennis E. Harris

Dr. Dennis E. Harris
Professor of History

cc: Gilbert Ashoff

DEH:kn

DEPARTMENT OF GENERAL SERVICES
STATE HISTORICAL BUILDING SAFETY BOARD
400 "P" STREET, FIFTH FLOOR
SACRAMENTO, CA 95814
(916) 445-6727

August 5, 1992

Mr. Chuck Rough
City Manager
City of Ukiah
300 Seminary Way
Ukiah, CA 95482

Dear Mr. Rough:

VICHY SPRINGS
CALIFORNIA LANDMARK NUMBER 980

Governor Wilson's Executive Order W-26-92, of last April once again confirms the importance the people of California place on the protection of their historic resources. This importance was earlier manifested in mandates of the California Environmental Quality Act (CEQA), to fully and fairly evaluate the consequences of actions which have the potential for adverse effect on our natural or cultural heritage.

There is well-founded concern for the potential contamination and irretrievable loss of the mineral waters of Vichy Springs, by the continuing - and expanded - use of the dumpsite infringing upon it. Additionally, it is reported that methane emissions from the dumpsite are already contaminating neighboring properties.

This letter serves as a formal request that the City of Ukiah, in consultation with all the control and regulatory agencies related to this dumpsite, provide a comprehensive environmental assessment of both existing and proposed dump operations vis-a-vis the full spectrum of potential effects, with particular emphasis on air quality, ground water quality, noise, odor, fire hazard and the continued viability of an important California Landmark whose existence predates humanity itself.

Sincerely,

Robert E. Mackensen
Executive Director

REM:mlg

cc: Gilbert L. Ashoff, Vichy Springs Resort
Nadine Sponomore, Consultant
Steade Craigo, Acting State Historic Preservation Officer
SHBSB Executive Committee

STATE OF CALIFORNIA — STATE AND CONSUMER SERVICES AGENCY PETE WILSON, *Governor*

DEPARTMENT OF GENERAL SERVICES
STATE HISTORICAL BUILDING SAFETY BOARD
400 "P" STREET, FIFTH FLOOR
SACRAMENTO, CA 95814

(916) 445-7627

March 3, 1993

Mr. Chuck Rough
City Manager
City of Ukiah
300 Seminary Way
Ukiah, CA 95482

Dear Mr. Rough:

VICHY SPRINGS - CALIFORNIA LANDMARK NUMBER 980

This is a follow-up to the letter (enclosed) sent to you on August 5th, from the State Historical Building Safety Board (SHBSB), and copied to the Office of Historic Preservation. That office shares the Board's concern over not only the potential loss of the historic resort which has been in existence since 1854, but also the irretrievable ruin, by contamination, of the prehistoric springs themselves - naturally carbonated, thermal mineral springs unique in North America.

California Landmark status is granted only to cultural resources of the very highest significance, and as such, their protection is of paramount importance to both present and future generations of Californians. These resources are protected, as you know, by the California Environmental Quality Act (CEQA), which requires serious, good-faith efforts to find alternatives to actions which will adversely affect cultural resources.

In recognition of the foregoing, any proposal or permit for either the continued or expanded use of the encroaching dumpsite, must include a comprehensive assessment of the very real threat such action poses to this major natural and cultural resource. Such assessment must address the effect of continued or expanded dumpsite use on the viability of Vichy Springs, as to water quality, the spring's natural setting, and its capacity to operate as a tourist destination, continuing a century-and-a-half historic legacy which is rich with the names of world-renowned individuals.

It must be understood that the threat of contamination of the water is but one of a number of very legitimate concerns. The already existing and continually worsening negative impact of the sight, the smell and the sounds of the dumpsite operation on this landmark resort must be addressed. It is painfully evident that, if the dump were owned and operated by the private sector, and the resort operated by the public sector, the kind of tolerance of damage to neighbors being exhibited by officialdom would not exist. It is a betrayal of the public trust for Government to ignore the rules it imposes on its citizens.

Please provide this office with documentation appropriate to the above noted CEQA mandates. If you have any questions or require further information, please contact the undersigned.

Finally, please be certain that all parties involved recognize the magnitude of the liability associated with the loss of this irreplaceable natural and cultural resource.

Sincerely,

Robert E. Mackensen, AIA
Executive Director

REM:je

Enclosure

cc: Assemblyman Dan Houser, Sacramento
Integrated Waste Management Board, Sacramento
Water Quality Control Board, North Coast Region
Environmental Health Department, Mendocino County
EBA Waste Technologies, Santa Rosa
Anderson Consulting Group, Roseville
State Office of Historic Preservation, Sacramento
Vichy Springs Resort, Ukiah
Les Perry, Counsel
James Mazzoni, Counsel
Kathleen Yates, Counsel
SHBSB Executive Committee

STATE OF CALIFORNIA — STATE AND CONSUMER SERVICES AGENCY

PETE WILSON, Governor

DEPARTMENT OF GENERAL SERVICES
STATE HISTORICAL BUILDING SAFETY BOARD
400 "P" STREET, FIFTH FLOOR
SACRAMENTO, CA 95814
(916) 445- 7627

May 28, 1993

Mr. Chuck Rough
City Manager
City of Ukiah
300 Seminary Way
Ukiah, CA 95482

Dear Mr. Rough:

VICHY SPRINGS
CALIFORNIA LANDMARK NUMBER 980

Thank you for your letter of March 15, 1993. Your assurances of compliance with both the letter and the spirit of the California Environmental Quality Act are most welcome.

The State Historical Building Safety Board's concern for Vichy Springs grows from both Governor Wilson's Executive Order W-26-92, of last April, and the mandates of the California Environmental Quality Act, both of which were referenced in my first letter (8-5-92). While they both confirm the importance the people of California place on the protection of their historic resources, The Executive Order cites the State Historic Building Code and its Board as resources through which each state agency "is directed...

> "3) to ensure that the protection of significant heritage resources are given full consideration in all of its land use and capital outlay decisions; and
>
> "4) in consultation with the California State Office of Historic Preservation, to institute procedures to ensure that state plans and programs contribute to the preservation and enhancement of significant non-state owned heritage resources."

The State Historical Building Safety Board (SHBSB) was consulted by the Office of Historic Preservation, in an effort to enlist the Board's significant expertise in achieving reasonable solutions that insure the viability of historic resources. The SHBSB, recognizing that local agencies have lead authority, but that State agencies control the permitting process, is alerting all parties to the severity of the damage being inflicted on this California Landmark, and of their obligation to take action which will protect rather than destroy it.

Finally, the Board recognizes that pursuing the "letter of the law" is frequently a time-consuming process. However the spirit of the heritage

protection mandates of CEQA are manifestly clear; yet since the date of your letter, continued operations, which exacerbate the negative impacts highlighted on the enclosed CEQA Appendix, are contradicting your letter's stated intent "to fully comply with the letter and spirit of CEQA. Both the Board and the Office of Historic Preservation are concerned over the mounting evidence that the existing, ongoing operations are doing irreparable harm to this Landmark; and thus, like arson or "demolition by neglect", will render moot any deliberations over its preservation. It is urgent that we have your guarantees to the contrary.

If you have any questions or require more information, please do not hesitate to contact either the Office of Historic Preservation, 916-653-6624, or the Board.

Sincerely,

Robert E. Mackensen, AIA
Executive Director

REM:jc

cc: Assemblyman Dan Houser, Sacramento
Senator Mike Thompson, Sacramento
Integrated Waste Management Board, North Coast Region
Water Quality Control Board, North Coast Region
Environmental Health Department, Mendocino County
State Office of Historic Preservation, Sacramento
Vichy Springs Resort, Ukiah
Les Perry, Counsel
James Mazzoni, Counsel
Kathleen Yates, Counsel
SHBSB Executuve Committee

EXECUTIVE DEPARTMENT
STATE OF CALIFORNIA

EXECUTIVE ORDER W-26-92

WHEREAS, the preservation and wise use of California's cultural and historic resources are of importance to the people of this state; and

WHEREAS, these cultural and historic resources, hereinafter referred to as "heritage resources," include artifacts, sites, building, structures, districts, and objects with historical, architectural, archaeological, and cultural significance; and

WHEREAS, these heritage resources provide not only continuity with our past, but foster community pride, stimulate economic activity, improve housing, enhance the quality of life and, along with California's unique natural resources, draw hundreds of thousands of visitors to California every year; and

WHEREAS, due to their location, age, and the construction materials used, many of our important historic buildings and historic sites may be at risk from deterioration, destruction, and natural disasters; and

WHEREAS, an assessment of the extent of our heritage resources is needed in order to ensure their recognition and adequate protection in the future; and

WHEREAS, the preservation and wise use of historic resources must include consideration of cost-effectiveness and fostering private sector incentives, and state agencies must consider these and other public interests in their decision-making processes;

NOW, THEREFORE, I, PETE WILSON, Governor of the State of California, by virtue of the power and authority vested in me by the Constitution and the statutes of the State of California, do hereby issue this order to become effective immediately, and do hereby direct all agencies of the Executive Branch of state government as follows:

Section 1. In furtherance of the purposes and policies of the State's environmental protection laws, including but not limited to the California Environmental quality Act, Public Resources Code Section 21000 et seq., the State Historic Building Code, Health and Safety Code Section 18950 et seq., and the historic resources preservation laws, Public Resources Code Section 5020 et seq., all state agencies shall recognize and, to the extent prudent and feasible within existing budget and personnel resources, preserve and maintain the significant heritage resources of the State. In accordance with these statutes, each state agency is directed:

1) to administer the cultural and historic properties under its control in a spirit of stewardship and trusteeship for future generations; and

2) to initiate measures necessary to direct its policies, plans, and programs in such a way that state-owned sites, structures, and objects of historical, architectural, or archaeological significance are preserved, restored, and maintained for the inspiration and benefit of the people; and

3) to ensure that the protection of significant heritage resources are given full consideration in all of its land use and capital outlay decisions; and

4) in consultation with the California State Office of Historic Preservation, to institute procedures to ensure that state plans and programs contribute to the preservation and enhancement of significant non-state owned heritage resources.

Section 2. Each state agency shall designate from among its current staff a key official (Agency Preservation Officer) whose responsibility will be to ensure that the State's policies regarding the protection of cultural and historic resources within the jurisdiction of such state agency are carried out.

Section 3. Under the direction of its Agency Preservation Officer, in consultation with the State Historic Preservation Officer, and in consultation as appropriate with the State Historical Building Safety Board, each agency shall, by January 1994, develop and institute feasible and prudent policies and a management plan to preserve and maintain its significant heritage resources.

(a) Inventories pursuant to Section 5024 are to be completed or updated by January 1995, or as soon thereafter as feasible as specified in a Memorandum of Understanding with the State Historic Preservation Officer. Inventory preparation shall take into account the kind, quantity, location of, and development risk to properties within the ownership and control of the agency.

(b) Heritage resources management plans and policies shall be reviewed periodically and revised as appropriate in consultation with the State Office of Historic Preservation.

(c) For purposes of developing management plans and policies under this order, resources which meet the following criteria shall be considered significant heritage resources:

(1) listed in or potentially eligible for inclusion in the National Register of Historic Places; or

(2) registered or eligible for registration as a state historical landmark or point of historical interest; or

(3) registered or eligible for listing in a California Register of Historical Resources in accordance with procedures and criteria developed by the State Historical Resources Commission.

Section 4. The State Historic Preservation Officer and the State Office of Historic Preservation shall provide leadership to and shall coordinate the efforts of State agencies in implementing their stewardship obligations with regard to historic resources, including, but not limited to, the requirements of Public Resources Code Sections 5020, et seq.

Section 5. Each state agency shall report to the State Office of Historic Preservation annually its progress in completing inventories, management plans, and policies pursuant to this order.

Section 6. The Resources Agency and the Office of Planning and Research shall provide guidance concerning the application of the California Environmental Quality Act (CEQA) and the state's CEQA regulations in order to provide for the consistent protection and preservation of the heritage resources of California.

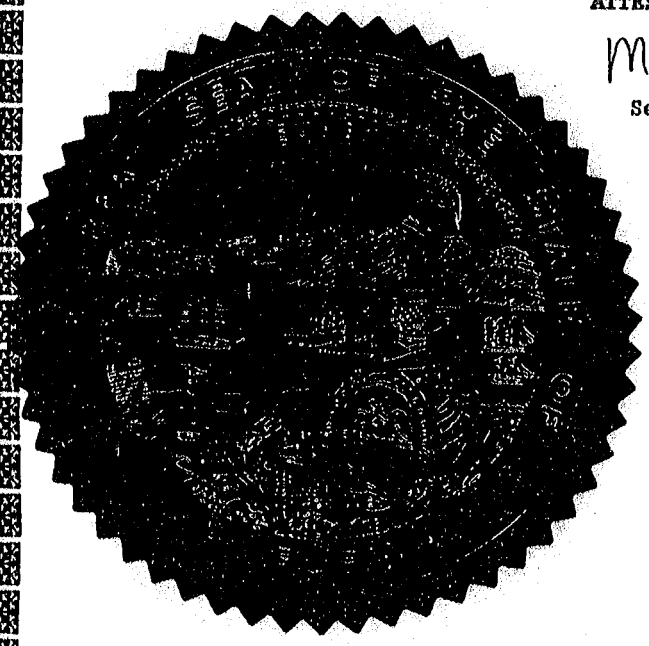
The provisions of Section 21080(b)(3) and (4) of the Public Resources Code shall not be construed or applied to exempt from review projects to alter significant historic resources except to the extent that the condition of the historic structures or resources poses an emergency as defined by Section 21060.3 of the Public Resources Code. The historic value of structures is to be preserved and enhanced, unless the state or local agency finds the structure presents an imminent threat of harm to the public or of damage to adjacent property.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 8th day of April 1992.

Governor of California

ATTEST:

Secretary of State



Appendix G

SIGNIFICANT EFFECTS

A project will normally have a significant effect on the environment if it will:

(a) Conflict with adopted environmental plans and goals of the community where it is located;

(b) Have a substantial, demonstrable negative aesthetic effect;

(c) Substantially affect a rare or endangered species of animal or plant or the habitat of the species;

(d) Interfere substantially with the movement of any resident or migratory fish or wildlife species;

(e) Breach published national, state, or local standards relating to solid waste or litter control;

(f) Substantially degrade water quality;

(g) Contaminate a public water supply;

(h) Substantially degrade or deplete ground water resources;

(i) Interfere substantially with ground water recharge;

(j) Disrupt or adversely affect a prehistoric or historic archaeological site or a property of historic or cultural significance to a community or ethnic or social group; or a paleontological site except as a part of a scientific study;

(k) Induce substantial growth or concentration of population;

(l) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system;

(m) Displace a large number of people;

(n) Encourage activities which result in the use of large amounts of fuel, water, or energy;

(o) Use fuel, water, or energy in a wasteful manner;

(p) Increase substantially the ambient noise levels for adjoining areas;

(q) Cause substantial flooding, erosion or siltation;

(r) Expose people or structures to major geologic hazards;

(s) Extend a sewer trunk line with capacity to serve new development;

(t) Substantially diminish habitat for fish, wildlife or plants;

(u) Disrupt or divide the physical arrangement of an established community;

(v) Create a potential public health hazard or involve the use, production or disposal of materials which pose a hazard to people or animal or plant populations in the area affected;

(w) Conflict with established recreational, educational, religious or scientific uses of the area;

(x) Violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations;

(y) Convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural land;

(z) Interfere with emergency response plans or emergency evacuation plans.

The Ukiah Daily Journal
Thursday, November 29, 2018 75 CENTS SEARCH JOURNAL ON FACEBOOK, TWITTER.COM/UDJNEWS ukiahdailyjo

CRIME

Vandalism continues at Lake Mendocino

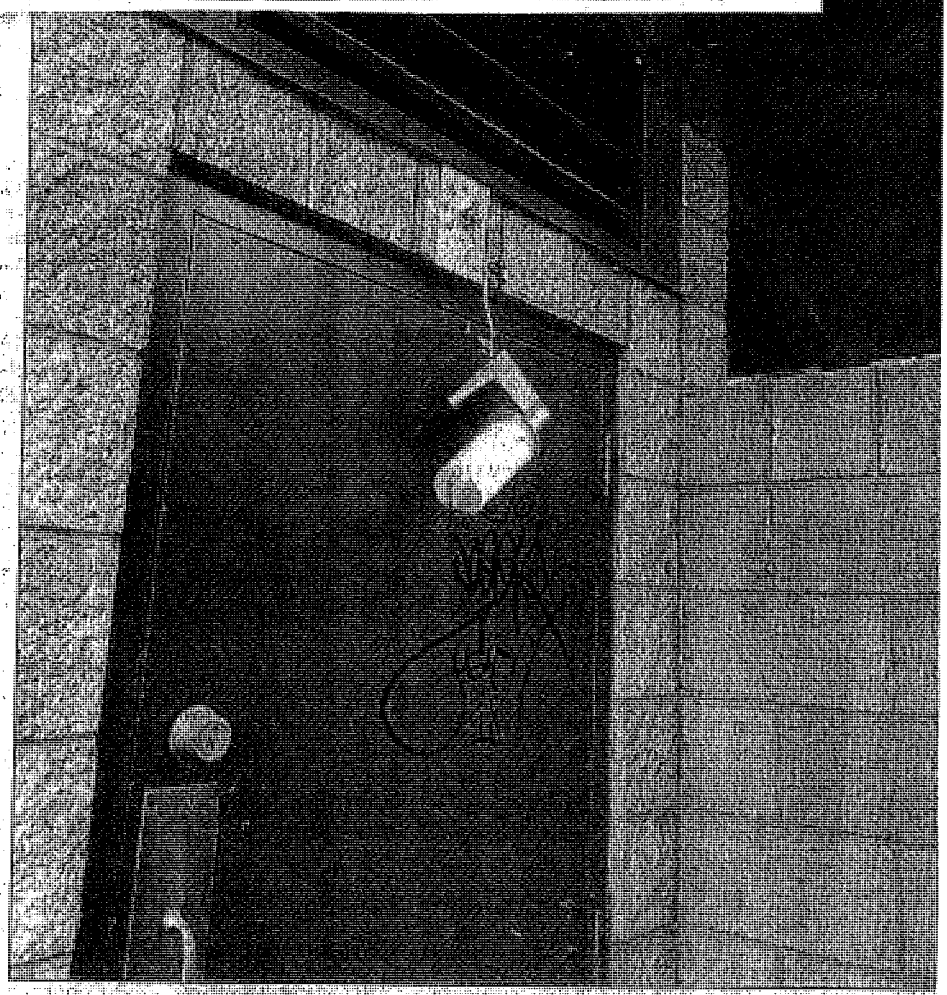
By Curtis Driscoll
cdriscoll@willitsnews.com

Vandalism at Lake Mendocino's recreational facilities continues to be a problem, and multiple recreational facilities at the park are in danger of being closed for an extended period if the problem can't be solved. Supervisory Park Ranger at Lake Mendocino Poppy Lozoff says that the vandalism ranges from raw sewage being dumped on Inlet Road to light fixtures being broken and removed at the locked North Boat Ramp restrooms.

Lozoff said that they closed Bushay Campground for the season because of excessive garbage dumped in sites and vandalism to the storage compound, cutting of locks, and off-roading through recreation areas. The Overlook restrooms on the south end of the lake are also in danger of being closed due to repeated graffiti, and janitorial contractors and ranger staff have repeatedly covered up graffiti only to have it return the next day.

The Kaweyo Horse Staging Area is available on the south end of the

VANDALISM » PAGE 2



CONTRIBUTED

A photo of one of the vandalized bathrooms at Lake Mendocino recreational facilities.

Vandalism

FROM PAGE 1

lake for access to the trails on the east side of the lake.

Because most of the vandalism seems to be happening in the early morning, staff said it's hard to say who is doing it. During the winter months they often shut down parts of the area, but they are considering closing down areas for an extended period if the vandalism continues.

"We would think about longer-term closures for areas, especially the ones with high vandalism like the overlook including the bathroom facilities and possibly even the gates, so people have to walk a little way to get in there," Lozoff said.

To deter vandalism, they have rangers working different hours checking on the grounds, and they also are working with the Sheriff's Office. They also remove the graffiti as soon as possible to deter future efforts.

Lozoff says they have received angry complaints from people online and in person that the campground and facilities around the campground are closed for recreation and were opened up to fire survivors. Lozoff said that if vandalism to the recreation facilities on the north end of the lake is because of the closures around Kyen Campground, it will not result in the opening of facilities. Part of the Army Corps' mission is to help with emergency response, and opening the campground to the fire survivors is a part of that.

She says they thought about having a community meeting at some point for people interested in finding a solution. However, a lot of the feedback they get is negative, and they worry the meeting would be counterproductive. Despite the problems, they hope that they can figure out a way to solve the problem so that they can keep it open to the public.

"It's definitely a cherished resource by the local community and by the people who work here, and we really want to maintain it and have access for everybody," Lozoff said.

The rangers ask that anyone who sees vandalism contact park headquarters at (707) 467-4200. They do not have designated front office staff, so there may be a small delay in returning phone calls, but they do appreciate reports on suspicious activity.

Law Offices Of

RAPPORT AND MARSTON

An Association of Sole Practitioners

405 W. Perkins Street
P.O. Box 488
Ukiah, California 95482
e-mail: drapport@pacbell.net

David J. Rapport (707) 462-6846
Darcy Vaughn FAX 462-4235

M E M O R A N D U M

TO: Honorable Mayor and City Council Members
FROM: David J. Rapport, City Attorney
DATE: May 19, 2020
SUBJECT: Agenda item 11.a - Hearing on Consideration and Possible Adoption of Resolution Certifying EIR for Landfill Closure and Post-Closure Maintenance Plan and Approval of Plan.

On Friday afternoon (May 15) Vichy Springs Resort, Russian Riverkeeper and Matee Environmental Justice Foundation filed a 41 page document, not counting attachments, entitled: CEQA Non-Compliance For City Of Ukiah's Final Environmental Impact Report (FEIR) For Landfill Closure Plan ("Vichy Opposition"), which attaches an opinion letter from a Licensed Engineer and an article from the Department of Physical Geography at Stockholm University and other materials.

The Vichy Opposition raises for the first time its claims that the use of the ClosureTurf geomembrane system in the closure of the landfill pose risks in a wildfire, including the potential release of toxic chemicals and adverse water quality impacts that were not addressed in the draft EIR.

The CEQA procedures allow them to raise these issues at the upcoming hearing, even though Russian Riverkeepers and Matee Environmental Justice Foundation did not submit comments on the draft EIR or otherwise participate during the preparation of the EIR and these issues were not raised during the public comment period on the draft EIR.[1]Without commenting on the merits of these claims, the City staff recommends delaying further action on certification of the EIR until the City can assess these claimed impacts and determine what, if any, additional environmental review should be done before a final EIR is certified for this project.

[1] In its comments on the draft EIR the North Coast Regional Water Quality Control Board wanted assurance that the City would have insurance or other financial resources to replace the geomembrane, if it were destroyed in a wild fire, but it did not raise the issue of the membrane's potential toxicity or any adverse water quality impacts.

For these reasons, City staff recommends against commencing the public hearing on item 11.a and continuing the matter to a future date to be determined.

ESA

2600 Capitol Avenue
Suite 200
Sacramento, CA 95816
916.564.4500 phone
916.564.4501 fax

www.esassoc.com

memorandum

date July 17, 2020

to David J. Rapport
Ukiah City Attorney
405 West Perkins Street
Ukiah, CA 95482
drapport@cityofukiah.com

from Luke Evans, Senior Managing Associate
Environmental Science Associates

subject Memorandum in Response to Comments on the Environmental Impact Report for the City of Ukiah Landfill Closure Plan

ESA has prepared this memorandum in connection with the Environmental Impact Report (EIR) for the proposed closure plan for the inactive City of Ukiah landfill located at 3100 Vichy Springs Road. The landfill operated between 1955 and 2001. Several permanent closure scenarios have been considered over the years, the latest of which is the subject of this EIR.[1] As proposed in the 2019 Final Closure and Postclosure Maintenance Plan,[2] the landfill would be capped with a specialized tufted geotextile. Per applicable regulations, the plan would also incorporate a number of other features, such as a post-closure maintenance plan and a monitoring plan.

This memorandum specifically addresses challenges to the EIR that were raised in a submittal made by attorneys representing the Vichy Springs Resort, Russian Riverkeeper, and the Mateel Environmental Justice Foundation, herein after collectively referred to as the "Petitioner." On May 15, 2020, the Petitioner submitted comments to the City in the form of a preemptory petition outlining a series of alleged deficiencies with the EIR. This memorandum summarizes those comments, where appropriate, and responds to the points identified in the petition.

1 SMB Environmental. 2020. *Final Environmental Impact Report, City of Ukiah's Landfill Closure Project.* March 2020.
2 EBA. 2019. *Final Closure and Postclosure Maintenance Plan for City of Ukiah Landfill, Mendocino County, California.* April 2019.

I. The Petitioner Alleges that the EIR Fails to Evaluate the Fire Hazards and Fire Risks of the Proposed Project

A. The Petitioner alleges that the proposed landfill cover is highly flammable.

The allegation that the proposed landfill cover is "particularly flammable," as stated in the Petitioner's comment, is not supported by evidence.

The synthetic tufted geotextile proposed for use as a cover of the landfill is referred to as the ClosureTurf® Final Cover System, manufactured by Watershed Geosynthetics.[3] ClosureTurf consists of a structured membrane with studs to prevent slippage (referred to as Super Gripnet or SGN), an engineered turf to resemble grass, and sand infill to protect the engineered turf and underlying componenets.[4] From top to bottom, the system consists of the following components:

- Minimum 5/8-inch-thick sand infill layer.
- Specialized tufted geotextile (Engineered Turf)
- 50 mil linear low-density polyethylene (LLDPE) geomembrane liner (Super Gripnet® with Spike Down) (collectively, the structured membrane)
- Minimum 2-foot-thick soil foundation layer

The materials were tested per the standards prescribed under American Society for Testing and Materials (ASTM) Test Method E108, Standard Test Methods for Fire Tests of Roof Coverings, the results of which are attached hereto as **Attachment A**.[5] ASTM E108 is a standardized test for roof coverings that measures the surface spread of flame and the ability of the roof covering material or system to resist fire penetration from the exterior to the underside of a roof deck under the conditions of exposure. This test method also provides criteria to determine if the roof covering material will develop flying burning material, identified as flying brands, when subjected to a 12 mile per hour wind during the simulated fire exposure tests. The materials are subjected to various degrees of fire severity, described as Class A, B, and C fire resistance. Class A tests are applicable to roof coverings that are expected to be effective against severe fire exposure, afford a high degree of fire protection to the roof deck, not slip from position, and not be expected to present a flying brand hazard. Class C tests are applicable to roof coverings that are effective against light fire exposure, afford a light degree of fire protection to the roof deck, do not slip from position, and are not expected to present a flying brand hazard. The test method places a fire source directly on the material, simulating burning materials (such as a burning tree, flying embers, or a burning portion of a house) falling directly onto the materials being tested.

In the test, the Class A and B tests burned away the turf blades under the direct fire; the turf blades under the Class C burn area were melted. The Class A and C tests melted the blades up to 6 inches (Class A) to 4 inches (Class C) from the fire; turf beyond these distances were not affected. The turf adjacent to the fire areas did not ignite, self-propagate, or spread fire. In all

[3] To date, the system has been approved for use and has been installed at four California locations, including landfills in Contra Costa, Monterey, Plumas, and San Bernardino Counties.

[4] Watershed Geosynthetics. 2020. Product Data.

[5] Richgels Environmental Services. 2020. *ClosureTurf Fire Test CT and CT-HD.* June 15, 2020.

cases, the fire did not burn through the structured membrane. The membrane and turf blades did not ignite or self-propagate fire away from the flame source. In other words, when the proposed synthetic landfill cover is exposed to fire, the fire is limited to the immediate location of the fire source; the fire does not spread by burning the synthetic landfill cover materials. The testing concluded that the proposed landfill cover demonstrates performance results that would qualify it as Class C fire resistant. Based on this information, there is no basis to the Petitioner's allegations that the landfill cover would constitute a fire hazard or spread fire to adjoining areas if it were to be exposed to sources of ignition. Natural grass cover, on the other hand, is easily ignited and carries fire readily. In this respect, the proposed landfill cover would result in an improved condition when compared with the existing natural vegetation that currently covers the landfill, or the Compacted Clay/Natural Cover Alternative advocated by the Petitioner. This assertion is supported by expert opinion provided by the City of Ukiah Fire Chief (**Attachment B**), with his opinion based on 36 years of firefighting experience and education, with more than 25 years of that time spent as a Strike Team Leader and Type 4 Incident Commander for wildland fires.

The Petitioner provided an opinion letter prepared by a consultant[6] who reviewed the product data sheets provided by Watershed Geosynthetics.[7] However, the consultant makes the expansive assertion that "polyethylene is a combustible substance which in contact with flame ignites and burns until exhausting." The consultant apparently did not review the above-described ASTM E108 fire test results, which indicated that the polyethylene tufted grass only burns under severe fire conditions and only at the immediate location of the flame source. This limited effect would not have the potential to impact the residences located within 2,000 feet of the landfill cover, as implied by the consultant.

The Petitioner's consultant provided Material Safety Data Sheets (MSDSs) for an unrelated artificial turf product and high-density polyethylene (HDPE) in its raw form. The consultant used these MSDSs, which are not actually representative of the ClosureTurf product, to selectively present information. For example, as previously noted, the consultant quoted "burns until exhausting" without providing the full context, precisely repeated below:

> ***Ignition conditions:*** *Polyethylene is a combustible substance but under normal housekeeping conditions there is no risk of ignition. It [does] not easily ignite but in contact with a flame it becomes soft, flows, ignites and burns until exhausting (if it isn't stabilized with a flame retardant agent). In foil form ignites easily. Static electricity may accumulate during handling/storage, and in certain conditions may constitute an ignition source in case a high dust concentration exists.*

As stated in the MSDS, while polyethylene is combustible, it does not ignite easily and "burns until exhausting" "in contact with a flame." This response to fire was verified by the previously described ASTM E108 tests, which indicate the polyethylene material will not burn beyond the immediate flame source.

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6 Pangea Environmental Services, 2020, *Opinions, Vichy Springs Resort v. City of Ukiah Public Works and City of Ukiah City Council*, May 13, 2020.

7 Watershed Geosynthetics, 2020, Product Data.

Further countering the Petitioner's claim of extreme flammability of the ClosureTurf product are the actual MSDSs for the product, attached hereto as **Attachment C**. One MSDS notes that the "material is non-combustible and is not expected to pose a fire or explosion hazard," while the other states that 'the material is not flammable or combustible."

Based on each of these considerations, the Petitioner's assertion that the proposed landfill cover would be highly flammable, or that it would propagate fire to surrounding areas, is in no way supported.

B. The Petitioner alleges that, if burned, the proposed landfill cover would emit airborne toxins.

As discussed above in Response I.A., the proposed landfill cover has a low flammability rating. When exposed to fire, fire is limited to the immediate location of the fire source and does not spread. As a result, the likelihood of the proposed landfill cover burning in quantities sufficient to create widespread emissions of airborne toxins is not supported, and the potential for emission of airborne toxins, if any, is insubstantial.

II. The Petitioner Alleges that the Proposed Landfill Cover Would Deteriorate and Release Microplastics and Perfluoroalky and Polyfluoroalkyl Substances (PFAS) into Surface Waters.

The tensile strength of the turf fiber was tested using ASTM G147, *Standard Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests*. The ASTM G147 test exposes the tested material to an ultraviolet (UV) radiation source at a 45-degree angle pointing south, and then quantifies the percent of degradation that is projected to occur over various time durations. The results indicate that the turf fiber is projected to retain 75 percent of its original tensile strength[8] after 30 years and over 60 percent after 100 years. This indicates a slow rate of degradation, which would also mean that the amount of microplastics generated over the years would be anticipated to be negligible. In addition, and as described above, a sand infill layer would be placed on the tufted blades and then worked in the blades. The sand would serve to reduce the exposure of the lower portions of the blades to UV radiation, thus further reducing the blade degradation and extending the service life of the product. Note that the underlying structural membrane is not exposed to any sunlight and its associated UV radiation.

It should further be noted that the Stockholm University master's thesis paper[9] presented in the Petitioner's comments on this issue evaluated a very different product from the proposed landfill cover. The paper also evaluated very different uses for those products than that proposed for the landfill cover. First, the artificial turfs that were analyzed in the paper were presumably of much lower quality and predicted durability than that of the proposed landfill cover, since their life spans were estimated at 8 to 15 years. In comparison, the lifespan of the proposed landfill covering has been predicted to be 100 years or more, based on laboratory tests. Second, rubber granulates were used as the filler material for the artificial turfs in the study, and those rubber

8 Tensile strength is the resistance of a material to breaking under tension. It is not an indicator of material degradation or production of microplastics.

9 Li, Ran. 2019. *Tracking Microplastics from Artificial Football Fields to Stormwater Systems*. Master's Thesis in Environmental Management and Physical Planning. Department of Physical Geography, Stockholm University.

granulates were the greatest contributing element of microplastics in samples gathered as part of the study. The proposed landfill cover, on the other hand, would use sand as its filler, not rubber granulates. Third, the artificial turfs in the study were in regular use on sports fields in an active application, where they were subjected to regular abrasion during sports activities and other events, and were also subjected to abrasion by snowplows and other mechanical equipment during snow removal. None of these activities would occur as part of the proposed landfill cover's use, since the cover would be installed in a fully passive application, and would not be subject to any sort of abrasive activity. In short, while superficially similar, the products assessed in the Stockholm study and the proposed landfill cover are vastly different, and are not comparable. Based on each of these considerations, the Stockholm study's results are not a reasonable predictor of what could be expected with the proposed landfill cover.

Finally, the following statement is presented in the conclusion of the Stockholm paper:

> *Microplastics are difficult to be separated from stormwater samples. Further development of a method for separation of microplastics is necessary for quantitative studies in the future, because the approach developed here includes subjective evaluations that should be avoided.*

The paper concludes that the evaluation and results of the study were subjective since microplastics could not be reliably and objectively identified and separated from soil and other organic particles in stormwater. Ultimately, the Stockholm study presents no quantifiably defensible measure of microplastics production from the studied sports fields. The paper does not represent objective, quantified, and repeatable scientific evidence of microplastic release from artificial turf, and therefore cannot be relied upon to support any conclusions related to the proposed landfill cover.

The Petitioner has also provided several references throughout the comment letter to perfluoroalky and polyfluoroalkyl substances (PFAS), with implied adverse implications to water quality. This allegation, however, does not apply to the Proposed Project, as the polyethylene used in the proposed landfill cover materials does not contain PFAS (see **Attachment D**).[10,11] The Petitioner's position is not supported.

III. The Petitioner Alleges that the EIR Failed to Evaluate a Reasonable Range of Alternatives

A. The Petitioner alleges that the finding of infeasibility of a permanent clay/earthen landfill cover was not supported by sufficient evidence.

As stated in the revised EIR Alternatives chapter on pages 4-22 through 4-39 of the Final EIR, the Compacted Clay/Natural Cover Alternative has not been rejected on the basis of infeasibility, but rather because it presents a number of operational and environmental disadvantages when compared to the Proposed Project. These disadvantages are articulated on page 4-30 of the Final EIR in Section 4.4.2. The disadvantages to the Compacted Clay/Natural Cover Alternative are

10 Chevron Phillips. 2019. *Letter stating the polyethylene provided for the synthetic bladed turf does not contain PFAs.* January 7, 2019.

11 Shaw. 2020. *Shaw PFAs Statement, ClosureTurf Products.* May 18, 2019.

not trivial in nature, and include constraints and heightened impacts related to slope instability, erosion and resultant water quality impacts, enhanced wildfire risk, and increased air quality and noise emissions from importation of cover materials. The Compacted Clay/Natural Cover Alternative provides no operational or environmental advantages over the Proposed Project.

B. The Petitioner alleges that adequate alternatives were not provided to deal with construction noise impacts to nearby receptors, which the Petitioner asserts are potentially significant.

The EIR determined that there would be no significant impacts from construction noise, thus negating the need for an alternative that would potentially lessen construction noise impacts. The EIR's finding of a less-than-significant construction noise impact was supported by substantial evidence, particularly as relates to the level of noise impacts that could be experienced by the Petitioner. As noted on page 3.8-2 of the Draft EIR, the nearest sensitive receptor to the site is approximately 600 feet from the nearest area of proposed construction activities, and the construction area and the sensitive receptor are separated by an intervening ridge. Most construction activities would occur at an even greater distance from the sensitive receptor, at distances greater than 1,000 feet. As shown in Table 3.8-3 of the Draft EIR, at this distance the noise from construction equipment would be well below the County's noise standards and also below land use noise compatibility standards, even when measured in a straight line, without the intervening ridge providing additional sound abatement. Other public areas on the Vichy Springs Resort property, such as the Resort's hiking trails, would be even further away from the noise sources, and the noise impacts would thus be even less in those areas. The Project would also comply with the City's Noise Ordinance, which allows operation of construction equipment between 7:00 a.m. and 7:00 p.m. Based on each of these considerations, there would be no significant impact from construction noise that would require consideration of an alternative to lessen that impact.

C. The Petitioner alleges that the range of alternatives evaluated in the EIR does not meet the requirements of CEQA.

The principal purpose of an EIR's alternatives analysis is to consider alternatives that would feasibly attain most of the basic objectives of a proposed project while avoiding or substantially lessening the identified significant effects of the project as proposed (CEQA Guidelines Section 15126.6). As conveyed in both the Draft EIR and the Final EIR, the Proposed Project would result in no significant effects that could not be effectively mitigated to a level of less-than-significant. Therefore, since there would be no significant effects remaining after implementation of prescribed mitigation measures, the requirement to identify potential alternatives to the Proposed Project is limited. Nevertheless, in addition to the No Project Alternative, and at the request of the Petitioner, a Compacted Clay/Natural Cover Alternative was evaluated in the Final EIR. Per the requirements of CEQA Guidelines Section 15126.6(d), alternatives are not required to be evaluated to the same level of detail as the Proposed Project. As noted in Table 4-1 of the Final EIR, the Compacted Clay/Natural Cover Alternative would not meet the Project objectives as well as the Proposed Project. In addition, the Compacted Clay/Natural Cover Alternative would result in a greater level of impact for a number of issues, including air quality, biological resources, cultural resources, geology, soils, and seismicity, greenhouse gas emissions, hydrology and water quality, and noise.

In summary, the City has responded to the Petitioner's request that the Compacted Clay/Natural Cover Alternative be analyzed in the EIR. Beyond that, it is unclear what other additional alternatives the Petitioner contends should be evaluated, nor is it clear why additional alternatives should even be considered, based on the Proposed Project's demonstrated lack of significant environmental effects.

IV. The Petitioner Alleges that the EIR did not Provide an Accurate and Complete Project Description

A. The Petitioner alleges that the EIR's Project Description did not provide information or consider the replacement of the proposed landfill cover.

The principal purpose of the Final Closure and Postclosure Maintenance Plan, which is the subject of the EIR, is to devise a plan to maintain the landfill until the buried waste is considered to have become inert and no longer capable of generating leachate with chemicals above regulatory standards. During this time, the landfill would be capped to prevent rainwater from leaching through the buried waste and generating leachate that could then contaminate groundwater and surface waters. Per the proposed plan, the postclosure maintenance period will be 30 years, during which time continued monitoring will occur to determine if any leaching is occurring, and if that leachate exceeds regulatory standards. At the end of that time, if the landfill surface is stable, and if the leachate has become inert, then the landfill responsible party (i.e., the City) would apply to the North Coast Regional Water Quality Control Board to end monitoring and other maintenance activities. Otherwise, the monitoring, leachate control, and surface maintenance requirements would be required to continue under an extended permit.

The proposed landfill cover would remain in place during the entire postclosure maintenance period, and perhaps longer. The cover has a design of life of 100 years or more, as documented in standardized tests (see the Final Closure and Postclosure Maintenance Plan, included as Appendix A of the Draft EIR). If the maintenance period is extended beyond 30 years for the reasons outlined above, the cover would remain in place. Based on the timeframes involved, determining when and if the cover would need to be removed and replaced would require speculation, and would also require speculation as to the different technologies and regulatory environment that could be in place at that time. Based on these considerations, the Petitioner's claim that the cover would require removal and replacement before the end of the postclosure maintenance period or before the designed lifespan of the material has elapsed is also speculative.

B. The Petitioner alleges that the EIR's Project Description did not provide a comprehensive list of Responsible Agencies that would use the EIR for their own CEQA compliance requirements.

The Petitioner claims that the EIR did not identify the Mendocino County Environmental Health Department, CalRecycle, and the North Coast Regional Water Quality Control Board as agencies that would use the Project's EIR to make their own CEQA determinations. This is not accurate. Table 2-2 on page 2-17 of the Draft EIR provides a list of regulatory permits and other agency approvals that would be required to implement the Project. This list includes the three aforementioned agencies. Further, all three agencies received the Notice of Preparation and Draft EIR. In their role as Responsible Agencies, both the North Coast Regional Water Quality Control

Board and CalRecycle provided comments on the Draft EIR. The City is fully aware of the various permits and approvals it will be required to obtain as part of the project's implementation, and has articulated those requirements in the EIR.

V. The Petitioner Alleges that the EIR did not Provide an Accurate Description of Baseline Conditions.

A. The Petitioner alleges that the EIR did not disclose baseline conditions for fire risks and fire hazards.

As stated on page 1-7 of the Draft EIR, issues related to hazards, including fire risk, were scoped out in the Initial Study that was circulated in 2016 (see Draft EIR Appendix B). Page 49 of the Initial Study identified the site as within an area of high fire hazard. However, the Initial Study determined that the Project would not include any development that would subject either structures or occupants of the site to the potential for loss, injury, or death resulting from the potential for wildland fire. This remains the case, and, as stated previously in Responses I.A. and I.B., the proposed landfill cover is not subject to ignition or self-propagation of fire away from direct flame sources. In this respect, the proposed landfill cover would result in a beneficial impact when compared with the existing natural grass cover, which could easily ignite and carry fire.

B. The Petitioner alleges that the EIR did not disclose baseline conditions for aesthetics and scenic resources.

Section 3.1.2 of the Draft EIR, commencing on page 3.1-2, describes the existing visual setting of the Project site and surrounding areas. This description was supplemented in the Final EIR, beginning on page 4-11. The description notes that the landfill has been graded to form a series of flat terraces, which are currently covered with seasonal grasses. This description is very similar to the description of existing conditions which the Petitioner claims is missing from the Draft EIR's baseline description. As a result, it is unclear what additional information the Petitioner contends needs to be added. The information presented in the EIR describes the landfill for what it is – a landscape that has been formed into a series of terraces that are now covered with seasonal grasses.

Both the Draft EIR and the Final EIR also provide detailed descriptions of views of the landfill as observed from potential sensitive receptors, such as the Vichy Springs Resort property. The analysis showed views of the landfill site to be partial and distant. Photographs submitted by the Petitioner purportedly showing views of the landfill site also depict views of the landfill from the Vichy Springs property that are also distant and partial, at best. The submitted photographs showed partial views that were: 1) either a very far distance of over 2,000 feet; or 2) from the edge of the Resort's property lines adjacent to the landfill property, which are not the main areas visited or used by most, if not all, Vichy Springs Resort guests and hiking trail users. It must also be noted that the submitted photographs were clearly zoomed photographs that showed a very narrow field of view, which therefore exaggerated the effect of the views and distorted the much broader field of view that would be experienced by someone actually viewing the landfill from the distances at which the photographs were taken. Most importantly, all of the visual resources-

related comments submitted by the Petitioner overlook the fact that the landfill is located on the far side of an intervening ridge that separates the Resort from the landfill property, which means that the landfill site is impossible to see from most of the Resort's property, and from those few locations where it is visible, those views are partial and/or very distant. This is particularly true for those portions of the Resort with which the Petitioner has expressed the most concern, such as the Resort's guest areas and hiking trails.

With respect to the commenter's assertion that the landfill is a valuable scenic resource, this assertion is not supported. Whether viewed from near or afar, it is clearly a human-manipulated landscape, and its features and covering vegetation are neither unusual nor particularly noteworthy in a region where such features are abundant. The landfill does not enjoy any designated status as a scenic vista or a scenic area; it does not contain any noteworthy trees, rock outcroppings, or historic buildings; and it cannot be seen from any state scenic highway. In short, the Petitioner is attributing unusual or even spectacular visual characteristics to the site that it simply does not possess. While the landfill site is not particularly ugly or unpleasant to look at, it is unlikely that any reasonable observer would consider it a valued scenic resource. The EIR's description of the baseline visual conditions of the landfill site provides readers with an accurate overview of what the site actually looks like. The Petitioner's contrary assertion is not supported.

C. The Petitioner alleges that the EIR did not accurately disclose the presence of feral swine in the Project area and the effect those animals could have on the proposed landfill cover.

As per common practice, the EIR's discussion of biological resources focused on sensitive species and habitats, since those resources are a key concern under CEQA. Common and invasive species are typically not considered, except in situations where they are relevant to the evaluation of impacts. The Project EIR followed that practice. Feral swine are not protected or otherwise sensitive, so their presence was not noted in the EIR. Under existing conditions, feral swine and other animals can burrow or otherwise cause damage to the existing clay soil layer that covers the landfill. This is a common problem at all soil-covered landfills, where the covering soil layer provides habitat and feeding opportunities for burrowing or rooting animals. This can damage the existing clay soil layer, and thereby compromise the integrity of the protective barrier that covers the landfill and subject the underlying waste material to intrusion by rainwater.

The proposed landfill cover would eliminate this current condition by covering the landfill with a durable cover that would be substantially more resistant to wildlife activity than the existing soil cover. The proposed cover consists of two layers of 6 oz/yd^2 woven geotextile that serve as an additional cushion to protect the underlying geomembrane. When subjected to puncture tests conducted under ASTM D-6241, the proposed cover material provides a puncture resistance of 1,500 pounds. **Attachment E** provides the results of the tests performed on the product, as well as general information on the product's resistance to wildlife. Hydrostatic tests have also been conducted on the product and show that no punctures or holes were observed under a loading pressure of 85 pounds per square inch (psi). By comparison, the hooves of an adult bull elk weighing 1,200 pounds exert a ground contact pressure of only 16.7 psi. As such, the product's durability and resistance to breaching is several orders of magnitude greater than that required to prevent puncture by feral swine or other rooting or burrowing animals. Further, since there would be no accessible soil layer, there would also be no accessible habitat or food sources to attract

burrowing or rooting animals. In the unlikely event that damage was to occur to the material through rooting by feral swine or in some other manner, or through some management requirement to open the covering, the material is designed to be patched and repaired.

When combined with the demonstrated durability of the product, the proposed landfill cover would represent an improved condition to landfill integrity over what is present currently, or that which would be present under the Compacted Clay/Natural Cover Alternative that is preferred by the Petitioner. Soil landfill coverings are readily subject to burrowing wildlife, erosion, and other factors that can compromise landfill integrity. That is not the case with the proposed landfill cover. Based on each of these considerations, the Petitioner's allegation that the proposed landfill cover could be breached by feral swine or other wildlife is not supported.

D. The Petitioner alleges that the EIR did not accurately disclose the presence of historic resources in the Project area and the Proposed Project's effects on those resources.

The presence of historic resources in the vicinity of the Project area are disclosed in the Draft EIR, commencing on page 3.4-2. Of particular note, on page 3.4-5 of the Draft EIR, the Vichy Springs Resort is identified as a State Historic Landmark. Therefore, the Petitioner's assertion that the EIR did not identify the Resort as an historic resource is not accurate.

With respect to the Petitioner's claim that the Project would have an adverse effect on the Resort's status as a designated landmark, the EIR found that the Project would cause no physical impact to the Resort property. At most, the Petitioner relies on changes the Project would create in the vicinity of the designated landmark, such as the proposed landfill cover. Environmental impacts on a historic resource are addressed in CEQA Guidelines Section 15064.5. Under those regulations, when evaluating environmental impacts of a project on an historic resource, the key question is whether the project would cause a substantial adverse change in the significance of the resource, which "means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historic resource would be significantly impaired." [CEQA Guidelines Section 15064.5(b)(1).] As stated in the Guidelines, the significance of an historical resource would be materially impaired when a project "demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources. [CEQA Guidelines Section 15064.5(b)(2)(A).] Under the proposed Project, no changes would be made directly to the Resort. Placing the landfill cover on the closed landfill would change the appearance of the landfill, but would not alter the physical characteristics of the Resort which convey its historical significance or adversely affect its qualification to be listed as a California Historical Landmark. The Resort was listed in 1988, when the landfill was an active solid waste disposal site with daily use of heavy earth-moving equipment and the transport and disposal of 100 and more tons of refuse per day by garbage trucks driving in and out of the landfill through the landfill entrance directly across Vichy Springs Road from the Resort. If that condition did not prevent the Resort from being listed in 1988, it cannot be reasonably claimed that placing the landfill cover over the closed landfill would adversely affect the Resort's historical significance or eligibility for continued listing. If anything, the proposed Project would result in an improved condition over what was present when the Resort was listed.

Also inaccurate is the Petitioner's claim that the EIR did not evaluate the potential effects of the Project on the Resort. In fact, the bulk of the EIR is devoted to evaluating the effect of the Project on the Resort, particularly with respect to aesthetics/scenic resources; geology, soils, and seismicity; hydrology and water quality; and noise. As conveyed in these responses, and also in the Draft and Final EIR, there would be no significant impact resulting to the Resort from the Proposed Project for any environmental issue. As also conveyed in these responses, the Petitioner has failed to present any evidence to indicate that the findings of the EIR are not adequately supported. Based on each of these considerations, the Petitioner's allegation that the Proposed Project would result in a significant impact to an historic resource is not supported.

E. The Petitioner alleges that the EIR did not disclose baseline conditions for recreation trails in the Project area and the effect of Project-related construction noise on those resources.

As discussed in Section 3.8 of the Draft EIR, ambient noise measurements were taken at selected locations in the Project area that were representative of the existing noise environment. The EIR characterized the Project area as "very quiet," with the lowest measurement being 42 dB along the private road immediately north of the gated landfill entrance, and the loudest measurement (63 dB) in the vicinity of Vichy Springs Road and Medicine Way. As stated previously under Response III.B., the EIR determined that there would be no significant impacts from construction noise to any sensitive receptors in the area, the nearest of which is approximately 600 feet from the nearest area of proposed construction activities when measured as a straight-line distance, but which also includes an intervening ridge between the construction site and the sensitive receptor. The referred-to hiking trails are an even greater distance from the construction area than the nearest sensitive receptor. Noise impacts on the hiking trails would therefore be even less than they would be at the sensitive receptor location. It should further be noted that construction noise would be temporary in duration, and most of the construction activity would occur 1,000 feet or more from the nearest sensitive receptor and would again be separated from that receptor by an intervening ridge. This amount of distance is the principal reason for the EIR's finding of a less-than-significant impact for construction noise. Noise from even the loudest types of heavy construction equipment would not surpass applicable thresholds at such a distance, even without the intervening ridge to provide additional abatement. As such, the Petitioner's allegation that the Project would create a significant impact to recreation trails or other sensitive receptors is not supported.

F. The Petitioner alleges that the EIR did not disclose purported groundwater connections between the Project site and the Vichy Springs Resort.

The Petitioner's contention that a groundwater connection exists between the landfill site and the Vichy Springs Resort was discussed in Section 3.7 of the Draft EIR, *Hydrology and Water Quality*, commencing on page 3.7-11. The impact of this purported connection, or more accurately, the documented lack of connection, was evaluated in the Draft EIR under Impact 3.7-2, commencing on page 3.7-25. The issue was again addressed in the Final EIR on page 3-12, in response to Comment C-7, as presented by the Petitioner. To repeat: the purported connection of groundwater beneath the landfill and the groundwater source to Vichy Springs was previously

addressed in 1994 in the declaration of Damon Brown, Certified Engineering Geologist,[12] and affirmed by the Regional Water Quality Control Board, which directed the City to drill the groundwater monitoring wells based on Brown's investigation and report. In the investigation, the water types of the Vichy Springs water and groundwater from the landfill's monitoring wells were compared using testing for organic and inorganic chemicals, stable isotopes, and knowledge of the local hydrogeology. The evaluation indicated that the landfill monitoring wells could not impact Vichy Springs because they are installed in a water-bearing zone significantly different from, and not connected to or intermixing with, the water-bearing zone of Vichy Springs. Any possible impact to Vichy Springs would have to be caused by wells that are part of the existing environmental baseline, and it has already been established that there is no connection between the landfill and Vichy Springs. Further, the Project does not propose the drilling of any new wells beyond those that would be used to monitor the buried refuse mass itself, which would have no effect on groundwater, even if there were a connection, which there is not.

VI. The Petitioner Alleges that the Draft EIR Should Have Been Recirculated Upon the City's Receipt of Significant New Information Regarding Fire Risk, Scenic Resources, and Noise Impacts

A. The Petitioner alleges that the Draft EIR should have been recirculated based on comments from the North Coast Regional Water Quality Control Board related to fire risk.

The potential fire risk related to the proposed landfill cover is discussed above in Response I.A. In summary, the proposed landfill cover materials are not capable of propagating fire, and in fact, have the beneficial impact of being significantly less flammable than native vegetation. There would therefore be no new significant impact that would warrant recirculation of the EIR.

B. The Petitioner alleges that the Draft EIR should have been recirculated based on comments received by the Vichy Springs Resort related to scenic resources.

As stated previously in Response V.B, and as provided in both the Draft EIR and the Final EIR, the baseline descriptions of the landfill property, particularly as viewed from the Vichy Springs Resort property, negate the possibility of a significant effect occurring to the Resort property as a result of Project implementation. The Petitioner's comments to the contrary are not supported, particularly in light of the fact that the landfill is located on the far side of an intervening ridge that separates the Resort from the landfill property, which means that the landfill site is impossible to see from most of the Resort's property, and from those few locations where it is visible, those views are partial and/or very distant. This is particularly true for those portions of the Resort with which the Petitioner has expressed the most concern, such as the Resort's guest areas and hiking trails. There would therefore be no new significant impact that would warrant recirculation of the EIR.

[12] Declaration of Damon Brown in Opposition to Plaintiffs' Application for Preliminary Injunction, Case No. 70873. December 19, 1994

C. The Petitioner alleges that the Draft EIR should have been recirculated based on comments received from the Vichy Springs Resort related to construction noise impacts on area recreation trails.

As stated previously in Response III.B, evidence provided in both the Draft EIR and Final EIR determined that the Project's implementation would not result in significant construction noise impacts. The Petitioner's comments did not provide any evidence to support a differing conclusion, as the sensitive receptors identified by the Petitioner (recreation trails) are even further from the area of proposed construction than the receptors analyzed in the Draft EIR. There would therefore be no new significant impact that would warrant recirculation of the EIR.

D. The Petitioner alleges that the Draft EIR and Final EIR's finding of a less than significant impact for construction noise was not supported by substantial evidence.

Please see Response III.B above, as well as Response VI.C. Both the Draft EIR and the Final EIR provided extensive documentation, prepared in conformance with accepted professional standards, concerning the Project's less-than-significant impacts resulting from construction noise. The Petitioner's comments did not provide any evidence to support a differing conclusion. There would therefore be no new significant impact that would warrant recirculation of the EIR.

VII. The Petitioner Alleges that the EIR did not Identify or Consider Feasible Mitigation Measures to Reduce Adverse Environmental Impacts

A. The Petitioner alleges that the Draft EIR did not identify or consider feasible mitigation related to fire risk.

The potential fire risk related to the proposed landfill cover is discussed above in Response I.A. In summary, the proposed landfill cover materials are not capable of propagating fire, and in fact, have the beneficial impact of being significantly less flammable than native vegetation. Therefore, no mitigation is necessary and the Petitioner's position is not supported.

B. The Petitioner alleges that the Draft EIR did not identify or consider feasible mitigation related to feral swine.

The potential for animals, including feral swine, to cause damage to the proposed landfill cover, is discussed above in Response V.C. In summary, the landfill cover system is not a food source, does not provide habitat, and would not be punctured by an adult bull elk standing on the materials, as verified in puncture tests. Therefore, no mitigation is necessary and the Petitioner's position is not supported.

C. The Petitioner alleges that the Draft EIR did not identify or consider feasible mitigation related to release of microplastics into surface waters.

The potential for degradation of the proposed landfill cover materials that might generate microplastics is discussed above in Response II. In summary, the structured membrane would not be exposed to sunlight and its associated UV radiation since it would be covered by synthetic tufted geotextile blades and sand infill. The sand infill does not degrade into microplastics. The synthetic tufted geotextile blades were tested for degradation due to UV radiation and were found

to resist degradation for decades, which would result in a negligible generation of microplastics. Therefore, no mitigation is necessary and the Petitioner's position is not supported.

D. The Petitioner alleges that the Draft EIR did not identify or consider feasible mitigation related to construction noise.

The Project's less-than-significant construction noise impacts have already been addressed in Responses III.B, VI.C, and VI.D. As stated previously, both the Draft EIR and the Final EIR provided extensive documentation, prepared in conformance with accepted professional standards, concerning the Project's less-than-significant impacts resulting from construction noise. The Petitioner's comments did not provide any evidence to support a differing conclusion. Therefore, no mitigation is necessary and the Petitioner's position is not supported.

VIII. The Petitioner Alleges that the EIR Failed to Provide Substantial Evidence as to the Project's Environmental Impacts and Costs

A. The Petitioner alleges that the Project may not proceed without concurrence from Responsible Agencies concerning the environmental impact findings as presented in the Final EIR.

The Petitioner's suggestion that the City is under the impression that the Proposed Project has been "approved" by relevant Responsible Agencies is not accurate. In responding to this comment we can only assume that the Petitioner is referring to the analysis conducted on the Proposed Project in compliance with 27 CCR § 20080(b), which requires that the Proposed Project be consistent with the performance goals addressed by the prescriptive standard and afford equivalent protection against water quality impairment, while also demonstrating that the construction of the prescriptive standard is unreasonably and unnecessarily burdensome and will cost substantially more than the proposed alternative. These analyses have been performed and have been found adequate by the regulatory agencies, including the North Coast Regional Water Quality Control Board.

The City is fully aware that without issuance of required permits by these agencies, the Project will not be able to proceed. The City is also aware that these Responsible Agencies will use the City's EIR to meet their own compliance requirements under CEQA. As noted previously in Response IV.B, and as noted in Table 2-2 on page 2-17 of the Draft EIR, these agencies include the Mendocino County Environmental Health Department, CalRecycle, and the North Coast Regional Water Quality Control Board. Each of these agencies has been consulted during the Notice of Preparation, Draft EIR, and Final EIR stages of the CEQA process, as evidenced by the comments that were received by both CalRecycle and the North Coast Regional Water Quality Control Board during the CEQA process.

B. The Petitioner alleges that the proposed landfill cover's advertised service life is not supported by substantial evidence.

As discussed above in Responses II and VII.C, the structured membrane would not be exposed to sunlight and its associated UV radiation since it would be covered by synthetic tufted geotextile blades and sand infill. The sand infill does not degrade. The synthetic tufted geotextile blades were tested for degradation due to UV radiation and were found to resist degradation for decades,

which would result in exceeding the required service life of 30 years and is projected to last to 100 years. Therefore, the advertised service life is supported by substantial evidence and the Petitioner's position is not supported.

C. The Petitioner alleges that the EIR's identification of an "environmentally superior alternative" did not consider an additional alternative that the Petitioner prefers.

At the request of the Petitioner, the Final EIR evaluated the Compacted Clay/Natural Cover Alternative. That alternative was not identified as the environmentally superior alternative because it would present a number of environmental disadvantages when compared to the Proposed Project. These disadvantages are articulated on page 4-30 of the Final EIR in Section 4.4.2. The disadvantages to the Compacted Clay/Natural Cover Alternative are not trivial in nature, and include constraints and heightened impacts related to slope instability, erosion and resultant water quality impacts, enhanced wildfire risk, and increased air quality and noise emissions from importation of cover materials. The Compacted Clay/Natural Cover Alternative provides no environmental advantages over the Proposed Project and was therefore not identified as the environmentally superior alternative.

D. The Petitioner alleges that the proposed landfill cover is an "interim measure" and that the EIR did not disclose the cost of removing and disposing of the landfill cover at the end of its service life, which the Petitioner alleges is only 30 years rather than the 100 years advertised by the manufacturer.

As discussed above in Responses II, VII.C, and VIII.B, the structured membrane would not be exposed to sunlight and its associated UV radiation since it would be covered by synthetic tufted geotextile blades and sand infill. The sand infill does not degrade. The synthetic tufted geotextile blades were tested for degradation due to UV radiation and were found to resist degradation for decades, which would result in exceeding the required service life of 30 years to possibly 100 years. Therefore, the service life is supported by substantial evidence and the Petitioner's position is not supported.

E. The Petitioner alleges that the findings in the EIR related to a less-than-significant impact from construction noise are not supported by substantial evidence.

As discussed previously in Response III.B, and as documented repeatedly in the Draft EIR and Final EIR, implementation of the Proposed Project would result in less-than-significant impacts with respect to construction noise.

F. The Petitioner alleges that the findings in the EIR related to a less-than-significant impact to groundwater resources are not supported by substantial evidence.

As discussed above in Response V.F, the Petitioner's contention that a groundwater connection exists between the landfill site and the Vichy Springs Resort was discussed in Section 3.7 of the Draft EIR, Hydrology and Water Quality, commencing on page 3.7-11. The impact of this purported connection, or more accurately, the documented lack of connection, was evaluated in the Draft EIR under Impact 3.7-2, commencing on page 3.7-25. The issue was again addressed in the Final EIR on page 3-12, in response to Comment C-7, as presented by the Petitioner. To repeat: the purported connection of groundwater beneath the landfill and the groundwater source

to Vichy Springs was previously addressed in 1994 in the declaration of Damon Brown, Certified Engineering Geologist,[13] and affirmed by the Regional Water Quality Control Board, which directed the City to drill the groundwater monitoring wells based on Brown's investigation and report. In the investigation, the water types of the Vichy Springs water and groundwater from the landfill's monitoring wells were compared using testing for organic and inorganic chemicals, stable isotopes, and knowledge of the local hydrogeology. The evaluation indicated that the landfill monitoring wells could not impact Vichy Springs because they are installed in a water-bearing zone significantly different from, and not connected to or intermixing with, the water-bearing zone of Vichy Springs. Any possible impact to Vichy Springs would have to be caused by wells that are part of the existing environmental baseline, and it has already been established that there is no connection between the landfill and Vichy Springs. Further, the Project does not propose the drilling of any new wells beyond those that would be used to monitor the buried refuse mass itself, which would have no effect on groundwater, even if there were a connection, which there is not. Therefore, substantial evidence demonstrates that the source water to Vichy Springs is not from the groundwater monitored under the landfill and the Petitioner's position is not supported.

G. The Petitioner alleges that the findings in the EIR related to a less-than-significant impact to visual resources are not supported by substantial evidence.

As discussed previously in Responses V.B. and VI.B, and as documented repeatedly with substantial evidence in the Draft EIR and Final EIR, implementation of the Proposed Project would result in less-than-significant impacts with respect to visual resources. The evidence supporting that conclusion, as well as the rationale used to determine it, is manifest within those responses and within the Draft and Final EIRs. The Petitioner's position is not supported.

IX. The Petitioner Desires Relief in the Form of a Recirculated Draft EIR That Considers the Alleged Deficiencies

CEQA Guidelines Section 15088.5 lists the conditions that must be present to necessitate recirculation of an EIR. These include the following:

1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.
2) A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.
3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project's proponents decline to adopt it.
4) The draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

[13] Declaration of Damon Brown in Opposition to Plaintiffs' Application for Preliminary Injunction, Case No. 70873. December 19, 1994

As demonstrated in these responses, as well as within previous responses presented in the Final EIR, none of these conditions arise here in connection with the EIR for the City of Ukiah's Landfill Closure Plan: no new significant environmental impacts have been identified; no mitigation measures have been identified that would increase the severity of an environmental impact; no alternative has been identified that would clearly lessen the environmental impacts of the Project as proposed; and no evidence has been presented that would render any aspect of the EIR as fundamentally inadequate or conclusory in nature. The Petitioner's request for relief is therefore not warranted.

Conclusion

Based upon substantial evidence in light of the whole record, and as summarized above in the responses provided to the Petitioner's comments, it is evident that the Petitioner has not presented any rationale that would indicate that the Project EIR is fundamentally flawed or otherwise inadequate so as to require recirculation. While the Petitioner has made it clear that they are not in favor of the Project as proposed, the contentions in Petitioner's comments are unsupported by evidence. The City has satisfied the requirements of CEQA, and further environmental analysis or documentation for the Proposed Project is not warranted.

Attachments:

A: ClosureTurf® Fire Resistance Testing Results
B: City of Ukiah Fire Chief Expert Opinion
C: Material Safety Data Sheets
D: Polyfluoroalkyl Substances (PFAS) Testing Results
E: ClosureTurf® and Wildlife Fact Sheet and Hydrostatic Pressure Test Report

Attachment A

ClosureTurf® Fire Resistance Testing Results

RICHGELS ENVIRONMENTAL SERVICES

ATTACHMENT A

June 15, 2020

Jose Urrutia
Vice President of Engineering
Watershed Geosynthetics.
11400 Atlantis Place
Suite 200
Alpharetta, GA 30022

RE: CLOSURETURF FIRE TEST CT AND CT-HD

Dear Jose:

Richgels Environmental Services (RES) had initially investigated the fire resistance of ClosureTurf CT in June 2015. RES' concern at the time was the State of California had declared wildfire as a "reasonable foreseeable" risk for solid waste landfill surfaces after wildfire events at landfills resulting in destruction of landfill gas collection systems and other supporting infrastructure. The most recent occurrence at Butte County's Neal Road Landfill in 2018 during the Camp Fire (destroyed the town of Paradise, CA). The American Society for Testing and Materials (ASTM) test Method E108 *Standard Test Methods for Fire Tests of Roof Coverings* is designed to test asphalt composite roofs for fire resistance. Section 10 of this test method is similar to field conditions such as large brush or trees adjacent to landfill surfaces from which burning embers could fall thus igniting grasses on the landfill surface.

Thus, this method was chosen to assess fire resistance of both the CT and CT-HD versions of ClosureTurf (data sheets attached). This investigation performed the Burning Brand Test (Section 10 of ASTM E108) conducted with 3 different brand sizes, Class A, B and C. The Class A brand is 12 inches square in length, width and nominally 3 inches in depth. The Class B brand is 6 inches square and nominally 3 inches in depth. The Class C brand is a 2-inch cube. The CT test was performed in California in June 2015. After development of the denser CT-HD version, its fire test was conducted in August 2018 under my supervision at Watershed Geo's Research and Development Laboratory in Louisiana.

Test Preparation

Brands for both the Class A and Class B tests were constructed using nominal 1x1 (¾ " x ¾" finished) pine stock and fastened together with 3d finishing nails. Strips were spaced ¼" apart using a ¼" template to provide consistent strip spacing. The Class A brand was built with 36 each 12" long strips. Class B brand was built with 18 each 6" long strips. The Class C brand was made with a 1-1/2" long piece of 2x2 pine stock with perpendicular saw kerfs on opposite sides per ASTM E108 specifications. The completed brands were oven cured overnight. ASTM E108 specifications recommend curing the brands in an oven for 24 hours at an oven temperature between 105°F and 120°F. Home ovens only go as low as 150°F, so the brands were just cured overnight (Figure 1). All brands were judged as nearly "bone dry," which was confirmed by their ignitability (below).

The test site subgrade was stripped of vegetation and bladed smooth with a straight shovel before placing 50-mil, LLDPE Super Gripnet geomembrane samples. ClosureTurf test pads were prepared using dimensions specified in ASTM E108 – 4'-4" by 3'-4." All test pads received 60 pounds of commercially available sand that met ASTM C33 specifications (Figure 2). Sand was poured evenly over the pads and raked in place per recommended construction practice. This is an equivalent application of 4.2 psf, less than the ClosureTurf manufacturer's recommended sand ballast application (5 psf).

Assuming a sand unit weight of 120 pcf,, sand applied at a rate of 5 psf would spread to approximately 0.5 inches deep. An application rate of 4.2 psf would be 0.42 inches. The thickness difference of 0.08 inches would expose that much more of HDPE grass tufting hence is considered conservative for the purposes of this examination.

Figure 1



Figure 2



Test Execution

The Class A brand was ignited over charcoal and propane outdoor grills for the CT and CT-HD tests respectively. Each large face was exposed to the ignition source for 30 seconds. Each side face was exposed for 45 seconds each. The final exposure of the brand faces per ASTM E108 procedures were not done as the brands were fully aflame and the pine stock was beginning to be consumed. The total ignition time was four minutes.

After the prescribed ignition time, the fully aflame brands were placed on the turf samples (Figure 3). Turf blades melted to the top of the sand ballast in proximity of the burning brand, yet the turf did not ignite nor self-propagate flame away from the brand in either test. A slight wind developed during testing fanning flames to one side.

Figure 3



ClosureTurf CT



ClosureTurf CT-HD

The Class B brands were also ignited over outdoor grills as described above for the Class A brands. Each face was placed on the grill for 30 seconds. Each side face was exposed for 30 seconds each. As with the Class A brands, the Class B brands were fully aflame after the last side face was placed against the grills. Total ignition time was 3 minutes.

The Class C brands were ignited over the grills as described above. Four of the brand faces were placed on the grills for 30 seconds for a total of 2 minutes ignition time.

The Class A brand finished burning with open flame approximately 30 minutes after placement. No fire propagation away from brand in the CT nor CT-HD tests occurred. The same was true for the Class B and C brand tests.

Post Test Inspections

The Class A and B brands were nearly entirely consumed. (Figure 4) Only a few pieces of brand were left after fire test completion. Grass tufts in both the CT and CT-HD samples were melted up to 6 inches away from the Brand A (Figure 5) edge in the melt zone. Ballast sand was discolored under the brand within burn zone.

The Class B brands were also nearly entirely consumed. Only a few pieces of brand were left after fire test completion. Grass tufts were melted up to 4 inches away from the brand edge as shown in Figure 6. Sand discolored under brand but retained natural color within melt zone.

The melt zone around the Class C brand was up to 4 inches in the longest dimension (Figure 7).

Figure 4



Brand A Closure CT



Brand A ClosureTurf CT-HD

Figure 5



Figure 6



Brand B ClosureTurf CT



Brand B ClosureTurf CT-HD

Figure 7



Brand C ClosureTurf CT Brand C ClosureTurf CT-HD

Upon peeling back the turf component of the tested samples, it was found the turf had melted on to the SGN and was essentially consumed by the fire within the burn zone of all the Class A and B tests. The SGN drainage studs were intact up to the boundary of the brand and melted down to the geomembrane sheet within the burn zone. The woven geotextile beyond the burn zone – or under the melt zone - was undamaged as shown in Figure 8.

Figure 8



The entire system was pulled back to observe if the fire had burned through the SGN for both tested samples.

The underside of the SGN displayed observable effects from the fire but was not broached. The SGN burn zone boundary for results typical to all Class A and Class B tests is shown in Figure 9. Some of the soil and organic debris beneath the burn zone was dry and adhering to the SGN. Spikes beneath the burn zone were gone, while spikes in areas immediately neighboring the burn zone were intact.

The Class A brand burn zone damage to the SGN was essentially the dimensions of the brand – 12" x 12".

Figure 9



Figure 10



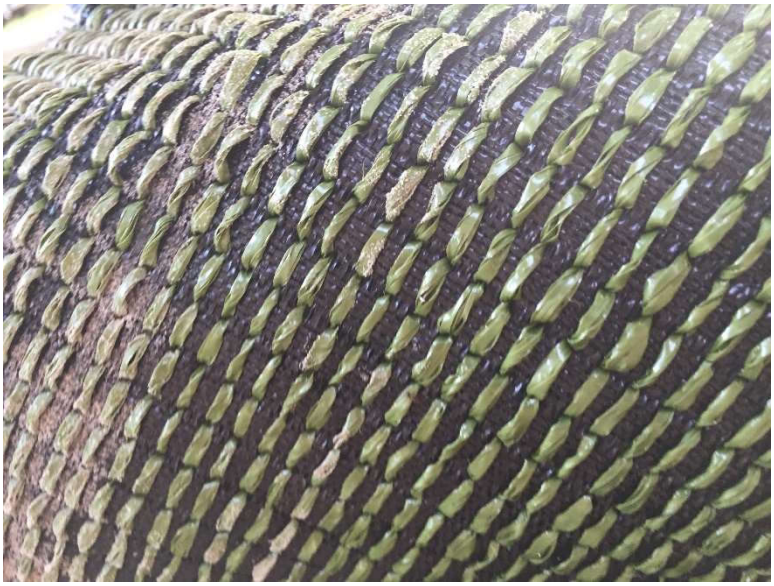
Sand discoloration beneath the burn zone was also observed in the Class B brand test. The underside of the SGN displayed observable melting from the fire but was not broached (Figure 10). Again dry soil and organic debris was found adhering to the SGN underside.

The Class B brand melt zone was slightly larger than the dimensions on the brand – 7-1/2" 7-1/2" for the CT test. For both the Class A and B tests, studs in the immediate vicinity of the burn zone were completely intact. Studs with the burn zone were flattened.

Class C brands were stuck to the underlying grass tufts after the fire had gone out. The CT test brand was not fully consumed by the fire. Note sand discoloration under the brand and minor melting of nearby grass tufts in Figure 7.

For both tests, Class C brands displayed no melting effect on the woven geotextile component in the turf (Figure 11) There were no observable impacts to the SGN either.

Figure 11



Conclusions

1. ClosureTurf exposure to fire is contained to the vicinity of the fire source. It does not spread.
2. None of the ASTM burning brand tests burned through the SGN component of ClosureTurf. This is important when considering active gas control maybe near site perimeter where burning embers may fall.

These results are relevant to concerns in California with respect to wildfire. Wildfire danger is a regulated consideration for closed landfills with surface infrastructure such as landfill gas (LFG) collection wells and piping. California considers wildfire a reasonably foreseeable event for which site owners must provide corrective action cost estimates. Vegetated surfaces provide fuel for fire propagation to other combustible structures such as LFG collection systems. This corrective action requirement could be coming to other states. Use of ClosureTurf as a final cover system should reduce these concerns and related financial burdens for corrective action financial liabilities.

If you have any questions, please call or email the undersigned.

Very Truly Yours

Chris Richgels, PE

Richgels Environmental Service



ClosureTurf® w 50 mil Super Gripnet® Liner

Product Data	Test Method	LLDPE Values	HDPE Values
Thickness (nominal), mil (mm)	ASTM D5994	50 (1.25)	50 (1.25)
Thickness (min. avg.), mil (mm)	ASTM D5994	47.5 (1.19)	47.5 (1.19)
Thickness (lowest indiv.), mil (mm)	ASTM D5994	42.5 (1.06)	42.5 (1.06)
Drainage Stud Height (min. avg.), mil (mm)	ASTM D7466	130 (3.3)	130 (3.3)
Friction Spike Height (min. avg.), mil (mm)	ASTM D7466	175 (4.45)	175 (4.45)
Density, g/cc	ASTM D792, Method B	0.939 (max.)	0.94 (min.)
Tensile Properties (avg. both directions)	ASTM D6693, Type IV		
Strength @Yield (min. avg.), lb/in. width (N/mm)		N/A	110 (19.3)
Elongation @ Yield (min. avg.), % (GL=1.3 in.)		N/A	12
Strength@Break (min. avg.), lb./in. width (N/mm)		105 (18.4)	110 (19.3)
Elongation@Break (min. avg.), %(GL=2.0 in.)		300	200
Tear Resistance (min. avg.), lbs. (N)	ASTM D1004	30 (133)	38 (169)
Puncture Resistance (min. avg.) lbs. (N)	ASTM D4833	55 (245)	80 (356)
Carbon Black Content (range %)	ASTM D4218	2-3	2-3
Carbon Black Dispersion (Category)	ASTM D5596	Only near spherical agglomerates for 10 views in Cat. 1 or 2	
Stress Crack Resistance (Single Point NCTL), hours	ASTM D5397, Appendix	N/A	500
Oxidative Induction Time, minutes	ASTM D3895, 200°C, 1 atm O_2	≥140	≥140

Agru America's geomembranes are certified to pass Low Temp. Brittleness via. ASTM D746 (-80°C), and Dimensional Stability via. ASTM D1204 (± 2% @ 100°C)

ENGINEERED TURF COMPONENT (CT)

Product Data	Test Method	Values
Yarn Type	N/A	Polyethylene, Fibrillated
Yarn Color	N/A	Olive Green, Play Green, Tan
Yarn Weight (Total Product Weight)	ASTM D5261 (sample size, 1 yd^2)	≥20 oz. / sq. yd. (≥ 32 oz. / sq. yd.)
Tensile Strength of Yarn	ASTM D2256	15 lbs. min.
CBR Puncture	ASTM D6241	1,500 lb. (MARV)
Tensile Product (MD/XD)	ASTM D4595	2,100 MD / 1,600 XD lb/ft (MARV)
Interface Friction between ClosureTurf CT and Super Gripnet®	ASTM D5321	35°, min. Peak
Engineered Turf Fiber UV Stability	ASTM G147	>60% retained tensile strength at 100 yrs. (projected)
Backing System UV Stability (Exposed)	ASTM G154 Modified Cycle 1., UVA340	110 lbs./ft. retained tensile strength at 6,500 hrs (projected)
Aerodynamic Evaluation	GTRI Wind Tunnel	120 mph with max. uplift of 0.12 lb/sf
Rainfall Induced Erosion	ASTM D6459	Infill Loss 0.1% at 6 in./hr. Rainfall
Steady State Hydraulic Overtopping (ClosureTurf® w/ HydroBinder®)	ASTM D7277/D7276	5 ft. overtopping resulting in 29 ft/s velocity and 8.8 psf shear stress for Manning's *n* value of 0.02
Full Scale Wave Overtopping Test Cumulative Volume (ClosureTurf® with HydroBinder®)	Colorado State University Wave Simulator	165,000 ft^3/ft
Full Scale Wave Overtopping Test Discharge (ClosureTurf® with HydroBinder®)	Colorado State University Wave Simulator	4.0 $ft^3/s/ft$
HydroBinder® Infill Mix	ASTM C387 / ASTM C109	3/4 in. infill 5,000 psi (min. at 28 days)

SUPPLY INFORMATION (Standard Roll Dimensions)

	Thickness		Width		Length		Area (approx.)		Weight (avg.)	
	mil	mm	ft.	m	ft.	m	ft^2	m^2	lbs	kg
Super Gripnet®	50	1.25	23	7	500	152	11,500	1,068	~5,000	~2,268
Turf Component	N/A	N/A	15	4.6	300	91.44	4,500	418	~1,000	~454

ClosureTurf®/and HydroTurf®/ products (US Patent No. 7,682,105, 8,585,322, 9,163,375, and 9,199,287; Canadian Patent No. 2,663,170; and other Patents Pending) and trademarks are the property of Watershed Geosynthetics LLC. All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, this information should not be used or relied upon for any specific application without independent professional examination and verification of its accuracy, suitability and applicability. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Watershed Geosynthetics LLC as to the effects of such use or the results to be obtained, nor does Watershed Geosynthetics LLC assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

ClosureTurf® w 50 mil Super Gripnet® Liner

Product Data	Test Method	LLDPE Values	HDPE Values
Thickness (nominal), mil (mm)	ASTM D5994	50 (1.25)	50 (1.25)
Thickness (min. avg.), mil (mm)	ASTM D5994	47.5 (1.19)	47.5 (1.19)
Thickness (lowest indiv.), mil (mm)	ASTM D5994	42.5 (1.06)	42.5 (1.06)
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Strength @Yield (min. avg.), lb/in. width (N/mm)		N/A	110 (19.3)
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Agru America's geomembranes are certified to pass Low Temp. Brittleness via. ASTM D746 (-80°C), and Dimensional Stability via. ASTM D1204 (± 2% @ 100°C)

ENGINEERED TURF COMPONENT (CT HD)

Product Data	Test Method	Values
Yarn Type	N/A	Polyethylene, Fibrillated
Yarn Color	N/A	Olive Green
Yarn Weight (Total Product Weight)	ASTM D5261 (sample size, 1 yd^2)	≥31 oz. / sq. yd. (≥ 43 oz. / sq. yd.)
Tensile Strength of Yarn	ASTM D2256	15 lbs. min.
CBR Puncture	ASTM D6241	1,500 lb. (MARV)
Tensile Product (MD/XD)	ASTM D4595	2,100 MD / 1,600 XD lb/ft (MARV)
Interface Friction between ClosureTurf CT HD and Super Gripnet®	ASTM D5321	33°, min. Peak
Engineered Turf Fiber UV Stability	ASTM G147	>60% retained tensile strength at 100 yrs. (projected)
Backing System UV Stability (Exposed)	ASTM G154 Modified Cycle 1., UVA340	110 lbs./ft. retained tensile strength at 6,500 hrs (projected)
Aerodynamic Evaluation	GTRI Wind Tunnel	120 mph with max. uplift of 0.12 lb/sf
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Steady State Hydraulic Overtopping (ClosureTurf® w/ HydroBinder®)	ASTM D7277/D7276	5 ft. overtopping resulting in 29 ft/s velocity and 8.8 psf shear stress for Manning's *n* value of 0.02
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SUPPLY INFORMATION (Standard Roll Dimensions)

	Thickness		Width		Length		Area (approx.)		Weight (avg.)	
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Super Gripnet®	50	1.25	23	7	500	152	11,500	1,068	~5,000	~2,268
Turf Component	N/A	N/A	15	4.6	300	91.44	4,500	418	~1,350	~608

ClosureTurf®/and HydroTurf®/ products (US Patent No. 7,682,105, 8,585,322, 9,163,375, and 9,199,287; Canadian Patent No. 2,663,170; and other Patents Pending) and trademarks are the property of Watershed Geosynthetics LLC. All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, this information should not be used or relied upon for any specific application without independent professional examination and verification of its accuracy, suitability and applicability. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Watershed Geosynthetics LLC as to the effects of such use or the results to be obtained, nor does Watershed Geosynthetics LLC assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

Attachment B

City of Ukiah Fire Chief Expert Opinion

Attachment B

UKIAH VALLEY FIRE AUTHORITY

1500 SOUTH STATE STREET
UKIAH, CA 95482-6709
Phone: (707)462-7921 ♦ Fax: (707)462-2938 ♦ Email: uvfd@sonic.net

MEMORANDUM

Date: 10 July, 2020

To: David Rappaport, City Attorney

From: Doug Hutchison, Fire Chief

Subject: Proposed Landfill Cover Fire Hazard

This memo is in response to your request to review and assess the fire hazard posed by the proposed artificial covering for the landfill. I base my opinions and assessments generally on my 36 years of firefighting experience and education, and more specifically as a 25+ year Strike Team Leader and Type 4 Incident Commander for wildland fires.

After reviewing the available data and test information regarding the proposed artificial covering for the landfill, it is my opinion that it would not pose an increased fire risk versus cured grasses, but would, in fact, burn slower and with much less intensity than vegetative fuels.

As for the concerns of toxic air contaminants being released, I would agree that it could occur. However, given the relatively low fire intensity, the extent would be very limited.

Please let me know if you have any other questions.

Attachment C
Material Safety Data Sheets

ATTACHMENT C

Safety Data Sheet

Section 1: Identification

Product identifier

Product Name • **DuraTurf**

Chemical Name • Polyolefin tufted turf.

Relevant identified uses of the substance or mixture and uses advised against

Recommended use • Erosion Protection

Details of the supplier of the safety data sheet

Manufacturer • Shaw Industries Group, Inc.
P.O. Drawer 2128
Dalton, GA 30720
United States
www.shawfloors.com

Telephone (General) • 706-278-3812

Emergency telephone number

Manufacturer • 800-255-3924 - Chem-Tel

Section 2: Hazard Identification

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012 • Not classified

Label elements

OSHA HCS 2012

Hazard statements • No label element(s) required

Other hazards

OSHA HCS 2012 • Under United States Regulations (29 CFR 1910.1200(c) - Hazard Communication Standard), the product(s) listed above are exempt as article(s) under stated normal conditions of use.

Other information

• This material, as an article, does not legally require an SDS

Section 3 - Composition/Information on Ingredients

Substances

- Material does not meet the criteria of a substance.

Mixtures

- Hazardous ingredients are encapsulated and are not airborne or of respirable size therefore will not be released or otherwise result in exposure to hazardous chemicals under normal conditions of use.

Section 4: First-Aid Measures

Description of first aid measures

Inhalation
- First aid is not expected to be necessary if material is used under ordinary conditions and as recommended. If signs/symptoms develop, move person to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.

Skin
- First aid is not expected to be necessary if material is used under ordinary conditions and as recommended. Wash skin with soap and water. If signs/symptoms develop, get medical attention.

Eye
- First aid is not expected to be necessary if material is used under ordinary conditions and as recommended. If contact with material occurs flush eyes with water. If signs/symptoms develop, get medical attention.

Ingestion
- First aid is not expected to be necessary if material is used under ordinary conditions and as recommended. If signs/symptoms develop, get medical attention.

Most important symptoms and effects, both acute and delayed

- Under normal conditions of use, no health effects are expected.

Indication of any immediate medical attention and special treatment needed

Notes to Physician
- No specific actions or treatments recommended related to exposure to this material.

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media
- Material is non-combustible. In case of fire use media as appropriate for surrounding fire.

Unsuitable Extinguishing Media
- No data available.

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards
- Material is non-combustible and is not expected to pose a fire or explosion hazard.

Hazardous Combustion Products
- No data available

Advice for firefighters

- Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions
- No special precautions expected to be necessary if material is used under ordinary conditions and as recommended.

Emergency Procedures
- No emergency procedures are expected to be necessary if material is used under ordinary conditions as as recommended. Use normal clean up procedures.

Environmental precautions

- No special precautions necessary.

Methods and material for containment and cleaning up

Containment/Clean-up Measures
- Carefully shovel or sweep up spilled material and place in suitable container.

Section 7 - Handling and Storage

Precautions for safe handling

Handling
- Use good safety and industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Storage
- Store in a cool, dry place.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines
- No applicable exposure limits available for product or components.

Exposure controls

Engineering Measures/Controls
- Under normal conditions of use, special ventilation is not required.

Personal Protective Equipment

Respiratory
- No respiratory protection is required under normal conditions of use.

Eye/Face
- Under normal conditions of use, eye protection is not required.

Skin/Body
- No skin protection is ordinarily required under normal conditions of use.

Environmental Exposure Controls
- Follow best practice for site management and disposal of waste.

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Solid	Appearance/Description	Tuft green or brown artificial turf.
Color	Brown or green.	Odor	No data available
Odor Threshold	No data available		
General Properties			
Boiling Point	No data available	Melting Point	No data available
Decomposition Temperature	No data available	pH	7 to 9
Specific Gravity/Relative Density	No data available	Water Solubility	Negligible < 0.1 %
Viscosity	No data available		
Volatility			
Vapor Pressure	No data available	Vapor Density	No data available
Evaporation Rate	No data available		
Flammability			

Flash Point	No data available	UEL	No data available
LEL	No data available	Autoignition	No data available
Flammability (solid, gas)	No data available		
Environmental			
Octanol/Water Partition coefficient	No data available		

Other Information

- No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable under normal temperatures and pressures.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- No data available.

Incompatible materials

- No data available.

Hazardous decomposition products

- No data available.

Section 11 - Toxicological Information

Information on toxicological effects

GHS Properties	Classification
Acute toxicity	**OSHA HCS 2012** • Not relevant
Aspiration Hazard	**OSHA HCS 2012** • Not relevant
Carcinogenicity	**OSHA HCS 2012** • Not relevant
Germ Cell Mutagenicity	**OSHA HCS 2012** • Not relevant
Skin corrosion/Irritation	**OSHA HCS 2012** • Not relevant
Skin sensitization	**OSHA HCS 2012** • Not relevant
STOT-RE	**OSHA HCS 2012** • Not relevant
STOT-SE	**OSHA HCS 2012** • Not relevant
Toxicity for Reproduction	**OSHA HCS 2012** • Not relevant
Respiratory sensitization	**OSHA HCS 2012** • Not relevant
Serious eye damage/Irritation	**OSHA HCS 2012** • Not relevant

Potential Health Effects

Inhalation

Acute (Immediate)

- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- Under normal conditions of use, no health effects are expected.

Skin

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- Under normal conditions of use, no health effects are expected.

Eye

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- Under normal conditions of use, no health effects are expected.

Ingestion

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- Under normal conditions of use, no health effects are expected.

Section 12 - Ecological Information

Toxicity

- Section is not required therefore ecological information for this material was not evaluated.

Persistence and degradability

- Section is not required therefore ecological information for this material was not evaluated.

Bioaccumulative potential

- Section is not required therefore ecological information for this material was not evaluated.

Mobility in Soil

- Section is not required therefore ecological information for this material was not evaluated.

Other adverse effects

- Section is not required therefore ecological information for this material was not evaluated.

Section 13 - Disposal Considerations

Waste treatment methods

Product waste
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	NDA	Not Regulated	NDA	NDA	NDA

Special precautions for user
- No special precautions.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
- Not relevant.

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

- Non-Mandatory section.

SARA Hazard Classifications

- None

Section 16 - Other Information

Last Revision Date

- 26/November/2013

Preparation Date

- 26/November/2013

Disclaimer/Statement of Liability

- Reasonable care has been taken in the preparation of this information, but the supplier gives no warranty of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser will make his own tests to determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental and/or consequential property damage arising out of the use of this product. No information provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights. Read the Safety Data Sheet before handling product.

Key to abbreviations

NDA = No Data Available

Material Safety Data Sheet

MARLEX ® and MARFLEX™ POLYETHYLENE (All Grades Except CL, L, R and Masterbatch Series)

October 8, 2003
MSDS #: 240370
Revision: 4

CHEVRON PHILLIPS CHEMICAL COMPANY LP
10001 Six Pines Drive
The Woodlands, TX 77380

PHONE NUMBERS
HEALTH:
Chevron Phillips Emergency Information Center 866.442.9628 (North America) and 1.832.813.4984(International)
TRANSPORTATION:
North America: CHEMTREC 800.424.9300 or 703.527.3887
ASIA: 1.703.527.3887
EUROPE: BIG .32.14.584545 (phone) or .32.14.583516 (telefax)
SOUTH AMERICA SOS-Cotec
Inside Brazil: 0800.111.767
Outside Brazil: 55.19.3467.1600
Technical Services: (800) 852-5531
For Additional MSDSs: (800) 852-5530

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Synonyms: Plastic
Chemical Name: Ethene, Homopolymer; 1-Butene, Polymer with Ethene; 1-Hexene, Polymer with Ethene; Ethylene Polymers & Copolymers plus Additives
Chemical Family: Olefin Polymers and Copolymers plus Additives
Chemical Formula: Mixture
CAS Reg. No.: Mixture-See Section B for ingredient CAS Reg. No.
Product No.: Marlex ® BHN, BMN, DTR, DTR-F, EHM, HHM, HHN, HMN, HXM, HXB, B, C, D, H, J, K, PE, HiD, mPact, Vytek, Dynex, LX, ER, TD, DS, Marlex ® and Marflex™ Series. As well as YYY and YYY-F (where Y is a number from 1 to 10) Series.

PRODUCT USE:
MEDICAL APPLICATION CAUTION: Do not use this Chevron Phillips Chemical material in medical applications involving permanent implantation in the human body or permanent contact with internal body fluids or tissues.

Do not use this Chevron Phillips Chemical material in medical applications involving brief or temporary implantation in the human body or contact with internal body fluids or tissues unless the material has been provided directly from Chevron Phillips Chemical under a contract which expressly acknowledges the contemplated use.

Chevron Phillips Chemical makes no representation, promise, express warranty or implied warranty concerning the suitability of this material for use in implantation in the human body or in contact with internal body fluid or tissues.

Product and/or Components Entered on EPA's TSCA Inventory: Yes
This product is in U.S. commerce, and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals; hence, it may be subject to applicable TSCA provisions and restrictions.

Canadian Inventory Listing Status: DSL
All ingredients are listed in the Domestic Substances List (DSL).
Impurities are exempt in accordance with Section 3 of the Canadian Environmental Protection Act (CEPA).

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	CAS Number	% By Wt.	OSHA PEL*	ACGIH TLV*
Polyethylene	9002-88-4	> 96	NE	NE
or				
Ethylene-Hexene-1 Copolymer	25213-02-9	> 96	NE	NE
Additives	Various	< 4	NE	NE

---

3. HAZARDS IDENTIFICATION

********** **EMERGENCY OVERVIEW** **********

Opaque, translucent, colorless pellets or fluff

- Formaldehyde can be produced at elevated temperature.

****

Recommended Exposure Limits:

Control as Particulate Not Otherwise Classified (PNOC) or Regulated:

	OSHA PEL
Respirable Fraction	5 mg/m3
Total Dust	15 mg/m3

* The value is for inhalable (total) particulate matter containing no asbestos and <1% crystalline silica.

_X_ Based on information presently available, this product does not meet any of the hazard definitions of 29 CFR Section 1910.1200.

Specify: No known applicable information for Canadian "Health Hazard Categories".

Other: Thermal decomposition products formed during thermal processing are expected to be irritating to the eyes.

Formaldehyde, A probable human carcinogen, may be formed at extrusion temperatures.

IMMEDIATE HEALTH EFFECTS

EYE:

Not expected to cause prolonged or significant eye irritation. Dust may cause mechanical irritation. If this material is heated, thermal burns may result from eye contact.

SKIN:

Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin. If this material is heated, thermal burns may result from skin contact.

INGESTION:

Not expected to be harmful if swallowed.

INHALATION:

Not expected to be harmful if inhaled. If this material is heated, fumes may be unpleasant and produce nausea and irritation of the upper respiratory tract. Inhalation: Dust may produce mechanical irritation to the mucous membranes of the nose, throat and upper respiratory tract.Long term exposure to high dust concentrations may cause non-debilitating lung changes.

SIGNS AND SYMPTOMS OF EXPOSURE:

Thermal burns to the eye: may include pain, tearing, reddening, swelling, and impaired vision. Thermal burns to the skin: may include pain or feeling of heat, discoloration, swelling, and blistering. Respiratory irritation: may include coughing and difficulty breathing.

At extrusion temperatures (>350F, >177C), polyethylenes can release vapors and gases which are irritating to the muccus membranes of the eyes, mouth, throat, and lungs. These substances may include acetaldehyde, acetone, acetic acid, formic acid, formaldehyde and acrolein. Generally these irritant effects are all transitory. However, prolonged exposure to irritating off gases can lead to pulmonary edema. Adequate ventilation should prevent sensory discomfort. Based on animal data and limited epidemiological evidence, NTP, IARC(2A), and OSHA have listed Formaldehyde as a probable human carcinogen.

---

4. FIRST AID MEASURES

EYE:

If heated material should splash into eyes, flush eyes immediately with fresh water for 15 minutes while holding the eyelids open. Remove contact lenses, if worn. Get immediate medical attention.

SKIN:

If the hot material gets on skin, quickly cool in water. See a doctor for extensive burns. Do not try to peel the solidified material from the skin or use solvents or thinners to dissolve it. The use of vegetable oil or mineral oil is recommended for removal of this material from the skin.

INGESTION:

No specific first aid measures are required because this material is not expected to be harmful if swallowed.

INHALATION:

Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.

---

5. FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:

Classification (29 CFR 1910.1200): Not flammable or combustible.

FLAMMABLE PROPERTIES:

FLASH POINT: 645F (340C) ASTM (D1929)
AUTOIGNITION: 716F (380C)
FLAMMABILITY LIMITS (% by volume in air): Lower: NA Upper: NA
EXTINGUISHING MEDIA:
C02, dry chemical, foam and water fog

NFPA RATINGS: Health 1; Flammability 1; Reactivity 0.

FIRE FIGHTING INSTRUCTIONS:

This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus (NIOSH SCBA).

If possible, water should be applied as a spray from a fogging nozzle since this is a surface burning material. The application of high velocity water will spread the burning surface layer.

COMBUSTION PRODUCTS:

Normal combustion forms carbon dioxide, water vapor and may produce carbon monoxide, original monomer, other hydrocarbons and hydrocarbon oxidation products, depending on temperature and air availability.

---

6. ACCIDENTAL RELEASE MEASURES

CHEMTREC EMERGENCY NUMBER (24 hr): (800)424-9300 or (703)527-3887
International Collect Calls Accepted

ACCIDENTAL RELEASE MEASURES:

Sweep up material and place in a disposable container. If liquid material is spilled, allow it to cool and solidify before proceeding with disposal methods. Contain spill and control dusts. Keep out of water sources and sewers. Spilled pellets can create slipping hazard. Sweep or vacuum up spill and place in drums for recovery or disposal.

---

7. HANDLING AND STORAGE

Avoid contact of heated material with eyes, skin, and clothing. Avoid breathing vapor or fumes from heated material.

Bulk storage of polyethylene pellets may result in accumulation of ethylene gas with possible explosion potential. Keep concentrations of ethylene gas below the lower explosive limit (LEL) of 2.7%.

Airborne dust concentrations above 20 mg/l may create a dust explosion hazard. Avoid inhalation of product dust (fines). Avoid eye contact with product dust. Avoid inhalation of, and eye contact with, off gases which may be produced during thermal processing. Do not get molten material in eyes, on skin or on clothing. Process only with adequate ventilation. Wash thoroughly after handling. Launder exposed clothing before reuse.

Thermal decomposition processing off gas condensate may form on surrounding equipment. Impervious gloves and apron should be used when cleaning condensate from equipment.
Store away from heat or flames.

Molten polymer may cause severe thermal burns. The interior of molten masses may remain hot for some time because of low thermal conductivity of the polymer. Use care when disposing of or handling such masses.

Spilled pellets may create a slipping hazard.

Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.

Bond and ground all containers and equipment before transfer operations to prevent electrostatic accumulation hazard.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS
Use in a well-ventilated area. If heated material generates vapor, or fumes, use process enclosures, local exhaust ventilation, or other engineering controls to control exposure. Ventilation requirements must be locally determined. If handling results in dust generation, special ventilation may be needed to ensure that dust exposure does not exceed the OSHA PEL for nuisance dust.

PERSONAL PROTECTIVE EQUIPMENT
EYE/FACE PROTECTION:
Wear safety glasses with side shields when working with this material as a good safety practice. If this material is heated, wear chemical goggles or safety glasses and a face shield.
VENTILATION:
Use adequate ventilation to control below recommended exposure levels. Supplemental ventilation may be needed to control off gases which may be produced during thermal processing.
SKIN PROTECTION:
Wear protective clothing to minimize skin contact as a good industrial hygiene practice. Selection of protective clothing will depend on operations conducted. Use heat resistant gloves when handling hot material. Use impervious gloves and apron when cleaning thermal decomposition processing off gas condensate from equipment.Consider physical requirements and other substanceswhen selecting protective clothing.
RESPIRATORY PROTECTION:
No special respiratory protection is normally required. When cutting or abrading these materials use a respirator approved by IOSH for protection against dust, mists and fumes having an exposure limit measured as a time weighted average (TWA) of not less than 0.05 mg/m3.When vapors or fumes from the heated material are not adequately controlled, wear a NIOSH/MSHA approved respirator. Use the following elements for air-purifying respirators: Organic Vapor and Formaldehyde.

NOTE: Personal protection information is based upon general information as to normal uses and conditions. Where special orunusual uses or conditions exist, it is suggested that the expertassistance of an industrial hygienist or other qualified professional be sought.

---

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION:
Opaque, translucent, colorless pellets or fluff

pH:	NA
VAPOR PRESSURE:	NA
VAPOR DENSITY (AIR=1):	NA
BOILING POINT:	NA
MELTING POINT:	100 - 135C
SOLUBILITY:	Insoluble in water
SPECIFIC GRAVITY:	0.91 - 1.02
DENSITY:	0.910 - 0.970 g/cm3
EVAPORATION RATE:	NA
PERCENT VOLATILE (VOL):	0.01%

---

10. STABILITY AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS:
Low molecular weight hydrocarbons, alcohols, aldehydes, acids, carbon oxides and ketones can be formed during thermal processing.

CHEMICAL STABILITY:
Stable.
CONDITIONS TO AVOID:
Avoid heating above the recommended processing temperature. Do not heat above the autoignition temperature. Do not heat without adequate ventilation.
INCOMPATIBILITY WITH OTHER MATERIALS:
May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc. May react with free halogens.
HAZARDOUS POLYMERIZATION:
Polymerization will not occur.

---

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS:
The eye irritation hazard is based on data for a similar material.
SKIN EFFECTS:
The skin irritation hazard is based on data for a similar material. The acute dermal toxicity is based on data for a similar material.
ACUTE ORAL EFFECTS:
The acute oral toxicity is based on data for a similar material.
ACUTE INHALATION EFFECTS:
The acute respiratory toxicity is based on data for a similar material.
ADDITIONAL TOXICOLOGY INFORMATION:
A similar material did not cause skin sensitization in a patch test study with human subjects.

This product contains polymerized ethylene. During thermal processing, this polymer can degrade. The three variables which control its degradation are the temperature, the length of time at that temperature, and the amount of oxygen available. Depending on the local processing conditions, a variety of low molecular weight hydrocarbons, alcohols, aldehydes, acids, and ketones can be formed. These materials are respiratory irritants. Prolonged and repeated breathing of fume components has been shown to cause other adverse health effects. Exposure to processing emissions should be minimized by following all recommendations in this MSDS.

---

12. ECOLOGICAL INFORMATION

ECOTOXICITY:
Fish or birds may eat pellets which may obstruct their digestive tracts.
ENVIRONMENTAL FATE:
This material is not expected to be readily biodegradable.

---

13. DISPOSAL CONSIDERATIONS

Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material. Recover for reuse,

recycle, incinerate for energy or place in waste management facility. Prior to disposal, consult your environmental contact to determine if the TCLP (Toxicity Characteristic Leaching Procedure, EPA Test Method 1311) is required. Reference 40 CFR Part 261.

---

14. TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT SHIPPING NAME: NOT DESIGNATED AS A HAZARDOUS MATERIAL BY THE FEDERAL DOT
DOT HAZARD CLASS: NOT APPLICABLE
DOT IDENTIFICATION NUMBER: NOT APPLICABLE
DOT PACKING GROUP: NOT APPLICABLE

---

15. REGULATORY INFORMATION

SARA 311 CATEGORIES:

1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01=SARA 313	11=NJ RTK	22=TSCA Sect 5(a)(2)
02=MASS RTK	12=CERCLA 302.4	23=TSCA Sect 6
03=NTP Carcinogen	13=MN RTK	24=TSCA Sect 12(b)
04=CA Prop 65-Carcin	14=ACGIH TWA	25=TSCA Sect 8(a)
05=CA Prop 65-Repro Tox	15=ACGIH STEL	26=TSCA Sect 8(d)
06=IARC Group 1	16=ACGIH Calc TLV	27=TSCA Sect 4(a)
07=IARC Group 2A	17=OSHA PEL	28=Canadian WHMIS
08=IARC Group 2B	18=DOT Marine Pollutant	29=OSHA CEILING
09=SARA 302/304	19=Chevron TWA	30=Chevron STEL
10=PA RTK	20=EPA Carcinogen	

None of the listed components of this material are found on the regulatory lists indicated.

---

16. OTHER INFORMATION

NFPA RATINGS: Health 1; Flammability 1; Reactivity 0;
HMIS RATINGS: Health 0; Flammability 1; Reactivity 0;
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association

(for HMIS ratings).

REVISION STATEMENT:
This revision updates Sections 2.

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV	- Threshold Limit Value	TWA	- Time Weighted Average
STEL	- Short-term Exposure Limit	TPQ	- Threshold Planning Quantity
RQ	- Reportable Quantity	PEL	- Permissible Exposure Limit
C	- Ceiling Limit	CAS	- Chemical Abstract Service Number
A1-5	- Appendix A Categories	()	- Change Has Been Proposed
NDA	- No Data Available	NA	- Not Applicable

Prepared according to the OSHA Hazard Communication Standard
(29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the EHS Product Stewardship Group, Chevron Phillips Chemical Company LP, 10001 Six Pines Dr., The Woodlands, TX 77380.

****

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THIS IS THE LAST PAGE OF THIS MSDS
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Attachment D

Polyfluoroalkyl Substances (PFAS) Testing Results

ATTACHMENT D

John Marek
Global Chemical Management Program Specialist

10001 Six Pines Drive
Suite 4105
The Woodlands, TX 77380

Telephone: (832) 813-4359
Fax: (832) 813-4435

chemcompliance@cpchem.com

www.cpchem.com

January 7, 2019

To Whom It May Concern:

Chevron Phillips Chemical Company can state that Marlex® 7104 Polyethylene, Marlex® K306 Polyethylene, and Marlex® K307 Polyethylene, as shipped, do not contain per- and polyfluoroalkyl substances (PFAS).

These substances are not used in the formulation of these products.

Sincerely,

John Marek

22-19

The information provided herein pertains only to the product as shipped, and is correct to the best of our knowledge, information and belief as of the date of this letter. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and/or release, and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process, unless otherwise specified.

© Shaw, A Berkshire Hathaway Company.

May 18, 2020

SHAW PFAS STATEMENT –
ClosureTurf® Products

To Whom It May Concern:

Shaw has a longstanding commitment to sustainability and the responsible manufacture of our products. This includes a strong focus on the material chemistry of our products.

Based on information provided to date by suppliers, Shaw does not use any PFAS chemicals currently listed as part of California's Proposition 65 regulations or identified as part of USEPA's Method 537 to manufacture the components of its ClosureTurf® products, including the fibers and backing materials. This information is confirmed through independent, third party laboratory testing of the finished product; thus, a copy of the most recent laboratory test results for the ClosureTurf products is provided for your convenience and reference.

If you should have any questions, please do not hesitate to contact the undersigned at 706-532-2185, or by email at troy.virgo@shawinc.com.

Sincerely,

Troy Virgo

Troy Virgo
Director of Sustainability
Shaw Industries Group, Inc.

PFAS by LC/MS/MS

Client: **Shaw Industries Technical Services** Laboratory ID: **VD13009-004**

Description: **Closure Turf** Matrix: **Solid**

Date Sampled: **04/10/2020 0900**

Date Received: **04/13/2020**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	04/18/2020 2108	KMM2	04/18/2020 1113	51423

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SO	ND	W	1.7	ug/kg	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	763051-92-9	PFAS by ID SO	ND	W	1.7	ug/kg	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SO	ND	W	1.7	ug/kg	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SO	ND	W	1.7	ug/kg	1
1H,1H,2H,2H-perfluorododecane sulfonic acid (10:2 FTS)	120226-60-0	PFAS by ID SO	ND	W	0.85	ug/kg	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SO	ND	W	1.7	ug/kg	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SO	ND	W	3.4	ug/kg	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SO	ND	W	1.7	ug/kg	1
N-ethylperfluoro-1-octanesulfonamide (EtFOSA)	4151-50-2	PFAS by ID SO	ND	W	1.7	ug/kg	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SO	ND	W	0.85	ug/kg	1
2-N-ethylperfluoro-1-octanesulfonamido-ethanol (EtFOSE)	1691-99-2	PFAS by ID SO	ND	W	1.7	ug/kg	1
N-methylperfluoro-1-octanesulfonamide (MeFOSA)	31506-32-8	PFAS by ID SO	ND	W	1.7	ug/kg	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SO	ND	W	0.85	ug/kg	1
2-N-methylperfluoro-1-octanesulfonamido-ethanol (MeFOSE)	24448-09-7	PFAS by ID SO	ND	W	1.7	ug/kg	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SO	ND	W	0.85	ug/kg	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SO	ND	W	0.85	ug/kg	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		118	50-150
13C2_6:2FTS		131	50-150
13C2_8:2FTS		112	50-150
13C2_PFDoA		89	50-150
13C2_PFTeDA		83	50-150
13C3_PFBS		86	50-150
13C3_PFHxS		89	50-150
13C3-HFPO-DA		86	50-150
13C4_PFBA		100	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Shaw Industries Technical Services**
Description: **Closure Turf**
Date Sampled: **04/10/2020 0900**
Date Received: **04/13/2020**

Laboratory ID: **VD13009-004**
Matrix: **Solid**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C4_PFHpA		83	50-150
13C5_PFHxA		84	50-150
13C5_PFPeA		100	50-150
13C6_PFDA		81	50-150
13C7_PFUdA		94	50-150
13C8_PFOA		100	50-150
13C8_PFOS		87	50-150
13C8_PFOSA		85	50-150
13C9_PFNA		83	50-150
d-EtFOSA		90	50-150
d5-EtFOSAA		91	50-150
d9-EtFOSE		77	50-150
d-MeFOSA		79	50-150
d3-MeFOSAA		87	50-150
d7-MeFOSE		81	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
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Attachment E

ClosureTurf® and Wildlife Fact Sheet and Hydrostatic Puncture Test Report

ClosureTurf and Wildlife

April 15, 2020

Birds

1. ClosureTurf® has low attraction to birds since it does not provide them with habitat or a food source. Birds are present at most sites where ClosureTurf is installed. There is typically an increase in bird population for sites with an open working face because the active waste disposal provides a source of food.

2. Based on field observations by Watershed Geo and site owners, bird damage is very limited and easily repaired. On a few sites, bird damage has been observed in localized areas. These may include areas where water has ponded, where birds typically perch, and around landfill gas wellheads. Also, it appears that the birds target the black geotextile backing of the engineered turf layer, rather than the green synthetic turf fibers or the underlying geomembrane. For sites that attract birds (i.e., with a working face), potential bird damage may be mitigated by maintaining coverage of the exposed geotextile backing, if any, with sand and/or HydroBinder infill. For example, bird damage around a landfill gas wellhead can be repaired and prevented by infilling the engineered turf in that area with the HydroBinder infill, which has compressive strength of 5,000 psi.

3. Bird damage, if it occurs, does not affect performance of ClosureTurf as follows:
   a) it is limited to localized areas (e.g., most times around landfill gas wellheads, ponded water, or berms where the birds can perch);
   b) it occurs only to the engineered turf, not the underlying geomembrane; and
   c) it can be immediately identified and easily repaired by patching and infilling.

Burrowing Animals

1. There is no soil layer, therefore there is no effective habitat for a burrowing animal. A burrowing animal, e.g., rodents, would be unlikely to spend any significant time on top of ClosureTurf® due to the lack of food sources, effective cover, and/or shielding from predators (i.e., birds of prey).

2. To date, with 2,000+ acres of ClosureTurf installed/being installed across multiple climate zones in the U.S. and Canada, there is no evidence of any burrowing animal activity.

3. If by chance evidence of burrowing was discovered, it is easily repaired due to the lack of soil.

Hoofed Animals

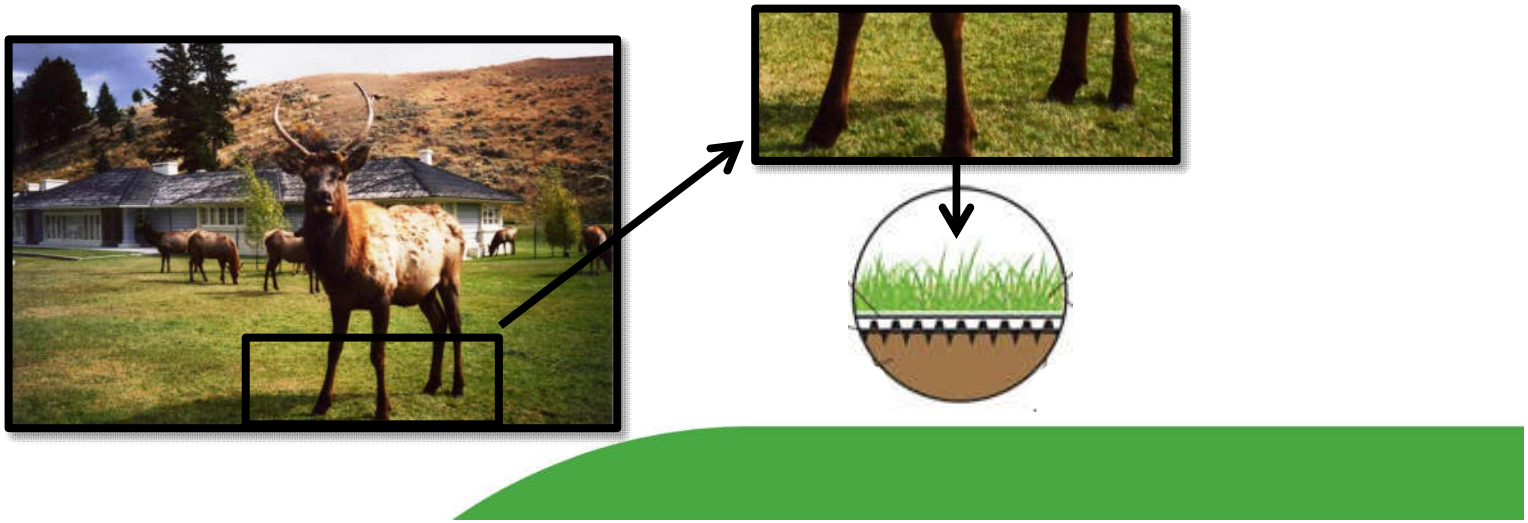


1. Hoofed animals (e.g., deer) have been spotted at ClosureTurf® sites. However, they usually do not spend any significant time on ClosureTurf due to the lack of food sources. To date, no damage has been reported due to activities of hoofed animals.
2. Unlike exposed geomembrane that is subject to damage by animal hoofs, the structured geomembrane of ClosureTurf is protected by the sand infill and engineered turf:
   a) The sand infill and engineered turf act as buffers to prevent direct contact of the hoofs with the underlying geomembrane;
   b) The sand infill dissipates the contact pressure from the hoofs and reduces their impact on both the engineered turf and geomembrane;
   c) The engineered turf consists of two layers of 6 oz/yd^2 woven geotextile that serve as an additional cushion to protect the underlying geomembrane; The CBR puncture resistance of the engineered turf is greater than 1,500 lbs (See **Attachment 1** for the ClosureTurf product data sheet); and
   d) The results of hydrostatic puncture testing show that no punctures or holes on the geomembrane were observed under a loading pressure of 85 psi (see **Attachment 2** for the test report).
3. Damage due to hoofed animals, if it occurs, can be immediately identified and easily repaired.

Hoofed Animals

Estimate of ground contact pressure from animal hoofs:

1. Assumptions:
   a) An adult bull elk weighs approximately 1,200 lbs, which is approximately 300 lbs per hoof; and
   b) A hoof size is about 4 in by 4.5 in and therefore, the contact area is about 18 in^2.
2. The ground contact pressure is estimated to be 16.7 psi (assuming all four hoofs on ground) or 33.4 psi (assuming two hoofs on ground). Note the latter represents a temporary situation.
3. The estimated ground contact pressures are less than the allowable loading limits of ClosureTurf suggested by WatershedGeo, i.e., 35 psi for slopes greater than 15% and 85 psi for slopes less than 15% (see **Attachment 3**).



Attachment 1

ClosureTurf Product Data Sheet

ClosureTurf® w 50 mil Super Gripnet® Liner

Product Data	Test Method	LLDPE Values	HDPE Values
Thickness (nominal), mil (mm)	ASTM D5994	50 (1.25)	50 (1.25)
Thickness (min. avg.), mil (mm)	ASTM D5994	47.5 (1.19)	47.5 (1.19)
Thickness (lowest indiv.), mil (mm)	ASTM D5994	42.5 (1.06)	42.5 (1.06)
Drainage Stud Height (min. avg.), mil (mm)	ASTM D7466	130 (3.3)	130 (3.3)
Friction Spike Height (min. avg.), mil (mm)	ASTM D7466	175 (4.45)	175 (4.45)
Density, g/cc	ASTM D792, Method B	0.939 (max.)	0.94 (min.)
Tensile Properties (avg. both directions)	ASTM D6693, Type IV		
Strength @Yield (min. avg.), lb/in. width (N/mm)		N/A	110 (19.3)
Elongation @ Yield (min. avg.), % (GL=1.3 in.)		N/A	12
Strength@Break (min. avg.), lb./in. width (N/mm)		105 (18.4)	110 (19.3)
Elongation@Break (min. avg.), %(GL=2.0 in.)		300	200
Tear Resistance (min. avg.), lbs. (N)	ASTM D1004	30 (133)	38 (169)
Puncture Resistance (min. avg.) lbs. (N)	ASTM D4833	55 (245)	80 (356)
Carbon Black Content (range %)	ASTM D4218	2-3	2-3
Carbon Black Dispersion (Category)	ASTM D5596	Only near spherical agglomerates for 10 views in Cat. 1 or 2	
Stress Crack Resistance (Single Point NCTL), hours	ASTM D5397, Appendix	N/A	500
Oxidative Induction Time, minutes	ASTM D3895, 200°C, 1 atm O_2	≥140	≥140

Agru America's geomembranes are certified to pass Low Temp. Brittleness via. ASTM D746 (-80°C), and Dimensional Stability via. ASTM D1204 (± 2% @ 100°C)

ENGINEERED TURF COMPONENT (CT)

Product Data	Test Method	Values
Yarn Type	N/A	Polyethylene, Fibrillated
Yarn Color	N/A	Olive Green, Play Green, Tan
Yarn Weight (Total Product Weight)	ASTM D5261 (sample size, 1 yd^2)	≥20 oz. / sq. yd. (≥ 32 oz. / sq. yd.)
Tensile Strength of Yarn	ASTM D2256	15 lbs. min.
CBR Puncture	ASTM D6241	1,500 lb. (MARV)
Tensile Product (MD/XD)	ASTM D4595	2,100 MD / 1,600 XD lb/ft (MARV)
Interface Friction between ClosureTurf CT and Super Gripnet®	ASTM D5321	35°, min. Peak
Engineered Turf Fiber UV Stability	ASTM G147	>60% retained tensile strength at 100 yrs. (projected)
Backing System UV Stability (Exposed)	ASTM G154 Modified Cycle 1., UVA340	110 lbs./ft. retained tensile strength at 6,500 hrs (projected)
Aerodynamic Evaluation	GTRI Wind Tunnel	120 mph with max. uplift of 0.12 lb/sf
Rainfall Induced Erosion	ASTM D6459	Infill Loss 0.1% at 6 in./hr. Rainfall
Steady State Hydraulic Overtopping (ClosureTurf® w/ HydroBinder®)	ASTM D7277/D7276	5 ft. overtopping resulting in 29 ft/s velocity and 8.8 psf shear stress for Manning's *n* value of 0.02
Full Scale Wave Overtopping Test Cumulative Volume (ClosureTurf® with HydroBinder®)	Colorado State University Wave Simulator	165,000 ft^3/ft
Full Scale Wave Overtopping Test Discharge (ClosureTurf® with HydroBinder®)	Colorado State University Wave Simulator	4.0 ft^3/s/ft
HydroBinder® Infill Mix	ASTM C387 / ASTM C109	3/4 in. infill 5,000 psi (min. at 28 days)

SUPPLY INFORMATION (Standard Roll Dimensions)

	Thickness		Width		Length		Area (approx.)		Weight (avg.)	
	mil	mm	ft.	m	ft.	m	ft^2	m^2	lbs	kg
Super Gripnet®	50	1.25	23	7	500	152	11,500	1,068	~5,000	~2,268
Turf Component	N/A	N/A	15	4.6	300	91.44	4,500	418	~1,000	~454

ClosureTurf®/and HydroTurf®/ products (US Patent No. 7,682,105, 8,585,322, 9,163,375, and 9,199,287; Canadian Patent No. 2,663,170; and other Patents Pending) and trademarks are the property of Watershed Geosynthetics LLC. All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, this information should not be used or relied upon for any specific application without independent professional examination and verification of its accuracy, suitability and applicability. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Watershed Geosynthetics LLC as to the effects of such use or the results to be obtained, nor does Watershed Geosynthetics LLC assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

Attachment 2

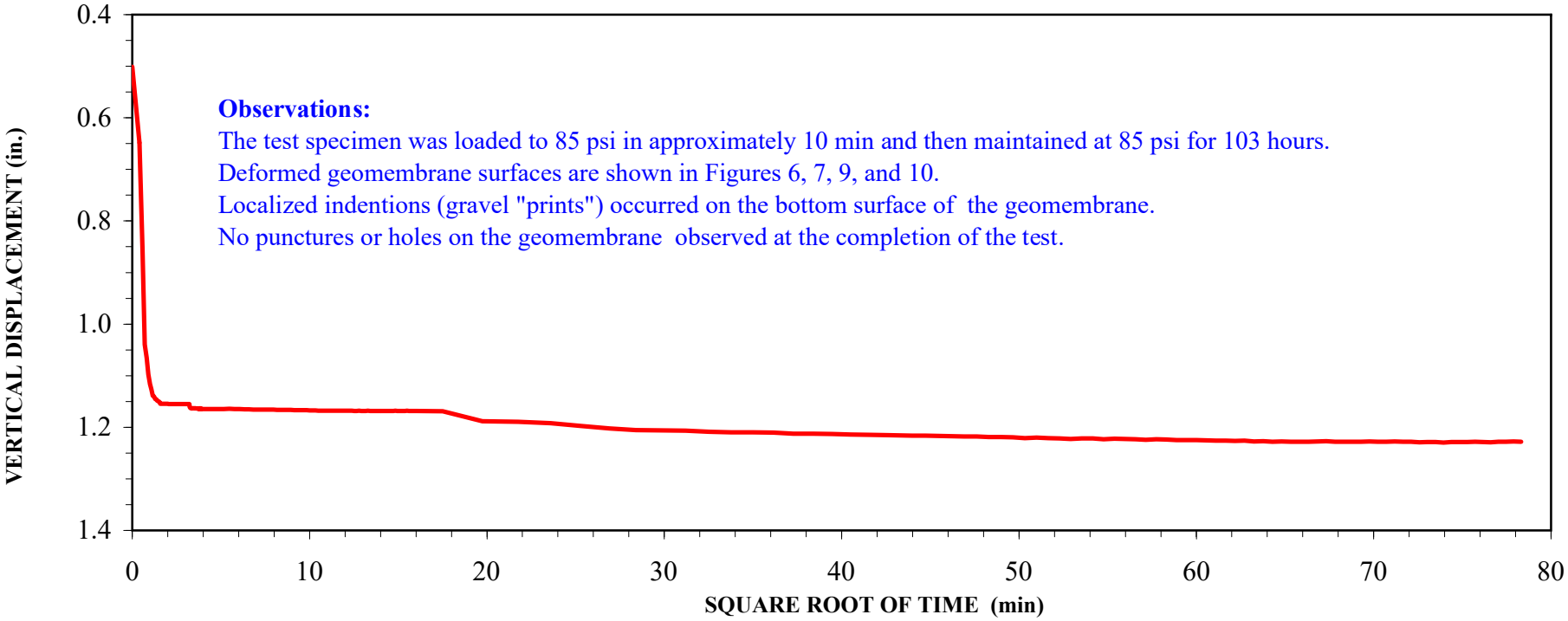
Hydrostatic Puncture Test Report

Notes:

1. The testing was performed on the HydroTurf sample; however, the test results are applicable to ClosureTurf because they both consist of structured geomembrane and engineered turf.
2. The testing was performed on a 40-mil MicroSpike geomembrane. If a thicker (i.e., 50-mil) MicroDrain or Super Gripnet geomembrane is used in ClosureTurf, the puncture performance is expected to be better.
3. The testing was performed at the maximum loading of 85 psi. Since no punctures or holes were observed, the ultimate static puncture strength of the system was not reached and therefore, should be greater than 85 psi.

WATERSHED GEOSYNTHETICS LLC- VIRGINIA PROJECT
HYDROSTATIC PUNCTURE TESTING (ASTM D 5514[(1)])

Concrete sand
HydroeTurf (2.25" long monofilament) #ZH37391 with geotextile (straight stitching pattern) down
Agru 40-mil Microspike HDPE geomembrane #G18C000439 with dull side up and shiny side down
VDOT #57 stone nominally compacted



Test	Test Specimen Size				Normal	Total	Concrete sand			#57 Stone		
	Length	Width	Upper Soil Thickness	Lower Soil Thickness	Stress	Duration	γ_d	ω_i	ω_f	γ_d	ω_i	ω_f
No.	(in.)	(in.)	(in.)	(in.)	(psi)	(hours)	(pcf)	(%)	(%)	(pcf)	(%)	(%)
1	12.0	12.0	3.0	6.0	85	102						

NOTE: (1) *Localized strains of the deformed geomembrane not calculated.*

SGI TESTING SERVICES, LLC

DATE OF REPORT:	3/2/2018
FIGURE NO.	A-2
PROJECT NO.	SGI18014
DOCUMENT NO.	
FILE NO.	

SGI18014-02.Puncture.xls

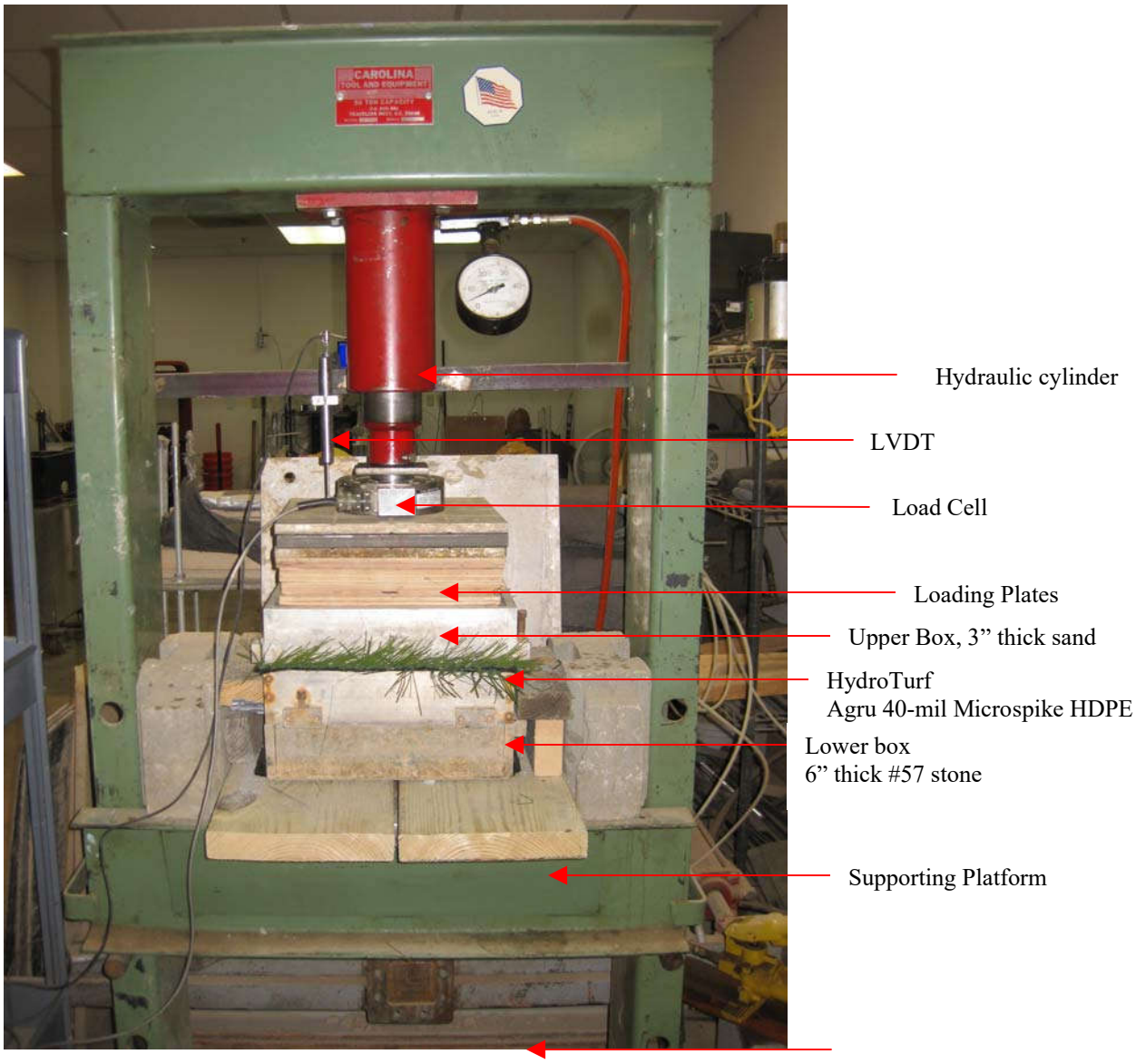


Figure 1. View of hydrostatic puncture test setup.



Figure 2. Compacted VDOT #57 stone in the lower box.



Figure 3. HydroTurf and geomembrane placed on top of compacted #57 stone.



Figure 4. Concrete sand placed in the upper box on top of HydroTurf.



Figure 5. Bottom surface of HydroTurf after the completion of test.



Figure 6. Deformed top surface of the geomembrane after the completion of test. No punctures or holes observed.



Figure 7. Deformed bottom surface of the geomembrane in contact with #57 stone after the completion of test. No punctures or holes observed.



Figure 8. Deformed bottom surface of the geomembrane in contact with #57 stone after the completion of test. No punctures or holes observed.



Figure 9. Deformed top surface of the geomembrane after the completion of test. No punctures or holes observed.

Attachment 3

ClosureTurf Loading Limits

(Excerpts from WatershedGeo ClosureTurf Installation Specification)

removal of selvage.

8. Any damage that occurs due to production seaming will be repaired as outlined in WG Installation Guidance Documents.

9. Any defects will be repaired as outlined in Section 3.14.

3.09 EQUIPMENT ON THE TURF:

A. During Construction:

1. On slopes exceeding 15%:

   a. No equipment will be allowed until Sand Infill is in place.

2. On slopes less than 15%:

   a. ATV type vehicles will be allowed prior to infill placement if the tire /track ground contact pressure is less than 5 psi.

B. Post construction (full specified sand infill thickness)

1. On slopes exceeding 15%

   a. Temporary or transient loads, allowable tire/track ground contact pressures will be limited to less than 35 psi
   b. Regularly trafficked areas will be designed and approved by the POR and/or CQA Engineer

2. On slopes less than 15%:

   a. Temporary or transient loads, allowable tire/track ground contact pressures will be limited to less than 85 psi
   b. Regularly trafficked areas will be designed and approved by the POR
   c. Allowable tire/track ground contact pressures may be increased with the written approval of the POR and/or CQA Engineer.

C. Any activity that may be identified during the course of construction by the POR, OWNER'S REPRESENTATIVE, or CQA PERSONNEL as being a possible danger to the integrity of the ClosureTurf® system will prohibited regardless of any prior approval.

Note to Author: The above suggested equipment load limits are based on assumptions that: (1) the subgrade is firm and unyielding and able to support the equipment without creating rutting or bearing capacity issues; and (2) the subgrade is free of sharp rock fragments or stones, large stones and other deleterious matter such as tree roots, construction debris and metallic objects that could cause damage to ClosureTurf. The CQA Engineer should verify the subgrade conditions and approve the suggested equipment load limit.

3.10 SAND BALLAST INFILL PLACEMENT

A. Sand infill that is placed between the tufts of the Engineered Turf Component:

1. The sand infill layer will be placed to a ½ inch minimum thickness not to exceed ¾ inch thick.

2. Will consist wholly of sand meeting Section 31 05 16, ClosureTurf® SAND INFILL COMPONENT.

3. CQA PERSONNEL shall check final thickness of sand infill at a rate of approximately 20 times per acre.

B. ClosureTurf® Sand Infill Grain Size Parameters are shown in Section 31 05 16 – Table 1.

1. CQA PERSONNEL shall observe that the following requirements regarding Sand Infill are met:

   a. Installation of sand infill will only be performed by a Watershed Geosynthetics' licensed and approved installer.
   b. Areas that are to receive sand infill must be accepted by the POR or CQA PERSONNEL before placement of sand infill takes place.

C. CQA PERSONNEL shall observe:

1. The sand infill is worked into the Engineered Turf between the synthetic yarn

Final Environmental Impact Report
City of Ukiah's Landfill Closure Project

SCH#: 2017022009



City of Ukiah

SMB ENVIRONMENTAL

April 2020

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1.0 Introduction

The City of Ukiah (City), Department of Public Works - Solid Waste Division, has prepared this Environmental Impact Report (EIR) in accordance with the California Environmental Quality Act (CEQA) to provide the public and responsible agencies with information about the potential environmental effects of the City's proposed Ukiah Landfill Closure Project (Proposed Project/Project). The Findings of Fact (Findings) presented herein address the environmental effects associated with the Proposed Project that are described and analyzed within the Final EIR. These Findings have been made pursuant to California Environmental Quality Act (CEQA; California Public Resources Code Section 21000 et seq.), specifically Public Resources Code Sections 21081 and 21081.6, as well as the CEQA Guidelines (14 CCR 15000 et seq.) Sections 15091 and 15093.

Public Resources Code Section 21081 and CEQA Guidelines Section 15091 require that the City as the Lead Agency for this Project, prepare written findings for any identified significant environmental effects along with a brief explanation of the rationale for each finding. Specific findings under CEQA Guidelines Section 15091(a) are:

1. Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effects as identified in the Final EIR.
2. Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.
3. Specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives identified in the Final EIR.

Further, in accordance with Public Resources Code Section 21081 and CEQA Guidelines Section 15093, whenever significant effects cannot be mitigated to below a level of significance, the City as the decision-making agency is required to balance, as applicable, the benefits of the project against its unavoidable environmental risks when determining whether to approve the project. If the benefits of a project outweigh the unavoidable adverse environmental effects, the adverse effects may be considered "acceptable," in which case the lead agency must adopt a formal statement of overriding considerations.

The Final EIR identified potentially significant environmental effects that could result from construction and implementation of the Proposed Project. Those effects were related to air quality, biological resources, and cultural, paleontological and tribal resources. However, with the implementation of appropriate mitigation measures identified in the Draft EIR and the Mitigation Monitoring and Reporting Program (MMRP) in the final EIR, all of the potential impacts could be avoided and/or reduced to less-than-significant levels. The Draft and Final EIR did not find any significant unmitigable impacts and thus a statement of overriding considerations is not necessary nor required.

2.0 Project Goals and Objectives

The overall purpose of the Proposed Project is to close the Ukiah Landfill in accordance with the applicable regulatory standards. Specifically, the components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, landfill gas control and monitoring systems, groundwater/surface water monitoring systems, and site security.

3.0 Project Description

As described in Chapter 2, Project Description of the Draft EIR, the Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County. The Landfill is an approximately 40-acre part of a 283.5-acre parcel of land and has a physical address of 3100 Vichy Springs Road, Ukiah, California in the southeast ¼ of Section 10, Township 15 north, Range 12 west, Mount Diablo Base and Meridian. The property is further identified by Mendocino County Assessor's Parcel Number 178-130-01.

Closure of the Ukiah Landfill will be performed in accordance with the applicable regulatory standards. The components and systems required for closure of the landfill include the final cover and grading design to control stormwater, potential infiltration and accommodate future settlement, landfill slope stability, construction quality assurance, drainage and erosion control systems, LFG control and monitoring systems, groundwater/surface water/leachate monitoring systems, and site security. As outlined in 27 CCR, §20950, the primary performance goal for final closure is to minimize the infiltration of water into the waste, thereby minimizing the production of leachate and LFG. The proposed final cover design for the Landfill areas will consist of the following layers, from top to bottom:

- Minimum 5/8-inch thick sand infill layer;
- Specialized tufted geotextile;
- 50-millimeter linear low-density polyethylene (LLDPE) geomembrane liner; and
- A minimum two-foot thick foundation layer.

This final cover design for the Landfill areas is an engineered alternative final cover consistent with 27 CCR, §20080.

4.0 Purpose of the EIR

The purpose of this EIR is to provide the public and responsible and trustee agencies with information about the potential environmental effects of the Proposed Project. This Draft EIR was prepared in compliance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000et seq.) of 1970 (as amended), and the CEQA Guidelines (California Code of Regulations, Title 14). As described in CEQA guidelines Section 15121(a), an EIR is a public information document that assesses potential environmental effects of the Proposed Project, and identifies mitigation measures and alternatives to the Proposed Project that would reduce or avoid adverse environmental impacts. CEQA requires that state and local government agencies consider the environmental consequences of projects over which they have discretionary authority.

5.0 Findings of Fact

Having received, reviewed, and considered the information in the Draft and Final EIR for this Project, as well as the supporting administrative record, the City hereby makes findings pursuant to, and in accordance with, Sections 21081, 21081.5, and 21081.6 of the Public Resources Code.

5.1 Environmental Effects Found Not to be Significant

Through the preparation of the Draft 2016 Initial Study/Mitigated Negative Declaration (IS/MND) it was determined that an EIR should be prepared for this Proposed Project. Subsequently and through project scoping and the environmental analysis contained within the Draft and Final EIR, it was determined that the Proposed Project would not result in a potential significant effect on the environment with respect to aesthetics/visual resources; agricultural and forestry resources; energy resources; geology, soils, and

seismicity; greenhouse gases; hydrology and water quality; hazards and hazardous materials; toxic air contaminants; land use and planning; mineral resources; noise; population and housing; public services; recreation; traffic and transportation; utilities and service systems; wildfire; growth inducing effects; and cumulative effects. A summary of the reasons for this determination can be found in the Draft and Final EIR. No further findings are required for these subject areas.

5.2 Findings for Significant but Mitigated Effects

The following findings have been made for the significant environmental effects identified in the Draft EIR related to air quality; biological resources; and cultural, paleontological, and tribal resources.

Air Quality

Implementation of the Proposed Project could result in temporary potentially significant impacts to air quality as follows:

> **Impact 3.2-2: Construction of the Proposed Project Could Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant Under an Applicable Federal or State Ambient Air Quality Standard.**
>
> **Impact 3.2-6: Would Construction of the Proposed Project Result in Other Emissions (Such as Naturally Occurring Asbestos) Adversely Affecting a Substantial Number of People.**

Finding:

Changes or alterations have been required in, or incorporated into, the Proposed Project which would avoid or substantially lessen the significant environmental effect as identified in the Draft EIR. (*Section 15091(a)(1)*).

Mitigation Measures:

Pursuant to CEQA Guidelines Section 15091, the following mitigation measures have been included in the Mitigation Monitoring and Reporting Program (MMRP) that is to be adopted concurrently with these findings.

> **Mitigation Measure 3.2-1: Fugitive Dust Control Measures***:* The following airborne dust control measures shall be required during all construction operations, grading of roads, or the clearing of land (MCAQMD Rule 1-430- Fugitive Dust Emissions):
>
> - All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions.
> - All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 miles per hour.
> - Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed.
> - Asphalt, oil, water or suitable chemicals shall be applied on materials stockpiles, and other surfaces that can give rise to airborne dusts.
> - All earthmoving activities shall cease when sustained winds exceed 15 miles per hour.
> - The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours.
> - The operator shall keep a daily log of activities to control fugitive dust.

Mitigation Measure 3.2-6: Develop and Submit NOA Dust Mitigation Plan. Prior to construction of the Proposed Project (if an exemption is not granted because it is determined that NOA is not found on the project site), the City shall submit a NOA Dust Mitigation Plan to the MCAQMD and comply with NOA requirements of the MCAQMD and Title 17 California Code of Regulations §93105. Specifically, the MCAQMD requires that the following control measures are implemented at the start and maintained throughout the duration of the construction or grading activity (one acre or greater), in accordance with Title 17 California Code of Regulations §93105:

- Submittal of an Asbestos Dust Mitigation Plan in accordance with Section 93105(e)(4)
- All Asbestos Dust Mitigation Plan requirements must be implemented and maintained throughout project.
- Stabilize disturbed areas after construction.
- Report and record all geologic survey and sampling analysis results.
- All fill removed from areas containing NOA must be disposed of in accordance with all applicable laws and regulations.
- Approved dust suppressants are to be used on all unpaved surfaces annually.
- Construction within ¼ mile of a school, hospital, or other sensitive receptors can occur only with a District permit.
- Discovery of NOA after start of a project requires stoppage of work, notification to the District and implementation of NOA requirements for the project size prior to restarting of work.
- All on-site workers must be notified of the presence or possible presence of NOA per OSHA requirements.

Significance after Mitigation:

With the incorporation of the above mitigation measures, significant environmental effects to air quality would be reduced to less-than-significant.

Biological Resources

Implementation of the Proposed Project could result in temporary potentially significant impacts to biological recourses as follows:

Impact 3.3-1: Construction of the Proposed Project could have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

Impact 3.3-3: Construction of the Proposed Project could have a substantial adverse effect on federally protected waters of the U.S. as defined by Section 404 of the federal Clean Water Act or protected waters of the state as defined by Section 1600 et seq. of the California Fish and Game Code (including, but not limited to, marshes, vernal pools, and coastal wetlands) through direct removal, filling, hydrological interruption, or other means.

Finding:

Changes or alterations have been required in, or incorporated into, the Proposed Project which would avoid or substantially lessen the significant environmental effect as identified in the Draft EIR. (*Section 15091(a)(1)*).

Mitigation Measures:

Pursuant to CEQA Guidelines Section 15091, the following mitigation measures have been included in the Mitigation Monitoring and Reporting Program (MMRP) that is to be adopted concurrently with these findings.

Mitigation Measure 3.3-1a: Conduct A Preconstruction Survey for Special Status Wildlife Species. A qualified biologist shall conduct a pre-construction survey for state and federal special status wildlife species no more than 10-days prior to construction. A combination of visual and trapping surveys may be performed with authorization from CDFW and/or USFWS. If a wildlife special species such as the western pond turtle, and/or the yellow-legged frog is found near any proposed construction areas, impacts on individuals and their habitat shall be avoided to the extent feasible. If occupied habitat can be avoided, an exclusion zone shall be established around the habitat and temporary suitable/authorized fencing shall be installed around the buffer area with "Sensitive Habitat Area" signs posted and clearly visible on the outside of the fence. If avoidance is not possible and the species is determined to be present in work areas, the biologist with approval and permits from CDFW may capture the wildlife special status species prior to construction activities and relocate them to nearby, suitable habitat a minimum of 300-feet from the work area. Exclusion fencing shall then be installed if feasible to prevent them from reentering the work area. For the duration of work in these areas, the biologist shall conduct regular follow-up visits during and throughout construction activities to monitor effectiveness.

Mitigation Measure 3.3-1b: Conduct Bird Breeding and Nesting Surveys. For construction activities that occur between February 1 and August 31, preconstruction breeding and nesting bird surveys shall be conducted by a qualified biologist prior to and within 3-days of any initial ground-disturbance activities to prevent birds from nesting between the survey and the start of construction. Typically, nesting birds can build a nest in approximately 4 days. Surveys shall be conducted within all suitable nesting habitat within 250-feet of the activity. All active, non-status passerine nests identified at that time shall be protected by a 75-100-foot radius minimum exclusion zone. Active raptor or special-status species nests shall be protected by a buffer with a minimum radius of 200-feet. CDFW and USFWS recommend that a minimum 500-foot exclusion buffer be established around active special-status species nests. The following considerations apply to this mitigation measure:

- Survey results are valid for 7-days from the survey date. Should ground disturbance commence later than 7-days from the survey date, surveys should be repeated. If no breeding birds are encountered, then work may proceed as planned.
- Exclusion zone sizes may vary, depending on habitat characteristics and species, and are generally larger for raptors and colonial nesting birds. Each exclusion zone would remain in place until the nest is abandoned or all young have fledged.
- The non-breeding season is defined as September 1 to January 31. During this period, breeding is not occurring and surveys are not required. However, if nesting birds are encountered during work activities in the non-breeding season, disturbance activities within a minimum of 50-feet of the nest should be postponed until the nest is abandoned or young birds have fledged.

Mitigation Measure 3.3-1c: Conduct a Bat Habitat Assessment of Trees: Removal of trees containing suitable bat roosting habitat comprised of cavities, crevices, and/or exfoliating bark, may cause direct mortality of roosting bats if removed during maternity season (April 15 to August 31) prior to self-sufficient volancy of pups, or in winter during torpor or hibernation (October 16 to February 28). Removal of larger mature trees has the potential of causing direct mortality of solitary tree-roosting species such as western red bat or hoary bat. Minimization Measures identified in Sections 1.3.7, and 1.3.8 will reduce these impacts to less than significant. However,

if the construction timing is changed and construction must occur between April 15 and August 31 or October 15 and February 29, a bat habitat assessment will be conducted.

For those trees with suitable potential habitat, presume presence of roosting bats, then conduct two-step tree removal during seasonal periods of bat activity, so that bats can safely abandon the tree prior to removal. These dates are:

A) between March 1 (or after evening temperatures rise above 45F and 72 hours after rains fall to less than 0.5-inches in 24 hours) and April 15 (maternity season), after which time non-volant pups are present in maternity roosts, and;

B) between September 1, after young are self-sufficiently volant, and October 15 (winter hibernation), or before evening temperatures fall below 45F, and 72 hours prior to onset of rains greater than 0.5-inches in 24 hours.

A qualified bat biologist experienced with two-step removal procedures is required to instruct and provide initial supervision of tree cutting crews on Day 1 so that they do not accidentally remove potential habitat features, which could result in direct mortality of bats. On Day 2, the day following trimming and removal of non-habitat roost features on habitat trees, the tree is removed. Any new tree cutting crew members added to the crew will require instruction and initial supervision by a qualified bat biologist.

Mitigation Measure 3.3-1d: Environmental Awareness Training. All construction personnel shall be given environmental awareness training by the Proposed Project's environmental inspector or biological monitor before the start of construction. The training will familiarize all construction personnel with the federally listed species that may occur in the Action Area, their habitats, general provisions and protections afforded by the Endangered Species Act, measures to be implemented to protect these species, and the project boundaries. This training will be provided to any new worker before they are authorized to perform project work. As part of the environmental awareness training, construction personnel will be notified that no dogs or any other pets under control of construction personnel will be allowed in the Project Area, and that no firearms will be permitted in the Project Area, unless carried by authorized security personnel or law enforcement.

Mitigation Measure 3.3-1e: Biological Monitor. A CDFW -approved Biological Monitor will be present on site for all construction activities that occur within 100-feet of suitable habitats for state and/or federally listed species that may be present during the Proposed Project. The City will submit the Biological Monitor's qualifications to the CDFW for approval 30-days prior to project construction. The Biological Monitor will ensure that all applicable avoidance and minimization measures are implemented during project construction. Specifically, the Biological Monitor will also ensure that:

- All vehicles entering the site are free of debris that may harbor organisms that could be introduced to the site, such as vegetation or mud from other areas.
- Turbidity, sedimentation, and the release of materials such as dust or construction runoff are controlled, and that spill control measures are enacted properly.
- No state or federally listed species and/or their habitats experience unintended effects.

The Biological Monitor will have the authority to stop any work activities that could result in unintended adverse effects to covered species and/or their habitats.

Mitigation Measure 3.3-1f: Staging Areas and Access Routes. Placement of all staging areas, access roads, and other facilities will avoid and limit disturbance-sensitive habitats (e.g., riparian habitat, suitable habitats) as much as possible. All staging and material storage areas, including the locations where equipment and vehicles are parked overnight, will be placed outside of the flood

zone of a watercourse, away from riparian habitat or wetland habitat, and away from any other sensitive habitats. When possible, staging and access areas will be situated in areas that are previously disturbed, such as developed areas, paved areas, parking lots, areas with bare ground or gravel, and areas clear of vegetation.

Mitigation Measure 3.3-3a: Protect Jurisdictional Waters and Sensitive Habitat Areas. The City shall implement the following measures to protect jurisdictional waters and sensitive habitats.

- Request a verification of the pre-construction delineated boundaries from the Corps. Following verification of the delineation boundaries from the Corps, the City shall develop measures to avoid impacts to jurisdictional wetlands.
- After final design, quantify impacts to wetlands and other waters. Submit to the Corps a permit application for discharge of fill material into waters of her United States, pursuant to Section 404 of the Clean Water Act.
- Install and maintain appropriate erosion and sedimentation controls during and following construction.
- Obtain a streambed alteration agreement with the California Department of Fish and Wildlife, pursuant to Section 1601 of the Fish and Game Code, before initiating construction within the 100-year floodplain of any stream crossing.
- Develop and implement mitigation plans for impacts to wetlands. Replace eliminated wetlands at a 1:1 ratio so there is no net loss of wetlands. Temporarily impacted wetlands should be restored onsite. Stockpile topsoil removed from wetlands and store in upland landscape positions. Following construction disturbance, restore the land surface contours and backfill the top 6- to 12-inches with stockpiled topsoil.
- Following Project completion, monitor the site to assess mitigation success. Success criteria should be clearly defined for all measures implemented to mitigate for project impacts to wetlands. Yearly reports should be submitted to the Corps until implementation has been determined to be successful.

Significance after Mitigation:

With the incorporation of the above mitigation measures, significant environmental effects to biological resources would be reduced to less-than-significant.

Cultural, Paleontological, and Tribal Resources

Implementation of the Proposed Project could result in temporary potentially significant impacts to Cultural, Paleontological, and Tribal Resources as follows:

Impact 3-4.2: Construction of the Proposed Project could cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5.

Impact 3.4-3: Construction of the Proposed Project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Impact 3.4-4: Construction of the Proposed Project could disturb any human remains, including those interred outside of formal cemeteries.

Impact 3.4-5: Construction of the Proposed Project could cause a substantial adverse change in the significance of a tribal cultural resource.

Finding:

Changes or alterations have been required in, or incorporated into, the Proposed Project which would avoid or substantially lessen the significant environmental effect as identified in the Draft EIR. (*Section 15091(a)(1)*).

Mitigation Measures:

Pursuant to CEQA Guidelines Section 15091, the following mitigation measures have been included in the Mitigation Monitoring and Reporting Program (MMRP) that is to be adopted concurrently with these findings.

Mitigation Measure 3.4-2: Halt Work if Cultural Resources are Discovered. In the event that any prehistoric or historic subsurface cultural resources are discovered during ground disturbing activities, all work within 100-feet of the resources shall be halted and after notification, the City shall consult with a qualified archaeologist to assess the significance of the find. If any find is determined to be significant (CEQA Guidelines 15064.5[a][3] or as unique archaeological resources per Section 21083.2 of the California Public Resources Code), representatives of the City and a qualified archaeologist shall meet to determine the appropriate course of action. In considering any suggested mitigation proposed by the consulting archaeologist in order to mitigate impacts to historical resources or unique archaeological resources, the lead agency shall determine whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If avoidance is infeasible, other appropriate measures (e.g., data recovery) shall be instituted. Work may proceed on other parts of the project site while mitigation for historical resources or unique archaeological resources is carried out.

Mitigation Measure 3.4-3: Stop Work if Paleontological Remains are Discovered. If paleontological resources, such as fossilized bone, teeth, shell, tracks, trails, casts, molds, or impressions are discovered during ground-disturbing activities, work will stop in that area and within 100-feet of the find until a qualified paleontologist can assess the significance of the find and, if necessary, develop appropriate treatment measures in consultation with the City.

Mitigation Measure 3.4-4: Halt Work if Human Remains are Found. If human remains are encountered during excavation activities conducted for the Proposed Project, all work in the adjacent area shall stop immediately and the Mendocino County Coroner's office shall be notified. If the Coroner determines that the remains are Native American in origin, the Native American Heritage Commission shall be notified and will identify the Most Likely Descendent, who will be consulted for recommendations for treatment of the discovered human remains and any associated burial goods.

Mitigation Measure 3.4-5: Halt Work if Tribal Cultural Resources are Discovered. In the event that any tribal cultural resources are discovered during ground disturbing activities, all work within 100-feet of the resources shall be halted and after notification, the City shall consult with a qualified archaeologist and local tribes to assess the significance of the find. If any find is determined to be significant as a unique tribal cultural resource, the City shall treat the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including to, but not limited to, the following:

- Protecting the cultural character and integrity of the resource;
- Protecting the traditional use of the resource; and
- Protecting the confidentiality of the resource.

In considering any suggested mitigation proposed by the consulting archaeologist and/or the appropriate tribe in order to mitigate impacts to any tribal cultural resources find, the City shall determine whether avoidance is feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If avoidance is infeasible, other appropriate measures (e.g., data recovery) shall be instituted and coordinated with the appropriate tribe(s). Work may proceed on other parts of the project site while mitigation measures for tribal cultural resources or other unique archaeological resources are carried out.

Significance after Mitigation:

With the incorporation of the above mitigation measures, significant environmental effects to Cultural, Paleontological, and Tribal Resources would be reduced to less-than-significant.

5.3 Findings for Significant and Unavoidable Effects

Public Resources Code 21081 and 21081.5, and CEQA Guidelines Section 15093, require that the City balance economic, legal, social, technological, or other benefit(s) of a proposed project against its unavoidable environmental effects when determining to approve a project. If specific economic, legal, social, technological, or other benefit(s) outweigh the unavoidable adverse environmental effect, the adverse effects may be considered "acceptable".

The Proposed Project does not have any significant and unavoidable effects.

5.4 Mitigation Monitoring and Reporting Program and Project Design Features

As referenced above in the findings, a MMRP has been prepared for the project and is to be adopted concurrently with these findings and statement of overriding considerations pursuant to Public Resources Code Section 21081(a)(1). The MMRP is a separate stand-alone document that will be used by the City to track compliance with the project mitigation measures. The MMRP will remain available for public review during the compliance period, which includes pre-construction coordination, construction, and post-construction documentation.

6.0 Project Alternatives

CEQA requires that a reasonable range of feasible alternatives be evaluated in an EIR. The CEQA Guidelines, Section 15126.6, *Consideration and Discussion of Alternatives to the Proposed Project*, specify the following:

> "(a) Alternatives to the Proposed Project. An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation. An EIR is not required to consider alternatives that are infeasible. The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting (and eliminating) those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason. (*Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553 and *Laurel Heights Improvement Association v. Regents of the University of California* (1988) 47 Cal.3d 376)."

With respect to the feasibility of alternatives, the CEQA Guidelines state, "among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, jurisdictional boundaries, and whether an applicant can reasonably acquire, control or otherwise have access to the alternative site." The CEQA Guidelines also state that the alternatives discussion should not be remote or speculative and need not be presented in the same level of detail as the assessment of the Proposed Project.

Section 15126.6(b) of the CEQA Guidelines provides:

> (b) Purpose. Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment (Public Resources Code Section 21002.1), the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

The EIR finds that proposed project using the ClosureTurf cover does not have significant adverse environmental impacts, including on viewsheds from public or private property that the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation could lessen or avoid. Accordingly, the analysis of this alternative properly considers whether the Proposed Project better achieves the project objectives and at less cost than the Proposed Project.

Section 15126.6 (e) of the CEQA Guidelines also requires the analysis of a No Project Alternative. The purpose of describing and analyzing a No Project Alternative is to allow decision-makers the opportunity to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. The CEQA Guidelines state that the No Project Alternative is the circumstance under which the project would not proceed. If the No Project Alternative would not result in the preservation of existing conditions, the consequences of not approving the Proposed Project should also be discussed.

As detailed in Chapter 3 – Environmental Analysis of the Draft EIR and discussed above, the Proposed Project would have several potentially significant impacts to the environment. However, with the implementation of the identified and corresponding mitigation measures, all of the potentially significant impacts can be reduced to less-than-significant levels. CEQA Guidelines §15126.6(c) recommends that an EIR briefly describe the rationale for selecting the alternatives to be discussed. The following factors were considered in identifying and considering a reasonable range of alternatives to the Project:

- Does the alternative accomplish all or most of the primary Project objectives?
- Is the alternative feasible, from an economic, environmental, legal, social and technological standpoint?
- Does the alternative avoid or lessen any significant environmental effects of the Project?

To that end, the Draft EIR identified and considered the following alternatives:

- The CEQA required No Project Alternative
- Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative
- Relocation of the Ukiah Landfill
- Alternative/Synthetic Specialized Tufted Geotextile Landfill Turf Cover Color

Consistent with CEQA, the City prepared a preliminary evaluation of these alternatives and eliminated all of the alternatives from further consideration, except for the CEQA required No Project Alternative. A summary of this evaluation and the rationale for the elimination of each alternative is disclosed in Chapter 4 of the Draft EIR. The No Action Alternative is not a legally feasible alternative as the Ukiah Landfill would not be properly closed according to state and local regulations and would be susceptible to slope instability, potential water quality impacts to surface water and groundwater resources due to inadequate cover leading to drainage and erosion issues during inclement weather/stormwater, and the potential for inadequate landfill gas control and monitoring leading to air quality issues and impacts. Under the No Action Alternative, the City would be potentially susceptible for a variety of water quality and air quality violations and fines. However, due to CEQA requirements, the No Project Alternative must still be evaluated against the Proposed Project.

Of particular concern to several commenters on the Draft EIR was the elimination of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative. However, the Ukiah Landfill

is located on steep, 2:1 plus, slopes and the potential for a clay and/or geosynthetic clay layer alternative failure is unreasonably quite high. Such a failure could result in significant water quality issues to the unnamed creek alongside the Ukiah Landfill, which drains into Sulfur Creek and then the Russian River. Further, forensic analyses of a number of natural landfill cover slope failures over the last 20-plus years has shown that both Compacted Clay and Geosynthetic Clay Liners fail due to pore water pressure rise in saturated cover soils building up beneath the clay layers; particularly on steep slopes such as the conditions of the Ukiah Landfill. In short, the heavy clay layers assist in the probability of slope failure. Further, CalRecycle has approved numerous alternative landfill covers that are similar to the Proposed Project throughout the State of California and they have proven to be a viable alternative, especially on landfills with steep slopes.

From an environmental perspective, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would also cause a substantial increase in temporary construction impacts to air quality, noise, and traffic issues over the Proposed Project as it would require the need to excavate and/or import (transport) significant quantities of clay sources and natural vegetation cover soils of to the site and spread them over the 40-acre Ukiah Landfill. Also, from an operational standpoint, this alternative would result in increased maintenance impacts (and costs) from having to maintain the natural grass/vegetation to prevent fires and keep rodents from compromising the clay layer structure, which would then contribute to a substantial increase in traffic, air quality, noise, and other potential environmental impacts.

However, to avoid controversy over whether the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure is feasible, the City expanded upon its environmental evaluation of that alternative, without determining that it is infeasible. However, as allowed by Section 15126.6(b) of the CEQA Guidelines, the Final EIR takes into consideration whether this alternative would impede to some degree the attainment of the project objectives and would be more costly. Specifically, this alternatives analysis includes a detailed discussion of the Compacted Clay and/or Geo Synthetic Clay Layer Alternative against the Proposed Project and within each of the environmental resource areas/categories. The conclusions are the same. From an environmental perspective, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would cause an increase in temporary construction impacts to air quality, biological resources, water quality, and noise as compared to the Proposed Project as the alternative would require the need to excavate and/or possibly import (transport) significant quantities of clay sources and natural vegetation cover soils to the site and spread them over the 40-acre Ukiah Landfill. Also, from an operational standpoint, the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative would increase maintenance impacts (and costs) from having to maintain and repair slope failures as well as to maintain the natural grass/vegetation to prevent fires and keep rodents from compromising the clay layer structure, which would then contribute to increases in traffic, air quality, noise, and other potential environmental impacts over the Proposed Project.

This further evaluation of the Compacted Clay and/or Geo Synthetic Clay Layers with Natural Vegetation Closure Alternative as well as comments received on the Final EIR and the City's responses to those comments do not constitute "significant new information" which would require recirculation of the Draft EIR. Significant new information is defined:

(1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.

(2) A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.

(3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project's proponents decline to adopt it.

(4) The Draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

None of these circumstances has arisen from this expanded evaluation and/or comments on the Draft EIR, the Final EIR or the response to those comments; therefore, recirculation is not required.

As a result, the Proposed Project and artificial cover alternative remains as the City's selected alternative because it has many advantages over the Compacted Clay and/or Geo Synthetic Clay Layer with Natural Vegetation Closure Alternative and the No Project Alternative as the Proposed Project provides: 1) A proven stable cover on steep slopes due to the elimination of low interface strength pore water pressure and gas relief layers, 2) Decreased exposure to construction-related air quality, noise, and traffic impacts and potential significant and unavoidable long-term water quality impacts to surface and groundwater resources which could lead to significant fines, and 3) significant lower capital and on-going/perpetual maintenance costs. As a result, the Compacted Clay and/or Geo Synthetic Clay Layer with Natural Vegetation Closure Alternative has been considered and evaluated pursuant to CEQA requirements, but is not selected as it does not perform as well as the Proposed Project. The No Project Alternative is not a legally implementable alternative. As a result, the Proposed Project remains the City's selected alternative and is also the Environmentally Superior Alternative.

7.0 Statement of Overriding Consideration

The Proposed Project does not have any significant and unavoidable effects. Therefore, the City does not need, nor is required, to prepare any Statements of Overriding Consideration.

8.0 Statement of Location and Custodian of Documents

Public Resources Code Section 21081.6(a)(2) requires that the City, as the Lead Agency, specify the location and custodian of the documents of other materials that constitute the record of proceedings upon which its decision has been based. The following location is where review of the record may be performed:

The City of Ukiah
300 Seminary Avenue
Ukiah, California 95482-5400

The City has relied on all of the documents contained within the record of proceedings in reaching its decision on the project.

RESOLUTION NO 2020-

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH ADOPTING AN ENVIRONMENTAL IMPACT REPORT, MITIGATION MONITORING AND REPORTING PROGRAM, AND CEQA FINDINGS OF FACT IN ACCORDANCE WITH THE CALIFORNIA ENVIRONMENTAL QUALITY ACT FOR THE PUBLIC WORK'S UKAH LANDFILL CLOSURE PROJECT

WHEREAS, the City of Ukiah (City) prepared an Environmental Impact Report for the Public Works Ukiah Landfill Closure Project (Proposed Project) in accordance with the requirements of the California Environmental Quality Act of 1970, as amended ("CEQA"), and state and local guidelines implementing CEQA; and

WHEREAS, the City is the CEQA Lead Agency on the Proposed Project, and the City Council is the decision-making body for the Proposed Project; and

WHEREAS, the City of Ukiah Landfill is located approximately three miles east of the City of Ukiah within the unincorporated area of Mendocino County; and

WHEREAS, waste disposal operations at the Ukiah Landfill began in 1955 at the eastern end of the landfill footprint and progressed upslope and westward; and

WHEREAS, the Ukiah Landfill occupies approximately 40-acres of a 283.5-acre parcel having a maximum width of approximately 1,000-feet in the north-south direction and a maximum length of about 3,500-feet in the east-west direction; and

WHEREAS, dwellings around the Ukiah Landfill property include a group of structures owned by the Vichy Springs Resort that are located within 500-feet of the City's south property line, but are well over 1,250 feet from the actual Ukiah Landfill area that is also separated visually by an elevation barrier/ridge; and

WHEREAS, the method of operation during the Landfill's operation was a fill and cover approach in a canyon/gully terrain; and

WHEREAS, the Landfill operated as a nonhazardous Class III solid waste disposal site servicing the City of Ukiah and the surrounding area; and

WHEREAS, the types of waste received included garbage, rubbish, demolition and construction waste, brush, stumps, large appliances diverted as scrap metal and street refuse; and

WHEREAS, the Landfill ceased operations in September 2001; and

WHEREAS, the City's Public Works Department oversees the City's efforts to properly close the landfill according to the applicable regulatory standards to protect the public health and safety and the environment; and

WHEREAS, since the closing of operations in 2001, the City and its engineer (EBA Engineers) have been working with the various regulatory agencies and has evaluated numerous alternatives; and

WHEREAS, the City has selected an engineered alternative using an synthetic tufted geotextile cover system instead of the clay layer and natural cover prescribed by 27 CCR § 21090

("prescriptive clay layer") as the Proposed Project due to a variety of environmental, technical and cost considerations resulting in part from being located on steep 2:1 vertical to horizontal slopes; and

WHEREAS, the City prepared an EIR to evaluate its potential impacts of the Proposed Project and evaluated project alternatives pursuant to CEQA; and

WHEREAS, the City issued a Notice of Preparation (NOP) of the EIR on February 2, 2017 (State Clearing House (SCH) #2017022009); and

WHEREAS, the NOP was circulated to the public, local, state, and federal agencies, and other interested parties to solicit comments on the Proposed Project during the 30-day comment period; and

WHEREAS, during the scoping period, the City held two (2) scoping meetings on February 15, 2017 to discuss the Proposed Project and to solicit public input on the scope and content of the EIR; and

WHEREAS, the NOP and comments received are available for review in the Public Draft EIR; and

WHEREAS, in accordance with Sections 15087 and 15105 of the State CEQA Guidelines, the Public Draft EIR was circulated for public review and comment to lead and responsible agencies, as well as members of the public, for 45- days (November 13 through December 31, 2019 and was then extended through January 9, 2020); and

WHEREAS, the Public Draft EIR disclosed that the construction of the Proposed Project would result in short-term/temporary construction related impacts that can be reduced to less-than-significant impacts with the implementation of mitigation measures and best construction practices as identified in the Public Draft EIR; and

WHEREAS, operations of the Proposed Project would also generally result in less-than-significant impacts and/or any potentially significant impacts that can be reduced to less-than-significant levels with the implementation of mitigation measures and best practices as identified in the Public Draft EIR; and

WHEREAS, in connection with the approval of a project involving the preparation of a Public Draft EIR that identifies one or more significant environmental effects, CEQA requires the decision-making body of the lead agency to incorporate feasible mitigation measures that would reduce those significant environment effects to a less-than-significant level; and

WHEREAS, the Proposed Project will not individually or cumulatively have an adverse effect on wildlife resources, as defined in Section 711.2 of the California Department of Fish and Game Code; and

WHEREAS, whenever a lead agency approves a project requiring the implementation of measures to mitigate or avoid significant effects on the environment, CEQA also requires a lead agency to adopt a Mitigation Monitoring and Reporting Program (MMRP) to ensure compliance with the mitigation measures during project implementation; and

WHEREAS, the Public Draft EIR found that the Proposed Project does not directly create or induce growth in the Ukiah area because it does not provide a significant number of additional permanent jobs nor does it approve land development; and

WHEREAS, the Public Draft EIR found that the Proposed Project would not have any cumulatively considerable effects; and

WHEREAS, the during the 45-day Public Review Period the City received four (4) comment letters – two (2) from public agencies and two (2) from Vichy Springs Resort on the Public Draft EIR; and

WHEREAS, none of the comments, nor the City's responses change any of the outcomes or conclusions in the Public Draft EIR which would require the re-circulation or cancellation of the Public Draft EIR; and

WHEREAS, the City prepared a Final EIR document that responded to all of the comments received during the 45-day public review period, responded where appropriate to late comments and comments on the Final EIR, and also prepared a Mitigation Monitoring and Reporting Program (MMRP) to ensure compliance with the identified mitigation measures identified and proposed in the Public Draft EIR, and

WHEREAS, all of the commenters on the Public Draft EIR have been given a copy of the Final EIR with the City's responses to those comments and have been invited to this City Council Meeting to express any issues and concerns they may have; and

WHEREAS, no public (or other) comments were received from the two public agencies in regard to the City's responses to their comments in the Final EIR;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF UKIAH AS FOLLOWS:

THAT THE CITY COUNCIL does hereby certify the EIR in compliance with CEQA and makeR the following findings: (1) it has independently reviewed, analyzed and based its decision on the whole of the record, which includes those items identified in Public Resources Code Section 21167.6(e), including, but not limited to, the Public Draft and Final EIR, the staff reports and other information in the administrative record. The City Council has considered the information contained therein, prior to acting upon or approving the Project, (2) the Public Draft and Final EIR prepared for the Proposed Project has been completed in compliance with CEQA and consistent with state and local guidelines implementing CEQA, and (3) the Public Draft and Final EIR represents the independent judgment and analysis of the City as lead agency for the Proposed Project. The City Council designates the City's Director of Public Works Department as the custodian of documents and records of proceedings on which this decision is based.

THAT THE CITY COUNCIL does hereby adopt the MMRP prepared for the Proposed Project.(Appendix A to the Final EIR). The Public Draft, Final EIR, and MMRP are: (1) on file with the City at its Public Works Department at 300 Seminary Avenue, Ukiah, California 95482 and (2) available for inspection by any interested person.

THAT THE CITY COUNCIL does hereby adopt the CEQA Findings of Fact that have been prepared for the Proposed Project. The CEQA Findings of Fact are: (1) on file with the City at its Public Works Department at 300 Seminary Avenue, Ukiah, California 95482 and (2) available for inspection by any interested person.

THAT THE CITY COUNCIL does hereby authorize the Director of Public Works to file the Notice of Determination with the California State Clearinghouse and the Mendocino County Recorder-Clerk, along with a check for $3,393 for the required California Fish and Wildlife Filing Fee ($3,343) and the Mendocino County Processing Fee ($50) within five (5) days of this resolution as required by CEQA.

THAT THE CITY COUNCIL does hereby adopt the Ukiah Landfill Closure Project, as currently written. The Public Works Integrated Master Plan is: (1) on file with the City at its Public Works

Department at 300 Seminary Avenue, Ukiah, California 95482 and (2) available for inspection by any interested person.

PASSED AND ADOPTED on May 6, 2020, by the following roll call vote:

AYES:

NOES:

ABSENT:

_____
Douglas Crane, Mayor

ATTEST:

_____
Kristine Lawler, City Clerk

Attachments:

1) Final Environmental Impact Report with Mitigation Monitoring and Reporting Program
2) CEQA Findings of Fact

pioneer
law group, llp

Andrea A. Matarazzo
Partner
andrea@pioneerlawgroup.net
direct: (916) 287-9502

July 30, 2020

Via Electronic and U.S. Mail

David J. Rapport, City Attorney
City of Ukiah
405 West Perkins Street
Ukiah, California 95482

Re: City of Ukiah Landfill Closure Project, 3100 Vichy Springs Road
Our File No. 5364-001

Dear Mr. Rapport:

As you requested, our office reviewed the Environmental Impact Report ("EIR") for the proposed closure plan for the City's landfill located at 3100 Vichy Springs Road, as well as comments received from attorneys representing the Vichy Springs Resort, Russian Riverkeeper, and the Mateel Environmental Justice Foundation, and a memorandum in response to those comments prepared by Environmental Science Associates ("ESA").

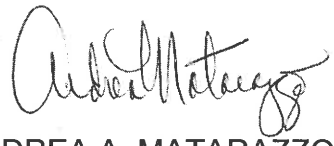
The attorneys' comment letter objected to approval of the landfill closure plan as proposed and asserted a variety of reasons for the challenge. ESA's technical memorandum evaluated and responded to each of the allegations made in the attorneys' comment letter. Our review and evaluation of these documents concludes that the EIR satisfies the requirements of the California Environmental Quality Act ("CEQA"), while the attorneys' comments disregard fundamental CEQA principles regarding the existing environmental baseline (CEQA Guidelines, § 15125(a); ; the City's duties under CEQA's standards of reasonableness and feasibility (e.g., CEQA Guidelines, §§ 15151, 15204, *Dry Creek Citizens Coalition v. County of Tulare* (1990) 70 Cal.App.4th 20, 26); the regulatory framework in which the closure plan will be implemented and monitored (see, e.g., CEQA

Guidelines, §§ 15064, 15064.7; 27 CCR, § 20950); and the definition of substantial evidence (CEQA Guidelines, § 15384), among others.

The opinion letter and other material submitted with the attorneys' comments make a variety of inaccurate and unsubstantiated assertions focused primarily on the suitability of the specialized tufted geotextile (ClosureTurf® Final Cover System, manufactured by Watershed Geosynthetics) proposed for the landfill cover.[1] Inaccurate and unsubstantiated comments and assertions do not constitute evidence, much less that which is considered substantial. Even if they did, the mere presence of conflicting opinions from purported experts is not sufficient to invalidate the analysis in an EIR.

ESA's detailed evaluation of the attorneys' comments and the evidence in the City's record as a whole demonstrate that the attorneys' comments identify no fundamental defect or inadequacy in the EIR and present no substantial evidence of a new or substantially more severe environmental impact of the project that would require revision and recirculation of the EIR. (CEQA Guidelines, § 15088, 15088.5.)

Very truly yours,
PIONEER LAW GROUP, LLP



ANDREA A. MATARAZZO

AAM:sr

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1 / The ClosureTurf® Final Cover System has been approved and is in use in several other California locations, including but not limited to the Salinas Valley Solid Waste Authority's Crazy Horse Sanitary Landfill in Monterey County, the City of Portola's Class III Municipal Solid Waste Landfill in Plumas County, and the George Air Force Base Landfill Closure in San Bernardino County. (https://watershedgeo.com/closureturf-projects/closureturf-projects-in-california/.) The final cover design proposed for the City of Ukiah Landfill Closure Project likewise is an engineered alternative cover consistent with 27 CCR, § 20080.

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Conduct a Public Hearing to Consider Adoption of a Resolution Authorizing Submittal of an Application in Response to the 2020 State Community Development Block Grant Program - Coronavirus Response Round 1 Notice of Funding Availability; and Approve Corresponding Budget Amendments if Awarded the Grant.

DEPARTMENT: Community Development

PREPARED BY: Craig Schlatter, Community Development Director

PRESENTER: Craig Schlatter, Community Development Director

ATTACHMENTS:
1. CDBG-CV1 NOFA
2. CARES-Programs-for-CDBG-Grantees-Enterprise
3. CDBG-CV1 Jurisdiction Allocations
4. Resolution- 2020 CDBG-CV1 application

Summary: Council will conduct a public hearing to consider and possibly adopt a resolution authorizing the submittal of an application in response to the 2020 State Community Development Block Grant Program - Coronavirus Response Round 1 Notice of Funding Availability.

Background: On June 5, 2020, the State Department of Housing and Community Development (HCD) announced the availability of $18.7 million in new federal funds for the Community Development Block Grant Coronavirus Response Round 1 (CDBG-CV1) for local assistance through a Notice of Funding Availability (NOFA) (Attachment 1). HCD began accepting applications beginning June 8, 2020, with applications and required documentation due by August 31, 2020. Funding for the NOFA was made available pursuant to the Coronavirus Aid, Relief, and Economic Security (CARES) Act signed into law March 27, 2020.

State CDBG Citizen Participation regulations require a public hearing to adopt a resolution authorizing submittal of an application, or applications, to HCD. That is the purpose of this public hearing.

CDBG-CV1 Eligible Activities and Threshold Requirements

The CDBG-CV1 NOFA provides funding for the following activities: assistance to businesses and microenterprises impacted by COVID-19 stay-at-home orders and shut-downs; public services related to COVID-19 support; facility improvements related to COVID-19 healthcare and homeless housing needs; and acquisition of real property to be used for the treatment or recovery of infectious diseases in response to COVID-19. Funds must be used to meet the national objective of benefit to low- to moderate-income (LMI) individuals and/or households.

CDBG-CV1 funds cannot be used where a "Duplication of Benefits" occurs- i.e. "when a program beneficiary receives assistance from multiple sources for a cumulative amount that exceeds the total need for a particular funding need." For this reason, jurisdictions must be careful in their deployment of CDBG-CV1 funds. Please

see Attachment 2 for a list of other financial assistance sources that may preclude deployment of CDBG-CV1 funds.

Applicants can apply for up to three activities with the total request not exceeding the allocation limit per jurisdiction. The City's allocation per the NOFA is $108,757 (Attachment 3). Up to 17 percent of this allocation can be utilized for general administration. Because CDBG-CV1 funds are noncompetitive, provided the City's application is complete and meets threshold requirements, the City will receive an award of $108,757.

Discussion: Staff within the City Manager's Office/Emergency Management, Electric Utility Department, and Community Development Department discussed current priorities related to the COVID-19 pandemic. Identified was the need for an emergency sheltering facility within the city limits to assist healthcare providers meet the demand for services and support in the event of a surge in the number of COVID-19 patients. Such an emergency sheltering facility should also have the capacity to sustain services in the event of a Public Safety Power Shutdown (PSPS).

The City's conference center was identified as a possible emergency sheltering facility but would need to be improved with a generator in the event of a PSPS or other disaster causing a power outage. Staff discussed the eligibility of a generator installation for CDBG-CV1 funds with HCD staff, and HCD staff confirmed the project would be eligible provided that it principally benefited LMI residents and could assist existing healthcare providers with increased capacity to respond to COVID-19. By having the City's conference center operational to handle emergency sheltering and support during a PSPS, the hospital is able to more fully focus on responding to the COVID-19 crisis, improving capacity. The conference center is located within a census tract/block group with more than 50% LMI area benefit, so the project is eligible per CDBG National Objective requirements.

Staff Recommendation to Council

The following is requested and included in the attached Resolution (Attachment 4):

City of Ukiah Public Facility Improvement Project = not to exceed $90,269
General Administration = not to exceed $18,488
Total = not to exceed $108,757

To proceed with this recommendation, Staff requests Council 1) conduct a public hearing; and 2) adopt the Resolution in Attachment 4 authorizing an application be submitted to HCD for the above activities; and 3) approve corresponding budget amendments if the application is awarded.

Recommended Action: 1) Conduct a public hearing to consider approval of application submittal to the State Department of Housing and Community Development; and 2) adopt a resolution authorizing the submittal of a 2020 State Community Development Block Grant application and authorizing the City Manager to execute all related documents; and 3) approve corresponding budget amendments if awarded.

BUDGET AMENDMENT REQUIRED: If CDBG-CV1 grant awarded.

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: $108,757: $18,488- General Administration; $90,269- City of Ukiah Public Facility Improvement Project

FINANCING SOURCE: CDBG-CV1

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Mel Grandi, Electric Utility Director, Tami Bartolomei, Office of Emergency

Approved: 
Sage Sangiacomo, City Manager

STATE OF CALIFORNIA - BUSINESS, CONSUMER SERVICES AND HOUSING AGENCY GAVIN NEWSOM, *Governor*

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF FINANCIAL ASSISTANCE
2020 W. El Camino Avenue, Suite 670
Sacramento, CA 95833
(916) 263-2771
www.hcd.ca.gov

June 5, 2020

MEMORANDUM FOR: All Potential Applicants

FROM: Jennifer Seeger, Acting Deputy Director
Division of Financial Assistance

SUBJECT: Community Development Block Grant Program – Coronavirus Response Round 1 (CDBG-CV1) Notice of Funding Availability

The California Department of Housing and Community Development (Department) is pleased to announce the availability of approximately $18.7 million in new federal funds for the Community Development Block Grant Coronavirus Response Round 1 (CDBG-CV1) funding for local assistance. Funding for this Notice of Funding Availability (NOFA) is made available pursuant to the Coronavirus Aid, Relief, and Economic Security (CARES) Act signed into law March 27, 2020.

The Department will be accepting applications through the Grants Network portal beginning June 8, 2020. Applications and required documentation must be received by the Department no later than **Monday, August 31, 2020, 5:00 p.m. Pacific Daylight Time. Any applications received after this time will not be accepted.**

Applications will be reviewed and awarded as received. Applicants must submit their approved governing body resolution prior to the Department's execution of a Standard Agreement. The Department will not execute agreements without an approved governing body resolution that is acceptable to the Department. In the event that the CDBG-CV1 funds are not fully awarded by the application closing date, the Department will either allocate additional funding to active contracts that have met performance and timeliness milestones, or it will roll unawarded funds into subsequent rounds of CARES Act funding as appropriate and available.

Applicants are encouraged to set-up their profiles in the Grants Network portal located at https://portal.ecivis.com/#/login as early as possible. Profile set-up instructions can be found in the Grants Network portal, external user manual on the CDBG webpage at https://www.hcd.ca.gov/grants-funding/active-funding/cdbg.shtml.

Applicants are encouraged to begin the application process early to ensure successful submission before the application deadline. If you have any trouble logging into the portal or have questions on how to complete the online application, please contact the CDBG staff at cdbg@hcd.ca.gov and make sure to include CDBG-CV1 in the subject line of your message.

To receive CDBG-CV1 NOFA FAQs, notice of the NOFA webinar, and other program information and updates, please subscribe to the CDBG listserv at https://www.hcd.ca.gov/HCD_SSI/subscribe-form.html. For questions or assistance, please email cdbgnofa@hcd.ca.gov.

Attachment

Community Development Block Grant Program -

Coronavirus Response Round 1 (CDBG-CV1)

Notice of Funding Availability

Gavin Newsom, Governor
State of California

Lourdes M. Castro Ramírez, Secretary
Business, Consumer Services and Housing Agency

Gustavo Velasquez, Director
California Department of Housing and Community Development

Division of Financial Assistance, Federal Programs Branch
Community Development Block Grant Program
2020 W. El Camino Avenue, Suite 200, Sacramento, CA 95833

CDBG Program Email: cdbg@hcd.ca.gov

June 5, 2020

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I. Notice of Funding Availability

The California Department of Housing and Community Development (Department) receives funding from the United States Department of Housing and Urban Development (HUD) for the Community Development Block Grant (CDBG) Program and allocates funds to CDBG eligible non-entitlement jurisdictions. Approximately $18.7 million in new CDBG coronavirus response round 1 (CDBG-CV1) federal funds authorized by the Coronavirus Aid, Relief, and Economic Security (CARES) Act, will be allocated to eligible jurisdictions to perform Activities related to COVID-19 response and recovery. The CARES Act provides extra CDBG funds specifically targeted to prevent, prepare for, and respond to coronavirus.

The CDBG-CV1 Notice of Funding Availability (NOFA) provides funding ONLY for the following Activities, which are narrowly tailored as described in Section II.A and Section II.B of this Notice of Funding Availability (NOFA):

- Assistance to businesses and microenterprises impacted by COVID-19 stay-at-home orders and shut-downs
- Public services related to COVID-19 support
- Facility improvements related to COVID-19 healthcare and homeless housing needs
- Acquisition of real property to be used for the treatment or recovery of infectious diseases in response to COVID-19

CDBG-CV1 funds will be distributed through a simplified application via the Grants Network portal online grant management system and will be available to all CDBG-eligible non-entitlement jurisdictions as outlined in the Department's Annual Plan Amendment located at https://www.hcd.ca.gov/policy-research/plans-reports/index.shtml.

This NOFA outlines application requirements, timelines for eligible jurisdictions, and provides documentation requirements.

A. Tentative program timeline

EVENT	DATE
CDBG-CV1 NOFA and application released	**June 5, 2020**
OTC application window opens	**June 8, 2020**
Application deadline	**August 31, 2020**
Department announces awards	**As applications are received**

* Award timeline is dependent on receipt of HUD's grant agreement.

B. Authorizing Legislation

Funding under this NOFA is made available pursuant to the CARES Act (Public Law No: 116-136) and the Housing and Community Development Act of 1974 (HCDA) as amended and codified at Title 42 United States Code (U.S.C.) § 5301 et. seq., and Subpart 1 of the Federal CDBG Regulations, found at Title 24 Code of Federal Regulations (CFR) § 570.480 et seq. The requirements of the state administered CDBG program are in California Health and Safety Code (HSC) §§ 50825-50834. This NOFA should be read in conjunction with the following regulations that establish state and federal CDBG requirements. Relevant legal authority includes, but is not limited to, the following:

- Housing and Community Development Act of 1974 (HCDA) as amended and codified at Title 42 United States Code 5301 et seq., and Subpart 1 of the Federal CDBG Regulations
- HSC §§ 50825-50834
- CFR, Title 24, Part 570, Subpart I
- 24 CFR Part 58
- 2 CFR Part 200
- CDBG Guidelines (Guidelines)
- The State of California 2015-2020 Consolidated Plan as amended
- The State of California 2019-2020 Annual Action Plan as amended
- Governor of California Executive Order N-66.20

If state or federal statutes or regulations, or other laws, relating to the CDBG-CV1 funds are modified by the United States Congress, HUD, the Department, California State Legislature, or the Governor, the changes may become effective immediately and may be applicable to this NOFA and existing Standard Agreements.

If there is a conflict between the state and federal regulations, the federal regulations shall prevail. In addition, the Department reserves the right, at its sole discretion, to suspend or amend the provisions of this NOFA. If such an action occurs, the Department will notify interested parties. Awards made under this NOFA are also contingent upon the Department executing a grant agreement from HUD for the CARES Act funds.

C. Conditions

Applicants and Awardees acknowledge that the funding opportunities referenced in this NOFA, and all obligations of the Department herein, are expressly subject to the following conditions:

1. The ongoing availability of funds

2. The continued authority of the Department to administer the CDBG-CV1 funds

3. The execution of the CARES Act funding grant agreement with HUD

4. Issuance of the Governor's Executive Order providing regulatory relief from state statute

In the event that funds are not available to fund any, or all, Activities offered herein, or if the Department's authority to administer the CDBG-CV1 funds or act under this NOFA is eliminated, or in any way restricted, the Department shall have the option, at its sole discretion, to amend, rescind, suspend, or terminate this NOFA and any associated funding pursuant to the provision set forth immediately above. **This NOFA is not a commitment of funds to any Activity or Applicant**.

D. Applicant responsibility

It is the Applicant's responsibility to ensure that the application submitted is clear, complete, and accurate. It is also the Applicant's responsibility to ensure that the governing body resolution submitted is clear, complete, and accurate. The Department will not execute agreements without a resolution that is also acceptable to the Department. In this NOFA, the Department has gone to great lengths to explain what will be an acceptable resolution to the Department. After the application submittal deadline, Department staff may request clarifying information to make sure the application is complete and accurate and meets federal eligibility requirements. Applicants may be asked to make changes to their Activities to meet eligibility requirements. Applications that do not meet federal minimum eligibility requirements will be returned to draft status for Applicant changes. No Applicant may appeal the Department's evaluation of another Applicant's application.

II. Eligible Activities (24 CFR §§ 570.201-203

Applicants can apply for a total of three (3) Activities with the total request not exceeding the allocation amount in Appendix A. **Activities funded under this NOFA will have a 12-month expenditure period**. See Appendix E for a list of eligible HUD Matrix Codes. Applicants must show a relationship between the need for services and COVID-19 impacts.

For the CDBG-CV1 NOFA, the following Activities are permitted:

A. Community Development

1. Public services to respond to COVID-19 impacts

2. Public facility improvements to increase capacity for healthcare facilities (facility improvements must include a documented connection with healthcare facility needs)

3. Public facility acquisition, provided that the end use increases healthcare facility capacity

4. Acquisition and/or improvement of housing facilities for persons experiencing homelessness

B. Economic Development with a focus on job retention

1. Business assistance

2. Microenterprise assistance (including Micro-financial assistance and Technical assistance)

III. Duplication of benefits

A Duplication of Benefits (DOB) occurs when a program beneficiary receives assistance from multiple sources for a cumulative amount that exceeds the total need for a particular funding need. The amount of the duplication is the amount of assistance provided in excess of the need. It is the Department's responsibility to ensure that each CDBG-CV1 Activity provides assistance only to the extent that the project's funding needs have not been met by another source. See the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (42 U.S.C. § 5155; HUD Memorandum dated 9 April 2020, subject: 'CARES Act Flexibilities for CDBG funds used to support coronavirus response and plan amendment waiver').

Section 312 of the Stafford Act prohibits federal agencies from providing assistance to any "person, business concern, or other entity" for any loss to which the entity has already received financial assistance from another source (42 USC § 5155(a)). The Federal Register Notice, published November 16, 2011 (Docket No. FR-5582-N), requires adequate policies and procedures in place to prevent a DOB and the recapture of funds, if necessary.

Applicants will be required to complete DOB documentation at application and will be required to continue to report on DOBs throughout the expenditure period for the CDBG-CV1 funds.

IV. National Objectives (24 CFR §§ 570.483-484)

A. Low- to Moderate-Income National Objective

At least 70 percent of the funds awarded shall benefit low- to moderate-income (LMI) individuals or households. No Activity or portion of a program assisted by these funds may exclude from its benefits the lowest-income eligible group.

Persons, households, and/or neighborhoods benefiting from LMI Activities must meet HUD's LMI requirements. Income limits are regularly updated. Applicants will be notified via a news email blast and information will be posted on the Department's website if the HUD Adjusted Median Family Income (HAMFI) limits or low- to moderate-income areas (LMA) are updated during the application period.

The LMI National Objective consists of the following categories:

1. LMI Limited Clientele (LMC), as defined by income limits or presumed benefit.

   LMC refers to persons who earn 80 percent or less of HAMFI for the county of residence, as updated annually by HUD.

   Presumed benefit LMC refers to persons who, as a category, are typically low income. This includes:

   - Seniors
   - Persons with a disability (must meet the Bureau of the Census' Current Population Report's definition of "severely disabled")
   - Homeless persons
   - Abused children and battered spouses
   - Illiterate adults
   - Persons living with acquired immunodeficiency syndrome (AIDS)
   - Migrant farmworkers

2. LMI Area (LMA), as defined by census tracts and block groups.

   - LMA eligibility is based on the American Community Survey using Census Geographies.
   - At least 51 percent of households in the area must be earning at 80 percent or below HAMFI to meet LMA.

- Must be contiguous – the area must be a solid area, without certain streets or buildings being excluded, and the area should be mapped to show eligibility. If a service area is not contiguous it will be determined to be a separate Activity and will need a separate application.

- Activity must be a public benefit for the area, for example, the construction of a facility to be used for testing, diagnosis, or treatment of infectious disease.

  LMA eligibility should be determined from the map application at HUD's Low- and Moderate-Income Summary Data Application page. Instructions for HUD's mapping application can be found at this link: https://hud.maps.arcgis.com/apps/webappviewer/index.html?id=ffd0597e8af24f88b501b7e7f326bedd

3. LMI Housing (LMH), as defined by household income limits

   - Households earning 80 percent or less of HAMFI.

4. LMI Job Creation or Retention (LMJ) Activities

   - LMJ is based on the number of full-time equivalent jobs created or retained.

   - Must create or retain jobs, and 51 percent of those jobs must be for LMI persons.

   - To meet the public benefit requirements for LMJ Activities, for every $35,000 spent (including Activity delivery), one full-time equivalent job must be created or retained.

B. Urgent Need National Objective

Urgent Need is a National Objective that is available for instances where the existing conditions in a community:

- Pose a serious and immediate threat to the health or welfare of the community.

- Are of recent origin or recently became urgent.

- The applicant is unable to finance the Activity.

- Other resources of funding are not available to carry out the Activity.

The availability of Urgent Need as a National Objective depends on the overall LMI performance of the state. The state may only offer Urgent Need in the margin above the statutory 70 percent LMI requirement. As a result, Urgent Need will not be a default National Objective and may only be designated on a case-by-case basis.

Applicants that have no option but to use Urgent Need must contact the Department to discuss how to prepare and submit their application.

Please note that if HUD should provide waivers of the 70 percent LMI requirement or other guidance that will allow for greater utilization of Urgent Need, the Department may make changes to the program allocation process to incorporate Urgent Need as a default National Objective without amending this NOFA. Applicants will be notified of any such changes via email.

V. Eligible applications

Applicants must meet the following requirements when the application is submitted to be eligible to apply for funding under this NOFA:

A. Eligible jurisdictions

Any California city or county is eligible to apply for CDBG-CV1 funding except a city or county that participates in the HUD-administered CDBG Entitlement program either as a direct entitlement, or as part of an Urban County consortium. Incorporated cities located in an Urban County as defined by 42 U.S.C. 5302(a)(6) must formally elect to be excluded from participation in the Urban County entitlement status.

HUD must be notified that the city has elected to be excluded from the Urban County participation as per 24 CFR 570.307(g) for it to be eligible for the state administered CDBG program, including CDBG-CV1 funding. Eligible Applicants may use the following approaches. Only eligible Activities from eligible Applicants will be reviewed.

1. An eligible Applicant may apply on its own behalf.

2. An eligible Applicant may apply on behalf of one or more other eligible Applicants. An application on behalf of one or more other eligible applications will need to include a Memorandum of Understanding (MOU), or similar formal agreement, fully executed by all parties of the application, that clearly identifies the lead Applicant and that details the roles, responsibilities, and requirements for each party. The agreement must be enforceable.

3. Two or more eligible Applicants, which share a program, may submit a joint application. A joint application must include a MOU, or similar formal agreement, fully executed by all parties of the application, that clearly identifies the lead Applicant and that details the roles, responsibilities, and requirements for each party. The agreement must be enforceable. Only one Applicant in a joint application may be designated as the lead agency and will have the lead responsibility for administering the Standard Agreement, financial management, and Activity reporting.

B. Financial Management Compliance (2 CFR Part 200)

The Applicant must demonstrate to the satisfaction of the Department that it is in compliance with the financial management requirements at 2 CFR §200, et seq., including the single audit requirements of 2 CFR §200.501.

C. Good standing

The Applicant, and any co-Applicant, together with the respective affiliates, must be in good standing with the Department (*i.e*., are current on all loan and/or grant obligations, have a satisfactory past performance history in all of their prior dealings with the Department, and are in full compliance with all Department contracts and reporting requirements). Applicants not meeting the foregoing requirements shall include with their application evidence that they are actively working with the Department to resolve any issue.

D. Federal debarment

Pursuant to 24 CFR Part 5, all CDBG-CV1 Applicants are required to verify they and their principals, or any/all persons, contractors, consultants, businesses, sub-recipients, etc., that will be conducting business with the Applicant as part of the Activity are not presently debarred, proposed for debarment, suspended, declared ineligible, or voluntarily excluded from participation in the covered transaction or in any proposal submitted in connection with the covered transaction.

The Department will not award any CDBG-CV1 funds to Applicants that are debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from participation from federally assisted programs, or that are proposing to partner, contract, or otherwise fund Activities through an organization that is debarred, suspended, proposed for debarment, or otherwise ineligible from participation in federally assisted programs. Applicants are responsible for providing proof that all program partners, subrecipients, contractors, and any other program participants, current or future, are not debarred. Applicants must provide proof from the federal System for Award Management that the Applicant, all application partners, and any subrecipients, developers, consultants, and contractors that are or may be participating in the application, the potential administration of the award, or the potential implementation of the Activity, are not debarred. Applicants are not required to run debarment checks against individual employees. If the Applicant has not yet procured the contractor or identified a subrecipient for a specific Activity, the Applicant will be required to check for debarment prior to executing a contract or agreement for that Activity and shall include proof of debarment evaluation in the Activity file.

E. Restrictions on multiple Activities in the same political districts

Applications for eligible Activities outside the Applicant's jurisdiction must include a legally binding agreement, acceptable to the Department, with the city or county in which the eligible Activity is located. Applicants may not apply to both the state administered CDBG program (including CDBG-CV1) and to a CDBG program

administered by an Urban County or other entitlement entity during the same program year.

VI. Funding and Activity limits

IMPORTANT NOTE:

All applications must be submitted through the Department's online Grants Network portal via https://portal.ecivis.com/#/login; no hard copies will be accepted. Jurisdictions will submit **one application per** Activity. Each jurisdiction **can submit up to three (3) applications** during this NOFA cycle. Each Activity must have a unique application with a complete budget, National Objective, scope of work, and milestone timeline. There will be no "combo" Activities or applications accepted in this NOFA cycle. Each Activity, both projects and programs, is stand-alone with a separate budget and scope of work. General Administration should be budgeted for each Activity up to 17 percent of the total Activity budget. HUD allows a total of 20 percent of funding to be used for planning and administration. HUD limits the state to 3 percent, which allows up to 17 percent for local jurisdictions. The Department is not proposing to allocate any funding for planning only Activities, which will allow local jurisdictions to access the full administration balance. Each Activity will have a stand-alone Standard Agreement for that Activity. Applicants are encouraged to review the attached draft Standard Agreement as a sample of the applicable terms and conditions.

- Funds from this NOFA cycle will be available to eligible Applicants via allocation through a simplified application (See Appendix A for final jurisdiction allocations).

- Maximum total grant amount limits are the allocation for your jurisdiction. Program income is not included in the allocation amounts. Total Activity budgets may exceed the award limits if program income is included in the Activity application. Note that program income included in a CDBG-CV1 application will be required to meet the same performance terms, duplication of benefits, and expenditure period for the CDBG-CV1 funds.

- Milestones: All CDBG-CV1 funded Activities must be implemented according to the milestones defined in the Standard Agreement. Applicants must include at least two milestones per Activity application – a milestone for Activity initiation and a milestone for Activity closeout. Additional milestones are optional, though encouraged for best practice Activity implementation.

VII. Program administrative costs

Grantees will be allowed to use a total of 17 percent of their allocation for program administration costs. Costs incurred in COVID-19 response prior to the allocation may be eligible for reimbursement as per the CARES Act. Applicants will be asked to identify pre-agreement costs as part of the simplified application.

VIII. Pre-agreement costs

Costs incurred in COVID-19 response prior to allocation may be eligible for reimbursement as per the CARES Act. Applicants will be required to identify pre-agreement costs. Pre-agreement costs not identified as part of the application budget will not be eligible for reimbursement. See the attached sample Standard Agreement for pre-agreement cost reimbursement terms.

IX. Threshold requirements

- A city or county must be a non-entitlement jurisdiction and must not currently be party to an Urban County Agreement or participate in, or be eligible to participate in, the HUD-administered CDBG Entitlement program.

- The Activity applied for must be an eligible Activity as defined by 24 CFR §§ 570.201-203 and the CARES Act.

- The Activity must meet a CDBG National Objective as defined by 24 CFR §570.483.

- The Applicant must provide the Department with its most recent single audit, if applicable. If the Applicant has open single audit findings and does not have a plan or agreement to remediate those findings, the Applicant will be deemed ineligible for CDBG-CV1 funding through the state administered CDBG program until the findings are resolved or a remediation plan or agreement is established.

- Pursuant to 24 CFR § 570.486, applications must follow CDBG Public Participation regulations as identified in the state's updated Citizen Participation Requirements for Federal Programs, Plans, and Reports. Applicants will be expected to provide opportunities for virtual meetings that include opportunities for the public to pose questions about the program and receive answers. Applicants will also be expected to meet noticing and public information requirements for the program as per federal regulations and the Citizen Participation Requirements.

- As per HSC § 50829, the Applicant must submit a draft and adopted Housing Element to the Department in accordance with the requirements listed in Government Code (GC) § 65580 et seq., most specifically GC § 65585. Applicants must demonstrate compliance with HSC § 50829 with documented proof at the time of application submittal. Documented proof includes, at a minimum, correspondence, resolutions or email verification from the Department. Failure to comply with the procedural requirements (i.e., GC § 65585) of Housing Element Law will invalidate the application for this NOFA and the Applicant will be deemed ineligible for funding through the state administered CDBG program, including CDBG-CV1 funding, until the Applicant has met procedural requirements. Applicants triggering the provision of HSC § 50830 must meet and document all pertinent requirements. See Appendix A for information on Housing Element status. For additional information and assistance, please contact Paul McDougall at paul.mcdougall@hcd.ca.gov.

- The Applicant must be in good standing with the Department as defined in Section V of this NOFA.

- The Applicant must demonstrate compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 relocation requirements, as applicable.

- The Applicant must demonstrate compliance with Article XXXIV, as applicable.

- To reduce delays in the application review, award, and contracting processes, Applicants are required to use the Department's *Sample Resolution of the Governing Body*. For reference, please see Appendix D.

X. Applications

A. Application webinar

The Department will hold a NOFA workshop webinar on June 24, 2020. Please visit the Department's website at https://www.hcd.ca.gov/grants-funding/active-funding/cdbg.shtml to register.

Applicants are also strongly encouraged to review available webinars and training materials on the CDBG program in general, the CDBG Redesign, using the Grants Network portal, and preparing a CDBG program application in the Grants Network portal.

B. Application submission

Applicants **must** follow instructions in both this NOFA and the online application. Failure to follow instructions will result in disqualification, and applications will be returned to draft status for correction and re-submittal.

The CDBG-CV1 application and all required attachments must be submitted to the Department through the Grants Network portal located at https://portal.ecivis.com/#/login. Applications must include all required information to be submitted. Applicants must certify that all information is true and complete to the best of their knowledge, under penalty of perjury.

Applicants that do not have an account with the Grants Network portal should log into the https://portal.ecivis.com/#/login. Use the "Create an account" option to initiate a profile.

Applications must meet all threshold and eligibility requirements upon submission. It is the Applicant's responsibility to ensure that the submitted application is clear, complete, and accurate. Department staff may request clarifying information and may request that applications be revised and resubmitted to help address eligibility and threshold issues prior to approving applications and issuing awards.

C. Disclosure of application

Information provided in the application will become public record available for review by the public pursuant to the California Public Records Act (PRA) (GC § 6250 et seq.). As such, the Department may disclose any materials provided by the Applicant to any person making a request under the PRA. The Department cautions Applicants to use discretion in providing information not specifically requested, including, but not limited to, bank account numbers, personal phone numbers, home addresses, or other personally identifiable information. By providing this information to the Department, the Applicant is waiving any claims of confidentiality, and consents to the Department's disclosure of the Applicant's material upon receipt of a PRA request.

XI. Application review, approval and commitment process

A. Application review

All applications are required to pass threshold requirements. Failure to meet threshold will result in immediate disqualification. Applications that do not meet threshold will not be further reviewed and will be returned to a draft status for Applicant revisions.

All applications will be reviewed for Activity eligibility. Activities that do not meet program eligibility will be disqualified, and the application will be returned to a draft status for Applicant revisions.

B. Recommendations

The Department will review applications and make award recommendations according to the above criteria. Applicants that are recommended for awards will be contacted and provided with an opportunity to update project schedules or other date-dependent data that may have aged during the application review period. Applicants will officially be notified of awards through the Grants Network portal. Applicants should ensure that the appropriate contact information is included in applicant profiles to facilitate notifications of awards and requests for changes. The award notification will include instructions for accepting or declining the award, as well as an executable Standard Agreement. Applicants that are not recommended for awards will be notified through the Grants Network portal that their application has been returned to draft status for Applicant revision, as applicable.

C. Standard Agreements

Successful Applicants (Grantees) will enter into a Standard Agreement with the Department. A draft sample is included as Appendix K of this NOFA. The Standard Agreement contains all the relevant state and federal requirements, Activity performance and management requirements, and disbursement requirements. A condition of award will be that a Standard Agreement must be executed by the Grantee within 30 days (contracting period) of the Grantee's receipt of the Standard Agreement(s). Failure to execute and return the Standard Agreement(s) to the

Department within the contracting period will result in award cancellation. Award cancellations are final.

XII. Awards announcement and grant implementation

The Department anticipates awards will be announced as applications are approved for funding.

XIII. Federal program requirements

A. Cross-cutting requirements

The CDBG-CV1 funding is administered under the general rules and regulations promulgated primarily in 24 CFR § 570.600, et seq. These primary regulations are known as the federal cross-cutting requirements and form the basis of the programmatic requirements. The Department incorporates all federal cross-cutting requirements into the state administered CDBG program, and the regulations in Part 570 are translated into required actions on the part of all Grantees of the state administered CDBG program, including CDBG-CV1 funds.

This following is a summary of the federal cross-cutting requirements:

1. Environmental Standards (based on the National Environmental Policy Act of 1969 [NEPA])
2. Labor Standards (Davis-Bacon and related laws)
3. Achieving a HUD National Objective
4. Public participation requirements
5. Fair Housing and Affirmatively Furthering Fair Housing
6. Equal Opportunity and Non-Discrimination in federal Grant Programs
7. Federal Procurement Guidelines
8. National Flood Insurance Program compliance
9. Relocation and displacement requirements
10. Employment and Contracting Opportunities Section 3 compliance
11. Lead-based paint requirements
12. No use of debarred, ineligible, or suspended contractors or sub-recipients
13. Uniform Administrative Requirements and Cost Principles
14. Conflict of interest prohibitions
15. Compliance with the Architectural Barriers Act and the Americans with Disabilities Act
16. Compliance with Eligibility Restrictions for certain resident aliens
17. Federal reporting requirements
18. Grant and subrecipient monitoring requirements

B. Relocation Plan requirement

Applicants engaging in project-specific Activities that may or will cause the temporary or permanent relocation and displacement of persons, property, or businesses must provide a project-specific relocation plan as part of the application. The plan must meet the standards established in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (URA). Applicants must successfully demonstrate that they have met URA requirements prior to the start of the project or displacement Activity. Applicants should include relocation costs in project budgets.

Applicants must provide General Information Notices to persons who may be displaced if the Activity in the grant application is funded. This plan must outline how the Grantee will enforce and manage the project's temporary relocation and displacement Activities and estimate what relocation benefits will be required so those costs can be included in the project's development budget.

C. Article XXXIV compliance

Applicants engaging in low-income housing project Activities that are subject to Article XXXIV of the California Constitution must show that the project approval process complies with Article XXXIV requirements as defined in the California Constitution, California state statutes, and applicable case law. The state statutes implementing Article XXXIV can be found at HSC § 37000, et seq.

D. Procurement

Pursuant to 24 CFR §570.489(g), all Grantees must comply with federal procurement requirements. The Department will review the Grantee's procurement documents for services (i.e., administrative sub-contractor, Davis-Bacon Act consultant, etc.) at time of monitoring.

Requirements for federal procurement can be found at 2 CFR §200.317-326. Applicants are responsible for meeting all federal procurement standards for goods and services funded through federal programs. Failure to meet procurement requirements may result in disqualification, recapture of federal funds, and debarment.

E. Certifications and Statement of Assurances

Applicants must sign and submit the Certifications and Statement of Assurances (Appendix J) with their application to meet threshold. Please review the Statement and confirm compliance with each requirement. Failure to comply with the certifications and assurances may result in disqualification, recapture of federal funds, and debarment.

JURISDICATION ALLOCATIONS

Housing Element Eligibility status is as of June 1, 2020. This is a static list. Ineligible jurisdictions are encouraged to resolve Housing Element issues as early to be able to participate in the CDBG-CV1 funding. Eligible jurisdictions that fail to meet Housing Element timelines may be ineligible at application. For additional information and assistance, please contact Paul McDougall at paul.mcdougall@hcd.ca.gov.

Jurisdiction Low-Mod Income percentages are based on HUD's 2020 Area Benefit instructions.

Jurisdiction	CDBG-CV1 Allocation	Jurisdiction-Wide % Low-Mod Income	Housing Element Eligibility
Alpine County	$56,890	39.82%	Currently Ineligible
Alturas	$66,337	48.47%	Eligible
Amador City	$55,037	46.67%	Currently Ineligible
Amador County	$112,462	38.76%	Eligible
American Canyon	$98,383	33.80%	Eligible
Anderson	$86,899	61.16%	Currently Ineligible
Angels	$68,004	43.94%	Eligible
Arcata	$147,657	67.47%	Eligible
Artesia	$113,758	53.95%	Eligible
Arvin	$116,166	66.80%	Eligible
Atwater	$132,653	49.81%	Eligible
Auburn	$100,421	43.22%	Eligible
Avenal	$87,639	74.18%	Eligible
Benicia	$118,575	23.60%	Eligible
Biggs	$59,113	58.07%	Eligible
Bishop	$70,042	49.67%	Eligible
Blue Lake	$57,075	39.69%	Currently Ineligible
Brawley	$126,725	52.15%	Eligible
Butte County	$279,919	45.99%	Eligible
Calaveras County	$173,220	41.57%	Eligible
Calexico	$170,998	51.68%	Eligible
Calimesa	$74,302	38.19%	Eligible
Calipatria	$64,484	57.63%	Eligible
Calistoga	$71,338	54.19%	Eligible
Capitola	$88,010	52.78%	Eligible
Carmel-by-the-Sea	$68,560	28.46%	Eligible
Chowchilla	$92,456	61.49%	Currently Ineligible
Clearlake	$122,279	71.16%	Eligible
Coalinga	$86,343	40.56%	Eligible
Colfax	$60,224	56.79%	Eligible
Colusa	$71,894	47.70%	Eligible
Colusa County	$69,856	38.92%	Eligible
Corcoran	$95,420	67.17%	Eligible
Corning	$77,451	66.47%	Eligible
Crescent City	$67,634	62.71%	Eligible

Jurisdiction	CDBG-CV1 Allocation	Jurisdiction-Wide % Low-Mod Income	Housing Element Eligibility
Del Norte County	$118,019	45.60%	Eligible
Dinuba	$124,317	60.81%	Eligible
Dixon	$96,716	38.99%	Eligible
Dorris	$55,593	72.58%	Eligible
Dos Palos	$69,301	65.38%	Currently Ineligible
Dunsmuir	$60,224	62.58%	Eligible
El Dorado County	$403,103	34.73%	Eligible
Etna	$56,149	68.57%	Eligible
Eureka	$157,290	50.52%	Eligible
Exeter	$81,897	54.96%	Eligible
Farmersville	$82,268	59.18%	Eligible
Ferndale	$59,483	34.69%	Eligible
Firebaugh	$79,859	61.04%	Eligible
Fort Bragg	$89,492	52.65%	Eligible
Fort Jones	$57,816	47.96%	Eligible
Fortuna	$90,974	49.51%	Eligible
Fowler	$67,819	49.83%	Eligible
Glenn County	$89,492	48.08%	Eligible
Grass Valley	$113,573	65.31%	Eligible
Greenfield	$117,278	64.77%	Eligible
Gridley	$77,451	45.79%	Eligible
Grover Beach	$101,532	53.61%	Eligible
Guadalupe	$84,676	69.04%	Eligible
Gustine	$61,521	46.42%	Eligible
Hidden Hills	$59,668	18.33%	Eligible
Hollister	$151,177	45.57%	Eligible
Holtville	$69,115	59.48%	Eligible
Humboldt County	$289,181	46.58%	Eligible
Huron	$83,379	70.69%	Eligible
Imperial	$76,525	20.91%	Eligible
Imperial County	$145,805	48.54%	Eligible
Indian Wells	$74,302	23.11%	Eligible
Industry	$54,815	65.85%	Eligible
Inyo County	$86,899	41.44%	Eligible
Ione	$63,003	38.75%	Eligible
Jackson	$73,191	49.71%	Eligible
King City	$112,462	68.41%	Eligible
Kings County	$137,099	46.93%	Eligible
Lake County	$202,859	51.44%	Currently Ineligible
Lakeport	$66,337	41.50%	Currently Ineligible
Lassen County	$85,417	38.47%	Eligible
Lemoore	$121,724	41.05%	Eligible

Jurisdiction	CDBG-CV1 Allocation	Jurisdiction-Wide % Low-Mod Income	Housing Element Eligibility
Lincoln	$170,442	33.27%	Eligible
Lindsay	$98,198	67.17%	Eligible
Live Oak	$75,043	55.17%	Eligible
Livingston	$91,159	41.01%	Eligible
Loomis	$68,375	24.55%	Eligible
Los Banos	$157,845	52.59%	Eligible
Loyalton	$56,519	55.81%	Currently Ineligible
Madera County	$229,904	47.90%	Eligible
Mammoth Lakes	$68,375	53.34%	Eligible
Maricopa	$55,778	60.66%	Currently Ineligible
Marina	$132,097	46.32%	Currently Ineligible
Mariposa County	$107,645	38.31%	Eligible
Marysville	$92,456	56.37%	Eligible
McFarland	$94,493	75.01%	Eligible
Mendocino County	$293,812	45.87%	Eligible
Merced County	$261,024	51.54%	Eligible
Modoc County	$63,929	48.50%	Currently Ineligible
Mono County	$64,484	50.27%	Eligible
Montague	$57,445	43.29%	Eligible
Mount Shasta	$75,228	45.91%	Eligible
Napa County	$120,057	41.84%	Eligible
Nevada City	$65,966	48.00%	Eligible
Nevada County	$257,134	39.32%	Eligible
Orange Cove	$84,861	75.54%	Currently Ineligible
Orland	$77,451	55.25%	Eligible
Oroville	$114,870	55.20%	Eligible
Pacific Grove	$99,495	23.93%	Eligible
Palos Verdes Estates	$80,971	15.31%	Eligible
Parlier	$111,906	71.45%	Eligible
Pismo Beach	$83,379	43.06%	Eligible
Placer County	$382,171	31.45%	Eligible
Placerville	$92,826	55.93%	Eligible
Plumas County	$101,532	41.09%	Eligible
Plymouth	$56,334	55.42%	Eligible
Point Arena	$56,334	53.85%	Eligible
Portola	$63,003	59.34%	Eligible
Rancho Mirage	$144,323	34.32%	Eligible
Red Bluff	$103,941	58.69%	Eligible
Rio Dell	$66,152	48.88%	Currently Ineligible
Rio Vista	$80,600	43.80%	Eligible
Riverbank	$102,273	35.70%	Eligible
San Benito County	$101,532	45.98%	Eligible
San Joaquin	$65,781	76.81%	Eligible

Jurisdiction	CDBG-CV1 Allocation	Jurisdiction-Wide % Low-Mod Income	Housing Element Eligibility
San Juan Bautista	$63,558	51.56%	Eligible
San Juan Capistrano	$198,413	51.84%	Eligible
Sand City	$56,112	62.90%	Eligible
Sanger	$129,689	47.09%	Eligible
Santa Cruz County	$475,347	50.09%	Eligible
Scotts Valley	$86,899	24.62%	Eligible
Shasta County	$240,833	42.64%	Currently Ineligible
Shasta Lake	$85,602	44.42%	Eligible
Sierra County	$56,519	42.56%	Eligible
Siskiyou County	$119,130	50.10%	Eligible
Solano County	$107,460	39.35%	Eligible
Soledad	$101,347	56.49%	Eligible
Sonora	$76,525	54.59%	Eligible
South Lake Tahoe	$138,951	59.15%	Eligible
St. Helena	$74,487	36.53%	Eligible
Suisun City	$129,689	41.31%	Eligible
Susanville	$78,007	42.62%	Eligible
Sutter County	$97,457	40.84%	Eligible
Sutter Creek	$65,781	50.48%	Eligible
Taft	$75,784	45.35%	Eligible
Tehama	$54,815	47.56%	Currently Ineligible
Tehama County	$156,586	47.18%	Eligible
Trinidad	$55,222	27.27%	Eligible
Trinity County	$101,903	48.72%	Eligible
Truckee	$87,639	27.72%	Eligible
Tulare County	$490,166	53.64%	Eligible
Tulelake	$57,260	63.50%	Eligible
Tuolumne County	$203,229	38.07%	Eligible
Ukiah	$108,757	49.25%	Eligible
Vernon	$54,630	75.00%	Eligible
Wasco	$113,573	57.01%	Eligible
Weed	$64,114	65.41%	Eligible
Westmorland	$60,780	77.14%	Eligible
Wheatland	$60,224	30.21%	Eligible
Williams	$67,634	36.54%	Eligible
Willits	$77,266	55.82%	Eligible
Willows	$78,377	44.56%	Eligible
Winters	$74,302	40.32%	Eligible
Woodlake	$75,228	62.74%	Currently Ineligible
Yolo County	$114,499	50.42%	Eligible
Yountville	$67,819	44.71%	Eligible
Yreka	$85,417	59.78%	Eligible
Yuba County	$228,607	45.13%	Eligible

Local Assistance Total	$17,579,805
Non-Federal Tribe 1.25%	$234,397
Colonia 5%	$937,590
Total Local Assistance	**$18,751,792**
State of California Operations	$579,952
Program Total	**$19,331,744**

IDIS Matrix- CDBG Eligibility Activity Codes and National Objectives

Matrix Code Key - National Objective Codes (N = Not Allowed)

Code	Eligible Activity	LMA	LMC	LMH	LMJ	URG
01	Acquisition of Property - 570.201(a)					
03B	Facility for Persons with Disabilities	N		N		
03C	Homeless Facilities (not operating costs)	N		N		
03P	Health Facilities			N		
03T	Operating Costs Homeless/AIDS Patients	N		N	N	
05A	Senior Services	N		N	N	
05B	Services for Persons with Disabilities	N		N	N	
05C	Legal Services			N	N	
05D	Youth Services	N		N	N	
05F	Substance Abuse Services			N	N	
05G	Services for Victims of Domestic Violence, Dating Violence, Sexual Assault, or Stalking	N		N	N	
05H	Employment Training			N	N	
05J	Fair Housing Activities-Subj.to Pub.Serv.Cap			N	N	
05K	Tenant/Landlord Counseling	N		N	N	
05L	Child Care Services	N		N	N	
05M	Health Services			N	N	
05N	Abused and Neglected Children	N		N	N	
05O	Mental Health Services			N	N	
05Q	Subsistence Payments	N		N	N	
05S	Rental Housing Subsidies	N	N		N	
05T	Security Deposits	N	N		N	
05U	Housing Counseling Only, under 24 CFR 5.100	N	N		N	N
05W	Food Banks			N	N	
05X	Housing information and referral services	N			N	N
06	Interim Assistance		N	N	N	
08	Relocation					
09	Rental Income Loss					
14B	Rehab; Multi-Unit Residential	N	N		N	
14G	Acquisition for Rehabilitation	N	N		N	
14H	Rehabilitation Administration					
14I	Lead-Based Paint Abetment	N	N		N	
18A	ED Assistance to For-Profits		N	N		
18B	Economic Development: Technical Assistance		N	N		
18C	Micro-Enterprise Assist.			N		
21A	General Program Admin. - 570.206	N	N	N	N	N

Please contact the Department's Division of Housing Policy Development with questions and current status at (916) 263-2911.

CARES Act Programs through SBA, FEMA, IRS, Treasury, USDA, and HHS for CDBG Grantees' Awareness for Duplication of Benefits

Agency	Program Name	Populations Served	Services Provided	Program Rollout and Duration	Size & Additional Notes on Eligibility	Funding and operating mechanisms
SBA	Payment Protection Program Loans	All small businesses, including non-profits, Veterans organizations, Tribal concerns, sole proprietorships, self-employed individuals, and independent contractors, with 500 or fewer employees, or no greater than the number of employees set by the SBA as the size standard for certain industries.[1]	The new loan program will help small businesses with their payroll and other business operating expenses. It will provide critical capital to businesses without collateral requirements, personal guarantees, or SBA fees – all with a 100% guarantee from SBA. All loan payments will be deferred for six months. Most importantly, the SBA will forgive the portion of the loan proceeds that are used to cover the first eight weeks of payroll costs, rent, utilities, and mortgage interest.	Treasury and the Small Business Administration launched this program on April 3, allowing businesses to go to a participating SBA 7(a) lender, bank, or credit union, to apply for a loan, and be approved on the same day. As of April 7, the program had reached the funding limit set in the CARES Act.	Maximum loan amounts up to $10 million. Small Business owners in all U.S. states and territories	**$349 billion** of loans available. Loan forgiveness if proceeds used for payroll costs and other designated business operating expenses in the 8 weeks following the date of loan origination (due to likely high subscription, it is anticipated that not more than 25% of the forgiven amount may be for non-payroll costs). All loans under this program will have the following identical features: Interest rate of 0.5%, maturity of 2 years, first payment deferred for six months, 100% guarantee by SBA, no collateral, no personal guarantees, no borrower or lender fees payable to SBA
SBA	Economic Injury Disaster Loans	Small Business owners in all U.S. States and territories	In response to the Coronavirus (COVID-19) pandemic, small business owners in all U.S. states, Washington D.C., and territories are eligible to apply for an Economic Injury Disaster Loan advance of up to $10,000.[2]	Funds will be made available within three days of a successful application, and this loan advance will not have to be repaid.	Loans up to $10,000. Small Business owners in all U.S. states and territories	An additional appropriation of **$10 billion**. This advance will provide economic relief to businesses that are currently experiencing a temporary loss of revenue. Funds will be made available within three days of a successful application. This loan advance will not have to be repaid.

[1] https://www.sba.gov/about-sba/sba-newsroom/press-releases-media-advisories/349-billion-emergency-small-business-capital-cleared-sba-and-treasury-begin-unprecedented-public
[2] https://www.sba.gov/disaster-assistance/coronavirus-covid-19

Agency	Program Name	Populations Served	Services Provided	Program Rollout and Duration	Size & Additional Notes on Eligibility	Funding and operating mechanisms
SBA	Express Bridge Loans	Small Business owners in all U.S. States and territories	Express Bridge Loan Pilot Program allows small businesses who currently have a business relationship with an SBA Express Lender to access up to $25,000 quickly.	These loans can provide vital economic support to small businesses to help overcome the temporary loss of revenue they are experiencing and can be a term loans or used to bridge the gap while applying for a direct SBA Economic Injury Disaster loan.	Access up to $25,000 quickly.	If a small business has an urgent need for cash while waiting for decision and disbursement on an Economic Injury Disaster Loan, they may qualify for an SBA Express Disaster Bridge Loan.
SBA	Debt Relief Program	Small Business owners in all U.S. States and territories	As part of SBA's debt relief efforts will automatically pay the principal, interest, and fees for: - current 7(a), 504, and microloans for a period of six months, and - new 7(a), 504, and microloans issued prior to September 27, 2020.	For current SBA Serviced Disaster (Home and Business) Loans: If your disaster loan was in "regular servicing" status on March 1, 2020, the SBA is providing automatic deferments through December 31, 2020.		Payment of applicable principal, interest, and fees, or of loan deferment, is automatic.
FEMA	Disaster Relief Fund	State and local governments attempting to mitigate against the spread of COVID-19 and protect public health.	FEMA can direct, coordinate, manage, and fund eligible response and recovery efforts associated with COVID-19 that overwhelm State resources pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act.[3]	Every 30 days the Administrator shall provide the Committees on Appropriations of the Senate and the House both projected and actual costs for funds provided.	$25 billion set aside for major disasters declared pursuant to the Stafford Act. The other $15 billion may be used for all purposes authorized by FEMA under the CARES Act. (*The other $5 billion seems to be unmentioned)*	**$45 billion** to remain available until expended. Through the DRF, FEMA can fund authorized Federal disaster support activities as well as eligible State, territorial, tribal, and local actions, such as: (1) the repair and restoration of qualifying disaster-damaged public infrastructure; (2) hazard mitigation initiatives; (3) financial assistance to eligible disaster survivors.
FEMA	Public Assistance Program	State, territorial, tribal, and local government entities and certain private non-	Under the COVID-19 Emergency Declaration described above, FEMA may	Consistent with the President's national emergency declaration for the coronavirus (COVID-	President Trump declared a national emergency under Section 501(b) of the Stafford Act on March 13 in wake	FEMA assistance will be provided at a 75 percent federal cost share. This assistance will

[3] https://www.fema.gov/media-library/assets/documents/31789

Agency	Program Name	Populations Served	Services Provided	Program Rollout and Duration	Size & Additional Notes on Eligibility	Funding and operating mechanisms
		profit organizations are eligible to apply for Public Assistance.	provide assistance for emergency protective measures including, but not limited to: *Management, control and reduction of immediate threats to public health and safety, Emergency medical care, Medical sheltering, and Purchase and distribution of food,* provided they are not funded by the HHS/CDC or other federal agency. Final reimbursement determinations will be coordinated by HHS and FEMA.	19) pandemic on March 13, 2020, FEMA urges officials to, without delay, take appropriate actions that are necessary to protect public health and safety pursuant to public health guidance and conditions and capabilities in their jurisdictions. FEMA provides the following guidance on the types of emergency protective measures that may be eligible under FEMA's Public Assistance Program in accordance with the COVID-19 Emergency Declaration in order to ensure that resource constraints do not inhibit efforts to respond to this unprecedented disaster.	of the ongoing COVID-19 pandemic. State, territorial, tribal, and local government entities and certain private non-profit organizations are eligible to apply for Public Assistance. FEMA will not duplicate any assistance provided by HHS/CDC.	require execution of a FEMA-State/Tribal/Territory Agreement, as appropriate, and execution of an applicable emergency plan. Local governments and other eligible PA applicants will apply through their respective state, tribal or territorial jurisdictions.
FEMA	Emergency Food and Shelter Program (EFSP)	American families in sudden economic crisis.	Shelter, food and supportive services to individuals and families in sudden economic crisis.	EFSP was established to supplement and expand the ongoing work of local social service organizations, both nonprofit and governmental. Accordingly, EFSP funding is open to all organizations helping hungry and homeless people, as well as organizations that support those at risk of becoming hungry or homeless due to economic hardships[4]	$200 million allocation to program account. Nonprofit and governmental service organizations in U.S. states and territories	Unlike FEMA's disaster assistance programs authorized under the Stafford Act, EFSP is authorized by the McKinney-Vento Homeless Assistance Act of 1987 (PL 100-77).
Treasury	The Coronavirus Relief Fund	States, Tribal governments, and units of local governments with a population above 500,000	The CARES Act requires that the payments from the Coronavirus Relief Fund only be used to cover expenses that— (1) are necessary expenditures incurred due to the public health emergency	The legislation specifies that within 30 days of passage the funds will be released to states based on their relative populations, with each state receiving at least $1.25 billion.	$150 billion fund. U.S. states and territories. Additional information on eligible uses of Fund disbursements by governments will be posted as it becomes available.	Funds will be released to states based on their relative populations, with each state receiving at least $1.25 billion. A local government must have a population above 500,000 to qualify.

[4] https://www.fema.gov/media-library/assets/documents/24422

Agency	Program Name	Populations Served	Services Provided	Program Rollout and Duration	Size & Additional Notes on Eligibility	Funding and operating mechanisms
			created by COVID-19. (2) were not accounted for in the budget most recently approved as of March 27, 2020 (the date of enactment of the CARES Act) for the State or government; and (3) were incurred during the period that begins on March 1, 2020, and ends on December 30, 2020.			$3 billion for making payment to the District of Columbia, the Commonwealth of Puerto Rico, the United States Virgin Islands, Guam, the Commonwealth of the Northern Mariana Islands, and American Samoa. $8 billion for making payments to Tribal governments**.**
Treasury	Unemployment Insurance Provisions	Makes sure self-employed and independent contractors, gig workers, can receive unemployment during the public health emergency. The bill also includes support to state and local governments and nonprofits so they can pay unemployment to their employees.	Makes benefits more generous by adding a $600/week across-the-board payment increase through the end of July.	For those who need extra assistance the bill provides an additional 13 weeks of benefits beyond what states typically allow.	$250 billion to expand unemployment benefits. Individuals in U.S. states and territories.	The expansion in unemployment benefits expires at the end of 2020 in recognition of the temporary nature of this challenge.
IRS	Economic Impact Payments	Tax filers with adjusted gross income up to $75,000 for individuals and up to $150,000 for married couples filing joint returns will receive the full payment. For filers with income above those amounts, the payment amount is reduced by $5 for each $100 above the $75,000/$150,000 thresholds. Single filers with income exceeding	Direct payment.	One-time payment for eligible citizens.	Up to $1,200 for single filers. Up to $2,400 for joint filers. Individuals in U.S. states and territories.	The payments will be administered by the Internal Revenue Service (IRS) and function as a federally refundable tax credit.

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		$99,000 and $198,000 for joint filers with no children are not eligible. Social Security recipients and railroad retirees who are otherwise not required to file a tax return are also eligible and will not be required to file a return.				
USDA	Commodity Assistance Program	Through CSFP, USDA distributes both food and administrative funds to participating states and Indian Tribal Organizations (ITOs).	The Commodity Supplemental Food Program (CSFP) works to improve the health of low-income elderly persons at least 60 years of age by supplementing their diets with nutritious USDA Foods.	Sec 1101. (g) AVAILABILITY OF COMMODITIES.—During fiscal year 2020, the Secretary of Agriculture may purchase commodities for emergency distribution in any area of the United States during a public health emergency designation. (i) FUNDING.—There are hereby appropriated to the Secretary of Agriculture such amounts as are necessary to carry out this section.	Through CSFP, USDA distributes both food and administrative funds to participating states and Indian Tribal Organizations (ITOs).	$450 million to Commodity Assistance Program, $150 million of which may be used for distribution.
USDA	Child Nutrition Programs	Children from low-income families (at or below 130% of the Federal Poverty Level (FPL), or $31,590 for a family of four in school year 2016 - 2017) are eligible for free meals. Those with incomes up to 185% of the FPL are eligible for reduced price meals.	Child nutrition programs help to ensure that children have access to nutrition meals and snacks in schools, summer programs, childcare centers and homes, and afterschool programs. FNS also issued guidance on meal delivery using existing authorities in summer meal programs.	Waiver authority for existing program.	For Congregate Meal Waivers, FNS has approved waivers from all 50 states, DC, Guam, Puerto Rico, and the Virgin Islands, enabling Summer Food Service Program (SFSP) and National School Lunch Program Seamless Summer Option (SSO) sponsors to serve meals in a non-congregate setting and at school sites during school closures related to the coronavirus.	$8.8 billion. Pandemic EBT – Supplemental EBT allotments in FY2020 for the value of school meals for each eligible child in the household.
USDA	Supplemental Nutrition for Women, Infants and Children (WIC)	The WIC target population are low-income, nutritionally at risk: - Pregnant women (through pregnancy and up	The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides federal grants to states for supplemental foods, health care referrals,	WIC is not an entitlement program as Congress does not set aside funds to allow every eligible individual to participate in the program. WIC is a Federal grant program for which Congress authorizes a specific amount	WIC operates through 1,900 local agencies in 10,000 clinic sites, in 50 State health departments, 34 Indian Tribal Organizations, the District of Columbia, and five territories (Northern Mariana, American	The Families First Coronavirus Response Act provided the WIC Program with $500 million to remain available through Sept. 30, 2021 for increases in program participation. FNS will

Agency	Program Name	Populations Served	Services Provided	Program Rollout and Duration	Size & Additional Notes on Eligibility	Funding and operating mechanisms
		to 6 weeks after birth or after pregnancy ends). - Breastfeeding women (up to infant's 1st birthday) - Non breastfeeding postpartum women (up to 6 months after the birth of an infant or after pregnancy ends) - Infants (up to 1st birthday). - Children up to their 5th birthday.	and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age five who are found to be at nutritional risk.	of funds each year for the program. WIC is administered at the Federal level by FNS, and by 90 WIC state agencies, through approximately 47,000 authorized retailers.	Samoa, Guam, Puerto Rico, and the Virgin Islands).	work with state to ensure funding is available to state agencies that require additional funds based on enrollment.
USDA	Nutrition Assistance Block Grant to Territories	Low-income individuals and families are eligible for benefits as determined by each Territory.	The NABG Provides food assistance to low-income households in the U.S. Territories of the Commonwealth of Puerto Rico, American Samoa, and the Commonwealth of the Northern Mariana Islands, in lieu of operating a Supplemental Nutrition Assistance Program (SNAP).	With the authority granted them via the block grants, the U.S. territories establish eligibility and benefit levels for their nutrition assistance programs.	$200 million U.S. Territories of the Commonwealth of Puerto Rico, American Samoa, and the Commonwealth of the Northern Mariana Islands	$200 million for PR, CNMI, AS.
USDA	Disaster Household Distribution	USDA has approved targeted DHD programs for the following states and Indian Tribal Organizations (ITOs).	States and Tribes may apply for the DHD program to meet specific needs when traditional channels of food are unavailable and not being replenished on a regular basis.	Please check with the specific state or ITO for details on the DHD operation	USDA has approved targeted DHD programs for the following states and Indian Tribal Organizations (ITOs).	Please check with the specific state or ITO for details on the DHD operation
USDA	Summer Food Service Program	Summer Food Service Program (SFSP) and National School Lunch Program Seamless Summer Option (SSO) to serve	The U.S. Department of Agriculture's (USDA) Summer Food Service Program (SFSP), also known as the Summer Meals Program, provides kids	The SFSP reimburses providers who serve free healthy meals to children and teens in low-income areas during the summer months when school is not in session.	The SFSP serves children and teens age 18 and younger. Serve meals in non-congregate setting and at school sites during COVID-related school closures.	There are three main players involved: State agencies, sponsors, and sites.

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		meals in non-congregate setting and at school sites during COVID-related school closures.	and teens in low-income areas free meals when school is out.			- State agencies administer the program and communicate with USDA. - Sponsors enter into agreements with State agencies to run the program. Schools, local government agencies, camps, faith-based and other non-profit community organizations that can manage a food service program may be SFSP sponsors. Sponsors get reimbursed by the Program and may manage multiple sites. - Sites are places in the community where children receive meals in a safe and supervised environment. Sites may be in a variety of settings, including schools, parks, community centers, health clinics, hospitals, apartment complexes, churches, and migrant centers. Sites work directly with sponsors.
USDA	The Emergency Food Assistance Program	The Emergency Food Assistance Program (TEFAP) is a federal program that helps supplement the diets of low-income Americans, including elderly people, by providing them with emergency food assistance at no cost.	Through TEFAP, the U.S. Department of Agriculture (USDA) purchases a variety of nutritious, high-quality USDA Foods, and makes those foods available to State Distributing Agencies.	States provide the food to local agencies that they have selected, usually food banks, which in turn distribute the food to local organizations, such as soup kitchens and food pantries that directly serve the public.	The amount of food each state receives out of the total amount of food provided is based on the number of unemployed persons and the number of people with incomes below the poverty level in the state.	State agencies may adjust The Emergency Food Assistance Program (TEFAP) income eligibility guidelines to expand participation at any time; can consider categorical income eligibility (e.g. all SNAP and WIC participants).
USDA	Pandemic EBT	As a result of the Families First Coronavirus Response	Temporary emergency standards of eligibility and	Waiver of existing requirements is provided upon request.	State agencies may submit plans in any case in which a school is closed	Secretary has authority to approve state agency plans for

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		Act of 2020, children who would receive free or reduced-price meals if not for school closures are eligible to receive assistance under this provision. USDA is providing guidance to state agencies on plan requirements in order to receive approval.	levels of benefits for free or reduced-price meals.		for at least 5 consecutive days during a public health emergency designation during which the school would otherwise be in session.	temporary emergency standards of eligibility and levels of benefits under the Food and Nutrition Act of 2008. Children eligible for free or reduced-price meals if not for the school closure are eligible under this provision.
USDA	Supplemental Nutrition Assistance Program Emergency Allotments	USDA has granted waivers to all states, allowing for the issuance of emergency allotments (supplements) based on a public health emergency declaration by the Secretary of Health and Human Services under section 319 of the Public Health Service Act related to an outbreak of COVID-19 when a state has also issued an emergency or disaster declaration.	SNAP provides nutrition benefits to supplement the food budget of needy families so they can purchase healthy food and move towards self-sufficiency.	Waiver of existing program requirements is provided upon request.	Options for plan adjustments include a number of approaches to easing states' workload to facilitate processing the large number of new applications expected. For example, USDA has already allowed states to extend certification periods and take other measures to keep current participants from having their cases closed when they cannot conduct business online or remotely. USDA also has allowed states to modify their application processes to streamline operations, for example by reducing interview requirements and adapting telephone signature procedures.	The Act allows USDA to approve state plans to adjust their SNAP operations and procedures to help states manage their workload under current conditions.

Agency	Program Name	Populations Served	Services Provided	Program Rollout and Duration	Size & Additional Notes on Eligibility	Funding and operating mechanisms
HHS	Community Living Allocation	Older adults in need of meals.	These programs provide meals to more than 2.4 million older adults each year, both through home delivery and in places like community centers. The need for these services, particularly home-delivered and packaged meals, has increased as community measures to slow transmission of COVID-19 have closed meal sites and have left many family caregivers unable to assist their older loved ones.	Funding has been provided to states, territories, and tribes for subsequent allocation to local meal providers. Grant amounts are determined based on the population-based formulas defined in the Older Americans Act.		$250 million in grants from the Administration for Community Living (ACL) to help communities provide meals for older adults.
Labor	Dislocated Worker Grants	Workers laid off because of impact from COVID-19.	Grants for temporary employment and training services, including humanitarian assistance, clean-up and mitigation associated with the virus, and job training for industries still hiring during the health emergency.	Grants will be made in installments to state and local workforce programs, with the first 26 grants totaling $131 million awarded on April 15, 2020.	States and other eligible entities may also apply for Employment Recovery DWGs to provide reemployment services to eligible individuals	$345 million made available through state and local workforce programs.

*Note on Duplication of Benefits

Federal disaster law prohibits the provision of federal assistance in excess of need. Before paying a cost with federal disaster assistance, a Federal agency must check to see that the assistance will not cause a duplication of benefits, meaning that the cost has not or will not be paid by another source. HUD grantees are required to prevent the duplication of benefits when carrying out HUD-funded programs to provide disaster assistance.

Knowing the other sources of assistance that may be available to pay for coronavirus-related needs can help grantees prevent duplication of benefits in two ways. First, it helps grantees design programs that target needs that are unlikely to be addressed by other sources. Second, it helps grantees know which sources of assistance it needs to look for when completing a duplication of benefits check before providing assistance to individuals, households, and entities.

Assistance is not prohibited to meet needs that remain after considering other federal, state, local or philanthropic financial assistance. Private, unsubsidized loans generally are not considered a duplication of benefits. In some cases, subsidized loans do not cause a duplication, if all assistance is used for disaster-related needs. More specific information about how to comply with this requirement is available from HUD.

JURISDICATION ALLOCATIONS

Housing Element Eligibility status is as of June 1, 2020. This is a static list. Ineligible jurisdictions are encouraged to resolve Housing Element issues as early to be able to participate in the CDBG-CV1 funding. Eligible jurisdictions that fail to meet Housing Element timelines may be ineligible at application. For additional information and assistance, please contact Paul McDougall at paul.mcdougall@hcd.ca.gov.

Jurisdiction Low-Mod Income percentages are based on HUD's 2020 Area Benefit instructions.

Jurisdiction	CDBG-CV1 Allocation	Jurisdiction-Wide % Low-Mod Income	Housing Element Eligibility
Alpine County	$56,890	39.82%	Currently Ineligible
Alturas	$66,337	48.47%	Eligible
Amador City	$55,037	46.67%	Currently Ineligible
Amador County	$112,462	38.76%	Eligible
American Canyon	$98,383	33.80%	Eligible
Anderson	$86,899	61.16%	Currently Ineligible
Angels	$68,004	43.94%	Eligible
Arcata	$147,657	67.47%	Eligible
Artesia	$113,758	53.95%	Eligible
Arvin	$116,166	66.80%	Eligible
Atwater	$132,653	49.81%	Eligible
Auburn	$100,421	43.22%	Eligible
Avenal	$87,639	74.18%	Eligible
Benicia	$118,575	23.60%	Eligible
Biggs	$59,113	58.07%	Eligible
Bishop	$70,042	49.67%	Eligible
Blue Lake	$57,075	39.69%	Currently Ineligible
Brawley	$126,725	52.15%	Eligible
Butte County	$279,919	45.99%	Eligible
Calaveras County	$173,220	41.57%	Eligible
Calexico	$170,998	51.68%	Eligible
Calimesa	$74,302	38.19%	Eligible
Calipatria	$64,484	57.63%	Eligible
Calistoga	$71,338	54.19%	Eligible
Capitola	$88,010	52.78%	Eligible
Carmel-by-the-Sea	$68,560	28.46%	Eligible
Chowchilla	$92,456	61.49%	Eligible
Clearlake	$122,279	71.16%	Eligible
Coalinga	$86,343	40.56%	Eligible
Colfax	$60,224	56.79%	Eligible
Colusa	$71,894	47.70%	Eligible
Colusa County	$69,856	38.92%	Eligible
Corcoran	$95,420	67.17%	Eligible
Corning	$77,451	66.47%	Eligible
Crescent City	$67,634	62.71%	Eligible

Jurisdiction	CDBG-CV1 Allocation	Jurisdiction-Wide % Low-Mod Income	Housing Element Eligibility
Del Norte County	$118,019	45.60%	Eligible
Dinuba	$124,317	60.81%	Eligible
Dixon	$96,716	38.99%	Eligible
Dorris	$55,593	72.58%	Eligible
Dos Palos	$69,301	65.38%	Currently Ineligible
Dunsmuir	$60,224	62.58%	Eligible
El Dorado County	$403,103	34.73%	Eligible
Etna	$56,149	68.57%	Eligible
Eureka	$157,290	50.52%	Eligible
Exeter	$81,897	54.96%	Eligible
Farmersville	$82,268	59.18%	Eligible
Ferndale	$59,483	34.69%	Eligible
Firebaugh	$79,859	61.04%	Eligible
Fort Bragg	$89,492	52.65%	Eligible
Fort Jones	$57,816	47.96%	Eligible
Fortuna	$90,974	49.51%	Eligible
Fowler	$67,819	49.83%	Eligible
Glenn County	$89,492	48.08%	Eligible
Grass Valley	$113,573	65.31%	Eligible
Greenfield	$117,278	64.77%	Eligible
Gridley	$77,451	45.79%	Eligible
Grover Beach	$101,532	53.61%	Eligible
Guadalupe	$84,676	69.04%	Eligible
Gustine	$61,521	46.42%	Eligible
Hidden Hills	$59,668	18.33%	Eligible
Hollister	$151,177	45.57%	Eligible
Holtville	$69,115	59.48%	Eligible
Humboldt County	$289,181	46.58%	Eligible
Huron	$83,379	70.69%	Eligible
Imperial	$76,525	20.91%	Eligible
Imperial County	$145,805	48.54%	Eligible
Indian Wells	$74,302	23.11%	Eligible
Industry	$54,815	65.85%	Eligible
Inyo County	$86,899	41.44%	Eligible
Ione	$63,003	38.75%	Eligible
Jackson	$73,191	49.71%	Eligible
King City	$112,462	68.41%	Eligible
Kings County	$137,099	46.93%	Eligible
Lake County	$202,859	51.44%	Currently Ineligible
Lakeport	$66,337	41.50%	Currently Ineligible
Lassen County	$85,417	38.47%	Eligible
Lemoore	$121,724	41.05%	Eligible

Jurisdiction	CDBG-CV1 Allocation	Jurisdiction-Wide % Low-Mod Income	Housing Element Eligibility
Lincoln	$170,442	33.27%	Eligible
Lindsay	$98,198	67.17%	Eligible
Live Oak	$75,043	55.17%	Eligible
Livingston	$91,159	41.01%	Eligible
Loomis	$68,375	24.55%	Eligible
Los Banos	$157,845	52.59%	Eligible
Loyalton	$56,519	55.81%	Currently Ineligible
Madera County	$229,904	47.90%	Eligible
Mammoth Lakes	$68,375	53.34%	Eligible
Maricopa	$55,778	60.66%	Currently Ineligible
Marina	$132,097	46.32%	Eligible
Mariposa County	$107,645	38.31%	Eligible
Marysville	$92,456	56.37%	Eligible
McFarland	$94,493	75.01%	Eligible
Mendocino County	$293,812	45.87%	Eligible
Merced County	$261,024	51.54%	Eligible
Modoc County	$63,929	48.50%	Currently Ineligible
Mono County	$64,484	50.27%	Eligible
Montague	$57,445	43.29%	Eligible
Mount Shasta	$75,228	45.91%	Eligible
Napa County	$120,057	41.84%	Eligible
Nevada City	$65,966	48.00%	Eligible
Nevada County	$257,134	39.32%	Eligible
Orange Cove	$84,861	75.54%	Currently Ineligible
Orland	$77,451	55.25%	Eligible
Oroville	$114,870	55.20%	Eligible
Pacific Grove	$99,495	23.93%	Eligible
Palos Verdes Estates	$80,971	15.31%	Eligible
Parlier	$111,906	71.45%	Eligible
Pismo Beach	$83,379	43.06%	Eligible
Placer County	$382,171	31.45%	Eligible
Placerville	$92,826	55.93%	Eligible
Plumas County	$101,532	41.09%	Eligible
Plymouth	$56,334	55.42%	Eligible
Point Arena	$56,334	53.85%	Eligible
Portola	$63,003	59.34%	Eligible
Rancho Mirage	$144,323	34.32%	Eligible
Red Bluff	$103,941	58.69%	Eligible
Rio Dell	$66,152	48.88%	Currently Ineligible
Rio Vista	$80,600	43.80%	Eligible
Riverbank	$102,273	35.70%	Eligible
San Benito County	$101,532	45.98%	Eligible
San Joaquin	$65,781	76.81%	Eligible

Jurisdiction	CDBG-CV1 Allocation	Jurisdiction-Wide % Low-Mod Income	Housing Element Eligibility
San Juan Bautista	$63,558	51.56%	Eligible
San Juan Capistrano	$198,413	51.84%	Eligible
Sand City	$56,112	62.90%	Eligible
Sanger	$129,689	47.09%	Eligible
Santa Cruz County	$475,347	50.09%	Eligible
Scotts Valley	$86,899	24.62%	Eligible
Shasta County	$240,833	42.64%	Currently Ineligible
Shasta Lake	$85,602	44.42%	Eligible
Sierra County	$56,519	42.56%	Eligible
Siskiyou County	$119,130	50.10%	Eligible
Solano County	$107,460	39.35%	Eligible
Soledad	$101,347	56.49%	Eligible
Sonora	$76,525	54.59%	Eligible
South Lake Tahoe	$138,951	59.15%	Eligible
St. Helena	$74,487	36.53%	Eligible
Suisun City	$129,689	41.31%	Eligible
Susanville	$78,007	42.62%	Eligible
Sutter County	$97,457	40.84%	Eligible
Sutter Creek	$65,781	50.48%	Eligible
Taft	$75,784	45.35%	Eligible
Tehama	$54,815	47.56%	Currently Ineligible
Tehama County	$156,586	47.18%	Eligible
Trinidad	$55,222	27.27%	Eligible
Trinity County	$101,903	48.72%	Eligible
Truckee	$87,639	27.72%	Eligible
Tulare County	$490,166	53.64%	Eligible
Tulelake	$57,260	63.50%	Eligible
Tuolumne County	$203,229	38.07%	Eligible
Ukiah	$108,757	49.25%	Eligible
Vernon	$54,630	75.00%	Eligible
Wasco	$113,573	57.01%	Eligible
Weed	$64,114	65.41%	Eligible
Westmorland	$60,780	77.14%	Eligible
Wheatland	$60,224	30.21%	Eligible
Williams	$67,634	36.54%	Eligible
Willits	$77,266	55.82%	Eligible
Willows	$78,377	44.56%	Eligible
Winters	$74,302	40.32%	Eligible
Woodlake	$75,228	62.74%	Currently Ineligible
Yolo County	$114,499	50.42%	Eligible
Yountville	$67,819	44.71%	Eligible
Yreka	$85,417	59.78%	Eligible
Yuba County	$228,607	45.13%	Eligible

Local Assistance Total	$17,579,805
Non-Federal Tribe 1.25%	$234,397
Colonia 5%	$937,590
Total Local Assistance	**$18,751,792**
State of California Operations	$579,952
Program Total	**$19,331,744**

RESOLUTION NO. 2020-__

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH APPROVING AN APPLICATION FOR FUNDING AND THE EXECUTION OF A GRANT AGREEMENT AND ANY AMENDMENTS THERETO FROM THE 2020 COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM- CORONAVIRUS RESPONSE ROUND 1 (CDBG-CV1) NOFA DATED JUNE 5, 2020

BE IT RESOLVED by the **City Council** of the **City of Ukiah** as follows:

SECTION 1:

The City Council has reviewed and hereby approves the submission to the State of California of one application, in the aggregate amount of not to exceed $108,757, for the following CDBG-CV1 activities, pursuant to the June 2020 CDBG-CV1 NOFA:

City of Ukiah Public Facility Improvement Project	Not to Exceed $ 90,269
General Administration	Not to Exceed $ 18,488
Total	Not to Exceed $108,757

SECTION 2:

The City hereby approves the use of Program Income in an amount not to exceed $0 for the CDBG-CV1 activities described in Section 1.

SECTION 3:

The City acknowledges compliance with all state and federal public participation requirements in the development of its application.

SECTION 4:

The City hereby authorizes and directs City Manager Sage Sangiacomo to execute and deliver the application and act on the City's behalf in all matters pertaining to the application.

SECTION 5:

If an application is approved, the City Manager is authorized to enter into, execute and deliver the grant agreement (i.e., Standard Agreement) and any and all subsequent amendments thereto with the State of California for the purposes of the grant.

SECTION 6:

If an application is approved, the City Manager is authorized to sign and submit Funds Requests and all required reporting forms and other documentation as may be required by the State of California from time to time in connection with the grant.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Ukiah held on August 5, 2020 by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

_____

Douglas F. Crane, Mayor
Ukiah City Council

STATE OF CALIFORNIA
City of Ukiah

ATTEST:

I, Kristine Lawler, City Clerk of the City of Ukiah, State of California, hereby certify the above and foregoing to be a full, true and correct copy of a resolution adopted by said City Council on this 5th day of August, 2020.

Kristine Lawler, City Clerk
of the City of Ukiah of the State of California

By: _____

Agenda Item No: 11.c.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-428

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Public Hearing on Financing Documentation for Facilities Acquisition, Enhancement, and Repair of Recently Acquired Property at 501 South State Street and Other Facilities (Recommended to be continued to a date certain of August 19, 2020).

DEPARTMENT: Finance **PREPARED BY:** Dan Buffalo, Finance Director
PRESENTER: Dan Buffalo, Director of Finance

ATTACHMENTS:
None

Summary: The City Council has expressed its intention to issue municipal tax-exempt bonds to reimburse the City for the cost to purchase the 501 South State Street. Furthermore, there is also the need to consider other renovations and deferred maintenance at other city facilities.

Background: The acquisition of the 501 South State took place on June 1, 2020, and it is now necessary and appropriate for the City to follow through with the financing the acquisition costs. Further, staff anticipates financing needs for renovation and deferred maintenance of other city facilities.

Discussion: This item is recommended to be continued to the August 19, 2020 City Council meeting in order to allow time for the Budget Ad hoc to continue meeting and review the scope, financing plan, and related documents. Note, the item was originally scheduled and noticed for July 1 and subsequently continued to August 5th.

Recommended Action: Continue the agenda item to a time/date certain on August 19, 2020, at 6:15 PM to conduct a public hearing on financing documentation for facility acquisition and improvements.

BUDGET AMENDMENT REQUIRED: No
CURRENT BUDGET AMOUNT: N/A
PROPOSED BUDGET AMOUNT: N/A
FINANCING SOURCE: N/A
PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A
COORDINATED WITH: City Manager's Office

Approved: Sage Sangiacomo, City Manager

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Receive Report and Consider Directing Staff to Gather the Necessary Information and Conduct the Necessary Analyses to Develop an Application for Potential Annexation of Certain Unincorporated Lands, Including and Surrounding those Areas Commonly Known as the Brush Street Triangle, the Masonite Area Properties, and the City's Water Treatment Plant; and Bring that Application and Pertinent Information and Analyses to the City Council for its Consideration.

DEPARTMENT: Community Development

PREPARED BY: Craig Schlatter, Community Development Director

PRESENTER: Craig Schlatter, Community Development Director

ATTACHMENTS:

1. Past Staff Reports- 1-16-20 and 8-27-19 workshops
2. CC Reso 2020-06 - Adopting Annexation Policy
3. Map of Potential Annexation Area

Summary: Council will receive a report and consider directing Staff to gather the necessary information and conduct the necessary analyses to develop an application for potential annexation of certain unincorporated lands, including and surrounding those areas commonly known as the Brush Street Triangle, the Masonite Area properties, and the City's Water Treatment Plan. Council will also consider directing Staff to bring that application and pertinent information and analyses to the City Council for its consideration.

Background: At two workshops on August 27, 2019 and January 16, 2020, City Council and Staff discussed the City of Ukiah's long-term land use planning policy for Ukiah and the Ukiah Valley. The August 27 workshop provided an overview of reorganization requirements under the Cortese-Knox-Hertzberg Act and the role of the Mendocino Local Agency Formation Commission. Staff also outlined proposed Policy Directives for Council's consideration, which Council approved by a 3-1-1 vote. Councilmembers expressed concern with and request for further consideration of Policy Directive #2, particularly as it related to the origin of the 1995 Sphere of Influence (SOI) proposed as part of the 1995 General Plan.

Consequently, at the January 16, 2020 workshop, Staff presented research on long term land use planning conducted in Ukiah and the Ukiah Valley since 1974, including a discussion on the origin of the Ukiah Valley General Plan (City of Ukiah General Plan) and the resulting 1995 SOI. Staff also presented a revised Policy Directive #2, to reflect this history and the input received from Council, as well as a proposed SOI. Council approved the revised Policy Directive #2 and proposed SOI by a 5-0 vote. The staff reports for both items at the August 27, 2019 and January 16, 2020 workshops are attached as Attachment 1.

Also at the January 16, 2020 workshop, a second agenda item requested Council adoption of a resolution adopting an annexation policy. Council adopted Resolution No. 2020-06 (Attachment 2) by a 5-0 vote.

Discussion: Since receiving direction from Council at the January 16 workshop and in accordance with the City's Annexation Policy, which states in part that: "the City will apply for the annexation of unincorporated areas and will support property owners who desire to annex to the City where the City determines it to be in its

residents' interests to do so, to promote orderly development, to implement General Plan goals and objectives, and/or to ensure the efficient provision of municipal services," Staff have been analyzing possible annexation implementation approaches. Possible implementation approaches have been informed and influenced by the City's priority as expressed by City Council in providing efficient municipal services, including effective fire mitigation and suppression, water supply, and electricity services; preventing urban sprawl; preserving open space and protecting prime agricultural lands; maintaining economic opportunities; and having an orderly approach to long-term planning in the Ukiah Valley.

Given Council's recent direction plus historical efforts to annex portions of the area generally known as the Brush Street Triangle, Staff and the Ad Hoc feel annexing the area in and around the Brush Street Triangle, including areas around the Masonite Area properties and the City's Water Treatment Plant (see Attachment 3 for a map of the potentially proposed area), is appropriate and an important first step in achieving the Council's policy objectives outlined above. Additionally, Staff have been approached by owners within this area who have expressed a desire for the City to annex their properties.

There are also compelling economic development reasons for the Ukiah Valley for proceeding with annexation of the Brush Street Triangle, areas around the Masonite Area properties, and areas around the City's Water Treatment Plant. These areas represent the primary region for industrial and manufacturing zoned properties in the Valley, and by extension and implication, all of Mendocino County. Providing the full suite of City municipal services to these areas will provide significant economic opportunities to Ukiah and the Ukiah Valley, as well as keeping businesses and jobs in the Ukiah Valley.

At this time, Staff and the Advanced Planning and Policy Ad Hoc recommend Council receive this report and direct Staff to gather the necessary information and conduct the necessary analyses to develop an application for potential annexation of certain unincorporated lands, including and surrounding those areas commonly known as the Brush Street Triangle, the Masonite Area properties, and the City's Water Treatment Plan; and bring that application and pertinent information and analyses to the City Council for its consideration.

Recommended Action: Receive report and direct staff to gather the necessary information and conduct the necessary analyses to develop an application for potential annexation of certain unincorporated lands, including and surrounding those areas commonly known as the Brush Street Triangle, the Masonite Area Properties, and the City's Water Treatment Plant; and bring that application and pertinent information and analyses to the City Council for its consideration.

BUDGET AMENDMENT REQUIRED: N/A

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: N/A

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Advanced Planning and Policy Ad Hoc Committee; Phil Williams, Special Water Counsel; Shannon Riley, Deputy City Manager/Economic Development Lead

Approved: Sage Sangiacomo, City Manager

Agenda Item No: 3.a.
MEETING DATE/TIME: 1/16/2020
ITEM NO: 2020-114

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Discussion with Possible Direction to Staff Regarding the City of Ukiah's Long-Term Land Use Planning Policy for Ukiah and the Ukiah Valley.

DEPARTMENT: Community Development

PREPARED BY: Craig Schlatter, Community Development Director

ATTACHMENTS:

1. 8-27-19 CC LT Planning Workshop ASR
2. City of Ukiah 1995-Proposed SOI
3. Building Div # of inspections-permits 2003-present (2019)

Summary: Council will receive a report from Staff regarding the City of Ukiah's long-term land use planning policy for Ukiah and the Ukiah Valley, specifically related to research and additional analysis and information pertaining to Policy Directive No. 2.

Background:

On August 27, 2019, City Council and Staff discussed the City of Ukiah's long-term land use planning policy for Ukiah and the Ukiah Valley during a workshop at the Ukiah Valley Conference Center. The workshop served to provide information regarding reorganization requirements under the Cortese-Knox-Hertzberg Act, the role of the Local Agency Formation Commission, and key terms such as Sphere of Influence and Municipal Service Review, as well as outlining proposed Policy Directives for Council's consideration. The discussion was prompted by priorities and strategies within the City Council's Strategic Plan, which listed actionable items as 1) update the Ukiah General Plan; 2) update the City of Ukiah's sphere of influence; 3) prepare and adopt annexation policies, and; 4) evaluate and amend the city zoning code to improve efficiencies/public service and protect natural resources. See Attachment 1 for the Staff Report for August 27.

During discussion by Council related to the recommended Policy Directive No. 2, Council requested additional information regarding possible reasons for the reduction of the Sphere of Influence (SOI) proposed in the 1995 General Plan. Although never adopted by the Mendocino County Local Agency Formation Commission (Mendocino LAFCo), the 1995-proposed SOI (see Attachment 2) reflected a departure from the long-term planning policy and approach to growth management in Ukiah and the Valley since 1974.

Discussion:

To address Council's questions plus explore information provided by Mendocino LAFCo's Executive Officer at the August 27 City Council workshop related to Areas of Interest, Staff has conducted extensive research into the City's archives and historical files, as well as reviewing past City Planning staff's notes and files. The following constitutes the sources and materials reviewed: 1974 General Plan, 1984 General Plan, *Sphere of Influence Study* prepared by William R. Zion, Fall 1984, Planning Commission agenda packets and minutes for the period 1991 to 1995 (which included updates from the Growth Management Steering Committee formed to provide recommendations for the City's 1995 General Plan), 1991 Ukiah Valley-Wide Task Force Report and Recommendations, minutes and agenda packet materials from 1994 and 1995 meetings of the City Council,

the 1995 Ukiah Valley General Plan, documents/notes from former Community Development Director Stump titled “City of Ukiah Sphere of Influence Update 2014-2015,” 2009 Ukiah Valley Area Plan, Mendocino County General Plan (2009), and the 2012 City of Ukiah Municipal Service Review.

Research was conducted from published reports, studies, and documents and publicly available legislative materials. No interviews were conducted as part of this research, nor were any opinions collected from the former members of the committees, City Councils, Boards of Supervisors, special districts, certain special interest agencies and organizations, or the former or current staffs of these various entities.

Below is a timeline listing key events leading up to and/or related to the development of the 1995 General Plan, as well as pertinent quotes.

1. Establishment of the City of Ukiah Sphere of Influence

Fall 1984: *Sphere of Influence Study*, by William R. Zion

Known as the Zion Study, this was an independent Mendocino County-wide study completed for all special districts and local agencies in Mendocino County. The purpose of the study was to make recommendations to Mendocino LAFCo on appropriate SOIs for Mendocino County. Relevant quotes:

“The adopted city” (of Ukiah) “sphere of influence includes all of both water districts, except for that part of Willow south of Boonville Road. In addition the territory of both districts is part of the Ukiah urban area and needs the full range of city services.”

“*Because of the inclusion of the districts within the Ukiah sphere, a “zero” sphere is indicated, implying no annexations and eventual annexation to Ukiah and dissolution. That part of the Willow district outside the city sphere could have a sphere permitting some expansion, if LAFCo feels this is consistent with the county general plans and with local needs.”*

This study and recommendations within the study served as the basis for establishing Ukiah’s SOI, which Mendocino LAFCo adopted on December 3, 1984, through Resolution No. 84-15.

2. Early Annexation Efforts and Intentions

There has been speculation that the City never intended to annex areas within its 1984 SOI. However, in reviewing actions and legislative proceedings from 1984 to 1989 it appears the City was actively preparing to annex areas within the entire SOI while also focusing on preservation and protection of agricultural areas.

August 1986: *City Council Ordinance 858*, Prezoning Certain Properties Ukiah North

“Whereas, pursuant to Government Code Section 65859, the City has the authority to prezone property within its Sphere of Influence, and

Whereas, the subject prezone includes 1110 parcels extending from the northern city boundaries to Highway 20 and westerly to the foothills from the Russian River.”

November 1988: *City Council Minutes*, Presentation of Maps of the Incorporated Ukiah Valley

“The City Manager presented maps depicting the Ukiah Valley with the City of Ukiah sphere of influence that is overlapped by different water, sanitation, and fire districts. He noted since the City Council has established a

goal of incorporating the Ukiah Valley, this map visibly shows the magnitude of the issues to be resolved. (Mayor Henderson, Councilmembers Shoemaker, Schneiter, Hickey, and Wattenburger)."

February 1989: *Letter from Mayor of Ukiah City Council to Board of Supervisors* and *Policy Resolution*

First paragraph and part of second paragraph from letter written by Mayor Colleen Henderson to Marilyn Butcher, Chairman of Board of Supervisors: *"As you may know, the City of Ukiah is in the process of prezoning all parcels of land within its sphere of influence. We have completed the prezoning of all lands to the north, and down the east side of the valley south to Gobbi Street. This process raised some concern within the farming community that agriculturally zoned lands might not be preserved. The City has always had a strong commitment to the preservation of agriculture in the valley and an individual's right to farm on such agriculturally zoned lands. In light of this commitment and in light of the farming community's concerns, the City Council and Mendocino County Farm Bureau have adopted policy resolutions reflecting our joint position on prezoning and annexation of agricultural lands from Gobbi Street south in Ukiah's sphere of influence…I am enclosing copies of both resolutions for your reference."*

3. Towards a Plan for the Ukiah Valley- Development of the 1995 Ukiah Valley General Plan

1990-91: *Ukiah Valley-Wide Task Force Report and Recommendations*

A Valley-wide task force was formed by the City of Ukiah and County of Mendocino in April 1990. The task force consisted of a combination of citizens-at-large, County and City representatives, representatives from each of the water districts and fire district, and representatives from agencies of other certain interests. The purpose of this task force was *"to initiate a long overdue study of possible consolidation of services, and consolidation of interests in providing services and/or meeting future service needs in the areas of water, sewer, emergency services and development standards."*

After several meetings, the Task Force produced a draft report in August 1991 with findings and recommendations for efficient delivery of public services within the Ukiah Valley. The task force also produced an implementation plan for accomplishing the recommendations.

"8. The County and City shall reactivate their joint planning meetings and utilize these joint meetings to facilitate the standardization of development standards in the Valley."

In relation to the sections focused on the Ukiah Valley, the report reinforced the importance of joint planning between the City and Mendocino County, especially in regards to future development and land use. The report also served as the basis for the future *Community Facilities Element* of the 1995 Ukiah Valley General Plan (1995 Ukiah Valley General Plan, Section 2.02.8).

1990-1994: *Growth Management Steering Committee*

November 21, 1994 Staff Report from City of Ukiah Planning Department to City of Ukiah Planning Commission providing background and a recommendation to adopt the *Draft Ukiah Valley General Plan and Draft Environmental Impact Report*: *"In late 1990, the Ukiah City Council authorized and budgeted for this planning effort" (the 1995 Ukiah Valley General Plan). "Thereafter, the Growth Management Steering Committee (GMSC) was formed to guide the Plan's development, and a planning consultant was awarded the contract to perform necessary research and actually compose the document. The GMSC is a 35-member citizen advisory committee made up of Valley-wide participants representing groups, organizations, agencies, districts, and the general public. The consultant is The Company of Eric Jay Toll AICP, Inc., a small planning firm from Carson City, Nevada. The GMSC, which met regularly over the course of the entire four-year period,*

was basically responsible for crafting the final version of virtually every goal, policy, and implementation measure contained in the Plan, as well as many of the findings contained in each Element."

In addition to the GMSC, individual Citizen Advisory Committees (CACs) were created for each of the 14 General Plan Elements. Similar to the member composition of the GMSC, the CACs represented Valley-wide interests. *"Each volunteer" (*of the GMSC and CACs) "*was drawn from a broad cross-section of the **entire"*** (emphasis included within document) ***"**community- both in the City and in the Valley."* (1995 Ukiah Valley General Plan, Section 1- Preface)

"…it was apparent from the early stages of the planning process that the Ukiah Valley General Plan would have its greatest influence on the long-term development and use of the Valley if both the City of Ukiah and the County of Mendocino would utilize it for decision-making and planning policy. Accordingly, about mid-1991, City staff broached the subject of having the County adopt the eventual document as an Area Plan of the Mendocino County General Plan with County officials and the County Planning Commission and Board of Supervisors."

Although serving as the City of Ukiah's General Plan, the 1995 Ukiah Valley General Plan appears to have been envisioned by its creators to be the area plan for the Ukiah Valley. Through the collaborative efforts of both County and City representatives, the 1995 Plan would eventually be used to develop the 2009 Ukiah Valley Area Plan (UVAP), which is a component of the Mendocino County General Plan.

Utilization of an area plan as a municipal general plan is unusual. Common planning practice is for area or specific plans to be used for systematic implementation of a general plan (as is the case currently with the 2009 UVAP and its relationship to the Mendocino County General Plan). In its 2017 General Plan Guidelines, the California Office of Planning and Research (OPR) notes the followings: *"Area and community plans are part of the general plan. A specific plan is a tool for implementing the general plan but is not part of the general plan..."Area plan" and "community plan" are terms for plans that focus on a particular region or community within the overall general plan area."*

This aspect deserves further study, which Staff has attempted in Section 4 below. Additionally, given the City's current updating of the General Plan, Council will want to consider if continuing with a Valley-wide focused municipal general plan for the 2040 General Plan is appropriate, especially in light of the 2009 County of Mendocino adopted UVAP. Staff has provided some preliminary recommendations, and a future General Plan workshop has been scheduled to discuss the subject further.

1994-1995: *Sphere of Influence* and *Planning Commission and City Council Review and Adoption*

The earliest conceptualizations of the 1995-proposed SOI appear to have been developed by various stakeholder groups, either in conjunction with or independent of the Ukiah Valley General Plan GMSC. For example, in a City planning staff report produced in February 1994 a footnote to the report states *"In addition to the Staff-proposed version, the GMSC already has a color copy of the Board of Realtors' proposed Sphere of Influence, and has seen a presentation of the Farm Bureau's version. In addition, Lief Farr has also proposed a Sphere of Influence based on other issues."*

From the reports, minutes, and documents produced during this period, it appears that the GMSC reviewed multiple proposed SOIs from different Valley-wide stakeholders, then developed a final proposed SOI, which was inserted into the *Draft Ukiah Valley General Plan*.*

The efforts of the GMSC concluded sometime in mid-1994, and the *Draft Ukiah Valley General Plan* was presented to the Planning Commission on December 13, 1994. Through a series of public meetings from

December 1994 to April 1995, the Planning Commission discussed and deliberated on proposed revisions to the General Plan. After conceptually approving the Draft on June 10, 1995, the City Council conducted a series of public meetings and made *"numerous additional revisions,*" resulting in a Final General Plan that was adopted on December 6, 1995.

It seems the final City Council adopted version was relatively unchanged from the GMSC Draft document. Per Section I.1.3, Preface, of the *Ukiah Valley General Plan "The Planning Commission worked hard on the draft Plan, but, in the end, the Plan was left basically and functionally intact from the Growth Management Steering Committee's final version…The document was, and remains, truly representative of the citizens of the Valley…"*

4. Summary of Research

The 1995 Ukiah Valley General Plan, although serving as the City's municipal general plan, is essentially an older version of the (2009) Ukiah Valley Area Plan. It is not a traditional municipal General Plan in that it is not focused primarily on City incorporated areas. This historical context is important. Although aligning with a vision in earlier General Plans that foresaw the City and Valley as one community, the difference between the City's General Plans and related efforts between 1974 and 1989 and the Ukiah Valley General Plan process of 1990-1995 appears to be that the former was Ukiah-centric versus the latter that was area-wide. It is Staff's opinion that although this was a worthwhile planning effort ultimately leading to development of the UVAP, at this point (2020) in the Valley's development it is appropriate for the City to have its own municipal general plan, and although not required by State law, the 2040 General Plan should seek to achieve consistency with the 2009 UVAP.

It is also not clear that City of Ukiah representatives on the Planning Commission or City Council were fully in support of the valley-wide approach to the City's General Plan. "*While the document was not changed in a grand or profound way as a result of the Commission's involvement, it would nevertheless be misleading and inaccurate to deduce that the Commission was in full harmony on various issues, or that individual Commissioners did not have viewpoints that substantially deviated from the Steering Committee's recommendations…Indeed, differences of opinion were expressed in regards to…the Plan's relationship to the community's needs."*

However, although it can be proven with a degree of certainty that the 1995 Ukiah Valley General Plan is akin to an area plan, the specific motivation or reasoning behind the 1995-proposed SOI is more ambiguous. There appear to have been several early versions of the SOI developed by various stakeholder groups but few additional details or reasons are provided as to how these proposals were formulated. Given that the final *Draft Ukiah Valley General Plan* was produced by the GMSC for presentation to the Planning Commission and City Council and this Draft Plan included the 1995-proposed SOI, it is thus reasonable to conclude the 1995 SOI was a product of the GMSC.

In light of this research, plus research into subsequent confirmations of the 1995 SOI by City Councils in 2006 and 2012 (although in 2012 there was an amendment proposed to increase the 1995 SOI slightly to encompass the western hills) it is Staff's conclusion that the reasoning behind the 1995 SOI consisted of the following: 1) the focus of the City's General Plan was on the entire Valley, and the City's representation was reduced due to the composition and focus of the GMSC and CACs; 2) little to no City-related annexation applications had been received, nor approved, during the period from 1974 to 2012, so there were limited realistic development expectations for the City, and 3) a combination of little to no population growth, limited new construction activity, and the Great Recession in 2007-2009 all tempered future growth expectations.

5. Staff Recommendations

Given this research, plus other analysis below, Staff recommends modifying Policy Directive No. 2 as follows (note that strikethroughs are utilized to show deletions to the current Policy language):

Policy Directive No. 2: Maintain the City's current ~~Sphere of Influence~~ **Planning Area as the City's** ~~long-term Sphere of Influence~~ **2040 Planning Area. Reduce the City's Sphere of Influence to be reflective of areas with existing and forecast urbanized development within the next 10 years and designate as Areas of Interest areas outside the SOI but within the City's 2040 Planning Area.**

Reasoning behind 2040 Planning Area Recommendation

The planning area in the 1995 General Plan is coterminous with the current (1984) SOI and planning area of the Ukiah Valley Area Plan (UVAP). Planning areas represent geographical areas, sometimes similar to or the same as SOIs and at other times greater than SOIs, representing any land outside a city's boundaries which in the planning agency's judgment bears relation to its planning (Gov. Code 65300).

In its 2017 General Plan Guidelines, the California Office of Planning and Research (OPR) notes *"When establishing its planning area, each city should consider using its sphere of influence as a starting point, and building off of that area based on factors such as its location in a watershed."* Both the 1995 Ukiah Valley General Plan and 2009 UVAP refer to the Ukiah Valley as one community, and in Staff's opinion this reinforces the importance of establishing the City's planning area as coterminous to the UVAP planning area. However, adoption of a planning area alone would limit the City's ability to "have a seat at the table" when it comes to land use planning and future development in the Ukiah Valley.

Therefore, Staff recommends Council direct that Staff work with Mendocino LAFCo to pursue Areas of Interest for all areas outside the proposed SOI but within the 2040 planning area. Mendocino LAFCo defines Areas of Interest in its Policies & Procedures Manual as the following:

"An Area of Interest is a geographic area beyond the sphere of influence in which land use decisions or other governmental actions of one local agency (the "Acting Agency") impact directly or indirectly upon another local agency (the "Interested Agency"). For example, approval of a housing project developed to urban densities on septic tanks outside the city limits of a city and its sphere of influence may result in the city being forced subsequently to extend sewer services to the area to deal with septic failures and improve city roads that provide access to the development. The city in such a situation would be the Interested Agency with appropriate reason to request special consideration from the Acting Agency in considering projects adjacent to the city."

(Policies & Procedures Manual, Section 10.1.12)

Reasoning behind Sphere of Influence Recommendation

The Office of Planning and Research defines a Sphere of Influence as "a plan for the probable physical boundaries and service area of a local government agency as determined by the" (local agency formation) "commission." Spheres of Influence are designed to map out future development of urban uses or urban-type service expectations within a certain period of time, usually 10-20 years. In deciding on an appropriate SOI for recommendation, it is important to analyze both the historical decision-making leading up to the current SOI and 1995-proposed SOI, plus affirmations of these SOIs, as well as the planning and development landscapes of these eras and the era since the 2012 Municipal Service Review (the date of the most recent Council affirmation of the 1995-proposed SOI). This historical perspective was the key component missing in Staff's

presentation at the August 27, 2019 workshop.

There are five, and possibly more, notable differences between the time period of 1995 to 2012 and the period of 2012 to the present. From a review of data on building permits (see Attachment 3), plus inquiries related to new commercial and residential development, development pressures have potentially been greater within the last seven years than in any time since the “growth years” of the 1920s.** Second and given the demand for development, the City is rapidly approaching full build-out. Third, within the last approximately 5 years Ukiah like most of California has experienced significant demand for housing, and new State laws like SB 743 and the California Housing Package have prioritized that this housing be located within infill areas served by adequate infrastructure and services. Fourth, the City recently completed a study that identified 12 Disadvantaged Unincorporated Communities (DUCs), and per Mendocino LAFCo’s Policies and Procedures, Issues of Interest, Section D. “*To promote environmental justice for underserved inhabited communities, funding sources should be identified for extension of municipal services, including options for annexation of contiguous disadvantaged unincorporated communities.”* And fifth, given these reasons, plus the increasing need for wildfire mitigation planning within the Wildland Urban Interface, it will be vital that the City move forward with a plan for the orderly development of future urbanized areas.

Consequently, it is Staff’s opinion that the SOI should reflect the current and future perspective of Ukiah and its Valley, representing realistic infill development expectations within the short-term planning period- areas that are planned to be annexed by the City within the next 10 years (see proposed SOI in Attachment 4). Staff is also of the opinion that the City’s general plan should be reflective of this updated perspective and that, although not required by State Law, the general plan be consistent with the County’s UVAP.

From a big picture standpoint, this policy recommendation effectively ties together all separate but related components of long-range planning in Ukiah and the Ukiah Valley. It is reflective of historical policy (through consistency with the UVAP), current development conditions, and future infill development expectations. It also represents a policy that is more proactive and driven by the City.

Footnotes: *Because the GMSC provided information to the consultant Eric Jay Toll, Inc., who then prepared the *Preliminary General Plan*, which would serve as the basis for the *Draft Ukiah Valley General Plan* presented to the Planning Commission and City Council, and because it appears the GMSC and CACs were not legislative or quasi-legislative bodies and not subject to the Brown Act, no minutes or reports have been found that were produced by the GMSC and CACs. Instead, Staff has been able to piece together the origin of City planning staff’s Sphere of Influence recommendation through review of informational reports (updates) produced by City staff and agenda packets and minutes of the Planning Commission and City Council.

**This statement is made from a review of the resources cited in this report. Development pressures prior to 1974 have not been studied in detail.

Recommended Action: 1) Receive report and discuss; 2) direct Staff to proceed with Policy Directive No. 2, as revised within this Staff Report.

BUDGET AMENDMENT REQUIRED:
CURRENT BUDGET AMOUNT:
PROPOSED BUDGET AMOUNT:
FINANCING SOURCE:

PREVIOUS CONTRACT/PURCHASE ORDER NO.:

COORDINATED WITH:

Approved: _____

Sage Sangiacomo, City Manager

Agenda Item No.: 4a

MEETING DATE/TIME: 8/27/2019

PEAK ITEM NO: COU-784-2017

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Discussion with Possible Direction to Staff Regarding the City of Ukiah's Long-Term Land Use Planning Policy for Ukiah and the Ukiah Valley.

DEPARTMENT: Community Development **PREPARED BY:** Craig Schlatter

ATTACHMENTS:

Attachment 1- Mendocino LAFCo P&P Manual 2018
Attachment 2- Mendocino LAFCo 4-1-19 agenda packet
Attachment 3- UVAP Chap. 3- Land Use and CD
Attachment 4- UVAP Map-Planning Area (Figure 9.1)
Attachment 5- Ukiah Valley Fire District Map

Summary: Council will discuss the status of planning documents relating to long-term land use planning in Ukiah and the Ukiah Valley, with possible direction to Staff. This item specifically addresses the "Actionable Items" identified in the Council's Strategic Plan under "Plan for the Future: Utilize sound principles for valley-wide planning."

Background: The Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 ("CKH Act"), enacted through the passage of AB 2838, combined existing statutes--such as the act formerly known as the Cortese-Knox Act--into a single law and significantly and comprehensively reformed local government reorganization law. The CKH Act provides the framework for proposed city and special district annexations, incorporations/formations, consolidations, and other changes of organization. This law establishes a Local

RECOMMENDED ACTION: 1) Receive report and discuss; 2) direct Staff to proceed with Policy Directives 1, 2, and 3 as outlined in this Staff Report.

BUDGET AMENDMENT REQUIRED: No
CURRENT BUDGET AMOUNT: N/A
PROPOSED BUDGET AMOUNT: N/A
FINANCING SOURCE: N/A
PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A
COORDINATED WITH: David Rapport, City Attorney

Approved: Sage Sangiacomo, City Manager

Agency Formation Commission (LAFCo) in each county, empowering it to review, approve, or deny proposals for boundary changes and incorporations/formations for cities, counties, and special districts. LAFCos were first created by the Legislature in 1963. Currently, although exercising both regulatory and planning functions, the major planning task of LAFCOs across the state is the "establishment, periodic review, and update of spheres of influence (SOI) for the various governmental bodies within their jurisdiction" (Office of Planning and Research--LAFCOs, General Plans, and City Annexations, 2012).

The Mendocino County Local Agency Formation Commission ("Mendocino LAFCo") is the LAFCo for Mendocino County. Mendocino LAFCo annually reviews its five-year rolling work plan and associated budget, primarily focusing on municipal service reviews ("MSRs") and SOI Updates. Mendocino LAFCo also reviews and updates its policies and procedures manual as needed. The Mendocino Local Agency Formation Commission Policies & Procedures Manual (Attachment 1), last updated and adopted on November 5, 2018, sets forth policies and procedures for carrying out Mendocino LAFCo's functions.

A Sphere of Influence is "a plan for the probable physical boundaries and service area of a local government agency as determined by the commission," while a municipal service review is a "comprehensive review of all agencies that provide the services LAFCo identifies" (Office of Planning and Research, 2012).

Mendocino LAFCo's 2019 five-year rolling work plan and associated budget was adopted on April 1, 2019 (Attachment 2). Included in the work plan was to update the MSR and SOI for the City of Ukiah, planned as being undertaken in Fiscal Year 2020-21. Mendocino LAFCo also voted to re-prioritize the MSR/SOI update for Ukiah Valley Fire District, originally planned to be completed in FY 2019-20, to FY 2020-21 to correspond with the City of Ukiah MSR/SOI update. The City's MSR was last updated in 2012. An update to the City's SOI has not been completed since 1984. AB 2838 and the CKH Act require the local LAFCo to review and update each local agency's SOI every five years. The law also requires local LAFCos to conduct MSRs before or in conjunction with the establishment or update of SOIs.

Both City Staff and Mendocino LAFCo staff have been in communication regarding a tentative work plan for these MSR/SOI updates since 2017. Of significant relevance has been the timing of the City's General Plan Update which, through extensive community engagement and the establishment of other long-term policies, sets forth the City's future intentions for surrounding unincorporated lands within the City's SOI. As the SOI describes the probable physical boundaries and service area for the City, it is important these two advanced planning projects are coordinated and aligned between the City and Mendocino LAFCo as much as possible.

Of additional importance is the City Council's Strategic Plan, which sets as a priority "Plan for the Future: Utilize sound principles for valley-wide planning." The recommended strategy for this item is to "Review and revise land use planning documents to be reflective of the long-term vision for the community." The "actionable items" associated with that strategy are 1) update the Ukiah General Plan; 2) update the City of Ukiah's sphere of influence; 3) prepare and adopt annexation policies, and; 4) evaluate and amend the city zoning code to improve efficiencies/public service and protect natural resources.

Discussion: Although the City's MSR/SOI updates are not scheduled to be undertaken by Mendocino LAFCo until 2020-21, there are primarily two reasons Staff is seeking Council's input regarding policy at this juncture:

1) Mendocino LAFCo has received, or may receive prior to the City's updating of the MSR/SOI, proposals from single- or multi-purpose districts in the City's SOI to annex portions of lands within the City's SOI. Under existing Mendocino LAFCo policy, "where an area could be assigned to the sphere of influence of more than one agency, the following hierarchy typically applies:

a) Inclusion within a city's sphere
b) Inclusion within a multi-purpose district's sphere
c) Inclusion within a single-purpose district's sphere"

2) Mendocino LAFCo's guidelines state "in all of its decisions and actions, the Commission's desired result is the most efficient and effective delivery of services by local entities…" and "preference shall be given to those local agencies which can provide services in the most effective and efficient manner." Given the efficiency and potential capacity of both existing and future City services, Staff believes it important that the City outline its potential policy for these services for the future. This policy should be shared publicly but especially outlined to Mendocino LAFCo, the County of Mendocino, and special districts within the City's existing and proposed SOI.

Staff has researched historical City and Ukiah Valley policies regarding long-term growth management planning and analyzed the status of current land use and availability in Ukiah and the Ukiah Valley with the capacity of municipal services. Below are policy recommendations for the Council's consideration and discussion:

Policy Directive No. 1: The goals and vision of the Ukiah Valley Area Plan will be utilized as the basis for the City's policy towards future reorganization efforts in the Valley.

Adopted by the Mendocino County Board of Supervisors in 2011, the Ukiah Valley Area Plan ("UVAP") is a "comprehensive and long range inter-jurisdictional planning document" envisioned as one that would "meet the needs of the County, as well as shared needs of the City" [of Ukiah], "by addressing the important issues that affect how the area will grow..." The UVAP also sets forth a vision that "The Ukiah Valley is understood to be one community with collaborative decision-making between County and City agencies." UVAP policies "take precedence over the [Mendocino County] General Plan" for land use and development proposals in the Valley.

Section 3 of the UVAP, Land Use and Community Development (Attachment 3), lists several goals on Page 3-3 in support of this policy. Promoting compatible land uses and managing future growth to ensure essential support infrastructure is in place prior to development recognizes "that the Ukiah Valley is one community[.]" Realizing the vision of a coherent community will not be possible without the coordinated and efficient provision of services to lands in the Ukiah Valley.

Policy Directive No. 2: Maintain the City's current Sphere of Influence as the City's long-term Sphere of Influence.

Although past attempts were made by the City to revise its SOI, no update has been successfully completed, nor approved by LAFCo, since the 1984 SOI. The 1984 SOI, which is coterminous to the UVAP planning area, "extends from Highway 20 in the north to Boonville Road in the south and from ridge to ridge on east and west" (Attachment 4).

At the time of adoption of the 1984 General Plan, Mendocino LAFCo, working with the City, identified the SOI/planning area to consider the areas surrounding Ukiah that would have an impact on the ultimate development of the City." At that time, the General Plan was "based upon a policy that growth will occur, but will be directed toward existing developed areas and those locales unsuitable for viable agricultural production."

In restating the current (1984) SOI as the City's long-term SOI, the City will reaffirm that the level of growth and/or service delivery anticipated by the City remains consistent for 2020-40 and aligned with the Ukiah Valley Area Plan. Ukiah is the county seat and commercial hub of a growing region that extends over 5,000 square miles, including the counties of Sonoma, Mendocino, Lake, and Humboldt. Ukiah will invariably continue to grow in the coming years. Planned well, that growth can result in a vibrant, healthy, and sustainable community. Unmitigated, the piecemeal provision of services leads to piecemeal development, which leads to urban sprawl and/or the lack of supporting infrastructure.

Staff also recommends reaffirming the current SOI as the City's long-term SOI to ensure efficiency and reliability of service delivery within the Ukiah Valley. As an example, the Ukiah Valley Fire District spans an area larger than the City's city limits (see Attachment 5), and as recent wildfire seasons have shown, having a well-funded and operated Fire Authority is important for the continued safety of the region. Additionally, as much-needed housing is developed, it will be important to ensure adequate water and sewer infrastructure is in

place. By utilizing existing tax measures and revenue sources, the City can ensure the effective and efficient provision of services. Reaffirming the current SOI as the long-term SOI will help ensure the City has an active role in directing urbanized growth to appropriate areas in our community and ensuring "the preservation and enhancement of the existing and potential agriculture within the valley," which is one of the primary visions set forth in the 1984 General Plan.

Policy Directive No. 3: Implement an annexation plan, with the first phase designating the area to be annexed within the first 10 years.

In multiple planning documents produced over the past 35 years, including the 1984 Ukiah General Plan, the 1995 Ukiah General Plan, both the 2009-14 and 2014-19 Housing Elements, and the 2011 Ukiah Valley Area Plan, two common and recurring themes emerge: 1) our community values the rural and agricultural identity of Ukiah and its surrounding valley; and 2) our community seeks to preserve that identity through well-designed projects and conservation of open space and agricultural lands.

In developing and adopting a growth management phasing plan, the first 10-year phase would identify the area around existing and forecasted urbanized development north and south of the city limits as the focus of the City's annexation efforts. Encouraging infill development where services are already concentrated will limit unnecessary sprawl and protect agricultural uses.

Development of a growth management phasing plan will ensure adequate services and infrastructure are in place for existing development, as well as ensuring that future development occurs in a sustainable manner. This policy would preserve the agricultural identity of the Valley, including preservation of an existing natural "green belt" around these areas.

Summarizing, Staff recommends Council direct Staff to implement the following three Policy Directives:

1. The goals and vision of the Ukiah Valley Area Plan will be utilized as the basis for the City's policy towards future reorganization efforts in the Valley.

2. The City will maintain the City's current Sphere of Influence as the City's long-term Sphere of Influence.

3. The City will implement an annexation plan, designating the area to be annexed within the first 10 years.

RESOLUTION NO. 2020-06

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH ADOPTING ANNEXATION POLICY

WHEREAS, the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 provides for the annexation of unincorporated areas within a City's sphere of influence; and

WHEREAS, on August 27, 2019, the Ukiah City Council provided direction to staff to prepare and adopt annexation policies as part of the City's long-term land use planning and City Council Strategic Plan; and

WHEREAS, the City intends, in part through the attached Annexation Policy, to avoid the consequences of continued urban sprawl in the Ukiah Valley, to ensure the efficient provision of municipal services, and to protect open space and prime agricultural land in the Ukiah Valley; and

WHEREAS, the City envisions a future of the Ukiah Valley as a thriving community that is politically, economically, environmentally, and socially sustainable; and

WHEREAS, the City desires to provide annexation policies for the City and property owners within the City's sphere of influence that promote the successful annexation of unincorporated areas.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF UKIAH DOES HEREBY RESOLVE to adopt the Annexation Policy attached as Exhibit A, which shall be endorsed to show adoption by the City Council on January 16, 2019 and made publicly available.

PASSED AND ADOPTED this 16th day of January, 2020, by the following roll call vote:

AYES: Councilmembers Mulheren, Brown, Scalmanini, and Mayor Crane
NOES: None
ABSENT: None
ABSTAIN: None

Douglas F. Crane, Mayor

ATTEST:

Kristine Lawler, City Clerk

EXHIBIT A

City of Ukiah

Annexation Policy

The City will pursue, apply for, and support the annexation of unincorporated areas to the City to avoid the negative consequences of continued urban sprawl and to ensure the efficient provision of municipal services to unincorporated areas without placing an undue financial burden on the City or its residents.

The City's Sphere of Influence reflects the City's intent and ability to apply to annex those territories within that Sphere of Influence. The City's Sphere of Influence should be updated periodically and as necessary to reflect any change in the City's intent or ability to annex unincorporated territory.

The City's Area of Interest reflects that territory outside its Sphere of Influence where the City has an interest in ensuring orderly development and the efficient provision of municipal services, and a financial interest in the implications of any such development and services. The City will consider providing services to unincorporated areas within its Area of Interest when the City and all local agencies with relevant jurisdiction, if any, arrive at an agreement ensuring the City is adequately compensated for the costs it incurs and/or will incur due to development in its Area of Interest.

The City will apply for the annexation of unincorporated areas and will support property owners who desire to annex to the City where the City determines it to be in its residents' interests to do so, to promote orderly development, to implement General Plan goals and objectives, and/or to ensure the efficient provision of municipal services.

In pursuing, applying for, or supporting annexation, the City will demonstrate that existing or planned-for facilities, infrastructure and improvements, and municipal services are or will be available, including but not limited to: vehicular and pedestrian traffic corridors, fire protection, sewer, electricity, and municipal and industrial water, in accordance with City standards and General Plan goals and objectives, to those areas proposed to be annexed.

The City will pursue, apply for, or support annexations that could affect open space and prime or unique agricultural lands, when it is satisfied that they will be adequately protected.

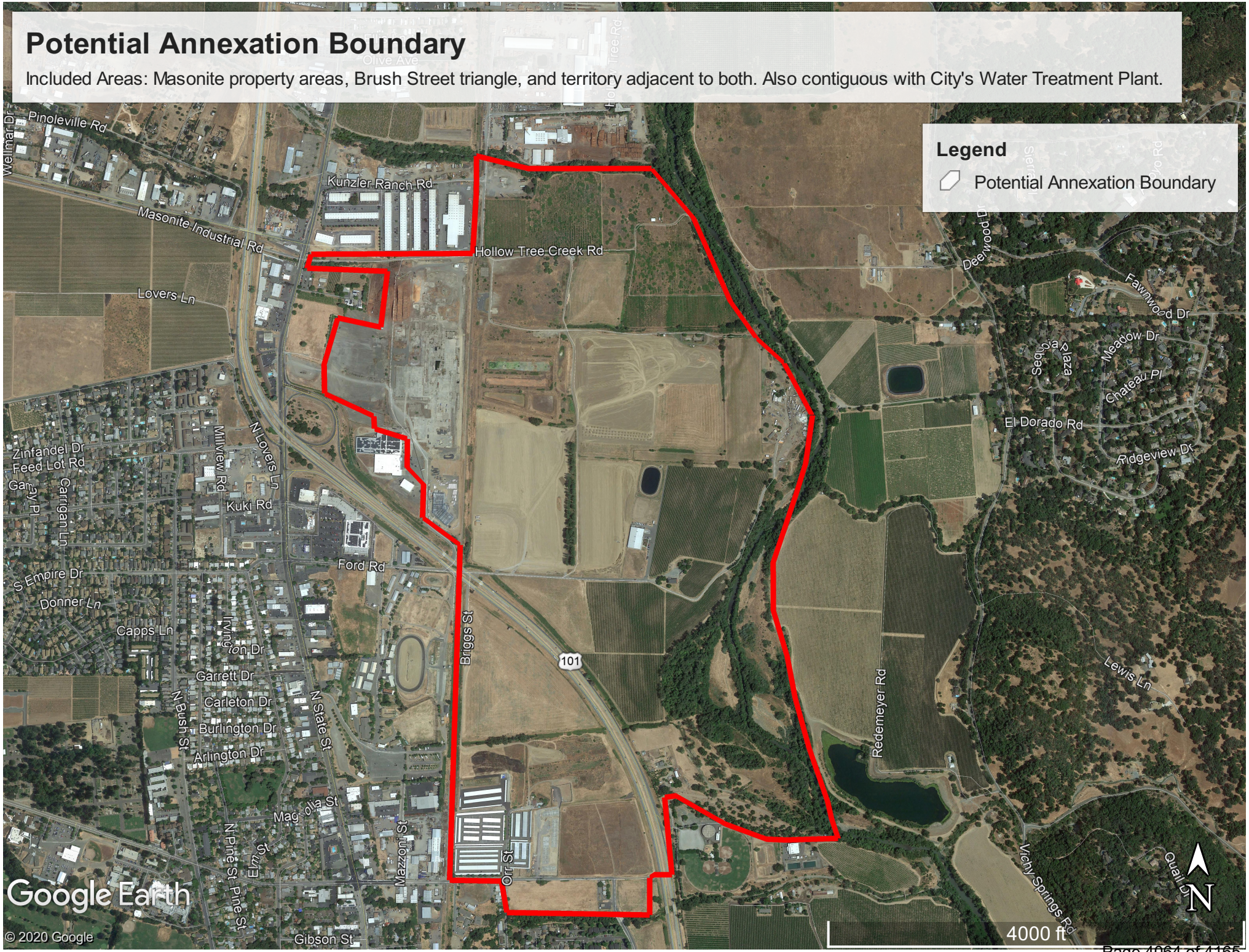
The City will pursue, apply for, or support annexation in those cases where significant environmental impacts have been mitigated or avoided as appropriate.

The City will develop, maintain, and make publicly-available a City of Ukiah Annexation Guide that includes an annexation applicant's responsibilities, the requirements for environmental review, requirements for development plans, and fees associated with applications for annexation.

If appropriate, and as it may be amended, the City will incorporate and include this Annexation Policy in its 2040 General Plan.

Potential Annexation Boundary

Included Areas: Masonite property areas, Brush Street triangle, and territory adjacent to both. Also contiguous with City's Water Treatment Plant.



Agenda Item No: 12.b.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-352

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Receive Status Report and Consider Any Action or Direction Related to the Novel Coronavirus (COVID-19) Emergency Including Operational Preparedness and Response; Continuity of City Operations and Services; Community and Business Impacts; and Any Other Related Matters.

DEPARTMENT: City Manager / Admin

PREPARED BY: Tami Bartolomei, Community Services Administrator

PRESENTER: Tami Bartolomei, Office of Emergency Management Coordinator

ATTACHMENTS:
None

Summary: The City Council will receive a status report and consider any action or direction related to the Novel Coronavirus (COVID-19) Emergency including operational preparedness and response; continuity of City operations and services; community and business impacts; and any other related matters.

Background: On March 4, 2020, California Governor Gavin Newsom declared a State of Emergency in California in response to the COVID-19 pandemic.

The County of Mendocino declared a State of Emergency related to the COVID-19 on March 4, 2020.

On March 17, 2020, the City Manager acting as the Director of Emergency Services declared the existence of a local emergency.

On March 18, 2020, City Council approved a Resolution ratifying the proclamation declaring the existence of a local emergency.

Since the onset of the emergency, the City of Ukiah has worked to respond to the public health and safety needs of the community in cooperation with the County of Mendocino and other partners. The local response for public health is lead regionally by the County of Mendocino and the County's Public Health Officer. In addition, the City of Ukiah has worked to maintain the continuity of public services including public safety, water, sewer, electric, airport, public works, and other essential activities.

Discussion: As the coronavirus “COVID-19” continues to evolve, the City of Ukiah continues to monitor the situation and respond to emerging needs of the community. The City is in continued contact with local and state agencies, as well as community partners, hospitals, schools, and neighboring cities to ensure we have the most updated information pertaining to COVID-19 and are coordinating efforts.

Reports and/or information from the City of Ukiah's Emergency Operation Center (EOC) will include:

* Emergency Operation Center (EOC) Status
* COVID-19 Case Updates
* Public Information Officer

* Medical Services
* School/Education
* Public Safety (Police/Fire/EMS)
* Shelter in Place Monitoring and Compliance
* Community Service Groups
* Homeless Response
* Business Impacts/Services
* Public Infrastructure/Construction Status
* City Finance
* Recovery Efforts and Planning
* Other Related matters

Staff will provide a status report to City Council and will seek direction or action on operational preparedness and response; continuity of City operations and services; community and business impacts; and any other related matters.

Go to the City's website (www.cityofukiah.com) for direct access to information related to the Novel Coronavirus (COVID-19) emergency including local updates, City Services, Community/Resident Information, and Business Resources.

Recommended Action: Receive status report and consider any action or direction related to the Novel Coronavirus (COVID-19) Emergency including operational preparedness and response; continuity of City operations and services; community and business impacts; and any other related matters.

BUDGET AMENDMENT REQUIRED: N/A

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: N/A

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Sage Sangiacomo, City Manager

Approved: 
Sage Sangiacomo, City Manager

Agenda Item No: 12.c.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-476

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Consideration of Adoption of Amended Resolution Authorizing Applications for Funding and the Execution of Grant Agreements and any Amendments thereto from the 2019-2020 Funding Year of the State Community Development Block Grant Program.

DEPARTMENT: Community Development

PREPARED BY: Craig Schlatter, Community Development Director

PRESENTER: Craig Schlatter, Community Development Director

ATTACHMENTS:

1. CC Reso 2020-20 - Approving Application for Funding from CDBG
2. 2020-CDBG-OTC-Applications-Received-Final
3. Resolution (Amended)- 2020 State CDBG application

Summary: Council will consider adoption of an amended resolution authorizing applications for funding and the execution of grant agreements and any amendments thereto from the 2019-2020 funding year of the State Community Development Block Grant program.

Background: On May 6, 2020, Council adopted Resolution No. 2020-20 (Attachment 1) approving one or more applications for funding and the execution of a grant agreement(s) and any amendments thereto from the 2019-2020 funding year of the State Community Development Block Grant (CDBG) Program. Within the Resolution, Council approved submission of applications in the aggregate amount of not to exceed $3,460,000 for five eligible activities: Microenterprise Technical Assistance Program, Business Assistance Program, Clara Avenue Reconstruction Project, Orr Street Bridge and Transportation Corridor Study and Plan, and a Design and Feasibility Study for ADA Improvements at a City of Ukiah Municipal Services Facility located at 501 S. State Street. Council also approved the use of CDBG Program Income in an amount not to exceed $48,530 for the Clara Avenue Reconstruction Project.

With the exception of the Clara Avenue application, Staff submitted all other applications to the State Department of Housing and Community Development (HCD) prior to HCD's amended application submittal deadline of June 1, 2020. Per the 2019-2020 CDBG Notice of Funding Availability (NOFA), capital improvement project applications, such as for the Clara Avenue project, are submitted in the Over the Counter (OTC) application pool and due September 30, 2020. OTC project applications are awarded on a rolling basis as complete applications are received.

On July 7, 2020, the City received a payoff of a business assistance loan in the amount of $117,412.06. Repayments and payoffs of loans originally funded by open CDBG grants are known as Program Income (PI). PI can be reused by jurisdictions for eligible activities in substantially the same manner as that of open CDBG grants. Additionally, CDBG regulations require all PI be expended or committed to an eligible activity prior to drawing down and/or applying for additional funding. 17% of the $117,412 payoff, or $19,960, is automatically earned by the City as revenue for general administration activities, for the purposes of ongoing administration of CDBG programming. This leaves $97,452 to be committed within the City's 2019-2020 CDBG application.

In addition to the need to commit additional unanticipated PI, on June 19, 2020 HCD released a second amended NOFA reducing the maximum amount for the Business Assistance program from $750,000 to $500,000. The City's Resolution No. 2020-20 had approved an application be submitted for a $504,500 Business Assistance Program.

Staff discussed these two issues with HCD representatives in July. Due to the release of a list of OTC applications received as of June 4, 2020 (Attachment 2), Staff also discussed the likelihood of an award in the 2019-2020 funding cycle for the Clara Avenue Reconstruction project application. At Staff's request and for the City to be in compliance with current HCD guidance and CDBG regulations, HCD changed the status of the City's Business Assistance and Microenterprise Technical Assistance programs from submitted to draft. Both applications are due August 31 (also within NOFA amendment #2).

Discussion: Working closely with its underwriter/program operator, Staff redesigned the CDBG Business Assistance program for the provision of at least eight to nine forgivable loans to businesses impacted by the COVID-19 pandemic. As the impacts from the pandemic continue, additional funds to sustain the Ukiah small business community will likely be needed, and therefore Staff recommends the additional unanticipated Program Income be committed to the City's Business Assistance Program application. The $97,452 plus additional loan repayments expected within the 2020-21 fiscal year, bring the total amount of PI to be committed to approximately $140,000.

HCD representatives expressed doubt that additional OTC projects submitted within the next two months prior to September 30, 2020 would be awarded, as the amount available for OTC projects was already oversubscribed by approximately $37 million as of June 2. HCD suggested the City may have a better chance at an OTC award if submitting an application early in the 2021 CDBG NOFA funding cycle. The 2021 CDBG NOFA is expected to be released in mid-January 2021.

For all these reasons, Staff recommends Council adopt the Resolution in Attachment 3 for the following:

City of Ukiah Microenterprise Technical Assistance Program = $140,000
General Administration- Microenterprise Technical Assistance Program = $10,500
City of Ukiah Business Assistance Program = $431,000
Activity Delivery- Business Assistance Program = $34,000
General Administration- Business Assistance Program = $35,000
Orr Street Bridge and Transportation Corridor Study and Plan = $150,000
Design and Feasibility Study for ADA Improvements at City of Ukiah Municipal Services Facility located at 501 South State Street = $50,000
Total = $850,500

Staff also recommends Council approve the use of Program Income in an amount not to exceed $140,000 for the City of Ukiah Business Assistance Program.

Recommended Action: Adopt amended resolution authorizing applications for funding and the execution of grant agreements and any amendments thereto from the 2019-2020 funding year of the State CDBG program.

BUDGET AMENDMENT REQUIRED: N/A

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: CDBG

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: N/A

Approved: Sage Sangiacomo, City Manager

RESOLUTION NO. 2020-20

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH APPROVING AN APPLICATION FOR FUNDING AND THE EXECUTION OF A GRANT AGREEMENT AND ANY AMENDMENTS THERETO FROM THE 2019-2020 FUNDING YEAR OF THE STATE CDBG PROGRAM

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Ukiah as follows:

SECTION 1:
The City Council has reviewed and hereby approves the submission to the State of California of one or more application(s) in the aggregate amount, of not to exceed $3,460,000, for the following CDBG activities, to be implemented in City of Ukiah incorporated areas, pursuant to the January 2020 CDBG NOFA:

City of Ukiah Microenterprise Technical Assistance Program	$ 140,000
General Administration – Microenterprise Technical Assistance Program	$ 10,500
City of Ukiah Business Assistance Program	$ 434,539
Activity Delivery – Business Assistance Program	$ 34,763
General Administration – Business Assistance Program	$ 35,198
Clara Avenue Reconstruction Project	$2,300,000
Activity Delivery – Clara Avenue Reconstruction Project	$ 230,000
General Administration – Clara Avenue Reconstruction Project	$ 75,000
Orr Street Bridge and Transportation Corridor Study and Plan	$ 150,000
Design and Feasibility Study for ADA Improvements at City of Ukiah Municipal Services Facility Located at 501 South State Street	$ 50,000
Total Grant Amount	$3,460,000

SECTION 2:
The City hereby approves the use of Program Income in an amount not to exceed $48,530 for the Clara Avenue Reconstruction Project Public Improvement Project described in Section 1.

SECTION 3:
The City acknowledges compliance with all state and federal public participation requirements in the development of its applications.

SECTION 4:
The City hereby authorizes and directs City Manager Sage Sangiacomo to execute and deliver all applications and act on the City's behalf in all matters pertaining to all such applications.

SECTION 5:
If an application is approved, the City Manager is authorized to enter into, execute and deliver the grant agreement (i.e., Standard Agreement) and any and all subsequent amendments thereto with the State of California for the purposes of the grant.

SECTION 6:
If an application is approved, City Manager is authorized to sign and submit Funds Requests and all required reporting forms and other documentation as may be required by the State of California from time to time in connection with the grant.

The foregoing Resolution introduced by Councilmember Mulheren, seconded by Councilmember Scalmanini, and passed and adopted at a regular meeting of the City Council of the City of Ukiah this 6th day of May, 2020, by the following roll call vote:

AYES: Councilmembers Mulheren, Brown, Scalmanini, Orozco, and Mayor Crane
NOES: None
ABSTAIN: None
ABSENT: None

Douglas F. Crane, Mayor
Ukiah City Council

ATTEST:

I, Kristine Lawler, City Clerk of the City of Ukiah, State of California, hereby certify the above and foregoing to be a full, true and correct copy of a resolution adopted by said City Council on this 6th day of May 2020.

Kristine Lawler, City Clerk
of the City of Ukiah of the State of California

By: _____
Kristine Lawler, City Clerk

DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT
Community Development Block Grant (CDBG)
January 21, 2020 NOFA - Over the Counter (OTC) Applications Received as of June 4, 2020

NOFA Release Date:	**January 21, 2020 and Amended on April 3, 2020**
Community Development - OTC Application Period:	**February 14, 2020 through September 30, 2020**
Total NOFA Amount:	**$60 million**
OTC Available Amount:	**$23 million**

Applicant Name	Date Application Received in Grants Network	Time Application Received in Grants Network	Activity	Amount Requested
Grass Valley, City of	**2/14/2020**	9:00:05 AM	Public Facilities - Park Improvements	$3,499,281
Firebaugh, City of	**2/14/2020**	9:00:06 AM	Public Facilities - Fire Station	$3,500,000
Dinuba, City of	**2/14/2020**	9:00:06 AM	Public Improvements-Sewer, Storm Drain, Street/Sidewalk Project	$3,499,000
King City, City of	**2/14/2020**	9:00:07 AM	Public Improvements - Sidewalk Improvement Project	$3,500,000
Winters, City of	**2/14/2020**	9:00:07 AM	Public Facilities-Senior Center Project	$3,500,000
Livingston, City of	**2/14/2020**	9:01:01 AM	Public Improvements-Sewer Project	$3,050,000
San Joaquin, City of	**2/14/2020**	9:01:07 AM	Public Improvements - Water Line Rehabilitation Project	$2,900,000
Shasta Lake, City of	**2/14/2020**	9:02:23 AM	Public Improvements - Street Rehabilitation Project	$3,389,204
Grover Beach, City of	**2/14/2020**	9:06:42 AM	Public Improvements - Waterline Rehabilitation Project	$2,586,467
Marysville, City of	**2/14/2020**	9:46:52 AM	Public Facilities - Firetruck	$590,877
Yreka, City of	**2/14/2020**	4:58:22 PM	Public Improvements - Main Street Water System Improvement Project	$3,500,000
Ft. Bragg, City of	**2/18/2020**	2:56:26 PM	Public Improvements - Water Meter Replacement Project	$2,944,365
Mt. Shasta, City of	**3/11/2020**	5:05:24 PM	Public Improvements-Sewer/PRV Station Project	$3,499,525
Hollister, City of	**3/11/2020**	5:14:26 PM	Public Improvements - West Gateway Improvement Project	$3,000,000
Avenal, City of	**3/20/2020**	6:41:07 PM	Parks and Recreation - Avenal Community Center	$3,500,000
Guadalupe, City of	**3/27/2020**	3:02:36 PM	Public Improvements-Sewer/Lift Station Project	$3,534,908
Colfax, City of	**5/21/2020**	3:13:44 PM	Public Improvements - Street Improvements	$2,954,035
Kings, County of	**5/22/2020**	3:02:46 PM	Public Improvements - Curbs, Gutters, Sidewalks	$650,000
Kings, County of	**5/22/2020**	3:28:27 PM	Public Facility - Fire Engine	$1,750,000
St. Helena, City of	**5/26/2020**	5:19:42 PM	Acquisition of Property	$1,509,560
Arvin, City of	**5/29/2020**	1:59:59 PM	Public Improvements - Streets	$1,700,000
Arvin, City of	**5/29/2020**	2:04:52 PM	Public Improvements - Water/Sewer	$1,500,000
Crescent City, City of	**5/29/2020**	4:02:57 PM	Public Improvements - Storm Drains	$1,065,485
Mendocino, County of	**6/1/2020**	3:46:24 PM	Public Improvements in Support of Housing	$728,598
			Community Development OTC Funds Available	**$23,000,000**
			Community Development OTC Funding Requested	**$61,851,305**

RESOLUTION NO. 2020-__

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH APPROVING AN APPLICATION FOR FUNDING AND THE EXECUTION OF A GRANT AGREEMENT AND ANY AMENDMENTS THERETO FROM THE 2019-2020 FUNDING YEAR OF THE STATE CDBG PROGRAM

BE IT RESOLVED by the **City Council** of the **City of Ukiah** as follows:

SECTION 1:

The City Council has reviewed and hereby approves the submission to the State of California of one or more application(s) in the aggregate amount, of not to exceed $850,500, for the following CDBG activities, pursuant to the January 2020 CDBG NOFA:

City of Ukiah Microenterprise Technical Assistance Program	$ 140,000
General Administration – Microenterprise Technical Assistance Program	$ 10,500
City of Ukiah Business Assistance Program	$ 431,000
Activity Delivery – Business Assistance Program	$ 34,000
General Administration – Business Assistance Program	$ 35,000
Orr Street Bridge and Transportation Corridor Study and Plan	$ 150,000
Design and Feasibility Study for ADA Improvements at City of Ukiah Municipal Services Facility Located at 501 South State Street	$ 50,000
Total Grant Amount	$ 850,500

SECTION 2:

The City hereby approves the use of Program Income in an amount not to exceed $140,000 for the City of Ukiah Business Assistance Program described in Section 1.

SECTION 3:

The City acknowledges compliance with all state and federal public participation requirements in the development of its applications.

SECTION 4:

The City hereby authorizes and directs City Manager Sage Sangiacomo to execute and deliver all applications and act on the City's behalf in all matters pertaining to all such applications.

SECTION 5:

If an application is approved, the City Manager is authorized to enter into, execute and deliver the grant agreement (i.e., Standard Agreement) and any and all subsequent amendments thereto with the State of California for the purposes of the grant.

SECTION 6:

If an application is approved, City Manager is authorized to sign and submit Funds Requests and all required reporting forms and other documentation as may be required by the State of California from time to time in connection with the grant.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Ukiah held on August 5, 2020 by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

_____

Douglas F. Crane, Mayor
Ukiah City Council

STATE OF CALIFORNIA
City of Ukiah

ATTEST:

I, Kristine Lawler, City Clerk of the City of Ukiah, State of California, hereby certify the above and foregoing to be a full, true and correct copy of a resolution adopted by said City Council on this 5th day of August, 2020.

Kristine Lawler, City Clerk
of the City of Ukiah of the State of California

By: _____
Name and Title

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Consider Adoption of the Ordinance Amending City Code Provisions Regulating Development of Accessory Dwelling Units.

DEPARTMENT: City Attorney **PREPARED BY:** Darcy Vaughn, Assistant City Attorney
PRESENTER: Darcy Vaughn, Assistant City Attorney

ATTACHMENTS:
1. ADU Ordinance Amendment REDLINE
2. ADU Ordinance Amendment CLEAN

Summary: The City Council will consider adopting the Ordinance Amending City Code Provisions Regulating Development of Accessory Dwelling Units.

Background: In 2018, the California State legislature enacted AB 68, AB 88, SB 13, AB 671, and AB 587 ("ADU Statutes"), which are intended to encourage development of Accessory Dwelling Units ("ADUs") and impose new requirements on local regulation of ADUs. These provisions are codified in California Government Code §§ 65852.2 (for ADUs) and 65852.22 (for Junior Accessory Dwelling Units ("JADUs")). While the City updated the City Code provisions regulating ADUs ("ADU Ordinance") in order to incorporate the then-current State regulations in 2017, the ADU Statutes include even further requirements that should again be incorporated into the City Code. Because the new State laws were effective January 1, 2020, the City ADU Ordinance is currently in conflict with State law and is, as such, void until amended to comply with the ADU Statutes. Because the only minimal State default standards for ADUs apply while the City's ADU Ordinance is void, it is in the City's interest to adopt an amended ADU Ordinance ("Amended ADU Ordinance") so that the City can continue to regulate ADU development in a manner that considers local needs and limitations, to the extent that the Statutes allow.

It is also in the interest of the City to adopt an Amended ADU Ordinance as soon as possible to assist Planning staff in the development of building plans for public use through funding from the City's SB 2 Planning Grant. The changes required by the ADU Statutes undoubtedly affect features of the building plans, and Planning has issued an RFP for design professionals to develop these plans, which include plans for ADUs. As such, an Amended ADU Ordinance that includes updated standards for ADU development would provide essential guidance in the development of ADU building plans during this process.

Prior to introduction of the Amended ADU Ordinance at the July 15, 2020 Council meeting, two Council members had questions about the following issues:

ADU Development and the Airport Land Use Compatibility Plan:

Mayor Crane inquired whether the land use requirements in the Airport Land Use Compatibility Plan ("ALUCP") were superceded by those set forth in the ADU Statutes and Amended ADU Ordinance regarding density calculations. Staff has considered this issue and has determined that provisions in the ALUCP that could prohibit detached ADU development are permissible under the ADU Statutes because these provisions

have an impact on public safety.

The 2020 ALUCP states as follows: “Secondary Dwellings. Detached secondary dwellings on the same parcel should be counted as additional dwellings for the purposes of density calculations. This factor needs to be reflected in local policies either by adjusting the maximum allowable densities or by prohibiting secondary dwellings where their presence would conflict with the compatibility criteria.”

The ALUCP defines a Secondary Dwelling as: “An attached or a detached residential dwelling unit which provides complete independent living facilities for one or more persons. It shall include permanent provisions for living, sleeping, eating, cooking, and sanitation on the same parcel as the single-family dwelling is situated. (California Department of Housing and Community Development).”

As mandated by the ADU Statutes, both the ADU Ordinance and Amended ADU Ordinance state, “ADUs and JADUs shall be deemed not to exceed the allowable density for the residential lot upon which an ADU or JADU is located”

However, many other jurisdictions, including the City, have already designated certain zoning districts where ADU development is not an allowed use due to concerns about the impact of increased density on traffic flow and public safety. Local jurisdictions can do so because of the following provision in the ADU Statutes, codified aton Govt Code § 65852.2(a)(1)(A):

"A local agency may, by ordinance, provide for the creation of accessory dwelling units in areas zoned to allow single-family or multifamily dwelling residential use. The ordinance shall do all of the following:

(A) Designate areas within the jurisdiction of the local agency where accessory dwelling units may be permitted. The designation of areas may be based on the adequacy of water and sewer services and the impact of accessory dwelling units on traffic flow and public safety. . . . "(emphasis added).

The provisions of the 2020 ALUCP that authorizes prohibition of ADUs in areas where their presence would conflict with compatibility criteria address a possible impact on public safety posed by ADU development. Section 21670 of the Public Utilities Code declares that the purpose of airport land use compatibility plans is “. . . to protect public health, safety, and welfare by ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public’s exposure to excessive noise and safety hazards within areas around public airports to the extent that these areas are not already devoted to incompatible uses.” The density and height limits in airport compatibility zones promote public safety and an ADU in this zone that exceeded either limit should be excludable under Govt. Code § 65852.2.

Sewer and Water Connection Fees:

Councilmember Scalmanini expressed concern about the provisions of the ADU Statutes and the Amended ADU Ordinance that prohibit imposing a sewer or water connection fee or capacity charge for an ADU constructed within the space of an existing single-family home or accessory structure (“Existing Space ADU”) but allow such charges to be imposed on an Existing Space ADU that is constructed with and is a part of a new single-family home. Specifically, he observed that this would effectively penalize someone who wanted to build a new home with an Existing Space ADU included and would result in a double standard for differently situated Existing Space ADU developers.

Staff has researched this issue and has concluded that this application of sewer and water connection fees or capacity charges for Existing Space ADUs does not violate State or City law. Proposition 218 does not apply

here, and, while Proposition 26 does apply to sewer and water connection fees and capacity charges, these charges are subject to an exception within Proposition 26.

From a policy perspective, the State rationalizes that, for an ADU converted from existing space, the utilities for that space have already been accounted for in the original utility connection fee assessment when the house was constructed. For an ADU contained within a newly constructed building, the new ADU's impact on utilities has not been accounted for and will be assessed as part of the impact of the new single-family home.

There is an exception under Proposition 26, i.e. California Constitution Article XIII C, that applies to a water and sewer connection fee or capacity charge:

(e) As used in this article, “tax” means any levy, charge, or exaction of any kind imposed by a local government, except the following:

***

(2) A charge imposed for a specific government service or product provided directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of providing the service or product.

Here, water and sewer connection fees or capacity charges are imposed for provision of sewer and water service, and imposed directly to the property owner paying for those services. The ADU Statutes and the current City Code already state that water and sewer connection fees and capacity charges cannot exceed the reasonable costs to the City of providing water and sewer services. As such, Proposition 26 does not bar application of the provisions regarding water and sewer connection fees and capacity charges in the ADU Statutes.

Finally, even if a California city or county determined that the provisions regarding water and sewer connection fees and capacity charges in the ADU Statutes were unconstitutional, there is no legal basis for refusing to comply with State law on these grounds. The city or county’s recourse would be to comply with the State law provisions while challenging their legality in California Superior Court. Alternatively, a reasonable interpretation of the provisions regarding water and sewer connection fees and capacity charges in the ADU Statutes is that while the City is prohibited from imposing these fees on an Existing Space ADU, the City has a choice as to whether to impose these fees on ADUs contained within a new single-family home.

Discussion: The Amended ADU Ordinance, a redlined version of which is attached here as Attachment 1 and a clean version as Attachment 2, amends a number of sections of the City Code to incorporate certain default standards imposed by the ADU Statutes for local agency ordinances regulating ADUs, to incorporate the revised basis for water and sewer connection fees and capacity charges, and to include provisions defining and regulating JADUs.

Note that, while the ADU Statutes do require cities and counties to amend ADU ordinances that are currently more restrictive than allowable under the new State standards, the City may still impose certain standards and restrictions on development of ADUs. For example, the City may still impose floor area and height limitations for ADUs, provided that these limitations are not more restrictive than the development standards set in the ADU Statutes. The City may still restrict development of ADUs in zoning districts if, due to local climatic, geologic and topographic conditions (e.g. inadequate roadways to provide adequate ingress and egress for emergency access and evacuation in the in the event of a fire or other emergency) the City determines that additional dwelling units in these areas would present negatively impact on traffic flow and public safety.

The current version of the Ordinance Amending City Code Provisions Regulating Development of Accessory

Dwelling Units reflects a wide array of community, City staff, and Council input. The Ordinance is now ready for consideration for adoption and, if adopted, will go into effect in thirty (30) days.

The primary changes required by the new State laws, and the recommended changes to the City's Ordinance, are as follows:

State Requirements Inconsistent with City Code	**Changes to City Code Provisions**
Cities must allow ADUs in any residential or mixed-use zone.	The City currently allows ADUs by right in the R-1, R-2, R-3, C-N, C-1, and C-2 zones. The Amended ADU Ordinance includes language clarifying that ADUs and JADUs are allowed in any zoning district that allows residential uses by right or with a use permit.
Cities must allow certain types of ADUs by right: • Within a new or proposed single-family home: one ADU and one JADU per lot if exterior access is available and side and rear setbacks are sufficient for fire and safety. • On a lot with a new or proposed single-family-home: one detached, new construction ADU that does not encroach into four-foot side and rear yard setbacks. A city may impose total floor area of 800 square feet; height limitation of 16 feet. • Within an existing multifamily dwelling: multiple ADUs within portions of existing multifamily dwelling structures that are not used as livable space including storage rooms, boiler rooms, passageways, attics, basements, garages if each unit complies with state building standards. A city must allow at least one and as many ADUs as is equal to 25% of the existing units in a multifamily dwelling. • On a lot with an existing multifamily dwelling: Not more than two ADUs that are detached from the dwelling and subject to a height limit of 16 feet and four-foot rear and side setbacks.	• The existing ADU Ordinance does not apply to ADUs associated with proposed single family homes or existing multifamily dwellings. The Amended ADU Ordinance requires ministerial approval of applications for ADUs associated with proposed single family homes. In addition, the Ordinance requires ministerial approval for up to two detached ADUs on a lot with an existing multifamily dwelling. The Ordinance also allows for ADUs within an existing multifamily dwelling, with the number of units capped at 25% of the existing units in a multifamily dwelling or one ADU, whichever is greater. • The Amended ADU Ordinance allows for ADUs with up to 1200 square feet in floor area and up to 18 feet in height.
If an applicant converts an attached garage, storage area, or other accessory structure to an ADU, and on-site parking is removed to allow for the conversion, a city may not require the applicant to replace the on-site parking. Cities shall require only one off street space for each bedroom or ADU, whichever is less. Cities cannot require off street parking for a JADU.	The City currently requires only one off street space per ADU. This provision was changed to one off street space per ADU or bedroom, whichever is less. A provision has been added indicating that an applicant is not required to replace on-site parking when conversion of an accessory structure involves removal of on-site parking. A provision has been added indicating that no off street parking is required for a JADU.
Cities are bound by the following development standards: • The maximum rear and side yard setback for an ADU that is not converted from an existing structure is 4 feet (reduced from 5 feet in the previous State ADU law). • A city may not impose a minimum lot size. • Maximum size may not be less than 850 square feet or 1,000 square feet for an ADU larger than one bedroom. • Combined, a city's standards governing lot coverage, floor	• The current ADU Ordinance mandates side and rear setbacks of five (5) feet for single story ADUs, and side and rear setbacks of ten (10) feet for a two-story unit. All these setbacks have been changed to four (4) feet. • A minimum lot size requirement in the City Code has been removed. • The percentage of lot size limitation has been

area ratio, open space and other standards may not preclude at least an 800 square foot ADU that is at least 16 feet high.	removed. Maximum floor area standards for ADUs remain up to 1200 square feet. • The current ADU Ordinance limits the floor area of an attached ADU to fifty percent of the existing floor area of the primary residence. Because this would prohibit an 800 square foot attached ADU for any residence smaller than 1600 square feet, this provision has been removed. The City currently imposes a maximum height of 18 feet, which is in compliance with the ADU Statutes.
A city must act on an application for an ADU on a lot with an existing single-family or multi-family structure within 60 days of receiving a completed application.	The current ADU Ordinance requires the City to act on a building permit application for an ADU in 120 days. This has been changed to 60 days.
A city may not require owner occupancy for either the primary dwelling or the ADU (this prohibition expires January 1, 2025). Cities must require owner occupancy for JADUs, in either the primary residence or the JADU.	The owner occupancy requirement in the City Code has been changed to apply only to JADUs.
Cities must include provisions allowing and regulating JADUs in their ADU ordinance. A JADU is a unit that is no more than 500 square feet and contained entirely within an existing or proposed single-family structure, and that is accessible through a separate entrance from the main entrance to the proposed or existing single-family residence. A JADU must have an efficiency kitchen with a cooking facility but a city cannot limit the nature of the electrical, gas, or propane gas connections. A city may not require a sink within the cooking facility. A city must act on an application for a JADU within 60 days of receiving a completed application.	The Amended ADU Ordinance defines a JADU and includes all the requirements and limitations imposed by the ADU Statutes.
Connection fees and capacity charges are based upon the "proportionate burden of the proposed ADU on the water or sewer system, based upon either its square feet (formerly "size") or the number of its drainage fixture unit (DFU) values, as defined by the UPC (formerly "number of plumbing fixtures").	The Amended ADU Ordinance includes this revision to the basis for assessing connection fees and capacity charges for water and sewer.

The current version of the Ordinance Amending City Code Provisions Regulating Development of Accessory Dwelling Units reflects a wide array of community, City staff, and Council input. The Ordinance is now ready for consideration for adoption and will go into effect thirty (30) days after adoption.

Recommended Action: Adopt the Ordinance Amending City Code Provisions Regulating Development of Accessory Dwelling Units.

BUDGET AMENDMENT REQUIRED: N

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: N/A

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Planning

Approved: 
Sage Sangiacomo, City Manager

ORDINANCE NO.

ORDINANCE OF THE CITY COUNCIL OF THE CITY OF UKIAH ADDING AND AMENDING VARIOUS SECTIONS OF THE UKIAH CITY CODE TO COMPLY WITH CALIFORNIA GOVERNMENT CODE SECTION 65852.2 REGULATING ACCESSORY DWELLING UNITS

The City Council of the City of Ukiah hereby ordains as follows.

SECTION 1

Findings and Declarations. The City Council finds and declares as follows:

A. In October 2019, the Governor of California signed Senate Bill 13, Assembly Bill 68, Assembly Bill 881, Assembly Bill 670 and Assembly Bill 587 ("ADU Statutes"), which relate to the creation of new Accessory Dwelling Units ("ADU") and were intended to address California's ongoing housing affordability crisis by reducing local regulatory barriers to constructing new ADUs.

B. The ADU Statutes, as codified in State of California Government Code Sections 65852.2 and 65852.22, established new standards for regulating ADUs to be effective January 1, 2020;

C. Because the City's existing standards for ADUs are inconsistent with the new standards enacted by the ADU Statutes, the current City Code provisions regarding ADUs are voided until amended to be consistent with the ADU Statutes.

D. Because the City's standards for ADUs are currently voided, any application for an ADU consistent with State law will be deemed approved and the default State law standards do not consider the City's particular needs and limitations. As such, it is in the interest of the City to amend the City Code to bring its standards for ADUs into compliance with the State standards and to include any permissible standards that consider local needs and limitations.

SECTION 2

Section 3702.5 of Division 4, Chapter 2, Article 3 of the Ukiah City Code is amended to read as follows:

§3702.5 SEWER REQUIRED

Any structure located within the City in which plumbing is to be installed and to which a public sewer is available shall, at the expense of the owner of the property, connect the plumbing of such structure directly to the proper public sewer in accordance with the provisions of this ordinance. A public sewer shall be deemed to be available if a public sewer is located within two hundred feet (200') of the property line of the property involved.

However, no new connection between an Accessory Dwelling Unit (as defined in Section 9278 of this Code) and the proper public sewer will be required for an Accessory Dwelling Unit contained within the ~~existing~~ space of an existing or proposed primary

residence or accessory structure, unless the Accessory Dwelling Unit was constructed with a new single-family home. ~~and located in the R-1 zone~~.

SECTION 3

Division 4, Chapter 2, Article 12 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§3731A SEWER CONNECTION CHARGES

The following charges are hereby established for the connection of the plumbing of any building or structure which discharges to the sanitary sewer system of the city and said charges are separate from any other charges presently levied or which may be levied in the future:

A. Residential Schedule:

Ten thousand nine hundred eleven dollars ($10,911.00) for equivalent sewer service unit (ESSU) per dwelling unit connected to the wastewater system based on the number of bedrooms according to the following schedule:

		Connection Fee	**ESSU**
1.	One bedroom	$ 9,820.00	0.9
2.	Two bedroom	10,911.00	1.0
3.	Three bedroom	12,002.00	1.1
4.	For each additional bedroom	1,091.00	0.1

* * *

D. Connection Fees for Accessory Dwelling Units

1. Accessory D~~d~~welling U~~u~~nits shall not be considered new residential uses for the purposes of calculating ~~local agency~~City connection fees or capacity charges for utilities, including water and sewer service. The Residential Schedule for calculation of sewer system connection fees set forth in Subdivision A of this Section shall not apply to Accessory Dwelling Units.

2. As provided in Section 3702.5, the City will not require a new connection between an Accessory Dwelling Unit (as defined in Section 9278 of this Code) and the sanitary sewer system for an Accessory Dwelling Unit contained within the ~~existing~~ space of an existing primary residence or accessory structure ~~and located in the R-1 zone~~. Notwithstanding Section 3734A, the City shall not impose a connection fee or capacity charge for this type of Accessory Dwelling Unit, unless the Accessory Dwelling Unit was constructed with a new single-family home~~.~~.

3. For Accessory Dwelling Units that are not contained within the ~~existing~~ space of an existing primary residence or accessory structure ~~or not located in the R-1 zone~~, the City may charge a connection fee or capacity charge that is proportionate to the burden of the proposed Accessory Dwelling Unit, based upon either its square feet or the number of its drainage fixture unit (DFU) values, as defined in the Uniform Plumbing Code adopted and published by the International Association of Plumbing and Mechanical Officials, upon the water or sewer system. ~~size or the number of fixture unit values as set forth in the current edition of the California Plumbing Code ("fixture units"), upon the sewer system.~~ This fee or charge shall not exceed the reasonable cost of providing this service.

4. The connection fee for an Accessory Dwelling Unit shall be calculated based on the number of fixture units in the developed ADU, as determined by the City Engineer.

5. In the event that the property on which a primary dwelling and an Accessory Dwelling Unit are located is subdivided to create a new lot on which the Accessory Dwelling Unit is located, and the Accessory Dwelling Unit was constructed on or after January 1, 2017, the property owner must pay to the City the difference between the sewer connection fee initially calculated for the Accessory Dwelling Unit pursuant to subdivision D4 of this Section and the connection fee that would have been calculated pursuant to subdivision A if the dwelling unit were the primary dwelling unit on a lot.

SECTION 4

Section 3861 of Division 4, Chapter 4 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§3861 WATER CONNECTION FEES

A. Payment of Fees

The storage and transmission and production and treatment facilities' fees are based on the size of the service. Said fees shall be due and payable prior to use and occupancy of the new facility requiring the service. No certificate of occupancy shall be issued and permanent water service shall not be provided until payment is received.

B. Connection Fees for Accessory Dwelling Units

1. Accessory dwelling units shall not be considered new residential uses for the purposes of calculating connection fees or capacity charges.

2. No new water connection shall be required, and no fee charged, for an Accessory Dwelling Unit (as defined in Section 9278 of this Code) contained within the ~~existing~~ space of an existing primary residence or accessory structure, unless the Accessory Dwelling Unit was constructed with a new single-family home. ~~and located in the R-1 zone~~.

3. Accessory Dwelling Units that are not contained within the ~~existing~~ space of an existing primary residence or accessory structure ~~or not located in the R-1 zone~~ are subject to connection fees for water service as provided in Section 3861.

SECTION 5

Article 3 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9016 ALLOWED USES

The following uses are allowed in single family residential (R-1) districts:

* * *

Accessory Dwelling Units (ADU) or Junior Accessory Dwelling Units (JADU) on lots developed with a primary single-family or multifamily residence or for which a primary residence is proposed subject to the following standards/criteria:

A. The requirements of this subsection are applicable to all existing ~~Accessory Dwelling Units~~ADUs and JADUs as well as those proposed after the effective date hereof, except for legal nonconforming units, or as is otherwise specifically provided herein. Existing ~~Accessory Dwelling Units~~ ADUs or JADUs as of the date hereof inconsistent with the provisions listed herein, shall be considered legal nonconforming, provided that they were legal at the time of their creation.

B. Pursuant to California Government Code 65852.2(a)(1)(C) and 65852.22(d) and (e), ~~accessory dwelling units~~ADUs and JADUs shall be deemed not to exceed the allowable density for the residential lot upon which an A~~ccessory Dwelling Unit~~DU or JADU is located, and ~~Accessory Dwelling Units~~ADUs and JADUs are deemed a residential use that is consistent with the existing general plan and zoning designation for the residential lot on which an ~~Accessory Dwelling Unit~~ADU or JADU is located.

C. These regulations do not allow the division of property upon which an Accessory Dwelling Unit is located unless all requirements of the applicable zoning district, and any other requirements of this Code are met.

D. The Accessory Dwelling Unit or JADU may be used for rental purposes. The minimum term of a lease for an Accessory Dwelling Unit or JADU shall be thirty (30) days.

E. The ADU or JADU may be rented separate from the primary residence, but may not be sold or otherwise conveyed separate from the primary residence.

F. For development of an ADU or JADU, the applicant shall record a deed restriction, which shall run with the land. A copy showing recordation with the Mendocino County Recorder~~,~~ shall be filed with the City, and shall include both of the following:

(1) A prohibition on the sale of the ADU or JADU separate from the sale of the primary residence, including a statement that the deed restriction may be enforced against future purchasers.

(2) For a JADU only, a restriction on the size and attributes of the JADU that conforms with this Section.

~~E~~G. Accessory Dwelling Units may be attached to existing single-family or multifamily residences or detached as separate structures. Accessory Dwelling Units shall incorporate the same or substantially similar architectural features, height, building materials and colors as the main dwelling unit or compatible dwellings located on adjacent properties. Architecture not similar to the architecture of the principal dwelling or buildings on adjacent properties shall be subject to the use permit process.

H. Junior Accessory Dwelling Units are installed within a legally established bedroom within the existing walls of a fully permitted single-family dwelling or proposed single-family dwelling. In the case of a legal, non-conforming single-family dwelling unit, the applicant must demonstrate adequate septic capacity for the bedroom count, if the dwelling uses a septic system, and utilize an existing, fully permitted bathroom. A separate entrance to the Junior Accessory Dwelling Unit shall be provided. A Junior Accessory Dwelling Unit may include a full bathroom, or the occupant(s) may use a full bathroom inside the remainder of the single-family dwelling. A Junior Accessory Dwelling Unit shall contain an efficiency kitchen, which shall include a cooking facility for preparation and sanitation of food with appliances (e.g., microwave, toaster oven, hot plate) and a food preparation counter and storage cabinets that are of reasonable size in relation to the size of the JADU. The efficiency kitchen must be removed when the JADU use ceases.

~~F. The minimum lot size upon which an Accessory Dwelling Unit may be placed is five thousand (5,000) square feet for an interior lot, and seven thousand (7,000) square feet for a corner lot.~~

~~G~~I. The maximum size of an Accessory Dwelling Unit shall be ~~ten percent (10%) of the lot size with a maximum size of~~ one thousand two hundred (1200) square feet. ~~The increased floor area of an Accessory Dwelling Unit that is attached to the primary residence shall not exceed 50 percent of the existing living area~~. The maximum size of a Junior Accessory Dwelling Unit shall not exceed five hundred (500) square feet in floor area. If the bathroom is shared with the remainder of the single-family dwelling, it shall not be included in the square footage calculation.

~~H~~J. Parking

(1) Parking requirements for the ~~Accessory Dwelling Unit~~ADU shall be one off street space (independently accessible or tandem) for each bedroom or ADU, whichever is less, in addition to the two (2) independently accessible parking spaces required for the existing single-family or multifamily residence. If the primary residence was legally constructed at a time when on-site parking was not required, then only the parking space(s) for the ~~Accessory Dwelling Unit~~ADU shall be required. No off street parking space shall be required for a JADU.

(2) Off-street parking shall be permitted in setback areas in compliance with the definition of “Off-street Parking” found in Section 9278B of this Code or through tandem parking

(3) Parking standards will not be imposed for an ~~Accessory Dwelling Unit~~ADU in any of the following instances:

(~~1~~a) The ~~Accessory Dwelling Unit~~ADU is located within one-half mile of public transit.

(~~2~~b) The ~~Accessory Dwelling Unit~~ADU is located within an architecturally and historically significant historic district.

(~~3~~c) The ~~Accessory Dwelling Unit~~ADU is part of the existing primary residence or an existing accessory structure.

(~~4~~d) When on-street parking permits are required but not offered to the occupant of the ~~Accessory Dwelling Unit~~ADU.

(~~5~~e) When there is a car share vehicle located within one block of the ~~Accessory Dwelling Unit~~ADU.

(4) If a garage, carport, or covered parking structure is demolished in conjunction with the construction of an ADU or converted to an ADU, the City shall not require that those offstreet parking spaces be replaced.

K~~I~~. ~~The~~ An ~~Accessory Dwelling Unit~~ADU must meet all applicable building and fire codes, and shall have electric, water and sewer or septic service ~~provided through the city~~ with the type of meter arrangement at the property owner's option. Water, sewer, and electrical services shall be available prior to the issuance of a building permit for an ~~Accessory Dwelling Unit~~ADU. No new water or sewer connection fees may be required for ~~Accessory Dwelling Unit~~ADUs that are contained within the existing space of a single-family or multifamily residence or accessory structure as provided in Sections 3731A and 3861.B, unless the ADU is constructed with a new single-family home . ~~Accessory Dwelling Unit~~ADUs shall not be required to provide fire sprinklers if they are not required for the primary residence.

L. A Junior Accessory Dwelling Unit shall not be considered a separate or new dwelling unit for purposes of applying building codes, fire codes, collection of impact fees, or the provision of water, sewer, and power, including connection fees that might otherwise be associated with the provision of those services. Junior Accessory Dwelling Units shall not be required to provide fire sprinklers if they are not required for the primary residence.

~~J~~M. The A~~ccessory Dwelling Unit~~ DU or JADU shall comply with all applicable requirements of this ~~code~~Code.

~~K~~N. The maximum height for ~~Accessory Dwelling Unit~~ADUs shall be eighteen feet (18'), except for attached ~~accessory dwelling unit~~ADUs, which shall have a maximum height of thirty feet (30'), pursuant to Section 9018 of this Chapter. Taller units may be approved through the use permit process.

~~L~~O. The following yard setback requirements shall apply to ~~Accessory Dwelling Unit~~ADUs ~~in the R-1 (single-family residential) zoning district~~:

1. Front Yard: The same as the existing ~~single-family~~primary residence, but no closer than five feet (5').

2. Side Yard or Rear Yard, Single-Story or Two-Story: ~~Side yard for single-story unit: Five feet (5').~~Four feet (4')

~~3. Side Yard, Two-Story: Side yard for two-story unit: Ten feet (10').~~

~~4. Rear Yard, Single-Story: Rear yard for single-story unit: Five feet (5').~~

~~5. Rear Yard, Two-Story: Rear yard for two-story unit: Ten feet (10').~~

~~If the subject lot abuts a differently zoned lot, then the side and rear yard setbacks shall be the same as for the adjoining lot.~~

3. No setback shall be required for an existing living area, garage, or accessory structure or a structure constructed in the same location and to the same dimensions as an existing structure that is converted to an ADU or to a portion of an ADU.~~Existing structures proposed for conversion to an Accessory Dwelling Unit must comply with the above yard setback requirements, except that no setback will be required for an existing garage that is converted to an accessory dwelling unit. A setback of no more than five feet from the side and rear lot lines shall be required for an accessory dwelling unit that is constructed above a garage.~~

~~M~~Q. The proposed ~~Accessory Dwelling Unit~~ADUs shall have a separate front door, which, in the event of an attached unit, shall not be located along the front of the existing single-family or multifamily residence unless it is not obviously visible from the street in front of the residence.

~~N~~R. ~~One~~ For a JADU, either the primary single-family residence or the JADU~~of the units on the lot~~ shall be occupied by the property owner. Owner-occupancy shall not be required if the owner is a governmental agency, land trust, or housing organization.

~~O~~S. Any balcony, window or door of an ~~Accessory Dwelling Unit~~ADU shall utilize techniques to lessen the privacy impacts onto adjacent properties. These techniques may include use of obscured glazing, window placement above eye level, or locating balconies, windows and doors toward the existing on site primary residence. In addition, trees shall be planted and maintained in a viable condition by the property owner, where appropriate, to preserve the privacy of neighboring property owners.

This requirement will not apply to an ~~Accessory Dwelling Unit~~ADU that is contained within the existing space of a single-family or multifamily residence or accessory structure.

~~P~~T. Driveways accessing ~~Accessory Dwelling Unit~~ADUs shall be set back a minimum of five feet (5') from any structure on an adjoining lot that has a bedroom adjacent to the proposed driveway.

U~~Q~~. The minimum width of a driveway serving an ~~Accessory Dwelling Unit~~ADU shall be twelve feet (12'), unless the City Fire Marshal determines that adequate fire protection can be provided to the ~~Accessory Dwelling Unit~~ADU even though the driveway has a width less than twelve feet (12').

~~R~~V. Unless otherwise indicated, relief from the above criteria and standards may be pursued through the use permit process pursuant to ~~article~~ Article 20 of this chapter.

~~S~~W. Applications for a building permit for an A~~ccessory Dwelling Unit~~DU or a JADU shall be considered ministerially without discretionary review or a hearing within ~~120~~ 60 days after receiving the application if there is an existing primary dwelling on the lot. If the permit application to create an ADU or a JADU is submitted with a permit application to create a new single-family dwelling on the lot, the City may delay acting on the permit

application for the ADU or JADU until the City acts on the permit application to create the new single-family dwelling, but the application to create the ADU or JADU shall be considered without discretionary review.

~~T~~X. Applications for a building permit within any zoning district where residential uses are allowed by right ~~for an Accessory Dwelling Unit that is contained within the existing space of an existing primary residence or accessory structure and located in the R-1 zone~~ shall be approved ministerially to develop any of the following: ~~if the unit is the sole Accessory Dwelling Unit on the lot, has independent exterior access from the existing residence, and has side and rear setbacks that are sufficient for fire safety. No additional parking or other development standards as set forth in subdivisions (F) through (H), (K) through (M), and (O) through (R) of this Section shall be applied except for building code requirements. This subdivision shall not apply to Accessory Dwelling Units that are not located within the R-1 zone.~~

(1) One ADU or JADU per lot with a proposed or existing single-family dwelling if all of the following apply:

(a) The ADU or JADU is within the proposed space of a single-family dwelling or existing space of a single-family dwelling or accessory structure and may include an expansion of not more than 150 square feet beyond the same physical dimensions as the existing accessory structure. An expansion beyond the physical dimensions of the existing accessory structure shall be limited to accommodating ingress and egress.

(b) The space has exterior access from the proposed or existing single-family dwelling.

(c) The side and rear setbacks are sufficient for fire and safety.

(d) The JADU complies with the requirements of this Section.

(2) One detached, new construction, ADU that does not exceed four-foot side and rear yard setbacks for a lot with a proposed or existing single-family dwelling. The ADU may be combined with a JADU described in subparagraph X.1 above.

(3) Multiple ADUs within the portions of existing multifamily dwelling structures that are not used as livable space, including, but not limited to, storage rooms, boiler rooms, passageways, attics, basements, or garages, if each unit complies with state building standards for dwellings. The number of ADUs permitted within an existing multifamily dwelling structure shall be capped at twenty five percent (25%) of the existing units in the multifamily dwelling, or one ADU, whichever is greater.

(4) Not more than two (2) ADUs that are located on a lot that has an existing multifamily dwelling, but are detached from that multifamily dwelling and are subject to four (4) foot rear yard and side setbacks.

(Y) For the development of ADUs and JADUs described in subdivision (X), no additional parking or other development standards as set forth in subdivisions (I) through (J), (N) through (Q), and (S) through (V) of this Section shall be applied except for Building Code requirements.

(Z) The City shall not require, as a condition for ministerial approval of a permit application for the creation of an ADU or JADU, the correction of nonconforming zoning conditions. For purposes of this Section, "Nonconforming zoning condition" means a physical improvement on a property that does not conform with current zoning standards.

* * *

§9021 REQUIRED PARKING

A. The minimum parking area required in single-family residential (R-1) districts is two (2) on site independently accessible spaces for each dwelling unit. Accessory Dwelling Units (ADU) require one additional onsite independently accessible parking space per ADU or per bedroom, whichever is less, except as provided in Section 9016 of this Chapter. The parking requirements for all other allowed or permitted uses shall be subject to the provisions of section 9198 of this chapter.

SECTION 6

Article 4 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9031 ALLOWED USES

The following uses are allowed in medium density residential (R-2) districts:

Accessory buildings and accessory uses.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

* * *

~~Second dwelling units as allowed in the R-1 districts in section 9016 of this chapter~~

*** * ***

SECTION 7

Article 5 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9046 ALLOWED USES

The following uses are allowed in high density residential (R-3) districts:

Accessory buildings and accessory uses. This shall not be construed as permitting any business use or occupation other than those specifically listed herein.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

*** * ***

~~Second dwelling units as allowed in the R-1 districts in section 9016 of this chapter~~

*** * ***

SECTION 8

Article 6 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9061 ALLOWED USES

The following uses are allowed in neighborhood commercial zoning districts:

Accessory uses to any of the uses allowed in this district.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

*** * ***

~~Second dwelling units as allowed in the R-1 districts in section 9016 of this chapter.~~

*** * ***

SECTION 9

Article 7 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9081 ALLOWED USES

The following uses are allowed in the Community Commercial (C-1) Zoning District:

Accessory uses to any of the uses allowed in this District.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

*** * ***

~~Second dwelling units as allowed in the R-1 districts in section 9016 of this chapter.~~

*** * ***

SECTION 10

Article 8 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9096 ALLOWED USES

The following uses are allowed in the heavy commercial (C-2) zoning district:

Accessory uses to any allowed or permitted uses.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

* * *

~~Second dwelling units as allowed in the R-1 districts in section 9016 of this chapter.~~

* * *

SECTION 11

Section 9278 in Division 9, Chapter 2, Article 21 of the Ukiah City Code (unchanged text is omitted and is shown by "* * *"):

* * *

DWELLING UNIT: A residential building or portion thereof providing complete, independent living facilities for one family including permanent provisions of living, sleeping, eating, cooking, and sanitation.

DWELLING UNIT, ACCESSORY:
An attached or a detached residential dwelling unit, located on a lot in any zoning district where residential uses are allowed by-right or with the securing of a use permit~~the R-1, R-2, and R-3 Zoning Districts~~ that has been developed with an existing or proposed primary single-family or multifamily residence, which provides complete independent living facilities for one or more persons. It can be wholly contained within the footprint of the proposed existing primary~~, single-family residence~~ dwelling, including attached garages, storage areas or similar uses or an ~~existing~~ accessory structure, or detached from the proposed or existing primary dwelling and located on the same lot as the proposed or existing primary dwelling.. It shall include permanent provisions for living, sleeping, eating, cooking, and sanitation on the same lot as the ~~single-family~~primary dwelling is situated. An Accessory Dwelling Unit also includes the following:
(A) An efficiency unit, as defined in Section 17958.1 of Health and Safety Code.
(B) A manufactured home, as defined in Section 18007 of the Health and Safety Code.

DWELLING UNIT, JUNIOR ACCESSORY:
An attached residential dwelling unit, located on a lot in the R-1, R-2, and R-3 Zoning Districts, not exceeding 500 sq. ft. in size and contained within a legally established bedroom within the existing walls of an existing or proposed single-family dwelling. A Junior Accessory Dwelling Unit (JADU) shall include an efficiency kitchen, which shall include a cooking facility with appliances and a food preparation counter and storage cabinets that are of reasonable size in relation to the size of the JADU. The JADU may include separate sanitation facilities or share sanitation facilities with the existing structure. A Junior Accessory Dwelling Unit shall have a separate entrance, and interior access to the remainder of the primary dwelling.

* * *

SECTION 12

1. SEVERABILITY.

If any section, subsection, subdivision, paragraph, sentence, clause or phrase of this Ordinance, or its application to any person or circumstance, is for any reason held to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the remaining sections, subsections, subdivisions, paragraphs, sentences, clauses or phrases of this Ordinance, or its application to any other person or circumstance. The City Council of the City of Ukiah hereby declares that it would have adopted each section, subsection, subdivision, paragraph, sentence, clause or phrase hereof, irrespective of the fact that any one or more other sections, subsections, subdivisions, paragraphs, sentences, clauses or phrases hereof be declared invalid or unenforceable.

2. EFFECTIVE DATE.

This Ordinance shall be published as required by law in a newspaper of general circulation in the City of Ukiah, and shall become effective thirty (30) days after its adoption.

Introduced by title only on _____, 2020 by the following roll call vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

Adopted on _____, 2020, by the following roll call vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

_____
Douglas F. Crane, Mayor

ATTEST:

_____
Kristine Lawler, City Clerk

ORDINANCE NO.

ORDINANCE OF THE CITY COUNCIL OF THE CITY OF UKIAH ADDING AND AMENDING VARIOUS SECTIONS OF THE UKIAH CITY CODE TO COMPLY WITH CALIFORNIA GOVERNMENT CODE SECTION 65852.2 REGULATING ACCESSORY DWELLING UNITS

The City Council of the City of Ukiah hereby ordains as follows.

SECTION 1

Findings and Declarations. The City Council finds and declares as follows:

A. In October 2019, the Governor of California signed Senate Bill 13, Assembly Bill 68, Assembly Bill 881, Assembly Bill 670 and Assembly Bill 587 ("ADU Statutes"), which relate to the creation of new Accessory Dwelling Units ("ADU") and were intended to address California's ongoing housing affordability crisis by reducing local regulatory barriers to constructing new ADUs.

B. The ADU Statutes, as codified in State of California Government Code Sections 65852.2 and 65852.22, established new standards for regulating ADUs to be effective January 1, 2020;

C. Because the City's existing standards for ADUs are inconsistent with the new standards enacted by the ADU Statutes, the current City Code provisions regarding ADUs are voided until amended to be consistent with the ADU Statutes.

D. Because the City's standards for ADUs are currently voided, any application for an ADU consistent with State law will be deemed approved and the default State law standards do not consider the City's particular needs and limitations. As such, it is in the interest of the City to amend the City Code to bring its standards for ADUs into compliance with the State standards and to include any permissible standards that consider local needs and limitations.

SECTION 2

Section 3702.5 of Division 4, Chapter 2, Article 3 of the Ukiah City Code is amended to read as follows:

§3702.5 SEWER REQUIRED

Any structure located within the City in which plumbing is to be installed and to which a public sewer is available shall, at the expense of the owner of the property, connect the plumbing of such structure directly to the proper public sewer in accordance with the provisions of this ordinance. A public sewer shall be deemed to be available if a public sewer is located within two hundred feet (200') of the property line of the property involved.

However, no new connection between an Accessory Dwelling Unit (as defined in Section 9278 of this Code) and the proper public sewer will be required for an Accessory Dwelling Unit contained within the space of an existing or proposed primary residence or

accessory structure, unless the Accessory Dwelling Unit was constructed with a new single-family home. .

SECTION 3

Division 4, Chapter 2, Article 12 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§3731A SEWER CONNECTION CHARGES

The following charges are hereby established for the connection of the plumbing of any building or structure which discharges to the sanitary sewer system of the city and said charges are separate from any other charges presently levied or which may be levied in the future:

A. Residential Schedule:

Ten thousand nine hundred eleven dollars ($10,911.00) for equivalent sewer service unit (ESSU) per dwelling unit connected to the wastewater system based on the number of bedrooms according to the following schedule:

		Connection Fee	**ESSU**
1.	One bedroom	$ 9,820.00	0.9
2.	Two bedroom	10,911.00	1.0
3.	Three bedroom	12,002.00	1.1
4.	For each additional bedroom	1,091.00	0.1

* * *

D. Connection Fees for Accessory Dwelling Units

1. Accessory Dwelling Units shall not be considered new residential uses for the purposes of calculating City connection fees or capacity charges for utilities, including water and sewer service. The Residential Schedule for calculation of sewer system connection fees set forth in Subdivision A of this Section shall not apply to Accessory Dwelling Units.

2. As provided in Section 3702.5, the City will not require a new connection between an Accessory Dwelling Unit (as defined in Section 9278 of this Code) and the sanitary sewer system for an Accessory Dwelling Unit contained within the space of an existing primary residence or accessory structure. Notwithstanding Section 3734A, the City shall not impose a connection fee or capacity charge for this type of Accessory Dwelling Unit, unless the Accessory Dwelling Unit was constructed with a new single-family home.

3. For Accessory Dwelling Units that are not contained within the space of an existing primary residence or accessory structure, the City may charge a connection fee or

capacity charge that is proportionate to the burden of the proposed Accessory Dwelling Unit, based upon either its square feet or the number of its drainage fixture unit (DFU) values, as defined in the Uniform Plumbing Code adopted and published by the International Association of Plumbing and Mechanical Officials, upon the water or sewer system. This fee or charge shall not exceed the reasonable cost of providing this service.

4. The connection fee for an Accessory Dwelling Unit shall be calculated based on the number of fixture units in the developed ADU, as determined by the City Engineer.

5. In the event that the property on which a primary dwelling and an Accessory Dwelling Unit are located is subdivided to create a new lot on which the Accessory Dwelling Unit is located, and the Accessory Dwelling Unit was constructed on or after January 1, 2017, the property owner must pay to the City the difference between the sewer connection fee initially calculated for the Accessory Dwelling Unit pursuant to subdivision D4 of this Section and the connection fee that would have been calculated pursuant to subdivision A if the dwelling unit were the primary dwelling unit on a lot.

SECTION 4

Section 3861 of Division 4, Chapter 4 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§3861 WATER CONNECTION FEES

A. Payment of Fees

The storage and transmission and production and treatment facilities' fees are based on the size of the service. Said fees shall be due and payable prior to use and occupancy of the new facility requiring the service. No certificate of occupancy shall be issued and permanent water service shall not be provided until payment is received.

B. Connection Fees for Accessory Dwelling Units

1. Accessory dwelling units shall not be considered new residential uses for the purposes of calculating connection fees or capacity charges.

2. No new water connection shall be required, and no fee charged, for an Accessory Dwelling Unit (as defined in Section 9278 of this Code) contained within the space of an existing primary residence or accessory structure, unless the Accessory Dwelling Unit was constructed with a new single-family home..

3. Accessory Dwelling Units that are not contained within the space of an existing primary residence or accessory structure are subject to connection fees for water service as provided in Section 3861.

SECTION 5

Article 3 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9016 ALLOWED USES

The following uses are allowed in single family residential (R-1) districts:

* * *
Accessory Dwelling Units (ADU) or Junior Accessory Dwelling Units (JADU) on lots developed with a primary single-family or multifamily residence or for which a primary residence is proposed subject to the following standards/criteria:

A. The requirements of this subsection are applicable to all existing ADUs and JADUs as well as those proposed after the effective date hereof, except for legal nonconforming units, or as is otherwise specifically provided herein. Existing ADUs or JADUs as of the date hereof inconsistent with the provisions listed herein, shall be considered legal nonconforming, provided that they were legal at the time of their creation.

B. Pursuant to California Government Code 65852.2(a)(1)(C) and 65852.22(d) and (e), ADUs and JADUs shall be deemed not to exceed the allowable density for the residential lot upon which an ADU or JADU is located, and ADUs and JADUs are deemed a residential use that is consistent with the existing general plan and zoning designation for the residential lot on which an ADU or JADU is located.

C. These regulations do not allow the division of property upon which an Accessory Dwelling Unit is located unless all requirements of the applicable zoning district, and any other requirements of this Code are met.

D. The Accessory Dwelling Unit or JADU may be used for rental purposes. The minimum term of a lease for an Accessory Dwelling Unit or JADU shall be thirty (30) days.

E. The ADU or JADU may be rented separate from the primary residence, but may not be sold or otherwise conveyed separate from the primary residence.

F. For development of an ADU or JADU, the applicant shall record a deed restriction, which shall run with the land. A copy showing recordation with the Mendocino County Recorder shall be filed with the City, and shall include both of the following:

(1) A prohibition on the sale of the ADU or JADU separate from the sale of the primary residence, including a statement that the deed restriction may be enforced against future purchasers.
(2) For a JADU only, a restriction on the size and attributes of the JADU that conforms with this Section.

G. Accessory Dwelling Units may be attached to existing single-family or multifamily residences or detached as separate structures. Accessory Dwelling Units shall incorporate the same or substantially similar architectural features, height, building materials and colors as the main dwelling unit or compatible dwellings located on adjacent properties. Architecture not similar to the architecture of the principal dwelling or buildings on adjacent properties shall be subject to the use permit process.

H. Junior Accessory Dwelling Units are installed within a legally established bedroom within the existing walls of a fully permitted single-family dwelling or proposed single-family dwelling. In the case of a legal, non-conforming single-family dwelling unit, the applicant must demonstrate adequate septic capacity for the bedroom count, if the dwelling uses a septic system, and utilize an existing, fully permitted bathroom. A separate entrance to the Junior Accessory Dwelling Unit shall be provided. A Junior Accessory Dwelling Unit may include a full bathroom, or the occupant(s) may use a full bathroom inside the remainder of the single-family dwelling. A Junior Accessory Dwelling Unit shall contain an efficiency kitchen, which shall include a cooking facility for preparation and sanitation of food with appliances (e.g., microwave, toaster oven, hot plate) and a food preparation counter and storage cabinets that are of reasonable size in relation to the size of the JADU. The efficiency kitchen must be removed when the JADU use ceases.

I. The maximum size of an Accessory Dwelling Unit shall be one thousand two hundred (1200) square feet.. The maximum size of a Junior Accessory Dwelling Unit shall not exceed five hundred (500) square feet in floor area. If the bathroom is shared with the remainder of the single-family dwelling, it shall not be included in the square footage calculation.

J. Parking

(1) Parking requirements for the ADU shall be one off street space (independently accessible or tandem) for each bedroom or ADU, whichever is less, in addition to the two (2) independently accessible parking spaces required for the existing single-family or multifamily residence. If the primary residence was legally constructed at a time when on-site parking was not required, then only the parking space(s) for the ADU shall be required. No off street parking space shall be required for a JADU.

(2) Off-street parking shall be permitted in setback areas in compliance with the definition of “Off-street Parking” found in Section 9278B of this Code or through tandem parking

(3) Parking standards will not be imposed for an ADU in any of the following instances:

(a) The ADU is located within one-half mile of public transit.
(b) The ADU is located within an architecturally and historically significant historic district.
(c) The ADU is part of the existing primary residence or an existing accessory structure.
(d) When on-street parking permits are required but not offered to the occupant of the ADU.
(e) When there is a car share vehicle located within one block of the ADU.

(4) If a garage, carport, or covered parking structure is demolished in conjunction with the construction of an ADU or converted to an ADU, the City shall not require that those offstreet parking spaces be replaced.

K. An ADU must meet all applicable building and fire codes, and shall have electric, water and sewer or septic service with the type of meter arrangement at the property

owner's option. Water, sewer, and electrical services shall be available prior to the issuance of a building permit for an ADU. No new water or sewer connection fees may be required for ADUs that are contained within the existing space of a single-family or multifamily residence or accessory structure as provided in Sections 3731A and 3861.B, unless the ADU is constructed with a new single-family home . ADUs shall not be required to provide fire sprinklers if they are not required for the primary residence.

L. A Junior Accessory Dwelling Unit shall not be considered a separate or new dwelling unit for purposes of applying building codes, fire codes, collection of impact fees, or the provision of water, sewer, and power, including connection fees that might otherwise be associated with the provision of those services. Junior Accessory Dwelling Units shall not be required to provide fire sprinklers if they are not required for the primary residence.

M. The ADU or JADU shall comply with all applicable requirements of this Code.

N. The maximum height for ADUs shall be eighteen feet (18'), except for attached ADUs, which shall have a maximum height of thirty feet (30'), pursuant to Section 9018 of this Chapter. Taller units may be approved through the use permit process.

O. The following yard setback requirements shall apply to ADUs:

1. Front Yard: The same as the existing primary residence, but no closer than five feet (5').

2. Side Yard or Rear Yard, Single-Story or Two-Story: Four feet (4')

3. No setback shall be required for an existing living area, garage, or accessory structure or a structure constructed in the same location and to the same dimensions as an existing structure that is converted to an ADU or to a portion of an ADU.

Q. The proposed ADUs shall have a separate front door, which, in the event of an attached unit, shall not be located along the front of the existing single-family or multifamily residence unless it is not obviously visible from the street in front of the residence.

R. For a JADU, either the primary single-family residence or the JADU shall be occupied by the property owner. Owner-occupancy shall not be required if the owner is a governmental agency, land trust, or housing organization.

S. Any balcony, window or door of an ADU shall utilize techniques to lessen the privacy impacts onto adjacent properties. These techniques may include use of obscured glazing, window placement above eye level, or locating balconies, windows and doors toward the existing on site primary residence. In addition, trees shall be planted and maintained in a viable condition by the property owner, where appropriate, to preserve the privacy of neighboring property owners.

This requirement will not apply to an ADU that is contained within the existing space of a single-family or multifamily residence or accessory structure.

T. Driveways accessing ADUs shall be set back a minimum of five feet (5') from any structure on an adjoining lot that has a bedroom adjacent to the proposed driveway.

U. The minimum width of a driveway serving an ADU shall be twelve feet (12'), unless the City Fire Marshal determines that adequate fire protection can be provided to the ADU even though the driveway has a width less than twelve feet (12').

V. Unless otherwise indicated, relief from the above criteria and standards may be pursued through the use permit process pursuant to Article 20 of this chapter.

W. Applications for a building permit for an ADU or a JADU shall be considered ministerially without discretionary review or a hearing within 60 days after receiving the application if there is an existing primary dwelling on the lot. If the permit application to create an ADU or a JADU is submitted with a permit application to create a new single-family dwelling on the lot, the City may delay acting on the permit application for the ADU or JADU until the City acts on the permit application to create the new single-family dwelling, but the application to create the ADU or JADU shall be considered without discretionary review.

X. Applications for a building permit within any zoning district where residential uses are allowed by right shall be approved ministerially to develop any of the following:

(1) One ADU or JADU per lot with a proposed or existing single-family dwelling if all of the following apply:

(a) The ADU or JADU is within the proposed space of a single-family dwelling or existing space of a single-family dwelling or accessory structure and may include an expansion of not more than 150 square feet beyond the same physical dimensions as the existing accessory structure. An expansion beyond the physical dimensions of the existing accessory structure shall be limited to accommodating ingress and egress.

(b) The space has exterior access from the proposed or existing single-family dwelling.

(c) The side and rear setbacks are sufficient for fire and safety.

(d) The JADU complies with the requirements of this Section.

(2) One detached, new construction, ADU that does not exceed four-foot side and rear yard setbacks for a lot with a proposed or existing single-family dwelling. The ADU may be combined with a JADU described in subparagraph X.1 above.

(3) Multiple ADUs within the portions of existing multifamily dwelling structures that are not used as livable space, including, but not limited to, storage rooms, boiler rooms, passageways, attics, basements, or garages, if each unit complies with state building standards for dwellings. The number of ADUs permitted within an existing multifamily dwelling structure shall be capped at twenty five percent (25%) of the existing units in the multifamily dwelling, or one ADU, whichever is greater.

(4) Not more than two (2) ADUs that are located on a lot that has an existing multifamily dwelling, but are detached from that multifamily dwelling and are subject to four (4) foot rear yard and side setbacks.

(Y) For the development of ADUs and JADUs described in subdivision (X), no additional parking or other development standards as set forth in subdivisions (I) through (J), (N) through (Q), and (S) through (V) of this Section shall be applied except for Building Code requirements.

(Z) The City shall not require, as a condition for ministerial approval of a permit application for the creation of an ADU or JADU, the correction of nonconforming zoning conditions. For purposes of this Section, "Nonconforming zoning condition" means a physical improvement on a property that does not conform with current zoning standards.

* * *

§9021 REQUIRED PARKING

A. The minimum parking area required in single-family residential (R-1) districts is two (2) on site independently accessible spaces for each dwelling unit. Accessory Dwelling Units (ADU) require one additional onsite independently accessible parking space per ADU or per bedroom, whichever is less,except as provided in Section 9016 of this Chapter. The parking requirements for all other allowed or permitted uses shall be subject to the provisions of section 9198 of this chapter.

SECTION 6

Article 4 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9031 ALLOWED USES

The following uses are allowed in medium density residential (R-2) districts:

Accessory buildings and accessory uses.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

* * *

*** * ***

SECTION 7

Article 5 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9046 ALLOWED USES

The following uses are allowed in high density residential (R-3) districts:

Accessory buildings and accessory uses. This shall not be construed as permitting any business use or occupation other than those specifically listed herein.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

*** * ***

*** * ***

SECTION 8

Article 6 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9061 ALLOWED USES

The following uses are allowed in neighborhood commercial zoning districts:

Accessory uses to any of the uses allowed in this district.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

*** * ***

*** * ***

SECTION 9

Article 7 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9081 ALLOWED USES

The following uses are allowed in the Community Commercial (C-1) Zoning District:

Accessory uses to any of the uses allowed in this District.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

*** * ***

*** * ***

SECTION 10

Article 8 of Division 9, Chapter 2 of the Ukiah City Code is hereby amended to read as follows (unchanged text is omitted and is shown by "* * *"):

§9096 ALLOWED USES

The following uses are allowed in the heavy commercial (C-2) zoning district:

Accessory uses to any allowed or permitted uses.

Accessory Dwelling Units and Junior Accessory Dwelling Units, as defined in Section 9278 of this Code and regulated in Section 9016 of this Code.

*** * ***
*** * ***

SECTION 11

Section 9278 in Division 9, Chapter 2, Article 21 of the Ukiah City Code (unchanged text is omitted and is shown by "* * *"):

*** * ***

DWELLING UNIT: A residential building or portion thereof providing complete, independent living facilities for one family including permanent provisions of living, sleeping, eating, cooking, and sanitation.

DWELLING UNIT, ACCESSORY:
An attached or a detached residential dwelling unit, located on a lot in any zoning district where residential uses are allowed by-right or with the securing of a use permit that has been developed with an existing or proposed primary single-family or multifamily residence, which provides complete independent living facilities for one or more persons. It can be wholly contained within the footprint of the proposed existing primary dwelling, including attached garages, storage areas or similar uses or an accessory structure, or detached from the proposed or existing primary dwelling and located on the same lot as the proposed or existing primary dwelling.. It shall include permanent provisions for living, sleeping, eating, cooking, and sanitation on the same lot as the primary dwelling is situated. An Accessory Dwelling Unit also includes the following:
(A) An efficiency unit, as defined in Section 17958.1 of Health and Safety Code.
(B) A manufactured home, as defined in Section 18007 of the Health and Safety Code.

DWELLING UNIT, JUNIOR ACCESSORY:
An attached residential dwelling unit, located on a lot in the R-1, R-2, and R-3 Zoning Districts, not exceeding 500 sq. ft. in size and contained within a legally established bedroom within the existing walls of an existing or proposed single-family dwelling. A Junior Accessory Dwelling Unit (JADU) shall include an efficiency kitchen, which shall include a cooking facility with appliances and a food preparation counter and storage cabinets that are of reasonable size in relation to the size of the JADU. The JADU may include separate sanitation facilities or share sanitation facilities with the existing structure. A Junior Accessory Dwelling Unit shall have a separate entrance, and interior access to the remainder of the primary dwelling.

* * *

SECTION 12

1. SEVERABILITY.

If any section, subsection, subdivision, paragraph, sentence, clause or phrase of this Ordinance, or its application to any person or circumstance, is for any reason held to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the remaining sections, subsections, subdivisions, paragraphs, sentences, clauses or phrases of this Ordinance, or its application to any other person or circumstance. The City Council of the City of Ukiah hereby declares that it would have adopted each section, subsection, subdivision, paragraph, sentence, clause or phrase hereof, irrespective of the fact that any one or more other sections, subsections, subdivisions, paragraphs, sentences, clauses or phrases hereof be declared invalid or unenforceable.

2. EFFECTIVE DATE.

This Ordinance shall be published as required by law in a newspaper of general circulation in the City of Ukiah, and shall become effective thirty (30) days after its adoption.

Introduced by title only on _____, 2020 by the following roll call vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

Adopted on _____, 2020, by the following roll call vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

_____
Douglas F. Crane, Mayor

ATTEST:

_____
Kristine Lawler, City Clerk

Agenda Item No: 13.a.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-477

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Consideration of Restructuring Proposal for the Community Development Department and Corresponding Budget Amendment.

DEPARTMENT: Community Development

PREPARED BY: Craig Schlatter, Community Development Director

PRESENTER: Craig Schlatter, Community Development Director

ATTACHMENTS:

1. CDD Housing Division Revenue 2020-2022
2. Planning Manager Job Description (revised 7-28-20)

Summary: Council will receive and consider a recommended proposal to restructure the Community Development Department's organization and position allocation.

Background: On December 20, 2017, the City Council approved a restructuring proposal and corresponding budget amendment for the Community Development Department, integrating the three divisions of Planning, Building, and Housing. The approved restructuring added two new staff positions, Building Inspector and Associate Planner-Housing, and reclassified an existing Planning and Building Technician position to a Community Development Technician position. The restructuring was completed to improve the customer service experience, as well as to effectively utilize current resources and plan for growth and succession.

Further review and evaluation of the effectiveness of the current structure in meeting the expectations of customers and planning for the future has been completed since 2017. This review has also incorporated the needs of the expanding Housing Division--and how best to assign resources to meet those needs.

Discussion: As a result of changes in state law due to the numerous California housing bills passed in 2017-2020, the proactive focus by the City Council on housing, and the City's recovery response to the COVID-19 pandemic, the programs and funding sources managed by the Housing Division have rapidly increased in the last three years. The Division currently manages and/or directly implements a variety of State and Federal programs and grants, totaling approximately $7 million. Of this, $111,800 was budgeted this fiscal year as revenue for the reimbursement of staff time in administering and implementing programs and projects. An additional $200,000 is anticipated to be earned in revenue to offset staff costs in the next 1-2 years. See Attachment 1 for details.

As part of integration of the three divisions in the 2017 approved restructuring proposal, planners within the Planning Division administer and implement programs and projects within the Housing Division. The Director has been the principal team member implementing the work of the Housing Division since 2017 and currently administers all Housing Division programs and projects while sharing current and advanced planning duties with the Associate Planner, who is also implementing current planning and ministerial planning permits. As the breadth and diversity of the duties of the Housing Division have increased, this has become less sustainable.

Reviewing the duties of administering and implementing programs and projects within the Housing Division to

those of the Planning Division reveals similarities between the two Divisions. Overseeing multiple CDBG grants, for example, requires a similar skill set and abilities to that of analyzing an application for a major use permit and preparing a staff report for approval. Where the two fields, housing and planning, differ in terms of qualified professionals is the latter generally requires more specialized training and education than the former. It is not uncommon for urban planners to become housing practitioners but less common for housing practitioners to become urban planners.

Based on this review, and with input from the City Manager, Deputy City Manager, and Human Resources/Risk Management Director, the following is recommended:

1. Reclassify the Associate Planner position to a Planning Manager position. This position is the Planning Division lead and will coordinate the budget and activities of the Division with the Director. The Planning Manager will also coordinate and administer Housing Division programs and projects with the Planning Manager-Housing and Director.

2. Add a second Planning Manager position, with an emphasis in Housing (Planning Manager-Housing). This position is the Housing Division lead and will coordinate the duties of the Division, serving as the principal implementer of all existing and new housing and community development programs, including state and federal-funded economic development program implementation duties, with the Director. The position will also coordinate and evaluate current and advanced planning projects with the other Planning Manager and Director.

Neither of the two Planning Managers would supervise subordinate staff within the Department but would oversee contracts, programs and projects, and budget preparation for the Housing and Planning Divisions. Both Planning Managers and all team members within the Community Development Department are expected to answer general customer inquiries, including at the public counter. The revised job description for both positions is attached as Attachment 2.

The salary schedule for the Planning Manager position, including the Planning Manager- Housing position, will remain unchanged at the 2621 range ($6,902.31 - $8,389.80).

If the staffing recommendations are approved, the new Community Development Department team will consist of the following:

Community Development Director
Planning Manager-Housing
Planning Manager
Building Official
Building Inspector

3. Authorize a corresponding budget amendment, as follows:

Expenditures for new personnel:
$125,451; FY 20-21 Personnel 10023100.51110 - for additional Planning Manager- Housing
$ 29,568; FY 20-21 Personnel 10023100.51110 - for reclassified Planning Manager
Please note: these salary estimates are fully loaded estimates based on hiring at the top step in the salary schedule. The hiring of the new Planning Manager- Housing assumes 10 full months of employment. It is not anticipated the costs for these positions will be as high as shown.

To plan for existing and future critical functions of the Department, this restructuring would assign resources

where appropriate and most effective. Monitoring of revenues versus expenditures will continuously be evaluated, including regular review and analysis of cost recovery efforts. The anticipated short- and long-term fiscal impacts of this restructuring proposal are listed below.

For Fiscal Year 2020-21: Transfer of grant revenue of $111,800 to the General Fund will offset the costs of the new position and reclassified position for the remainder of the fiscal year. Further transfers of anticipated revenue could also occur, bringing the net impact to the City to close to zero.

For Fiscal Year 2021 and beyond: Due to increasing revenue from the Housing Division, the overall net impact to the General Fund is expected to be minimal. New funding to assist communities and businesses recover from the economic impacts of COVID-19 has already been released, and additional funding is expected to be made available within the next 1-2 years.

Recommended Action: Approve Community Development Department restructuring proposal and corresponding budget amendment.

BUDGET AMENDMENT REQUIRED: Yes

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: $155,019; 10023100.51110

FINANCING SOURCE: 10023100.44830 (CDBG, HOME, future State and Federal Grants)

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Sheri Mannion, Human Resources/Risk Management Director; Daniel Buffalo, Finance Director

Approved: 
Sage Sangiacomo, City Manager

City of Ukiah
COMMUNITY DEVELOPMENT DEPARTMENT

Housing Division Revenue

Realized/Incorporated into CDD 2020-21 Budget				
Project/Grant	**Amount**	**Type**	**Use**	**Probability of Receipt/Award**
18-HOME-12560 (Ukiah Senior Apts.)	50,000.00	GA	HOME compliance/admin for project	Already earned
18-HOME-12560 (Ukiah Senior Apts.)	25,000.00	AD	Project Management/labor standards	Already earned
2019 HCD SB 2 grant	30,000.00	delivery	Staff reimbursement- housing planning	Already earned
CDBG PI - admin	6,800.00	admin	Assumed no grants and few loan repayments	Already earned
Total	**111,800.00**			
Anticipated Revenue (2020-2022)				
Project/Grant	**Amount**	**Type**	**Use**	**Probability of Receipt/Award**
18-HOME-12560	25,000.00	AD	Project management/labor standards	Already earned- did not budget full amount for 2020-21
HOME FTHB (16-HOME-11376)	15,843.75	AD	Delivery of TBRA assistance	Moderate- depends on implementation performance
HOME TBRA- admin	4,600.00	GA	Admin/compliance for HOME TBRA	Remaining admin not drawn down
HOME PI- FTHB	8,450.00	AD	FTHB #2, closing date = 7/31/20	High
HCD LEAP	65,000.00	delivery	Staff reimbursement- housing planning	High- noncompetitive
CDBG PI	19,960.00	GA	17% of PI received (in addition to B8 above)	Already earned
CDBG CV-1	18,488.00	GA	Admin/compliance for CDBG-CV1 award	High- noncompetitive
2020 CDBG BA program	35,000.00	GA	Admin/compliance for CDBG BA program	High- noncompetitive
2020 CDBG ME TA program	10,500.00	GA	Admin/compliance for CDBG ME-TA program	High- noncompetitive
Total	**202,841.75**			

City of Ukiah

JOB DESCRIPTION

PLANNING MANAGER

(Exempt, Management Position)

DEFINITION

Under direction of the Director of Community Development, administers, coordinates, and/or directly implements the activities of the Housing Division which is responsible for the development, implementation, and delivery of housing program and project activities, particularly within the City's Housing Element, but also including neighborhood enhancement programs, operations, and services to program participants; manages and supervises land use and environmental planning activities; performs complex and difficult administrative and technical planning work, assists in the preparation of work programs and strategic planning activities or projects; and performs related work as assigned.

CLASS CHARACTERISTICS

The Planning Manager is the management level in the Planner series. This class is responsible for monitoring work flow, timelines and delivery of services; designing and managing the activities of the Housing Division with the Director; conducting planning research, analysis, and conflict resolution on projects of planning issues having a high degree of complexity and public interest; making recommendations for comprehensive long-term planning and for changes in planning policies and procedures; regularly representing the department at meetings and hearings before the Planning Commission, various public agencies, community organizations, and interest groups, and occasionally before the City Council.

There are two Planning Manager positions within the Community Development Department, each with different areas of specialization. However, each Planning Manager may perform assignments in both areas. One position primarily focuses in the area of housing and community and economic development, including grant and project management and implementing the City's Housing Element. The other position primarily focuses in general planning, including over the counter planning permits and current planning. Both Planning Managers will be involved in long range planning, including development and eventual implementation of the City's 2040 General Plan.

EXAMPLES OF DUTIES: These examples are intended only as illustrations of the various types of work performed in positions allocated to this class. The examples of work performed are neither restricted to nor all-encompassing of the duties to be performed under this job title. **(E) Essential Duty; (M) Major Portion of Time**

- Organize, implement, and monitor CDBG, HOME, and/or other State, Federal, and local City of Ukiah housing and community and economic development programs. (E, M)
- Formulate Housing Division goals, objectives, policies, strategies, and goals with the Director and assist in goal setting for the Planning Division. (E, M)

- Depending on assignment, supervises and participates in the preparation of site evaluations, feasibility studies and master plans. (M)
- Coordinates the work of consultants, other City departments, citizen groups and others on planning and housing projects and programs. (E)
- Performs complex and difficult current and/or long range planning staff work. (E)
- Prepares detailed work programs. Monitors, tracks, reports and is accountable for workflow activities. (E)
- Makes recommendations before boards, commissions, and community groups involved with planning and housing and community development functions. (E)
- Initiates, analyzes, and interprets policies for the physical, social and economic development of the City of Ukiah. (M)
- May provide conflict resolution in regards to community and regional issues having a high degree of complexity and public interest. (M)
- Develops public informational and/or educational materials. (M)
- Reviews, analyzes, and recommends proposals initiated by staff, the Planning Commission, City Council and the public. (E)
- Participates in the preparation and administration of the department budget and grant applications. (E)
- Prepares staff reports and studies on a variety of planning, housing, and development issues and projects, including California Environmental Quality Act (CEQA) documents. (E)
- Utilizes a variety of computer software programs to prepare reports, maps, diagrams, graphs and other material related to planning studies. (M)
- May serve as Acting Community Development Director in his or her absence, if necessary. (E)
- Other duties as assigned.

Knowledge of:

- Principles, practices and trends in one or more fields of planning, such as current, advance, affordable housing, environmental, transportation, regional and/or sustainable development planning.
- Intensive practices and trends in planning policy development and analysis.
- Environmental and land use analysis.
- Legislative developments affecting regional and advanced planning including federal, state and local laws and ordinances.
- Difficult research, analytical and statistical methods and comprehensive cost analysis techniques.
- Research and statistical methods as applied to the collection, tabulation and analysis of data essential to planning studies.
- Principles of the California Environmental Quality Act (CEQA).
- Permit requirements of regulatory agencies.
- Comprehensive knowledge of land use and site planning.
- Basic municipal budgeting principals.

Ability to:

- Compose planning and housing reports, technical studies, and other related documents.
- Actively manage complex and/or controversial projects and complete within applicable time limits.
- Conceive, organize, and execute assigned projects with innovation and independence; develop work systems and timelines for housing and community development projects and programs.
- Develop and implement housing projects and programs, including associated funding sources.
- Effectively relate to a variety of concerned groups in clarifying and resolving problems or conflicts of a sensitive nature and a high degree of difficulty.

- Think critically, prepare analytical analysis and conduct strategic planning.
- Establish and maintain cooperative and productive working relationships with the public and staff; work effectively with a variety of organizations.
- Communicate effectively both verbally and in written form.
- Effectively apply technical, social, and political skills to solve problems in a timely manner.
- Work collaboratively with Community Development personnel and other Departments to assure the provision of comprehensive and coordinated related services.

Education and Experience:

Any combination equivalent to experience and education that could likely provide the required knowledge and abilities would be qualifying. A typical way to obtain these qualifications would be Bachelor's Degree with a major in planning, urban studies, geography, environmental studies, architecture, landscape architecture, biological sciences or closely related field and four years of increasingly responsible professional land use planning experience. Graduate degree desirable.

Necessary Special Requirement:

Possession of a valid Class C California Driver License.

Agenda Item No: 13.b.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-488

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Consideration of 1) Approval of Community Development Director Determination that the Identified Project for Homekey Funding Qualifies for a CEQA Exemption; and 2) Adoption of Resolution Authorizing an Application for Funding to the Homekey Program.

DEPARTMENT: Community Development

PREPARED BY: Craig Schlatter, Community Development Director

PRESENTER: Craig Schlatter, Community Development Director

ATTACHMENTS:

1. 2020_HCD_HomeKey-NOFA_07-15-2020
2. Resolution- 2020 CDBG-CV1 application

Summary: Council will consider 1) approval of Community Development Director determination that the identified project for Homekey Program funding qualifies for a CEQA exemption; and 2) adoption of a resolution authorizing an application for funding to the Homekey Program.

Background: On July 16, 2020, the California Department of Housing and Community Development (HCD) announced the availability of approximately $600 million of Homekey Program (Homekey) grant funding through a Notice of Funding Availability (NOFA). Homekey is "a statewide effort to rapidly sustain and expand housing for persons experiencing homelessness and impacted by COVID-19." See Attachment 1 for a copy of the Homekey NOFA.

Applications submitted through the priority application period are due August 13, 2020. Applications submitted after the priority application will be accepted until September 29, 2020, or until all funds are expended. However, it is only during the priority application period that funding is reserved for different regions on a time-limited basis. After August 13, applications compete with other applications from all-sized jurisdictions across the state.

Section 301 of the NOFA lists eligible uses for Homekey. These uses include, but are not limited to, the following:

- Acquisition or rehabilitation of motels, hotels, or hostels.
- Acquisition of other sites and assets, including purchase of apartments or homes, adult residential facilities, residential care facilities for the elderly, manufactured housing, and other buildings with existing residential uses that could be converted to permanent or interim housing.
- Relocation costs for individuals who are being displaced as a result of rehabilitation of existing units.

Section 302 of the NOFA lists eligible projects, which include, but are not limited to, the following:

- Nonresidential structures with a certification of occupancy as a motel, hotel, or hostel.
- Adult residential facilities, residential care facilities for the elderly, manufactured housing, and other buildings

with existing residential uses.
- Multifamily rental housing projects with five or more housing units.
- Shared housing or scattered site housing is permitted as long as the housing has common ownership, financing, and property management, and each household signs a lease. For example, a single-family home is one unit, a duplex is two units, a triplex is three units, etc.

For acquisition projects, "Homekey will generally fund up to $100,000 per door, as supported by an appraisal." If there is a higher per door cost per project, local match is required. All Homekey projects must be fully completed by December 30, 2020 and occupied, at least on an interim basis, within 90 days of completion.

AB 83 exempted certain Homekey projects from CEQA requirements and set forth a CEQA exemption specific to Homekey in Health and Safety Code Section 50675.1.2. There are additional streamlining pathways described in the appended CEQA guidance.

Discussion: Since release of the NOFA, Staff have been working with local partners to identify a housing project that may qualify for Homekey funding. Given the short timeline to submit an application and the restrictions around the Homekey funding, a project has not been identified as of the date of preparation of this staff report.

However, in the event a project is identified by August 5, 2020, and given the application due date of August 13, this agenda item is necessary for the City Council to approve the Community Development Director determination that the the identified Homekey project for Homekey funding qualifies for a CEQA exemption; and adopt a resolution (Attachment 2) authorizing submittal of an application to the Homekey Program.

Recommended Action: Approve Community Development Director determination that the identified project for Homekey Program funding qualifies for a CEQA exemption; and adopt resolution authorizing an application for funding to the Homekey Program.

BUDGET AMENDMENT REQUIRED: N/A

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: Homekey Program

PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: N/A

Approved: Sage Sangiacomo, City Manager

STATE OF CALIFORNIA - BUSINESS, CONSUMER SERVICES AND HOUSING AGENCY GAVIN NEWSOM, *Governor*
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF FINANCIAL ASSISTANCE
2020 W. El Camino Avenue, Suite 670, 95833
P.O. Box 952054
Sacramento, CA 94252-2054
(916) 263-2771
www.hcd.ca.gov

July 16, 2020

MEMORANDUM FOR: All Potential Applicants

FROM: Jennifer Seeger, Acting Deputy Director
Division of Financial Assistance

SUBJECT: **NOTICE OF FUNDING AVAILABLITY**
HOMEKEY PROGRAM

The California Department of Housing and Community Development (Department) is pleased to announce the availability of approximately $600 million of Homekey Program (Homekey) grant funding through this Notice of Funding Availability (NOFA). Building on the success of Project Roomkey, Homekey is a statewide effort to rapidly sustain and expand housing for persons experiencing homelessness and impacted by COVID-19.

Of the $600 million in Homekey funding, $550 million is derived from the state's direct allocation of the federal Coronavirus Relief Fund (CRF) and $50 million is state General Fund. The $50 million in state General Fund money is intended to supplement the acquisition of, and provide initial operating subsidies for, Homekey sites to promote Project feasibility. Accordingly, the Department will use these moneys to fund 24-month operating subsidies. **Projects receiving an award from the state's direct allocation of the federal CRF must expend the funds by December 30, 2020.** The portion of a Project's award associated with state General Fund must be expended by June 30, 2022. Depending on the funding award, the successful applicant must close escrow by the expenditure deadline.

Due to the Homekey expenditure deadline, and the potential for program oversubscription, eligible applicants are encouraged to submit their completed application as soon as possible. The Department will begin accepting applications on an over-the-counter basis on or about July 22, 2020. Review will be prioritized based on tiered criteria and date of submission. Applicants must submit a complete online application available at https://www.hcd.ca.gov/grants-funding/active-funding/homekey.shtml.

On July 24, 2020, the Department will hold a webinar to review the Homekey NOFA and application process. To register, please go to the Department's Homekey webpage. To receive information on the workshop and other updates, please subscribe to the Department's Homelessness Prevention Programs listserv at http://www.hcd.ca.gov/HCD_SSI/subscribe-form.html.

If you have any questions, please submit them to Homekey@hcd.ca.gov.

Homekey Program

2020 Notice of Funding Availability

State of California

Governor Gavin Newsom

Lourdes M. Castro Ramirez, Secretary
Business, Consumer Services and Housing Agency

Gustavo Velasquez, Director
Department of Housing and Community Development

2020 West El Camino Avenue, Sacramento, CA 95833 Telephone: (916) 263-2771
Website: https://www.hcd.ca.gov/grants-funding/active-funding/homekey.shtml

Homekey Program Email: Homekey@hcd.ca.gov

July 16, 2020

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HOMEKEY PROGRAM
NOTICE OF FUNDING AVAILABILITY

Article I – Program Overview

Section 100. Notice of Funding Availability (NOFA)

The California Department of Housing and Community Development (Department) is announcing the availability of approximately $600 million in Homekey funding to rapidly sustain and expand the inventory of housing for people experiencing homelessness or at risk of homelessness and impacted by COVID-19. The COVID-19 pandemic has exacerbated existing community needs and inequalities. In many communities, homelessness was already experienced disproportionately by race and other protected classes and persons experiencing homelessness are at increased risk of infection and death due to COVID-19. The Centers for Disease Control and Prevention is also reporting that evidence points to disproportionate impacts by race and ethnicity for COVID-19 hospitalization and death. As of June 12, age-adjusted hospitalization rates are highest among non-Hispanic American Indian or Alaska Native (5 times white persons) and non-Hispanic Black persons (5 times white persons), followed by Hispanic or Latino persons (4 times white persons).

Homekey is an opportunity for local public agencies to purchase motels and a broad range of other housing types in order to increase their community's capacity to respond to homelessness and the current COVID-19 pandemic. While Homekey builds off the success of Project Roomkey, applications are not limited to Project Roomkey sites.

Of the $600 million in Homekey grant funds, $550 million is derived from the state's direct allocation of the federal Coronavirus Aid Relief Funds (CRF) and $50 million is derived from the state's General Fund to supplement the acquisition of and to provide initial operating subsidies for, Homekey sites.

Each Homekey allocation has the following expenditure deadlines:

- **The $550 million in CRF must be expended by December 30, 2020.** The Department recognizes this expenditure deadline is challenging; however, the deadline is a requirement of federal CRF funding. The Department will provide ongoing support to assist Grantees in meeting the expenditure deadline and has already developed an accelerated application and award process.

  NOTE: For Projects that involve an acquisition and are receiving CRF awards, Grantees must expend the funds by the expenditure deadline and the Project escrow must be closed by December 30, 2020.

- **The $50 million in state General Funds must be expended by June 30, 2022.**

Section 101. Purpose and Program Objectives

The purpose of the Homekey program is to provide grant funding to Eligible Applicants and facilitate a partnership with the state to quickly acquire or rehabilitate or master lease a

variety of housing types. Once developed, these projects will provide interim or permanent housing options for persons experiencing homelessness and who are also at risk of COVID-19. For this NOFA, people experiencing homelessness or who are at risk of experiencing homelessness are considered inherently "impacted by COVID-19," as they are most likely to have a lower life expectancy, be at a higher risk of infectious and chronic illness, and suffer from substance abuse and poor health. The Target Population may also have the same underlying medical conditions that result in increased risk for severe illness from COVID-19. Additionally, Homekey recognizes the disproportionate racial impacts of homelessness and COVID-19 and encourages Eligible Applicants to examine disproportionate impact in their own communities and to develop strategies to address these impacts.

Section 102. Authorizing Legislation and Applicable Law

Assembly Bill No. 83 (2019-2020 Reg. Sess.) created the statutory basis for Homekey by adding section 50675.1.1 to the Health and Safety Code and exempted certain Homekey Projects from the California Environmental Quality Act (CEQA) by adding section 50675.1.2 to the Health and Safety Code.

Health and Safety Code section 50675.1.1, subdivision (d) states, "The Department of Housing and Community Development may adopt guidelines for the expenditure of the funds appropriated to the Department [for Homekey]. The guidelines shall not be subject to the requirements of Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code."

The Multifamily Housing Program (MHP) (Chapter 6.7 (commencing with Section 50675) of Part 2 of Division 31 of the Health and Safety Code), and as subsequently amended, is hereby incorporated by reference. In accordance with Health and Safety Code section 50675.1.1, subdivision (c), in the event of a conflict between this NOFA and the Multifamily Housing Program, the provisions of this NOFA are controlling.

The MHP Final Guidelines (MHP Guidelines), effective June 19, 2019, and as subsequently amended, are hereby incorporated by reference. In the event of a conflict between any of the MHP Guidelines and this NOFA, the provisions of this NOFA are controlling.

This NOFA establishes the terms, conditions, forms, procedures, and other mechanisms that the Department deems necessary to exercise its powers and to perform its duties pursuant to MHP in relation to Homekey.

The Department reserves the limited right to amend this NOFA after the close of the application period. Such right does not extend to material provisions of the application submission, review, and award process (e.g., scoring and tiering criteria). Post-NOFA amendments will take immediate effect and will govern the Standard Agreement process. After Standard Agreements have been executed, the Department will only amend this NOFA as necessary to provide clarification or to avoid a conflict of law.

The matters set forth herein are regulatory mandates and are adopted as regulations that have the dignity of statutes (*Ramirez v. Yosemite Water Company, Inc.* (1999) 20 Cal.4th 785, 799 [85 Cal.Rptr.2d 844]).

Section 103. Program Timeline

Homekey funds will be initially available to Eligible Applicants on an over-the-counter basis. Applications will be accepted from the release of this NOFA until September 29, 2020. The Department is also reserving a priority application period to allow for geographic equity in the disbursement of funds. The following table summarizes the Homekey program anticipated timeline.

Table 1: Anticipated timeline for Homekey applications

NOFA release	July 16, 2020
Stakeholder Call	July 16, 2020
Stakeholder Webinar	July 24, 2020
Pre-application consultations and the priority application period	July 16 – August 13, 2020
Final application due date	September 29, 2020
Award announcements	Rolling (Starting August 2020)
Final awards issued	October 2020
Standard agreements mailed	Upon submittal of required information and documentation
The Department redeploys unutilized funds	November 2020
CRF expenditure deadline	December 30, 2020
Grantee Expenditure and Program Report	Feb 1, 2021
State General Funds expenditure deadline	June 30, 2022
State General Funds expenditure report due dates	▪ January 31, 2021 ▪ July 31, 2021 ▪ January 31, 2022, ▪ July 31, 2022

The Department reserves the right to make adjustments to the projected timeline at any time.

Article II. Application Submission, Review, and Award Process

Section 200. Application Process Overview

The Homekey application is available electronically on the Homekey webpage. **The Department anticipates releasing the Homekey application on or about July 22, 2020.**

i. Applications for this NOFA will be received and reviewed on a rolling, over-the-counter basis until the CRF and the state General Fund moneys are committed.

ii. Applications will be prioritized as described in Section 202.

iii. The Department will evaluate applications for compliance with the minimum program requirements set forth in Section 304 and depending on the proposed Project Applicants should review requirements in Sections 304, 305, and 306. See the Homekey Application Process Flowchart at the end of this Section.

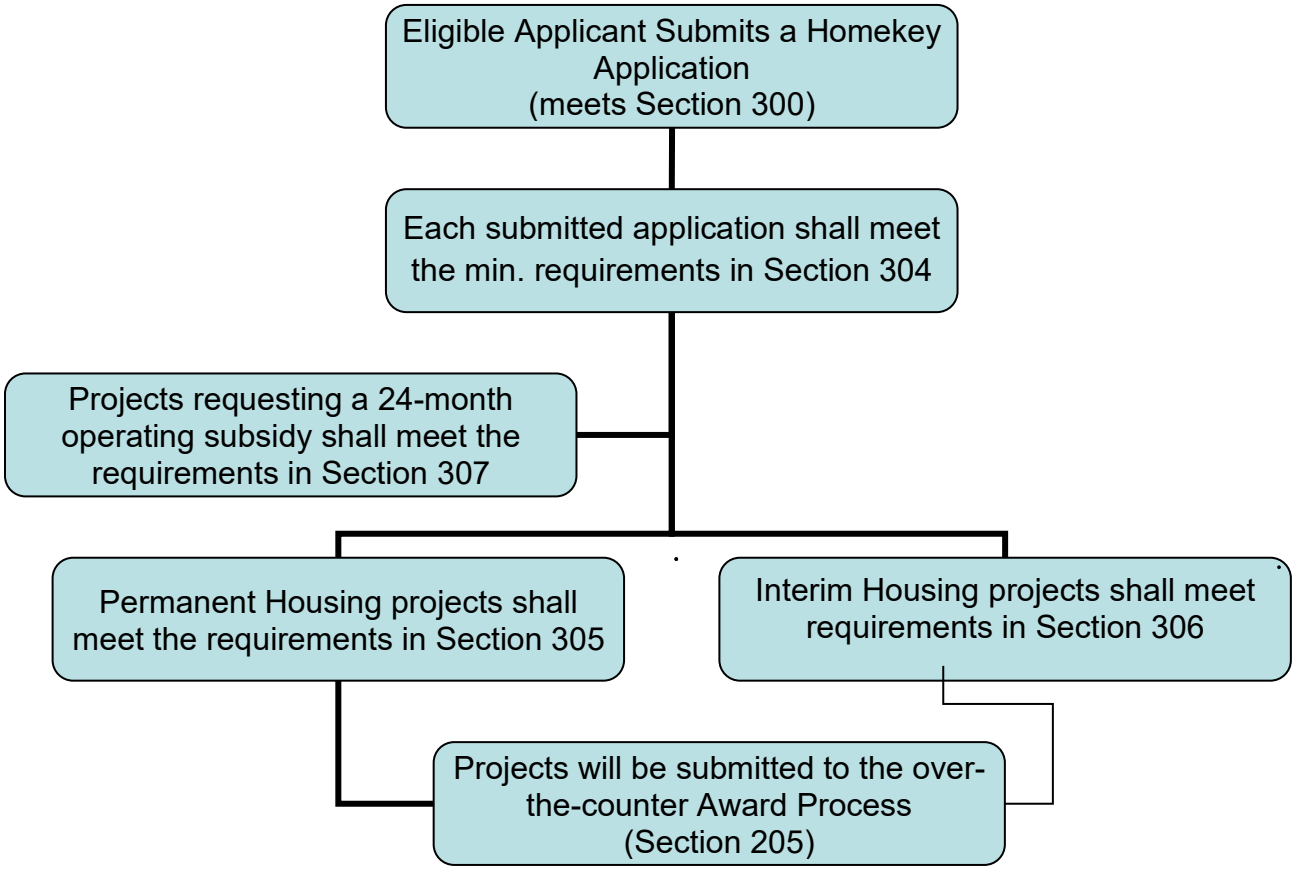
iv. After each Applicant has been certified to meet the minimum program requirements, to be considered for a funding award, each Project must receive a minimum overall score of 110 points, as outlined in Section 204.

v. The Department reserves the right to do the following:

   a. Score an application as submitted even if information is missing from the application; and/or

   b. Request clarification of unclear or ambiguous statements made in an application or request additional clarifying documentation or information.

Chart 1: Homekey Application Process Flowchart



Section 201. Pre-Application Consultation and Technical Assistance

The Department requires all Applicants to engage in a pre-application consultation with the Department and/or the Department of General Services (DGS) prior to submitting an application. The consultation will allow the prospective Applicant to discuss the proposed Project, along with other applicable programmatic considerations, including those related to site acquisition, CEQA, land use and land entitlements, and long-term financing approaches. Application consultations will be available upon the release of this NOFA and may be requested by emailing Homekey@hcd.ca.gov.

Section 202. Geographic Distribution and Project Prioritization

COVID-19 impacts people who are experiencing or who are at risk of homelessness throughout California. As such, the Department would like to ensure jurisdictions throughout the state have an equitable opportunity to apply for Homekey funds to protect the health and safety of their most vulnerable residents.

To this end, the Department has divided the state into eight regions, as outlined in Table 2, below. The regions are largely aligned with the various Councils of Government (COGs). As detailed in Table 2, 3, and 4 below, each region has funding reserved on a time-limited basis during the priority application period. Each region's share of the Homekey allocation is calculated based on its proportionate share of the persons experiencing homelessness of both the sheltered and unsheltered 2019 Homeless Point-in-Time counts and extremely low-income (ELI) renter households that are paying more than 50 percent of their income for rent.

Table 2: Homekey Counties by Region

Counties by Geographic Distribution			
Los Angeles County	**San Joaquin Valley**	**Central Coast**	**Balance of State (Cont.)**
Bay Area	Fresno	Monterey	Mendocino
Alameda	Kern	San Benito	Modoc
Contra Costa	Kings	San Luis Obispo	Mono
Marin	Madera	Santa Barbara	Nevada
Napa	Merced	Santa Cruz	Plumas
San Francisco	San Joaquin	**Balance of State**	Shasta
San Mateo	Stanislaus	Alpine	Sierra
Santa Clara	Tulare	Butte	Siskiyou
Solano	**San Diego County**	Calaveras	Tehama
Sonoma	**Sacramento Area**	Colusa	Trinity
Southern California	Amador	Del Norte	Tuolumne
Imperial	El Dorado	Glenn	
Orange	Placer	Humboldt	
Riverside	Sacramento	Inyo	
San Bernardino	Sutter	Lake	
Ventura	Yolo	Lassen	
	Yuba	Mariposa	

Table 3: Estimated Homekey Allocations by Region

Geographic Regions	PIT Count	Severely Rent-burdened ELI	CRF Allocation	GF Allocation
Los Angeles County	58,936	415,970	$161,572,217	$14,688,383
SF Bay Area	35,028	213,910	$91,134,470	$8,284,952
Southern California (w/o LA)	15,360	200,095	$55,577,540	$5,052,504
San Joaquin Valley	10,271	105,370	$32,987,450	$2,998,859
Central Coast	8,439	38,395	$20,025,927	$1,820,539
Sacramento Area	8,381	73,780	$25,125,077	$2,284,098
San Diego County	8,102	94,480	$27,690,283	$2,517,298
Balance of State	7,254	32,140	$17,087,036	$1,553,367

Two percent (2%) of the $550 million in Homekey funds is for Department administrative costs. Twenty percent (20%) of the remaining $550 million in Homekey funds is being held back by the Department to ensure there is adequate flexibility to issue awards expediently.

Table 4: Estimated Homekey Allocations

Funding Categories	CRF	General Fund
Total Homekey Allocation	$550,000,000	$50,000,000
Administrative at 2%	$11,000,000	$1,000,000
Discretionary Set Aside at 20%	$107,800,000	$9,800,000
Total Geographic Regional Allocation	$431,200,000	$39,200,000

Eligible Applicants who apply within the 30-day priority application period will be grouped into one of the eight geographic regions. The Department will further sort the applications into one of two tiers.

Tier One*:*

1. Tier One applications will be those Projects that: (1) can be occupied within 90 days from the date of acquisition; and (2) are permanent housing or will result in permanent housing as indicated on the application; or

2. Tier One projects include Projects that can be occupied within 90 days and used for Interim Housing, provided the project is expected to be developed into permanent housing at a later date **OR** Interim Housing with a coordinated exit strategy adopted by the Continuum of Care to support transitions into other permanent housing. Interim Housing projects shall submit a letter of support from the local Continuum of Care that demonstrates the coordinated exit strategy of the Target Population.

Tier Two*:*

Tier Two projects are all other Projects and uses, including housing that will be used for interim only and with no expectation of development into permanent housing.

For Projects received within the priority application period, the Department will award Tier One projects meeting the program requirements on a rolling basis, up to the regional cap, on a first-come, first-served basis. Tier Two projects meeting the program requirements will be waitlisted and awarded funding if funds are available, after the priority application period, according to the date stamp. Applications that were received after the priority application period, and that met the specified program requirements, will be awarded according to date stamp, as funds are available.

The Department can reimburse eligible Homekey expenditures that occurred prior to the release of this NOFA. Applicants are encouraged to discuss their options at the required pre-application consultation described in Section 201.

The following table summarizes the Homekey application prioritization process and timeline.

Table 5: Anticipated Homekey Application Prioritization Timeline

	Priority Application Review Period July 16 - August 13	Review Period 2 August 14 - September 29	September 30 – December 30, 2020
Applications	Sorted by: a. Regions b. Within Regions, by Tier One or Two c. Within Tiers, by a date stamp	Sorted by date stamp only (not by region or tier) Note: These applications will be put on a waitlist, and not sorted by Region or Tier.	No applications submitted during this period will be accepted.
Awards	Pre-application consultations and application review period. The Department will begin awarding Tier One projects meeting threshold within each region on a rolling basis, up to cap for the region.	For applications received through August 13, the Department will continue awarding Tier One projects meeting the Homekey program requirements on a rolling basis, up to the cap for the region. If these Tier One projects are undersubscribed, the Department will award qualified Tier Two projects. If the Tier Two projects are oversubscribed, the Department will award according to date stamp. If Tier Two projects are undersubscribed, The Department will proceed with awards in the following order: a. Any waitlisted applications from other regions received up to August 13, by tier and date stamp. b. Any waitlisted applications received on August 14 or later, by date stamp. For any tiebreaker needed (e.g., applications received on the same date), the Department will use ability to spend quickly, followed by PIT count, then leverage.	

Section 203. Maximum Grant Amounts

For acquisition projects, Homekey will generally fund up to $100,000 per door, as supported by an appraisal. "Door" refers to the number of units at the time of the acquisition, which may differ from the number of units after a future conversion. For those projects that undergo a future conversion, the number of units may need to be reduced to accommodate kitchenettes and other amenities.

The Department recognizes that some acquisitions may have a higher per-door appraised value in certain high-cost areas. Some properties may also have a higher per-door value because they need less upfront work and already have the necessary amenities to support permanent housing solutions—for example, units with kitchenettes.

To support these efforts, the Department will accept requests from Tier One projects up to $200,000 per door. However, for this $200,000 per door maximum, the following applies:

i. The Department will contribute the first $100,000 per door of the Homekey proposed Project. This contribution does not require a local match.

ii. The Eligible Applicant will be required to contribute an identical match of $50,000 or a 1:1 local match to receive an additional $50,000 contribution from the Homekey program.

iii. The Eligible Applicants will be required to contribute $100,000 or a 2:1 local match to receive an additional $50,000 contribution from the Homekey program.

Table 6: State contributions to projects

Homekey	Eligible Applicant Contribution	Total Per Door
FIRST $ 100,000	No Match Required	$100,000
NEXT $ 50,000 (TIER ONE PROJECTS)	1:1, Up to $50,000	$200,000
NEXT $ 50,000 (TIER ONE PROJECTS)	2:1, Up to $100,000	$350,000

Eligible Applicants can request the highest state contribution of Homekey funds if they meet the following criteria:

i. The proposed Project meets the Tier One category specified in Section 202.

ii. The proposed Project is close to permanent occupancy, or there is a clear demonstration of occupying the units with tenants from the Target Population within 90 days of acquisition, e.g., higher purchase price with minimal rehabilitation needed.

iii. The Department may consider additional criteria unique to the proposed Project that reduce the overall cost of a project when future rehabilitation needs are considered, support catalytic investments in disadvantaged communities without causing displacement, and affirmatively further fair housing.

Section 204. Application Scoring Criteria

Applications meeting the minimum program requirements outlined in Article III will require a **minimum score of 110 points to be eligible for funding**. Scores will be based on the following:

Table 7: Homekey Application Scoring Criteria

Homekey Application Scoring Categories and Max Point Scores	Evaluation Criteria
1. Ability to expend funds by December 30, 2020. **(Up to 50 points)**	a. Identification of the site suitable for development and evidence of site control, or a plan and timeline for obtaining site control along with other supporting evidence (e.g., letter of intent, an exclusive negotiating agreement, ground lease, etc.). **(Up to 20 points)** b. A proposed development vision that identifies the financial and regulatory mechanisms to be used to maintain the ongoing affordability of the Project. **(Up to 20 points)** c. An overview of the planned and timeline for any required entitlements, permits, environmental clearances. **(Up to 10 points)**
2. Demonstration of the development team's experience and capacity to acquire and operate the Project. **(Up to 40 points)**	a. Demonstration of the development's team experience to acquire and/or rehabilitate and operate the project. **(Up to 10 points)** b. A map of how the development team is connected and a description of how the team will work together, e.g., MOU, etc. **(Up to 10 points)** c. Development, ownership, or operation of a project similar in scope and size to the proposed Project. **(Up to 10 points**) d. The extent to which the Project can demonstrate the range of on-site and off-site supportive services that will be provided to the target population, e.g., mental health services, substance use disorder services, primary health, employment, and other tenancy support services. **(Up to 10 points)**
3. A demonstration of how the Project will address racial equity, other systemic inequities, state and federal accessibility requirements, and serve members of the Target Population. **(Up to 25 points)**	a. Eligible Applicant shall provide non-discrimination statement per Section 311, which references the Fair Employment and Housing Act. The Fair Employment and Housing Act is supported by accompanying regulations, 2 CCR Section 12005 et seq, covering tenant screening and affirmative marketing requirements. Eligible Applicant will also include a description of how the Project will address racial equity and inequities for the target population, including any local disproportionate impact of COVID-19 and homelessness by race and other protected classes. The description should include supporting evidence of the strategies' effectiveness if available. (**Up to 15 points)** b. The extent to which the Project exceeds the state and federal accessibility requirements set forth Section 311, specifically providing a minimum of 10 percent of units with features accessible to persons with mobility disabilities, as defined in 24 C.F.R. Section 8.22 and the parallel ADAAG 2010 and CBC provisions, and a minimum of 4 percent of units with features accessible to persons with hearing or vision disabilities, as defined in 24 C.F.R. Section 8.22 and the parallel ADAAG 2010 and CBC Chapter 11B provisions**. (Up to 5 points)**

Homekey Application Scoring Categories and Max Point Scores	Evaluation Criteria
	c. The Applicant or development team has three or more years of experience serving persons of the target population. **(Up to 5 points)**
4. The extent to which the Eligible Applicant can demonstrate the Project's community impact and site selection. **(This category is worth 45 points)**	a. The extent to which the Eligible Applicant can demonstrate the Project's impact on the community as demonstrated by a reduction of at least 5 percent of the local 2019 Point-in-Time Count. **(Up to 10 points**) b. The proposed Project is a Tier One project and requires no rehabilitation, or the rehabilitation and the occupancy can be completed within 30 days after acquisition. **(Up to 10 points)** c. The Project is expected to acquire and maintain 100 or more units for the target population. **(Up to 5 points)** d. For any Project below $350,000 per door, if the Eligible Applicant contributes more than a minimum match outlined in Table 5, above, the application will receive one (1) extra point for every additional 5% per door contributed to the Project. For example, for an acquisition that costs $100,000 per door, the Applicant will receive 1 extra point for every $5,000 per door in match contributed. **(Up to 10 points)** e. Site Selection **(Up to 10 points**) The project site is located within 1/3 mile of a bus rapid transit station, light rail station, commuter rail station, ferry terminal, bus station, or public bus stop. Commuter rail station, ferry terminal, bus station, or public bus stop OR the project includes an alternative transportation service for residents (e.g., van or dial-a-ride service), if costs of obtaining and maintaining the van and its service are included in the budget and the operating schedule is either on demand by tenants or a regular schedule is provided **(4 points)** The project site is in proximity to essential services: i. Grocery store – within 1/2 mile of a full-scale grocery store/supermarket of at least 25,000 gross interior square feet where staples, fresh meat, and fresh produce are sold (1 mile for projects in rural areas); **(2 points)** ii. Health facility – within 1/2 mile (1 mile for projects in rural areas) of a qualifying medical clinic with a physician, physician's assistant, or nurse practitioner on-site for a minimum of 40 hours each week, or hospital (not merely a private doctor's office). A qualifying medical clinic must accept Medi-Cal payments, or Medicare payments, or Health Care for the Homeless, or have an equally comprehensive subsidy program for low-income patients; **(1 point)** iii. Library – within 1/2 mile of a book-lending public library (1 mile for projects in rural areas); (**1 point**) iv. Pharmacy: within 1/2 mile of a pharmacy (1 mile for projects in rural areas). (**2 points**)

In the event of program oversubscription, where Applicants have the same score and the same date stamp, the following tiebreaker system will be applied to determine the Project funding:

i. The Department will take into consideration the highest score for each project received in the expenditure category (e.g. immediate ability to expend funds by December 30, 2020).

ii. If a funding determination cannot be made from (i) above, the Department will provide the grant funding to the project with the highest 2019 Homeless Point-in-Time count.

iii. If the funding determination cannot be made from (i) or (ii) above, the Department will provide funding to project that leverages the most non-Homekey funds (government, private, or philanthropic).

iv. The Department may consider additional criteria, including but not limited to the cost-effectiveness; community impact; affirmative furtherance of fair housing; innovative housing type; tenant stability; and proximity to transit, services and amenities.

Section 205. Application Submission

The Department will be accepting over-the-counter applications beginning on or about **July 22, 2020**. Instructions for submittal of an application can be found on the website. The Department will set aside a priority application period to immediately begin reviewing and awarding qualified Projects from **July 16, 2020 to August 13, 2020**. All other applications received after the priority application period must be received by the Department no later than 5:00 p.m. PDT on **September 29, 2020**.

Applicants must submit the Homekey application and required attachments provided by the Department. The Department will not accept modified application forms. It is the Applicant's responsibility to ensure that the submitted application is accurate. Department staff may request additional clarifying information.

The application is a public record, which is available for public review pursuant to the California Public Records Act (CPRA) (Chapter 3.5 (commencing with Section 6250) of Division 7 of Title 1 of the Government Code). After final Homekey awards have been issued, the Department may disclose any materials provided by the Applicant to any person making a request under the CPRA. The Department cautions Applicants to use discretion in providing information not specifically requested, including but not limited to, bank account numbers, personal phone numbers, and home addresses. By providing this information to the Department, the Applicant is waiving any claim of confidentiality and consents to the disclosure of submitted material upon request.

Section 206. Application Award Process

The Department will send both an award letter and a Standard Agreement to the successful Applicant. When the Standard Agreement is signed and returned by the Applicant, the Applicant will simultaneously submit a request for funds. Funds will be disbursed after the Department has received a request for funds and a fully executed Standard Agreement.

The Department is committed to disbursing Homekey funds in a timely manner. To avoid any expenditure delays, funds may be issued directly to the Applicant that is listed on the application, to the designated payee identified by successful co-Applicants, or to an escrow company that has been approved by the Department. For the latter option, the Applicant shall identify the name and address of the escrow company, the name of the escrow officer, the escrow number, and any other information requested by the Department.

Section 207. Appeals

Federal CRF money is the primary source of funding for the Homekey program, and it is subject to a short expenditure deadline. Section 601(f)(2) of the Social Security Act, as added by section 5001(a) of the federal Coronavirus Aid, Relief, and Economic Security (CARES) Act, provides that the U.S. Department of the Treasury will recoup CRF money that have not been used to cover expenses incurred by December 30, 2020. In view of this abbreviated timeframe for award and expenditure, as well as the specific needs and objectives of the Homekey program, the Department, in accordance with its authority under Health and Safety Code section 50675.7, subdivision (d), will not accept appeals of its award determinations. The Department encourages aggrieved Applicants to resubmit their applications within the specified timeframe.

Article III Program Requirements

Section 300. Eligible Applicants

i. Cities, counties, or any other Local Public Entity as that term is defined by Health and Safety Code section 50079; or

ii. Cities, counties, or any other Local Public Entity as that term is defined by Health and Safety Code section 50079, in partnership with nonprofit or for-profit corporations.

Cities, counties, or other Local Public Entities, including housing authorities or federally recognized tribal governments within California, may apply independently as a Development Sponsor. Alternatively, a Local Public Entity may apply jointly with a for-profit or nonprofit corporation.

Section 301. Eligible Uses

Awarded funds must be used to provide housing for individuals and families experiencing homelessness or at risk of experiencing homelessness and who are impacted by the COVID-19 pandemic. With respect to the list of eligible uses below, an Eligible Applicant may choose to target Project Roomkey properties, or other, non-Project Roomkey properties. The list of eligible uses for the CRF $550 million allocation and the $50 million state General Fund allocation is as follows:

i. Acquisition or rehabilitation of motels, hotels, or hostels.

ii. Master leasing of properties.

iii. Acquisition of other sites and assets, including purchase of apartments or homes, adult residential facilities, residential care facilities for the elderly, manufactured housing, and other buildings with existing residential uses that could be converted to permanent or interim housing.

iv. Conversion of units from nonresidential to residential in a structure with a certificate of occupancy as a motel, hotel, or hostel.

v. The purchase of affordability covenants and restrictions for units.

vi. Relocation costs for individuals who are being displaced as a result of rehabilitation of existing units.

vii. Capitalized operating subsidies for units purchased, converted, or altered with funds provided pursuant to Health and Safety Code section 50675.1.1.*

**Projects seeking capitalized operating subsidies for units purchased, converted, or altered will be awarded with funds from the $50 million state General Fund allocation. The $550 million in Homekey derived from the CRF is not permitted to be used for this purpose.*

Section 302. Eligible Projects

i. Nonresidential structures with a certificate of occupancy as a motel, hotel, or hostel.

ii. Adult residential facilities, residential care facilities for the elderly, manufactured housing, and other buildings with existing residential uses.

iii. Multifamily rental housing projects with five or more housing units.

iv. Shared housing or scattered site housing is permitted as long as the housing has common ownership, financing, and property management, and each household signs a lease. For example, A single-family home is one unit, a duplex is two units, a triplex is three units, et cetera.

The above list of eligible projects is not exhaustive. The Department welcomes and will consider a variety of other forms of housing as eligible projects. Interested Applicants should discuss other projects types with the Department during the pre-application consultation.

Section 303. Match

Eligible Applicants are required to demonstrate a five-year commitment to provide operating funds for the proposed project. The first two years of operating funds may include an award from the $50 million in state General Fund. Matching contributions may be obtained from any source, including any federal source as well as state, local, and private sources. Eligible Applicants will have an opportunity to discuss the match requirements and potential match sources during the pre-application consultation described in Section 201.

Additionally, the following requirements apply to match contributions:

i. The Eligible Applicant must ensure the laws governing any funds to be used as matching contributions do not prohibit those funds from being used to match Homekey funds; and

ii. If the state General Funds are used to satisfy the matching requirements of another program, then funding from that program may not be used to fulfill the matching requirements of the Homekey program.

Section 304. General Program Requirements

To be eligible to receive funding, projects must meet the following requirements as they relate to the Eligible Applicant and the project types:

i. Applications must be submitted independently by a single County, City, Public Housing Authority, or federally recognized tribal government as the Development Sponsor. Alternatively, applications must be submitted by a single County, City, Public Housing Authority, federally recognized tribal government and jointly with another entity as the Development Sponsor.

ii. Projects must serve persons qualifying as members of the Target Population.

iii. Developer experience

a. If the Eligible Applicant is acquiring, rehabilitating, and operating an eligible project type as outlined in Section 305 below, the Eligible Applicant shall demonstrate the following minimum experience requirements:

1) Development, ownership, or operation of a project similar in scope and size to the proposed Project, or at least two affordable rental housing projects in the last ten years, with at least one of those projects containing at least one unit housing a tenant who qualifies as a member of the Target Population.

2) The property manager shall have three or more years of experience serving persons of the Target Population. If a property manager is not yet selected for the proposed Project, the selected property manager shall have three or more years of experience serving persons of the Target Population, **OR** the Grantee shall certify that this requirement will be reflected in any future solicitation or Memorandum of Understanding.

b. If the Eligible Applicant is acquiring, rehabilitating, and operating an Interim Housing project, the Eligible Applicant shall demonstrate the following minimum experience requirements:

1) Development or ownership of an Interim Housing project in the last ten years for members who qualify as the Target Population.

2) The Eligible Applicant has successfully operated an emergency shelter or Transitional Housing or other Interim Housing for at least three years or more for members of the Target Population.

3) Demonstrated experience in linking Interim Housing program participants to permanent housing to ensure long-term housing stability.

4) Experience administering a Housing First program including principles of harm reduction and low barriers to entry.

c. The Eligible Applicant applying for the Homekey funding is the entity that the Department relies upon for experience and capacity, and will control the Project during acquisition, development, and occupancy. In a project with multiple layers of ownership, the Development Sponsor cannot have more than two corporate entities between itself and the borrowing entity.

iv. Evidence of strong organizational and financial capacity to develop the project, including but not limited to:

a. The urgency to acquire a site to provide affordable housing to the Target Population;

b. A development plan to meet the expenditure period;

c. If the project will leverage other funding sources.

v. Assisted units and other units of the Project must meet all applicable state and local requirements pertaining to rental housing, manufactured housing, including but not limited to requirements for minimum square footage, and requirements related to maintaining the project in a safe and sanitary condition.

vi. The Department encourages Eligible Applicants to consider the CEQA exemption set forth at Health and Safety Code section 50675.1.2, the provision for land use consistency and conformity at Health and Safety Code section 50675.1.1, subdivision (g), as well as the additional streamlining pathways described in the appended CEQA guidance.

vii. The Department will require Eligible Applicants to submit the following documents:

a. Overview of project vision;

b. Description of project team, including partnerships with any other entities;

c. Demonstration of the development's team experience to acquire and/or rehabilitate and operate the project;

d. Identification of the site suitable for development and evidence of site control or a plan and timeline for obtaining site control along with other supporting evidence (e.g., letter of intent, exclusive negotiating agreement, ground lease, etc.);

e. A proposed development vision that identifies the financial and regulatory mechanisms to be used to maintain the ongoing affordability of the project;

f. A summary of the committed and intended sources, and uses, of the project awarded with Homekey funds;

g. A proposed timeline for the entire project, including major milestones, any required entitlements, permits, environmental clearances, board or governing body approvals, etc., and completion of the project;

h. A proposed financing plan for any eventual development of the project;

i. Preliminary commitment for title insurance. If no title report is available, the Applicant shall identify any known encumbrances on the property;

j. Environmental site assessment (i.e., Phase 1 Environmental Assessment), or evidence that the assessment is in process and timeline to complete;

k. Appraisal or evidence that the appraisal is in process and timeline to complete;

l. Physical Needs Assessment or evidence that the physical needs assessment is in process and timeline to complete. This assessment must include consideration of accessibility requirements (Section 311);

m. Non-Discrimination Statement and descriptions of tenant selection and/or coordinated entry system practices that meet non-discrimination requirements (Section 311);

n. Documented ability to obtain the insurance coverages outlined in Article VI of this NOFA; and

o. Authorizing Resolution (AR) approved by the Applicant's governing body.

The Department reserves the right to request clarification of unclear or ambiguous statements made in an application and other supporting documents.

Section 305. Permanent Housing Requirements

Permanent housing projects will be evaluated on the following requirements:

i. The Sponsor shall have control of the property, and such control shall not be contingent on the approval of any other party. The status and nature of the Sponsor's title and interest in the property shall be subject to the Department's approval. Site control may be evidenced by one of the following:

a. Fee title;

b. A leasehold interest on the property with provisions that enable the lessee to make improvements on and encumber the property provided that the terms and conditions of any proposed lease shall permit compliance with all program requirements;

c. An executed disposition and development agreement, or irrevocable offer of dedication to a public agency;

d. A sales contract, or other enforceable agreement for the acquisition of the property;

e. A letter of intent, executed by a sufficiently authorized signatory of the Eligible Applicant, that expressly represents to the Department, without condition or reservation, that, upon successful application, the Eligible Applicant shall purchase or otherwise acquire a sufficient legal interest in the property to accomplish the purpose of the award. The letter of intent must also be acknowledged by the party selling or otherwise conveying an interest in the subject property to the Eligible Applicant. If this form of evidence is relied upon at the time of application, the Department may impose additional milestones, in the Standard Agreement, regarding increased evidence of eventual site control closer to the likely close of escrow; or

f. Other forms of site control that give the Department assurance (equivalent to items a. through e. above) that the Applicant will be able to complete the project in a timely manner and in accordance with all the program's objectives and requirements.

ii. The Eligible Applicant's plan to extend a local covenant restricting the use and Target Population for 55 years.

iii. A plan to cover operations and service costs with specific funding sources (government/philanthropic/private) for the proposed Project for five years and must demonstrate a path to ultimate use of the site for ten years.

iv. To the extent possible, the project shall provide a description of the services that will be available at the housing site including but not limited to case management, behavioral health services, physical health services, assistance obtaining benefits and essential documentation, and education and employment services. Please describe the on-site staffing plan proposed to deliver these services. Also describe the approach to securing off-site services including primary care and other needed physical health and behavioral health services as well as other tenancy supports.

v. One-for-one replacement of assisted housing

a. If the acquired housing or site is to be redeveloped/repositioned as part of the locality's overall goal to address the needs of the Target Population and the community, the Applicant shall provide as part of the application a commitment to ensure one-for-one replacement of units.

b. If the target site is going to be demolished before it is occupied as part of the Project being proposed by the Applicant, no one-for-one replacement commitment needs to be provided. The unit mix will be evaluated based on the project proposal.

c. The application shall include a site map indicating the original target housing location and all proposed housing location(s). If all proposed housing will be located within the neighborhood, no additional documentation is necessary. If replacement housing is proposed outside the target neighborhood, the application must also include a justification explaining why it is necessary to locate this

replacement housing outside the target neighborhood (i.e., offsite) and how doing so supports and enables the Target Population to maintain housing.

vi. If the development of any Project results in the displacement of tenants, regardless of whether the tenant meets the definition of the Target Population, the Applicant must describe the assistance and benefits to be provided in compliance with local, state, and federal law.

Section 306. Interim Housing Requirements

Interim Housing projects with no plan for conversion to permanent housing will be evaluated on the following requirements:

i. The Sponsor shall have control of the property, and such control shall not be contingent on the approval of any other party. The status and nature of the Sponsor's title and interest in the property shall be subject to the Department's approval. Site control may be evidenced by one of the following:

   a. Fee title;

   b. A leasehold interest on the property with provisions that enable the lessee to make improvements on and encumber the property provided that the terms and conditions of any proposed lease shall permit compliance with all program requirements;

   c. An executed disposition and development agreement, or irrevocable offer of dedication to a public agency;

   d. A sales contract, or other enforceable agreement for the acquisition of the property;

   e. A letter of intent, executed by a sufficiently authorized signatory of the Applicant, that expressly represents to the Department, without condition or reservation, that, upon successful application, the Applicant shall purchase or otherwise acquire a sufficient legal interest in the property to accomplish the purpose of the award. The letter of intent must also be acknowledged by the party selling or otherwise conveying an interest in the subject property to the Applicant. If this form of evidence is relied upon at the time of application, the Department may impose additional milestones, in the Standard Agreement, regarding increased evidence of eventual site control closer to the likely close of escrow; or

   f. Other forms of site control that give the Department assurance (equivalent to a-e above) that the Applicant will be able to complete the project in a timely manner and in accordance with all the program's objectives and requirements.

ii. A plan to cover operations and service costs with specific funding sources (government/philanthropic/private) for the proposed Project for five years and must demonstrate a path to the ultimate use of the site for ten years.

iii. To the extent possible, the project shall provide a description of the services that will be available at the housing site including but not limited to case management, behavioral health services, physical health services, assistance obtaining benefits

and essential documentation, and education and employment services. Please describe the on-site staffing plan proposed to deliver these services. Also describe the approach to securing off-site services including primary care and other needed physical health and behavioral health services as well as other tenancy supports.

Section 307. Other Requirements

i. The purchase of existing residential units, or affordability covenants and restrictions require the units to be restricted to individuals and families who are experiencing homelessness or who are at risk of homelessness defined in Section 578.3 of Title 24 of the Code of Federal Regulation, for no fewer than 20 years. Additionally, the Sponsor shall provide a plan to cover operations and service costs with specific funding sources (government/philanthropic) for the proposed Project for five years and must demonstrate a path to the ultimate use of the site for ten years.

ii. Master leasing projects will be evaluated on the following requirements:

   a. The Sponsor shall have adequate site control of the property, and such control shall not be contingent on the approval of any other party. Site control may be evidenced by one of the following:

      1) Fee title;

      2) A leasehold interest on the property with provisions that enable the lessee to make improvements on and encumber the property provided that the terms and conditions of any proposed lease shall permit compliance with all program requirements;

      3) An executed disposition and development agreement, or irrevocable offer of dedication to a public agency;

      4) A sales contract, or other enforceable agreement for the acquisition of the property;

      5) A letter of intent, executed by a sufficiently authorized signatory of the Eligible Applicant, that expressly represents to the Department, without condition or reservation, that, upon successful application, the Eligible Applicant shall purchase or otherwise acquire a sufficient legal interest in the property to accomplish the purpose of the award. The letter of intent must also be acknowledged by the party selling or otherwise conveying an interest in the subject property to the Eligible Applicant. If this form of evidence is relied upon at the time of application, the Department may impose additional milestones, in the Standard Agreement, regarding increased evidence of eventual site control closer to the likely close of escrow.

      6) Other forms of site control that give the Department assurance (equivalent to 1-5 above) that the Applicant will be able to complete the project in a timely manner and in accordance with all the program's objectives and requirements.

   b. The Sponsor shall provide a plan to cover operations and service costs with specific funding sources (government/philanthropic) for the proposed Project for five years.

c. To the extent possible, the Eligible Applicant shall demonstrate the range of on-site and off-site supportive services to participants, e.g., mental health services; substance use disorder services; and primary health, employment, and other tenancy support services.

Section 308. 24-Month Operating Subsidy

i. The total amount for each project requesting the 24-month operating subsidy shall not exceed $1,000 per month per unit to address project operating deficits attributable to the Assisted Units.

ii. The 24-month operating subsidy must be expended by June 30, 2022.

Section 309. Article XXXIV

Per Health and Safety Code section 37001, subdivision (h), Article XXXIV, section 1 of the California Constitution ("Article XXXIV") is not applicable to development involving the acquisition, rehabilitation, reconstruction, alterations work, or any combination thereof, of lodging facilities or dwelling units using moneys received from the CRF established by the federal CARES Act (Public Law 116-136).

Section 310. Housing First

Upon occupancy, the Eligible Applicant shall certify to employ the core components of Housing First (set forth in the Welfare and Institutions Code Section 8255) in the property management and tenant selection practices.

Section 311. Accessibility and Non-Discrimination

All developments shall adhere to the accessibility requirements set forth in California Building Code Chapter 11A and 11B and the Americans with Disabilities Act, Title II. In addition, developments shall adhere to either the Uniform Federal Accessibility Standards (UFAS) standards, 24 C.F.R. Part 8, or HUD's modified version of the 2010 ADA Standards for Accessible Design (Alternative 2010 ADAS), HUD-2014-0042-0001, 79 F.R. 29671 (5/27/14) (commonly referred to as "the Alternative Standards" or "HUD Deeming Memo"). Accessibly units shall, to the maximum extent feasible and subject to reasonable health and safety requirements, be distributed throughout the project and be available in a sufficient range of sizes and amenities consistent with 24 CFR Section 8.26.

All Sponsors shall adopt a written non-discrimination policy requiring that no person shall, on the grounds of race, color, religion, sex, gender, gender identity, gender expression, sexual orientation, marital status, national origin, ancestry, familial status, source of income, disability, age, medical condition, genetic information, citizenship, primary language, immigration status (except where explicitly prohibited by federal law), arbitrary characteristics, and all other classes of individuals protected from discrimination under federal or state fair housing laws, individuals perceived to be a member of any of the preceding classes, or any individual or person associated with any of the preceding classes be excluded from participation in, be denied the benefits of, or be subjected to discrimination under, any program or activity funded in whole or in part with program funds made available pursuant to this NOFA.

All recipients shall comply with the requirements contained in the Americans with Disabilities Act, the Fair Housing Amendments Act, the California Fair Employment and Housing Act, the Unruh Act, Government Code Section 11135, Section 504 of the Rehabilitation Act, and regulations promulgated pursuant to those statutes, including 24 C.F.R. Part 100, 24 C.F.R. Part 8, and 28 C.F.R. Part 35, in all of the Sponsor's activities.

Section 312 State Prevailing Wage

Applicant's contemplated use of Homekey funds may be subject to California's prevailing wage law (Lab. Code, § 1720 et seq.). Applicants are urged to seek professional legal advice about the law's requirements. Prior to disbursing the Homekey funds, the Department will require a certification of compliance with California's prevailing wage law. The certification must verify that prevailing wages have been or will be paid (if such payment is required by law), and that labor records will be maintained and made available to any enforcement agency upon request. The certification must be signed by the general contractor(s) and the Sponsor.

Article IV Program Operations

Section 401. Program Oversight

As requested by the Department, Grantees will be required to provide progress reports of the development plan and any updates to the timeline of the completion of the project. The development plan should include the project's completion milestones and any updates or substantial changes.

Section 402. Reporting

Grantees shall submit the following data:

i. The amount of funds expended for the project.

ii. The location of any properties for which the funds are used.

iii. The number of useable housing units produced, or planned to be produced, using the funds.

iv. The number of individuals housed, or likely to be housed, using the funds.

v. The number of units, and the location of those units, for which operating subsidies have been, or are planned to be, capitalized using the funds.

vi. Any lessons learned from the use of the funds.

vii. The proposed development vision that identifies the financial and regulatory mechanisms to be used to maintain the long-term affordability of the project.

viii. The progress and status in securing any required entitlements, permits, environmental clearances.

ix. The proposed timeline for the completion of the project.

If a project received an award for a 24-month operating subsidy, Grantees shall submit the use of the expenditures bi-annually 30 days after the reporting periods of January 1 to June 30 and July 1 to December 31. The first report will be due to the Department on January 31, 2021, and the final bi-annual report is due on July 31, 2022.

The Grantee that receives funds under the Homekey Program is responsible for ensuring that the expenditure of those funds is consistent with the requirements of the Program and for eligible activities described in Section 302. The Department shall monitor the expenditures to ensure that those expenditures comply with this NOFA.

The Department may request the repayment of funds or pursue any other remedies available to it by law for failure to comply with program requirements. After the contract has expired, any funds not expended for eligible uses shall revert and must be remitted to the Department. The deadline for expenditures under the contract is June 31, 2022.

The requested data shall be submitted in electronic format on a form provided by the Department.

Section 403. Disbursement of Grant Funds

The Department will disburse funds to cover Homekey-critical expenditures that were incurred during the period of March 1, 2020 through December 30, 2020. Homekey program funds shall be disbursed to the Sponsor after the Department has received a request for funds from the Sponsor and a Standard Agreement between the Sponsor and the Department is fully executed. The Standard Agreement will set forth the general conditions of disbursement, any conditions precedent to disbursements (e.g., documentation requirements for pre-Standard Agreement expenditures), and the Department's remedies upon an event of default. The Standard Agreement will also identify the payee. Where Co-Sponsors wish to receive the grant award outside of escrow, they must identify, and memorialize in the Standard Agreement, which Sponsor will serve as the designated payee for all award amounts.

Section 404. Legal documents

Upon the award of Homekey funds to a Project, the Department shall enter into one or more agreements with the Sponsor(s), including a Standard Agreement, which shall commit funds from the Homekey program, subject to specified conditions. The agreement or agreements shall include, but not be limited to, the following provisions:

i. A description of the approved project and the permitted uses of funds;

ii. The amount and terms of the program grant;

iii. The use, occupancy, and rent restrictions, if any, to be imposed on the project through a use restriction (e.g., covenant, regulatory agreement) recorded against the property of the project;

iv. Performance milestones, and other progress metrics, governing the completion of the project, along with the remedies available to the Department in the event of a failure to meet such milestones or metrics;

v. Provisions governing the manner, timing, and conditions of the disbursement of the program grant;

vi. Special conditions imposed as part of the Department's approval of the project;

vii. Terms and conditions required by federal and state law;

viii. Requirements for reporting to the Department;

ix. Remedies available to the Department in the event of a violation, breach, or default of the agreement; and

x. Provisions regarding Sponsor liability. Specifically, the Sponsor will remain liable to the Department for the performance of all program requirements regardless of any Department-approved transfer or assignment of interest. Likewise, each co-Sponsor will remain jointly and severally liable to the Department for the performance of all program requirements regardless of any Department-approved transfer or assignment of interest, and notwithstanding the co-Sponsors' identification of a designated payee.

The agreement will also include such other provisions as are necessary to ensure adherence to the objectives and requirements of the program.

Section 405. Sales, Transfers, and Encumbrances

An Applicant(s) shall not sell, assign, transfer, or convey the awarded project, or any interest therein or portion thereof, without the express prior written approval of the Department.

Section 406. Defaults and Grant Cancellations

Funding commitments may be canceled by the Department under any of the following conditions:

i. The objectives and requirements of the Homekey program cannot be met and the implementation of the project cannot proceed in a timely fashion in accordance with the timeframes established in the regulatory agreement/contract.

ii. In the event of a breach or violation by the Grantee, the Department may give written notice to the Development Sponsor to cure the breach or violation. If the breach or violation is not cured to the satisfaction of the Department within a reasonable time period, the Department, at its option, may declare a default under

the relevant document and may seek legal remedies for the default including the following:

a. The Department may seek, in a court of competent jurisdiction, an order for specific performance of the defaulted obligation or the appointment of a receiver to complete the project in accordance with Homekey program requirements; and

b. The Department may seek such other remedies as may be available under the relevant agreement or any law.

Article V. Definitions

Below are the definitions for purposes of the Homekey program:

i. "Applicant" or “Eligible Applicant” means a city, county, or other “local public entity,” as that term is defined at the Health and Safety Code section 50079, applying to be a Development Sponsor either on its own or with another entity (such as a for-profit or nonprofit corporation, or another local public entity).

ii. "Area Median Income" or "AMI" means the most recent applicable county median family income published by the California Tax Credit Allocation Committee (TCAC) or the Department.

iii. "Assisted Unit" means a residential housing unit that is subject to rent, occupancy or other restrictions associated with a Homekey site.

iv. "At Risk of Homelessness" has the same meaning as defined in Section 578.3 of Title 24 of the Code of Federal Regulations.

v. "City" means a city or city and county that is legally incorporated to provide local government services to its population. A city can be organized either under the general laws of this state or under a charter adopted by the local voters.

vi. "Chronic Homelessness" means a person who is chronically homeless, as defined in 578.3 of Title 24 of the Code of Federal Regulations.

vii. "Continuum of Care" means the same as defined by the United States Department of Housing and Urban Development at Section 578.3 of Title 24 of the Code of Federal Regulations.

viii. "Department" means the Department of Housing and Community Development.

ix. "Development Sponsor" or "Sponsor", as defined in Section 50675.2 of the Health and Safety Code and subdivision (c) of Section 50669 of the Health and Safety Code, means any individual, joint venture, partnership, limited partnership, trust, corporation, cooperative, local public entity, duly constituted governing body of an Indian reservation or rancheria, or other legal entity, or any combination thereof, certified by the Department as qualified to own, manage, and rehabilitate a rental housing development. A Development Sponsor may be organized for profit, limited profit or be nonprofit, and includes a limited partnership in which the Development Sponsor or an affiliate of the Development Sponsor is a general partner.

x. "Environment Assessment – Phase 1" is a report that demonstrates whether the property is free from severe adverse environmental conditions.

xi. "Grantee" means an Eligible Applicant that has been awarded funds under the program.

xii. "Homeless" has the same meaning as defined in Section 578.3 of Title 24 of the Code of Federal Regulations.

xiii. "Housing First" has the same meaning as in Welfare and Institutions Code Section 8255, including all of the core components listed therein.

xiv. "HUD" means the U.S. Department of Housing and Urban Development.

xv. "Interim Housing" Transitional Housing" or "Congregate Shelter" means any facility whose primary purpose is to provide a temporary shelter for the Homeless in general or for specific populations of the Homeless, and which does not require occupants to sign leases or occupancy agreements.

xvi. “Local Public Entity” means any county, city, city and county, the duly constituted governing body of an Indian reservation or rancheria, tribally designated housing entity as defined in Section 4103 of Title 25 of the United States Code and Section 50104.6.5, redevelopment agency organized pursuant to Part 1 (commencing with Section 33000) of Division 24, or housing authority organized pursuant to Part 2 (commencing with Section 34200) of Division 24, and also includes any state agency, public district, or other political subdivision of the state, and any instrumentality thereof, that is authorized to engage in or assist in the development or operation of housing for persons and families of low or moderate income. “Local public entity” also includes two or more local public entities acting jointly.

xvii. "NOFA" means a Notice of Funding Availability.

xviii. "Permanent Supportive Housing" has the same meaning as "supportive housing," as defined in Section 50675.14 of the Health and Safety Code, except that "Permanent Supportive Housing" shall include associated facilities if used to provide services to housing residents.

xix. "Permanent Housing" means a housing unit where the landlord does not limit length of stay in the housing unit, the landlord does not restrict the movements of the tenant, and the tenant has a lease and is subject to the rights and responsibilities of tenancy.

xx. "Project" means a multifamily structure or set of structures providing housing with common financing, ownership, and management.

xxi. "Program Award" means the portion of program funds available for a Grantee to expend toward eligible program uses.

xxii. "Point-in-Time Count" means a count of sheltered and unsheltered Homeless persons on a single night conducted by Continuums of Care as prescribed by HUD.

xxiii. “Rural Area” means an area defined in Health and Safety Code section 50199.21.

xxiv. "Target Population" means members of the target population identified in Health and Safety Code section 50675.1.1(a) are individuals and families who are experiencing homelessness or who are at risk of homelessness defined in Section 578.3 of Title 24 of the Code of Federal Regulation and who are impacted by the COVID-19 pandemic.

xxv. "Unit" means a residential unit that is used as a primary residence by its occupants, including individual units within the Project.

Article VI Insurance Requirements
Section 600. Insurance Requirements

i. Commercial general liability

Local public entities shall maintain general liability on an occurrence form with limits not less than $1,000,000 per occurrence and $2,000,000 aggregate for bodily injury and property damage liability. The policy shall include coverage for liabilities arising out of premises, operations, independent contractors, products, completed operations, personal and advertising injury, and liability assumed under an insured agreement. This insurance shall apply separately to each insured against which claim is made, or suit is brought subject to the local public entity's limit of liability. **The policy must name the State of California and the Department of Housing and Community Development, as well as the respective appointees, officers, agents, and employees of each, as additional insureds, but only with respect to work performed under the contract.**

If available in the open market at a reasonable cost, the policy shall also include an endorsement for physical abuse and child/sexual molestation coverage. Coverage shall include actual or threatened physical abuse, mental injury, sexual molestation, negligent hiring, employment, supervision, investigation, reporting to proper authorities, and retention of any person for whom the local public entity is responsible. This insurance shall apply separately to each insured against which claim is made, or suit is brought subject to the local public entity's limit of liability. Coverage shall include the cost of defense and the cost of defense shall be provided outside the coverage limit.

If available in the open market at a reasonable cost, the policy shall also include an endorsement for assault and battery.

ii. Automobile liability

Local public entity shall maintain motor vehicle liability with limits not less than $1,000,000 combined single limit per accident. Such insurance shall cover liability arising out of a motor vehicle including owned, hired, and non-owned motor vehicles. **The policy must name the State of California and the Department of Housing and Community Development, as well as the respective appointees, officers, agents, and employees of each, as additional insureds, but only with respect to work performed under the contract.**

If local public entity will not have any commercially owned vehicles used during the life of the Standard Agreement, by signing the Standard Agreement, the local public entity certifies that the local public entity and any employees, subcontractors or servants possess valid automobile coverage in accordance with California Vehicle Code sections 16450 to 16457, inclusive. The Department reserves the right to request proof at any time.

iii. Workers' Compensation and Employer's Liability

Local public entity shall maintain statutory worker's compensation and employer's liability coverage for all its employees who will be engaged in the performance of the contract. In addition, employer's liability limits of $1,000,000 are required. By signing the Standard Agreement, local public entity acknowledges compliance with these regulations. **A Waiver of Subrogation or Right to Recover endorsement in favor of the State of California and the Department of Housing and Community Development must be attached to the certificate.**

iv. Builder's risk/installation floater

If there is installation or construction of property/materials on or within the facility at any time during the life of the Standard Agreement, the local public entity shall maintain in force, at its own expense, Builders Risk/Installation Floater covering the local government entity's labor, materials, and equipment to be used for completion of the Work performed under this contract against all risks of direct physical loss, excluding earthquake and flood, for an amount not less than the full amount of the property and/or materials being installed and/or constructed on or within the facility. The Eligible Applicant agrees as a provision of the contract to waive all rights of recovery against the state.

v. Property insurance

The local public entity shall maintain fire, lightning and extended coverage insurance on the facility which shall be in a form of a commercial property policy, in an amount equal to one hundred percent (100%) of the then current replacement cost of the facility, excluding the replacement cost of the unimproved real property constituting the site. The extended coverage endorsement shall, as nearly as practicable, include but not be limited to loss or damage by an explosion, windstorm, riot, aircraft, vehicle damage, smoke, vandalism, and malicious mischief and such other hazards as are normally covered by such endorsement.

vi. Self-insured

If the local public entity is self-insured in whole or in part as to any of the above-described types and levels of coverage, the local government entity shall provide the Department with a written acknowledgment of this fact at the time of the execution of this Permit. If, at any time after the execution of the Standard Agreement, local public entity abandons its self-insured status, the local public entity shall immediately notify the Department of this fact and shall comply with all of the terms and conditions of this Section pertaining to insurance requirements.

RESOLUTION NO. 2020-__

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH AUTHORIZING APPLICATION TO THE HOMEKEY PROGRAM

WHEREAS:

A. The Department of Housing and Community Development (Department) has issued a Notice of Funding Availability ("**NOFA**"), dated July 16, 2020, for the Homekey Program ("**Homekey**" or "**Homekey Program**"). The Department has issued the NOFA for Homekey grant funds pursuant to Health and Safety Code section 50675.1.1 (Assem. Bill No. 83 (2019-2020 Reg. Sess.), § 21.)

B. City of Ukiah ("**Applicant**") desires to apply for Homekey grant funds. Towards that end, Applicant is submitting an application for Homekey funds ("**Application**") to the Department for review and consideration.

C. The Department is authorized to administer Homekey pursuant to the Multifamily Housing Program (Chapter 6.7 (commencing with Section 50675) of Part 2 of Division 31 of the Health and Safety Code). Homekey funding allocations are subject to the terms and conditions of the NOFA, the Application, the Department-approved STD 213, Standard Agreement ("**Standard Agreement**"), and all other legal requirements of the Homekey Program.

THEREFORE, IT IS RESOLVED THAT:

1. Applicant is hereby authorized and directed to submit an Application to the Department in response to the NOFA, dated July 16, 2020, and to apply for Homekey grant funds in a total amount not to exceed $_____. That amount includes $_____ for capital expenditures (as allowed under Health and Saf. Code, § 50675.1.1, subd. (a)(1)-(6)) and $_____ for a capitalized operating subsidy (as allowed under Health and Saf. Code, § 50675.1.1, subd. (a)(7)).

2. If the Application is approved, Applicant is hereby authorized and directed to ensure that any funds awarded for capital expenditures are spent by December 30, 2020, and that any funds awarded for capitalized operating subsidies are spent by June 30, 2022.

3. If the Application is approved, Applicant is hereby authorized and directed to enter into_____, any and all other documents required or deemed necessary or appropriate to secure the Homekey funds from the Department and to participate in the Homekey Program, and all amendments thereto (collectively, the "Homekey Documents").

4. Applicant acknowledges and agrees that it shall be subject to the terms and conditions specified in the Standard Agreement, and that the NOFA and Application will be incorporated in the Standard Agreement by reference and made a part thereof. Any and all activities, expenditures, information, and timelines represented in the Application are enforceable through the Standard Agreement. Funds are to be used for the allowable expenditures and activities identified in the Standard Agreement.

5. Sage Sangiacomo, City Manager, or his or her designee, is authorized to execute the Application and the Homekey Documents on behalf of Applicant for participation in the Homekey Program.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Ukiah held on August 5, 2020 by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

_____

Douglas F. Crane, Mayor
Ukiah City Council

STATE OF CALIFORNIA
City of Ukiah

ATTEST:

I, Kristine Lawler, City Clerk of the City of Ukiah, State of California, do hereby attest and certify the above and foregoing to be a full, true and correct copy of a resolution adopted by said City Council on this 5th day of August, 2020, and that the resolution has not been altered, amended, or repealed.

Kristine Lawler, City Clerk
of the City of Ukiah of the State of California

By: _____

Agenda Item No: 13.c.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-491

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Consider Adoption of Resolution for Authorization to Submit an Application to Join the Upper Russian River Water Agency (URRWA).

DEPARTMENT: Water Resources **PREPARED BY:** Sean White, Water Resources Director
PRESENTER: Sean White, Water Resources Director

ATTACHMENTS:
1. URRWA.Resolution

Summary: The Council will receive a report and consider whether to adopt the attached Resolution directing staff to apply to join the Upper Russian River Water Agency.

Background: The Upper Russian River Water Agency ("URRWA") is a Joint Exercise of Powers Authority (Attachment 1), formed in accordance with the Joint Exercise of Powers Act. URRWA was initially formed by four original Constituents: Willow County Water District, Redwood Valley County Water District, Calpella County Water District, and Millview County Water District. The Joint Powers Agreement provides for other public agencies within the Russian River Watershed to apply to join URRWA, provided they are either a purveyor of water or an operator of a sewer treatment or collection system. As a provider of water and wastewater services the City meets the criteria for membership.

Discussion: The URRWA was developed as a first step in unifying water and wastewater policy in the greater valley with a long term goal consolidating the number entities providing water and wastewater service in the region.

To date, the City has not been a member of the URRWA. However, as the membership has evolved, and the City develops it's long-range planning efforts, participation in a regional water and wastewater entity seems appropriate.

Staff recommends that the Council adopt the Resolution (Attachment 2) directing staff to apply to join URRWA.

Recommended Action: Approve resolution for authorization to submit an application to join the Upper Russian River Water Agency (URRWA)

BUDGET AMENDMENT REQUIRED: N/A

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: N/A

PREVIOUS CONTRACT/PURCHASE ORDER NO.:

COORDINATED WITH: Phillip Williams, Special Counsel

Approved: _____
Sage Sangiacomo, City Manager

RESOLUTION NO. 2020-

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH AUTHORIZING AN APPLICATION TO JOIN THE UPPER RUSSIAN RIVER WATER AGENCY

WHEREAS:

1. The City of Ukiah was incorporated as a general law city in 1876; and

2. The Upper Russian River Water Agency is a Joint Powers Authority, as defined by California Government Code section 56047.7, formed pursuant to Chapter 5 of Division 7 of Title 1 of the California Government Code (Sections 6500, ff) (the "Joint Exercise of Powers Act") and created through a joint powers agreement dated December 29, 2014 (the Joint Powers Agreement"); and

3. Article 11 of the Joint Powers Agreement provides for the "Addition of Constituents," which provides further that "[a]ny public agency that is a purveyor of water, or an operator of a sewer treatment or collection system, or both, which is located within the Russian River Watershed may apply to become a Constituent. The Board may approve the application, approve it with conditions or reject the application. The application shall be deemed completed when each of the governing bodies of the Constituents signifies ratification of the action of the Board and delivers such resolution to the Secretary of the Agency[]"; and

4. Article 1 defines "Constituents" to "refer[] to Willow [County Water District], Redwood Valley [County Water District], Calpella [County Water District] and Millview [County Water District]"; and

5. In addition to other rights to divert water, the City of Ukiah holds the two most senior municipal rights to divert water in the Ukiah Valley: a pre-1914 appropriative right and a 1954 appropriative right, and exercises its water rights to deliver water to its 16,000 residents and is therefore properly understood to be "a purveyor of water … located within the Russian River Watershed"; and

6. The City of Ukiah provides wastewater collection and treatment for about two-thirds of the City's residents and operates its own wastewater treatment plant and is therefore properly understood to be "an operator of a sewer treatment or collection system … located within the Russian River Watershed"; and

7. The City of Ukiah desires to join the Upper Russian River Water Agency so that it may participate in developing and implementing a bright and sustainable future for its residents and all of Ukiah Valley.

NOW, THEREFORE, the City Council does hereby resolve:

1. The City of Ukiah shall submit an application, pursuant to the Joint Powers Agreement, to become a Constituent of the Upper Russian River Water Agency.

DRAFT

2. The City Manager or his designee is authorized to take any and all actions necessary to submit such an application.

3. The City Council thanks the Boards of Directors of the Upper Russian River Water Agency and of the Constituents for their thoughtful consideration of this Resolution and the impending application and looks forward to a constructive partnership with its neighbors.

PASSED AND ADOPTED at a Regular Meeting of the City Council of the City of Ukiah, conducted in accordance with the Governor's March 12, 2020, Executive Order N-25-20 regarding teleconferencing of Meetings under the Ralph M. Brown Act, and signed in Ukiah, California, this 5th day of August, 2020.

AYES:
NOES:
ABSTAIN:
ABSENT:

_____
Douglas F. Crane, Mayor

ATTEST:

_____
Kristine Lawler, City Clerk

DRAFT

Agenda Item No: 13.d.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2020-481

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Discussion and Possible Adoption of Resolution Amending Procedures for Annual Appointment and Rotation of Mayor, Vice Mayor, and City Councilmembers.

DEPARTMENT: City Clerk **PREPARED BY:** Kristine Lawler, City Clerk
PRESENTER: Kristine Lawler, City Clerk

ATTACHMENTS:
1. Dais Seating
2. Mayor Rotation Scenarios
3. Resolution - Redline
4. Resolution A
5. Resolution B

Summary: The City Council will discuss and possibly adopt a resolution amending the guidelines for the annual councilmember rotations.

Background: In 2011, the City Council adopted resolution 2011-44, which established guidelines for how the Mayor and Councilmembers rotate their seating from year to year. The guidelines are based on seniority in a number of given situations, which can sometimes be unclear and requires interpretation by staff for what recommendations to make to Council.

On December 4, 2019, the Council held a discussion followed by the appointment of Mayor Crane and Councilmember Brown to serve on a Mayor Rotation ad hoc, to review the Mayor rotation guidelines and determine if they could be modified to address the discussed concerns.

Discussion: The Mayor Rotation ad hoc met and a revised rotation method – shown below - was proposed.

Proposed Method:

Based on the following seating arrangement *(See Attachment 1 for image of Dais seating)*:
Seat 1 – Farthest to Mayor's right
Seat 2 – Middle seat to Mayor's right
Seat 3 – Directly to Mayor's right
Vice Mayor
Mayor

Each year, all members will rotate as follows:
Seat 1 to Seat 2
Seat 2 to Seat 3
Seat 3 to Vice Mayor
Vice Mayor to Mayor
Outgoing Mayor to Seat 1

Rotation with Incoming Councilmembers:
• Outgoing Mayor will rotate into Seat 1.

• New member will rotate into Seat 2, which will give the new member a chance to be Mayor once during their first term.

o If there are two new members, then they will rotate into Seat 2 & 3.

o If there are three new members:

– This is the only scenario where – using the new method – a new member would rotate directly into the Vice Mayor position *(see Attachment 2, highlighted scenario.)* Alternatively, the three new members could rotate into Seat 1, 2 & 3; this would put the outgoing mayor back into the vice mayor position, and put the incoming member with the least amount of votes into Seat 1, which would most likely not give them a chance to be mayor in their first term.

– The seniority given to three new members would remain the same as the current method. With the member having received the most votes going into the most advanced seat.

• Appointed members to unfulfilled terms will be treated as new members in respect to the rotations.

There are an infinite number of combinations and possibilities for how various rotations would look over time; however, Attachment 2 provides some scenarios to show how the proposed method could look over the next couple of years.

Staff Recommendations:

Staff recommends that the City Council have a discussion regarding the following points:

• To keep the old method of rotation, go with the new method, or return back to the ad hoc with direction.

• If going with the new method, discuss the following options regarding the scenario of three new members:

Option A – Incoming members would go into Seat 2, 3, and the Vice Mayor position – meaning the member with the most votes would be placed directly into the Vice Mayor position; this option giving all three incoming members a chance to be mayor once during their first term.

Option B – Incoming members would go into Seat 1, 2, and 3 - meaning the outgoing mayor would rotate directly back to the vice mayor position, and the new member with the least votes would likely not be mayor in their first term.

• If going with the new method, then adopt one of the following resolutions *(a redline version has been provided for reference as Attachment 3)*:

- Resolution for Option A (Attachment 4)

- Resolution for Option B (Attachment 5)

Recommended Action: 1) Conduct a discussion per staff recommendations; and 2) If Council decides to go with the proposed method of rotation, then adopt Resolution A or B, depending on which option Council chooses; or 3) If Council decides not to go with the proposed method, then give direction to the ad hoc and staff.

BUDGET AMENDMENT REQUIRED: N/A

CURRENT BUDGET AMOUNT: N/A

PROPOSED BUDGET AMOUNT: N/A

FINANCING SOURCE: N/A

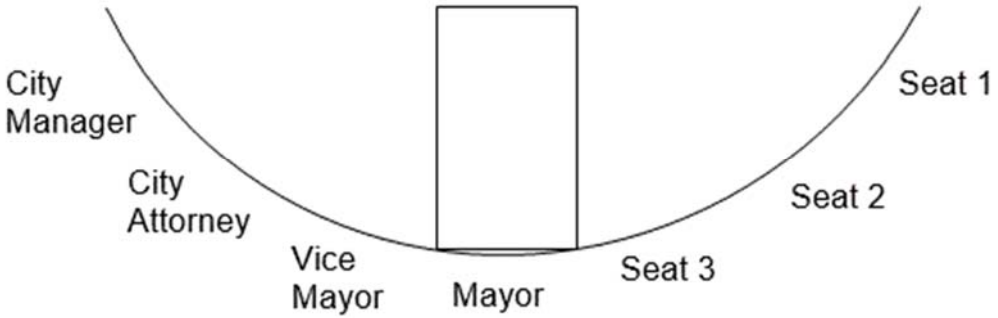
PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A

COORDINATED WITH: Mayor Rotation Ad Hoc Committee (Crane;Brown) and Sage Sangiacomo, City Manager.

Approved: Sage Sangiacomo, City Manager

DAIS SEATING

Audience



MAYOR ROTATION SCENARIOS USING PROPOSED NEW METHOD OF ROTATION

Proposed Rotation Method: Leaving Mayor always rotates to Seat 1 on the far right. Incoming members start in the middle seat (this allows a chance to be mayor in a four-year term. All other members rotate one seat up starting from Seat 1, 2, 3, Vice-Mayor, then Mayor.

RED = Councilmember Term Expirations 2022, 2026, 2030, 2034

BLUE = Councilmember Term Expirations 2020, 2024, 2028, 2032

	2019	2020 - Election Year, 2 blue Seats	2021	2022 - Election Year, 3 red Seats
	Scenario 1: Current Positions	**Scenario 2: No New Members**	**Scenario 3: No New Members from 2**	**Scenario 4: No New Members from 3**
MAYOR	**CouncilMember 1: 2006;2010;2012;2016**	**Councilmember 2: 2018**	**Councilmember 3: 2015;2016**	**CouncilMember 4: 2014;2018;2022**
VICE-MAYOR	**Councilmember 2: 2018**	**Councilmember 3: 2015;2016;2020**	**Councilmember 4: 2014;2018**	**CouncilMember 5: 2014;2018;2022**
SEAT 3 - next to Mayor	CouncilMember 3: 2015;2016	CouncilMember 4: 2014;2018	CouncilMember 5: 2014;2018	CouncilMember 1: 2006;2010;2012;2016;2020
SEAT 2 - middle	CouncilMember 4: 2014;2018	CouncilMember 5: 2014;2018	CouncilMember 1: 2006;2010;2012;2016;2020	Councilmember 2: 2018;2022
SEAT 1 - far right	CouncilMember 5: 2014;2018	CouncilMember 1: 2006;2010;2012;2016;2020	Councilmember 2: 2018	CouncilMember 3: 2015;2016;2020

		Scenario 2a: CM 1 Replaced	**Scenario 3a: No New Members from 2a**	**Scenario 4a: CM 2 Replaced from 3a**	**Scenario: CM 2 Replaced from 3**
MAYOR		**Councilmember 2: 2018**	**Councilmember 3: 2015;2016**	**CouncilMember 4: 2014;2018;2022**	**CouncilMember 4: 2014;2018;2022**
VICE-MAYOR		**Councilmember 3: 2015;2016**	**CouncilMember 4: 2014;2018**	**CouncilMember 5: 2014;2018;2022**	**CouncilMember 5: 2014;2018;2022**
SEAT 3 - next to Mayor		CouncilMember 4: 2014;2018	CouncilMember 5: 2014;2018	Councilmember 6: 2020	CouncilMember 1: 2006;2010;2012;2016;2020
SEAT 2 - middle		CouncilMember 5: 2014;2018	Councilmember 6: 2020	*Councilmember 7: 2022, new*	*Councilmember 6: 2022, New*
SEAT 1 - far right		*Councilmember 6: 2020, new*	Councilmember 2: 2018	CouncilMember 3: 2015;2016	CouncilMember 3: 2015;2016;2020

		Scenario 2b: CM 3 Replaced	**Scenario 3b: No New Members from 2b**	**Scenario 4b: CM 4 Replaced from 3b**	**Scenario: CM 4 Replaced from 3**
MAYOR		**Councilmember 2: 2018**	**CouncilMember 4: 2014;2018**	**CouncilMember 5: 2014;2018**	**CouncilMember 5: 2014;2018**
VICE-MAYOR		**CouncilMember 4: 2014;2018**	**CouncilMember 5: 2014;2018**	**Councilmember 1: 2006;2010;2012;2016**	**Councilmember 1: 2006;2010;2012;2016;2020**
SEAT 3 - next to Mayor		CouncilMember 5: 2014;2018	CouncilMember 1: 2006;2010;2012;2016	CouncilMember 6: 2020	Councilmember 2: 2018
SEAT 2 - middle		CouncilMember 1: 2006;2010;2012;2016	CouncilMember 6: 2020	Councilmember 2: 2018	*Councilmember 6: 2022, new*
SEAT 1 - far right		*CouncilMember 6: 2020, new*	Councilmember 2: 2018	*Councilmember 7: 2022, new*	CouncilMember 3: 2015;2016

		Scenario 2c: CM 1 & 3 Replaced	**Scenario 3c: No New Members from 2c**	**Scenario 4c: CM 5 Replaced from 3c**	**Scenario 4 : CM 5 Replaced from 3**
MAYOR		**Councilmember 2: 2018**	**CouncilMember 4: 2014;2018**	**Councilmember 6: 2020**	**CouncilMember 4: 2014;2018**
VICE-MAYOR		**CouncilMember 4: 2014;2018**	**CouncilMember 5: 2014;2018**	**Councilmember 7: 2020**	**Councilmember 1: 2006;2010;2012;2016;2020**
SEAT 3 - next to Mayor		CouncilMember 5: 2014;2018	Councilmember 6: 2020	Councilmember 2: 2018	Councilmember 2: 2018
SEAT 2 - middle		*Councilmember 6: 2020, new*	Councilmember 7: 2020	*Councilmember 8: 2022, new*	*Councilmember 6: 2022, new*
SEAT 1 - far right		*Councilmember 7: 2020, new*	Councilmember 2: 2018	CouncilMember 4: 2014;2018	CouncilMember 3: 2015;2016;2020

		Scenario 2d: CM 1, 3, & 5 Replaced	**Scenario 3d: No New Members from 2d**	**Scenario 4d: CM 2,4 Replaced from 3d**	**Scenario 4 : CM 2,4 Replaced from 3**
MAYOR		**Councilmember 2: 2018**	**CouncilMember 4: 2014;2018**	**Councilmember 6: 2020**	**CouncilMember 5: 2014;2018**
VICE-MAYOR		**CouncilMember 4: 2014;2018**	**Councilmember 6: 2020**	**Councilmember 7: 2020**	**CouncilMember 1: 2006;2010;2012;2016;2020**
SEAT 3 - next to Mayor		*Councilmember 6: 2020, new*	Councilmember 7: 2020	CouncilMember 8: appt to fill term	*Councilmember 6: 2022, new*
SEAT 2 - middle		*Councilmember 7: 2020, new*	CouncilMember 8: appt to fill term	*Councilmember 9: 2022, new*	*Councilmember 7: 2022, new*
SEAT 1 - far right		*CouncilMember 8: appt to fill term, new*	Councilmember 2: 2018	*Councilmember 10: 2022, new*	**Councilmember 3: 2015;2016**

		Scenario 4e: CM 2,5 Replaced from 3
MAYOR		**Councilmember 4: 2014;2018**
VICE-MAYOR		**CouncilMember 1: 2006;2010;2012;2016;2020**
SEAT 3 - next to Mayor		*Councilmember 6: 2022, new*
SEAT 2 - middle		*Councilmember 7: 2022, new*
SEAT 1 - far right		Councilmember 3: 2015;2016

		Scenario 4f: CM 4,5 Replaced from 3
MAYOR		**CouncilMember 1: 2006;2010;2012;2016;2020**
VICE-MAYOR		**Councilmember 2: 2018**
SEAT 3 - next to Mayor		*Councilmember 6: 2022, new*
SEAT 2 - middle		*Councilmember 7: 2022, new*
SEAT 1 - far right		Councilmember 3: 2015;2016

		Scenario 4g: CM 2,4,5 Replaced from 3
MAYOR		**CouncilMember 1: 2006;2010;2012;2016;2020**
VICE-MAYOR		***Councilmember 6: 2022, new***
SEAT 3 - next to Mayor		*Councilmember 7: 2022, new*
SEAT 2 - middle		*Councilmember 8: 2022, new*
SEAT 1 - far right		Councilmember 3: 2015;2016

RESOLUTION NO. ~~2011~~2020-

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH AMENDING RULES GOVERNING COUNCIL MEETINGS

WHEREAS,

1. The City Council has adopted by resolution Procedures of Conduct for City Council Meetings, last revised on ~~July 20, 2005~~November 2, 2011 ("Procedures"); and

2. The City Council has determined to revise the rules governing the Mayoral Rotation and Seating Arrangement for Council.

NOW, THEREFORE, BE IT RESOLVED that the title and Section 7 of the Procedures are amended as follows:

TITLE: City of Ukiah City Council Meeting Procedures

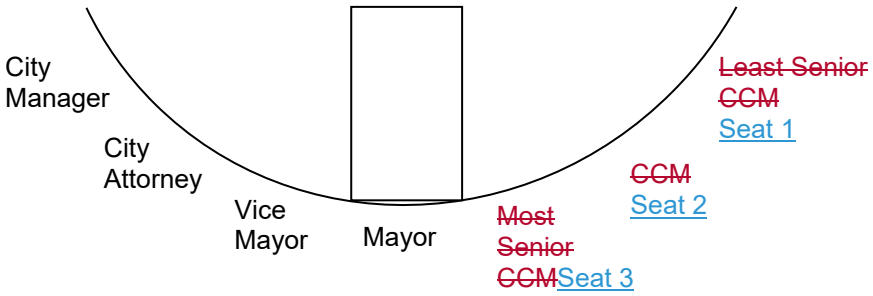
SECTION 7. VOTING PROCEDURE

I. Mayoral Rotation and Seating Arrangement for Council

It is the policy of the City Council that the office of Mayor be rotated ~~insofar as possible~~ among the members of the City Council and that the Mayor shall serve a term of one year or until a successor is appointed. The City Council shall choose one of its members as Mayor, and one of its members as Vice Mayor, at the same regular meeting in the month of December when the election results are presented.

Rotation is based on the following seating arrangement:

Seat 1 – Farthest to Mayor's right
Seat 2 – Middle seat to Mayor's right
Seat 3 – Directly to Mayor's right
Vice Mayor
Mayor



Each year, all members will rotate as follows:

Seat 1 to Seat 2
Seat 2 to Seat 3
Seat 3 to Vice Mayor
Vice Mayor to Mayor
Outgoing Mayor to Seat 1

Incoming Councilmembers:

- Outgoing Mayor will
  [Resolution A] rotate into Seat 1.
  [Resolution B] either rotate into Seat 1, or into Vice Mayor position if there are three incoming members.
- New member will rotate into Seat 2;
- If there are two new members, then they will rotate into Seat 2 & 3.
- If there are three new members:

[Resolution A] then incoming members will go into Seat 2, 3, and the Vice Mayor position, with the member having received the most votes going into Vice Mayor position, and the member with the least votes going into Seat 2.

[Resolution B] then incoming members will go into Seat 1, 2, and 3, with the member having received the most votes going into Seat 3, and the member with the least votes going into Seat 1.

- Appointed members to unfulfilled terms will be treated as new members in respect to the rotations.

~~The rotation is based on seniority. The Vice Mayor shall replace the outgoing Mayor. It is the intent and desire of the City Council to allow every member the opportunity to serve as Mayor, and consideration is given to those members of the Council who have not previously served as Mayor unless all members have so served.~~

~~The City Council shall, at its first regular meeting in the month of December, meet and choose one of its members as Mayor, and one of its members as Vice Mayor~~. ~~The Mayor's seat shall be filled by the most senior member in length of uninterrupted service who has not previously served as Mayor. The Councilmember selected as Mayor, however, shall have served at least one year as a member of the City Council.~~

~~Where all Councilmembers have served a term as Mayor, the person to be selected as Mayor shall be the person who has not served as Mayor for the longest period of time. If the person who has not served as Mayor for the longest period of time declines the position, then the person who has not served as Mayor for the longest period of time other than the declining Councilmember or Councilmembers shall be selected.~~

~~When a selection of Mayor is to be made from a Councilmember who has not yet served as Mayor, the person who is otherwise qualified and has served on the Council the longest without being Mayor shall be selected as Mayor. In the case where two or more persons qualified to be selected as Mayor have served the same amount of time as a~~

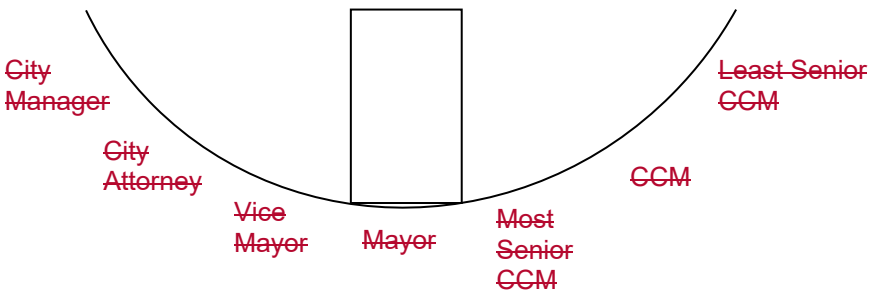
~~Councilmember without being Mayor, the person selected shall be the person who received the most votes at their initial election.~~

~~At the time of selection of the Mayor in any given year, the individual who would qualify to be selected as Mayor in the next following year, using the criteria above, shall be named Vice Mayor for the current year.~~

If a Councilmember declines to serve as Vice Mayor, the Council will decide by formal action where the member will fit into the rotation at the December meeting. The Council has the ultimate discretion to elect or not elect any Councilmember for any office at the December meeting.

~~The Mayor and Councilmembers shall be seated as follows, seating assignments given from the perspective facing the audience:~~

~~A. The Mayor and Councilmembers shall sit in the five of seven furthest rightward positions on the dais.~~
~~B. The Mayor's position shall be the fourth from the right or center of the dais.~~
~~C. The Vice Mayor shall be seated immediately to the Mayor's left or left hand side.~~
~~D. Following the installation of new Councilmembers into office, Councilmembers leaving office shall immediately step down from the dais. Incumbent Councilmembers shall then assume any positions vacated to their left. Newly elected or appointed Councilmembers shall be seated at the far right of the dais. If more than one Councilmember is newly elected, they shall be seated in order of votes cast, with the lowest vote getter being seated furthest right and the highest vote getter being seated to the left.~~
~~E. Except as described in subsection F below, following the annual rotation of the Vice Mayor, the exiting Vice Mayor shall move right to the Mayor's position in the center of the dais, the newly selected Vice Mayor shall move to the Mayor's left hand side, and the remaining Councilmembers shall move one seat to their left.~~
~~F. Following the annual rotation of the Vice Mayor during general election years, the newly elected Councilmembers shall remain in the furthest right seats and only incumbent Councilmembers shall rotate positions as described in subsection E above.~~
~~G. To the extent that the foregoing rules do not address Councilmember seating changes or rotations, the City Council shall determine the seating location by formal action of the same at a regular, special, or adjourned meeting.~~



BE IT FURTHER RESOLVED that the amended version of Section 7 as contained in this Resolution shall replace Section 7 in the City Council Meeting Procedures as it read prior to the adoption of this Resolution.

PASSED AND ADOPTED this ~~2nd~~ 5th day of ~~November~~August, ~~2011~~2020, by the following roll call vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

_____
~~Mari Rodin~~Douglas F. Crane, Mayor

ATTEST:

_____
~~JoAnne Currie~~Kristine Lawler, City Clerk

RESOLUTION NO. 2020-

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH AMENDING RULES GOVERNING COUNCIL MEETINGS

WHEREAS,

1. The City Council has adopted by resolution Procedures of Conduct for City Council Meetings, last revised on November 2, 2011 ("Procedures"); and

2. The City Council has determined to revise the rules governing the Mayoral Rotation and Seating Arrangement for Council.

NOW, THEREFORE, BE IT RESOLVED that the title and Section 7 of the Procedures are amended as follows:

TITLE: City of Ukiah City Council Meeting Procedures

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I. Mayoral Rotation and Seating Arrangement for Council

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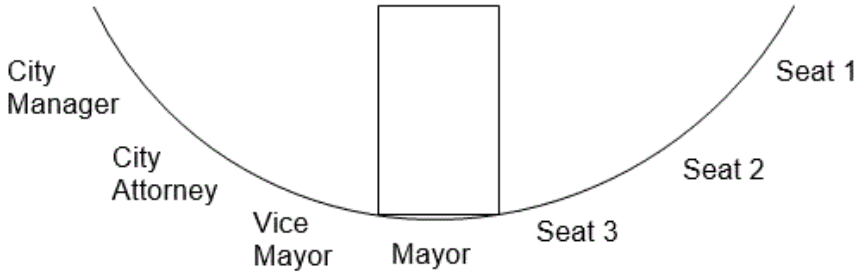
Rotation is based on the following seating arrangement:

Seat 1 – Farthest to Mayor's right
Seat 2 – Middle seat to Mayor's right
Seat 3 – Directly to Mayor's right
Vice Mayor
Mayor



Each year, all members will rotate as follows:

- Seat 1 to Seat 2
- Seat 2 to Seat 3
- Seat 3 to Vice Mayor
- Vice Mayor to Mayor
- Outgoing Mayor to Seat 1

Incoming Councilmembers:

- Outgoing Mayor will rotate into Seat 1.
- New member will rotate into Seat 2;
- If there are two new members, then they will rotate into Seat 2 & 3.
- If there are three new members, then incoming members will go into Seat 2, 3, and the Vice Mayor position, with the member having received the most votes going into the Vice Mayor position, and the member with the least votes going into Seat 2.
- Appointed members to unfulfilled terms will be treated as new members in respect to the rotations.

If a Councilmember declines to serve as Vice Mayor, the Council will decide by formal action where the member will fit into the rotation at the December meeting. The Council has the ultimate discretion to elect or not elect any Councilmember for any office at the December meeting.

BE IT FURTHER RESOLVED that the amended version of Section 7 as contained in this Resolution shall replace Section 7 in the City Council Meeting Procedures as it read prior to the adoption of this Resolution.

PASSED AND ADOPTED this 5th day of August, 2020, by the following roll call vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

_____
Douglas F. Crane, Mayor

ATTEST:

_____
Kristine Lawler, City Clerk

RESOLUTION NO. 2020-

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH AMENDING RULES GOVERNING COUNCIL MEETINGS

WHEREAS,

1. The City Council has adopted by resolution Procedures of Conduct for City Council Meetings, last revised on November 2, 2011 ("Procedures"); and

2. The City Council has determined to revise the rules governing the Mayoral Rotation and Seating Arrangement for Council.

NOW, THEREFORE, BE IT RESOLVED that the title and Section 7 of the Procedures are amended as follows:

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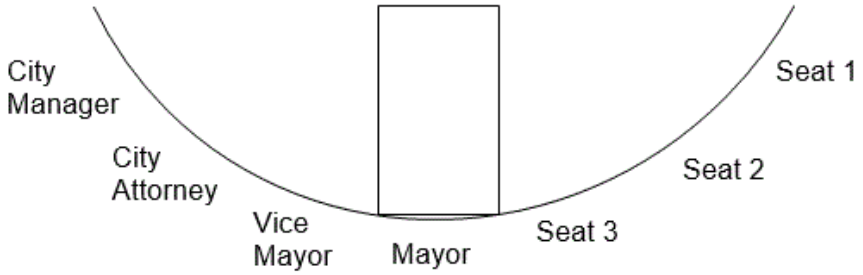
Mayor



Each year, all members will rotate as follows:

- Seat 1 to Seat 2
- Seat 2 to Seat 3
- Seat 3 to Vice Mayor
- Vice Mayor to Mayor
- Outgoing Mayor to Seat 1

Incoming Councilmembers:

- Outgoing Mayor will either rotate into Seat 1, or into Vice Mayor position if there are three incoming members.
- New member will rotate into Seat 2;
- If there are two new members, then they will rotate into Seat 2 & 3.
- If there are three new members, then incoming members will go into Seat 1, 2, and 3, with the member having received the most votes going into Seat 3, and the member with the least votes going into Seat 1.
- Appointed members to unfulfilled terms will be treated as new members in respect to the rotations.

If a Councilmember declines to serve as Vice Mayor, the Council will decide by formal action where the member will fit into the rotation at the December meeting. The Council has the ultimate discretion to elect or not elect any Councilmember for any office at the December meeting.

BE IT FURTHER RESOLVED that the amended version of Section 7 as contained in this Resolution shall replace Section 7 in the City Council Meeting Procedures as it read prior to the adoption of this Resolution.

PASSED AND ADOPTED this 5th day of August, 2020, by the following roll call vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

_____
Douglas F. Crane, Mayor

ATTEST:

_____
Kristine Lawler, City Clerk

Agenda Item No: 13.e.
MEETING DATE/TIME: 8/5/2020
ITEM NO: 2019-62

City of Ukiah

AGENDA SUMMARY REPORT

SUBJECT: Receive Updates on City Council Committee and Ad Hoc Assignments, and, if Necessary, Consider Modifications to Assignments and/or the Creation/Elimination of Ad Hoc(s).

DEPARTMENT: City Clerk **PREPARED BY:** Kristine Lawler, City Clerk
PRESENTER: Sage Sangiacomo, City Manager

ATTACHMENTS:

1. 2020 City Council Special Assignments - 07-06-20

Summary: City Council members will provide reports and updates on their committee and ad hoc assignments. If necessary, the Council may consider modifications.

Background: City Council members are assigned to a number of committees and ad hoc activities. These assignments are included as Attachment #1.

Discussion: Previously, the City Council discussed having more time allocated to reporting on committee and ad hoc activities. Often, the Council Reports section of the regular agenda is rushed due to impending business (i.e., public hearings), and not enough time is afforded for reports beyond community activities.

In an effort to foster regular updates on committee and ad hoc assignments, this item is being placed on the agenda to provide the City Council members an expanded opportunity to report on assignments and modify assignments as necessary.

Recommended Action: Receive report(s). The Council will consider modifications to committee and ad hoc assignments along with the creation/elimination ad hoc(s).

BUDGET AMENDMENT REQUIRED: No
CURRENT BUDGET AMOUNT: N/A
PROPOSED BUDGET AMOUNT: N/A
FINANCING SOURCE: N/A
PREVIOUS CONTRACT/PURCHASE ORDER NO.: N/A
COORDINATED WITH: N/A

Approved: Sage Sangiacomo, City Manager

2020 CITY COUNCIL SPECIAL ASSIGNMENTS

COUNTY/REGIONAL OnGoing One + Alternate	MTG DATE/TIME	MEETING LOCATION	MAILING ADDRESS/CONTACT	COMMITTEE FUNCTION	ASSIGNED TO	PRINCIPAL STAFF SUPPORT
Disaster Council	Shall meet a minimum of twice a year at a time and place designated upon call of the chair	Place designated upon call of the chair or, if she/he is unavailable or unable to call such meeting, the first vice chair and then the City Manager or her/his designee.	Emergency Management Coordinator 300 Seminary Ave. Ukiah, CA 95482 467-5765 - Tami Bartolomei	Develop any necessary emergency and mutual aid plans, agreements, ordinances, resolutions, rules, and regulations.	**Mulheren** **Orozco- Alternate**	**Tami Bartolomei,** Community Services Administrator; 467-5765 tbartolomei@cityofukiah.com
Greater Ukiah Business & Tourism Alliance	3rd Tuesday of month, 11:30 a.m.	200 S School St. Ukiah, CA 95482	200 S School St. Ukiah, CA 95482	Promotes tourism and works to strengthen and promote the historic downtown and businesses within the greater Ukiah area	**Mulheren**	**Shannon Riley,** Deputy City Manager; 467-5793 sriley@cityofukiah.com
Mendocino Council of Governments (MCOG)	1st Monday of month, 1:30 p.m.	Board of Supervisors Chambers 501 Low Gap Road Ukiah, CA	Executive Director 367 N. State Street, Ste. 206 Ukiah, CA 95482 463-1859	Plan and allocate State funding, transportation, infrastructure and project County wide	**Brown** **Mulheren- Alternate**	**Tim Eriksen, Public Works Director/City Engineer;** 463-6280 teriksen@cityofukiah.com
Mendocino County Inland Water and Power Commission (IWPC)	2nd Thursday of month, 6:00 p.m.	Civic Center 300 Seminary Avenue conference room 5	IWPC Staff P.O. Box 1247 Ukiah, CA 95482 391-7574 - Candace Horsley	Develops coordination for water resources and current water rights: Potter Valley project - Eel River Diversion	**Orozco** **Brown- Alternate**	**Sean White,** Director of Water Resources; 463-5712 swhite@cityofukiah.com
Mendocino Solid Waste Management Authority (MSWMA)	3rd Thursday of every other month (varies), 10:00 a.m.	Willits Council Chambers	Solid Waste Director 3200 Taylor Drive Ukiah, CA 95482 468-9710	County-wide Solid Waste JPA	**Brown** **Scalmanini- Alternate**	**Tim Eriksen,** Public Works Director/City Engineer; 463-6280 teriksen@cityofukiah.com
Mendocino Transit Authority (MTA) Board of Directors	Last Wednesday of month, 1:30 p.m.	Alternating locations - Ukiah Conference Center or Fort Bragg, or Point Arena	Executive Director 241 Plant Road Ukiah, CA 95482 462-1422	County-wide bus transportation issues and funding	**Mulheren** **Brown- Alternate**	**Tim Eriksen, Public Works Director/City Engineer;** 463-6280 teriksen@cityofukiah.com
North Coast Opportunities (NCO)	4th Wednesday of month, 2 p.m.	Alternating locations - Ukiah and Lakeport	Ross Walker, Governing Board Chair North Coast Opportunities 413 North State Street Ukiah, CA 95482	Assist low income and disadvantaged people to become self reliant	**Bartolomei** (appointed 12/19/18)	**Tami Bartolomei,** Community Services Administrator; 467-5765 tbartolomei@cityofukiah.com
North Coast Rail Authority (NCRA)	2nd Wednesday of month, 10:30 a.m.	Various Locations - announced	419 Talmage Road, Suite M Ukiah, CA 95482 463-3280	Provides a unified and revitalized rail infrastructure meeting the freight and passenger needs of the region	**Shannon Riley, Deputy City Manager**	**Shannon Riley,** Deputy City Manager; 467-5793 sriley@cityofukiah.com
Russian River Watershed Association (RRWA)	4th Thursday of month, 9:00 a.m. (only 5 times a year)	Windsor Town Hall	Russian River Watershed Association Attn: Daria Isupov 425 South Main St., Sebastopol, CA 95472 666-4857	Consider issues related to Russian river - plans projects and funding requests	**Mulheren** **Brown- Alternate**	**Tim Eriksen, Public Works Director/City Engineer;** 463-6280 teriksen@cityofukiah.com
Ukiah Valley Basin Groundwater Sustainability Agency (GSA)	2nd Thursday of month, 1:30 p.m.	Board of Supervisors Chambers; 501 Low Gap Road Ukiah, CA	County Executive Office Nicole French 501 Low Gap Rd., Rm. 1010 Ukiah, CA 95482 463-4441	GSA serves as the Groundwater Sustainability Agency in the Ukiah Valley basin	**Crane** **Mulheren- Alternate**	**Sean White,** Director of Water Resources; 463-5712 swhite@cityofukiah.com

COUNTY/REGIONAL One + Staff Alternate	MTG DATE/TIME	MEETING LOCATION	MAILING ADDRESS/CONTACT	COMMITTEE FUNCTION	ASSIGNED TO	PRINCIPAL STAFF SUPPORT
Economic Development & Financing Corporation (EDFC)	2nd Thursday of month, 2:00 p.m.	Primarily 631 S. Orchard Street (location varies)	Executive Director 631 South Orchard Avenue Ukiah, CA 95482 467-5953	Multi-agency co-op for economic development and business loan program	**Riley** (appointed 12/19/18)	**Shannon Riley,** Deputy City Manager; 467-5793 sriley@cityofukiah.com
Sun House Guild ex officio	2nd Tuesday of month, 4:30 p.m.	Sun House 431 S. Main St. Ukiah, CA	431 S. Main Street Ukiah, CA 95482 467-2836	Support and expand Grace Hudson Museum	**Bartolomei** (appointed 12/19/18)	**David Burton**, Museum Director; 467-2836 dburton@cityofukiah.com

Continued - COUNTY/REGIONAL One + Staff Alternate	MTG DATE/TIME	MEETING LOCATION	MAILING ADDRESS/CONTACT	COMMITTEE FUNCTION	ASSIGNED TO	PRINCIPAL STAFF SUPPORT
Mendocino Youth Project JPA Board of Directors	3rd Wednesday of month, 7:45 a.m.	776 S. State Street Conference Room	Mendocino Co. Youth Project 776 S. State Street, Ste. 107 Ukiah, CA 95482 707-463-4915	Targets all youth with a focus on drug and alcohol prevention, healthy alternatives and empowering youth to make healthy choices	**Noble Waidelich, Police Lieutenant**	**Noble Waidelich**, Police Lieutenant; 463-6249; nwaidelich@cityofukiah.com
Northern California Power Agency (NCPA)	4th Thursday of month, 9:00 a.m. *(see calendar from NCPA)*	Roseville, CA and other locations	651 Commerce Drive Roseville, CA 95678 916-781-4202	Pool of public utilities for electric generation and dispatch	**Crane** **Grandi - Alternate**	**Mel Grandi,** Electric Utility Director; 463-6295 mgrandi@cityofukiah.com

2020 CITY COUNCIL SPECIAL ASSIGNMENTS

LOCAL/COUNTY/REGIONAL/LIASONS OnGoing One or Two Council and/or Staff	MTG DATE/TIME	LOCATION	MAILING ADDRESS/CONTACT	COMMITTEE FUNCTION	ASSIGNED TO	PRINCIPAL STAFF SUPPORT
Adventist Health Community Advisory Council	Quarterly: Aug. 27, 6:45 a.m. Nov 5, 6:45 a.m.	275 Hospital Drive Ukiah, CA 95482	275 Hospital Drive Ukiah, CA 95482 707-463-7623 Allyne Brown - Allyne.Brown@ah.org	Provides the Adventist Health Ukiah Valley (AHUV) Governing Board and Administration with advice, support, and suggestions on matter of importance to Mendocino, Lake and Sonoma Counties.	**Brown**	**Kristine Lawler,** City Clerk, 463-6217 klawler@cityofukiah.com
League of California Cities Redwood Empire Legislative Committee	Prior to Division Meetings, meets 3x in person and then via conference call	Various locations that are announced	Redwood Empire League President; Public Affairs Program Manager (916) 658-8243	Elected city officials and professional city staff attend division meetings throughout the year to share what they are doing and advocate for their interests in Sacramento	**Mulheren** **Brown- Alternate**	**Sage Sangiacomo,** City Manager; 463-6221 ssangiacomo@cityofukiah.com
City Selection Committee	Called as required by the Clerk of the Board	BOS Conference Room 501 Low Gap Rd. Rm. 1090 Ukiah, CA	C/O: BOS 501 Low Gap Rd., Rm 1090 Ukiah, CA 95482 463-4441	Makes appointments to LAFCO and Airport Land Use Commission	**Mayor**	**Kristine Lawler,** City Clerk; 463-6217 klawler@cityofukiah.com
Investment Oversight Committee	Varies	Civic Center 300 Seminary Ave. Ukiah, CA 95482	Civic Center 300 Seminary Ave. Ukiah, CA 95482	Reviews City investments, policies, and strategies	**Crane** **Orozco, Alternate** **Alan Carter,** Treasurer	**Dan Buffalo,** Director of Finance; 463-6220 dbuffalo@cityofukiah.com
Library Advisory Board	3rd Wednesdays of alternate months (beginning January), 1:00 p.m.	Various Mendocino County Libraries	Ukiah County Library 463-4491	Review library policy and activities	**Mulheren**	**Kristine Lawler,** City Clerk; 463-6217; klawler@cityofukiah.com
Ukiah Players Theater Board of Directors	3rd Tuesday of month, 6:00 p.m	1041 Low Gap Rd Ukiah, CA 95482 462-1210	1041 Low Gap Rd Ukiah, CA 95482 462-1210	To oversee the activities, organization and purpose of the Ukiah Players Theater	**Greg Owen,** Airport Manager (appointed 12/19/18)	**Kristine Lawler,** City Clerk; 463-6217 klawler@cityofukiah.com
Ukiah Unified School District (UUSD) Committee	Quarterly	511 S. Orchard, Ste. D Ukiah, CA 95482	511 S. Orchard Ukiah, CA 95482	Information exchange with UUSD Board Chair, Mayor, Superintendent, and City Manager	**Mayor, City Manager and Police Chief**	**Sage Sangiacomo,** City Manager; 463-6221 ssangiacomo@cityofukiah.com
Russian River Flood Control District (RRFCD) Liaison	1st Monday of month, 5:30 p.m.	151 Laws Ave.,Suite D Ukiah, CA	151 Laws Ave., Ukiah, CA 95482; rrfc@pacific.net; 462-5278	Proactively manage the water resources of the upper Russian River for the benefit of the people and environment of Mendocino County	**Mulheren/Orozco** **White** (appointed 12/19/18)	**Sean White,** Director of Water Resources; 463-5712 swhite@cityofukiah.com
HHSA Advisory Board	2nd Wednesday of month; 9:00 a.m.	Big Sur Room County Department of Social Services	Executive Director Jackie Williams - 462-1934 c/o Ford St. Project 139 Ford St. Ukiah CA 95482	Discussions and possible work on health and human service issues	**Brown - Liaison**	**Shannon Riley**, Deputy City Manager; 467-5793 sriley@cityofukiah.com
Mendocino County Local Area Formation Commission (LAFCO)	1st Monday of month, 9:00 a.m.	Board of Supervisors Chambers	Executive Director 200 S. School Street, Ste. 2 Ukiah, CA 95482 463-4470	Required by legislation - planning spheres of influence, annexation, service areas, and special districts	**(positions not active)** **Crane** **Mulheren- Alternate**	**Craig Schlatter,** Director of Community Development; 463-6219; cschlatter@cityofukiah.com
Mendocino County Airport Land Use Commission	As needed	BOS Conference Room 501 Low Gap Rd., Rm. 1090, Ukiah, CA	Mendocino County Executive Office 501 Low Gap Rd. Rm. 1010 Ukiah, CA 95482	To formulate a land use compatibility plan, provide for the orderly growth of the airport and the surrounding area, and safeguard the general welfare of the inhabitants within the vicinity	**Owen/Schlatter**	**Greg Owen**, Airport Manager; 467-2855; gowen@cityofukiah.com **Craig Schlatter**, Director of Community Development; 463-6219; cschlatter@cityofukiah.com
Mendocino County 2nd District Liaison	1st Wednesdays of month, 8:00 a.m.	Civic Center Annex conference room #5 411 West Clay St. Ukiah, CA 95482	Civic Center 300 Seminary Ave. Ukiah, CA 95482	To coordinate activities and policy development with the City's 2nd District Supervisor	**Brown** **Crane- Alternate**	**Sage Sangiacomo,** City Manager; 463-6221; ssangiacomo@cityofukiah.com
LOCAL/COUNTY/REGIONAL/LIASONS OnGoing One or Two Council and/or Staff	**MTG DATE/TIME**	**LOCATION**	**MAILING ADDRESS/CONTACT**	**COMMITTEE FUNCTION**	**ASSIGNED TO**	**PRINCIPAL STAFF SUPPORT**
Fire Executive Committee	2nd Wednesdays of month, 3:45 p.m.	Ukiah Valley Conference Center, 200 S. School Street Ukiah, CA	Stephanie Abba Civic Center 300 Seminary Ave. Ukiah, CA 95482 sabba@cityofukiah.com	Per the recently adopted agreement between the City of Ukiah and the Ukiah Valley Fire Protection District	**Orozco/Brown**	**Doug Hutchison, Fire Chief;** 463-6263; dhutchison@cityofukiah.com
Mendocino County 5th District Liaison	Monthly; TBD	Civic Center Annex conference room #5 411 West Clay St. Ukiah, CA 95482	Civic Center 300 Seminary Ave. Ukiah, CA 95482	To coordinate activities and policy development with the County's 5th District Supervisor	**Brown**	**Sage Sangiacomo,** City Manager; 463-6221; ssangiacomo@cityofukiah.com

2020 AD HOC COMMITTEES			
COMMITTEE	**ASSIGNED TO**	**PRINCIPAL STAFF SUPPORT**	**COMMENTS**
Electric Grid Operational Improvements	**Crane/Scalmanini**	**Mel Grandi, Electric Utility Director**; 463-6295 mgrandi@cityofukiah.com	
Downtown Parking Management	**Mulheren/Brown**	**Shannon Riley, Deputy City Manager**; 467-5793 sriley@cityofukiah.com	
Public Works Project Specification Development	**Crane/Mulheren**	**Tim Eriksen, Public Works Director/City Engineer**; 463-6280 teriksen@cityofukiah.com	
Uniform Cost Accounting	**Crane/Mulheren**	**Tim Eriksen, Public Works Director/City Engineer**; 463-6280 teriksen@cityofukiah.com	
Marbut Study Ad Hoc	**Brown/Scalmanini**	**Justin Wyatt**, **Police Operations Captain**, 463-6760 jwyatt@cityofukiah.com	
Cannabis Events	**Mulheren/Brown**	**Tami Bartolomei, Community Services Administrator**; 467-5765 tbartolomei@cityofukiah.com	
Public Right of Way Related ADA Compliance	**Scalmanini/Orozco**	**Tim Eriksen**, **Public Works Director/City Engineer**; 463-6280 teriksen@cityofukiah.com	
Mayor Rotation Guidelines	**Brown/Crane**	**Kristine Lawler**, **City Clerk**; 463-6217 klawler@cityofukiah.com	
2020 Rate Study for Sewer	**Brown/Orozco**	**Sean White, Director of Water Resources;** 463-5712 swhite@cityofukiah.com **Tim Eriksen, Public Works Director/City Engineer;** 463-6280 teriksen@cityofukiah.com **Dan Buffalo, Director of Finance;** 463-6220 dbuffalo@cityofukiah.com	
Budget Development Best Practices and Financial Policy For FY 20/21 Budget	**Crane/Brown**	**Dan Buffalo, Director of Finance;** 463-6220 dbuffalo@cityofukiah.com **Sheri Mannion, Human Resource Director/Risk Manager**; 463-6272, smannion@cityofukiah.com	
Advance Planning & Policy for Sphere of Influence (SOI), Municipal Service Review (MSR), Annexation, Tax Sharing, Detachment, and Out of Area Service Agreements	**Crane/Scalmanini**	**Sage Sangiacomo, City Manager** 463-6221 ssangiacomo@cityofukiah.com **Shannon Riley, Deputy City Manager** 467-5793 sriley@cityofukiah.com **Craig Schlatter, Community Development Director** 463-6219 cschlatter@cityofukiah.com **Sean White, Director of Water Resources;** 463-5712 swhite@cityofukiah.com **Tim Eriksen, Public Works Director/City Engineer**; 463-6280 teriksen@cityofukiah.com **Mel Grandi, Electric Utility Director;** 463-6295 mgrandi@cityofukiah.com **Dan Buffalo,** Director of Finance; 463-6220 dbuffalo@cityofukiah.com	
2020 Electric Rate Study	**Crane/Scalmanini**	**Mel Grandi, Electric Utility Director**; 463-6295 mgrandi@cityofukiah.com	
Diversity and Equity	**Orozco/Mulheren**	**TBD**	